

# 2018

## SCIENCE & ENGINEERING INDICATORS

### APPENDIX TABLES

NATIONAL SCIENCE BOARD



## CHAPTER 1

# Elementary and Secondary Mathematics and Science Education

## List of Appendix Tables

Appendix Table 1-1	Average scores of students in grades 4, 8, and 12 on the main NAEP mathematics assessment, by student characteristics: 1990–2015.....	1-3
Appendix Table 1-2	Students in grades 4, 8, and 12 scoring at or above the main NAEP's proficient level in mathematics for their grade, by student grade and characteristics: 1990–2015 .....	1-8
Appendix Table 1-3	Average scores of students in grades 4, 8, and 12 on the main NAEP science assessment, by student grade and characteristics: 2009–15 .....	1-12
Appendix Table 1-4	Students in grades 4, 8, and 12 scoring at or above the main NAEP's proficient level in science for their grade, by student grade and characteristics: 2009–15.....	1-16
Appendix Table 1-5	Average scores of students in grade 8 on the main NAEP technology and engineering literacy assessment and the percentage scoring proficient or above, by student characteristics: 2014.....	1-20
Appendix Table 1-6	Average scores of students in grade 4 on the main NAEP mathematics assessment, by race or ethnicity and sex, by state: 2000–15.....	1-22
Appendix Table 1-7	Students in grade 4 scoring at or above the main NAEP's proficient level in mathematics, by race or ethnicity and sex, by state: 2000–15.....	1-35
Appendix Table 1-8	Average scores of students in grade 4 on the main NAEP science assessment, by race or ethnicity and sex, by state: 2009 and 2015 .....	1-48
Appendix Table 1-9	Students in grade 4 scoring at or above the main NAEP's proficient level in science, by race or ethnicity and sex, by state: 2009 and 2015.....	1-61
Appendix Table 1-10	Average scores of students in grade 8 on the main NAEP mathematics assessment, by race or ethnicity and sex, by state: 2000–15.....	1-74
Appendix Table 1-11	Students in grade 8 scoring at or above the main NAEP's proficient level in mathematics, by race or ethnicity and sex, by state: 2000–15.....	1-87
Appendix Table 1-12	Average scores of students in grade 8 on the main NAEP science assessment, by race or ethnicity and sex, by state: 2009–15.....	1-100
Appendix Table 1-13	Students in grade 8 scoring at or above the main NAEP's proficient level in science, by race or ethnicity and sex, by state: 2009–15.....	1-113
Appendix Table 1-14	Average mathematics assessment test scores of children who were in kindergarten for the first time in the 2010–11 school year and in third grade in the 2013–14 school year, by child and family characteristics .....	1-126
Appendix Table 1-15	Average science assessment test scores of children who were in kindergarten for the first time in the 2010–11 school year and in third grade in the 2013–14 school year, by child and family characteristics .....	1-128
Appendix Table 1-16	Average TIMSS mathematics scores of students in grade 4, by education system: 2015.....	1-130
Appendix Table 1-17	Average TIMSS mathematics scores of students in grade 8, by education system: 2015.....	1-133
Appendix Table 1-18	Average TIMSS science scores of students in grade 4, by education system: 2015.....	1-136



Appendix Table 1-19	Average TIMSS science scores of students in grade 8, by education system: 2015.....	1-139
Appendix Table 1-20	Average mathematics literacy assessment scores for 15-year-old students participating in PISA, by education system: 2015 .....	1-142
Appendix Table 1-21	Average science literacy assessment scores for 15-year-old students participating in PISA, by education system: 2015 .....	1-146
Appendix Table 1-22	Highest-level mathematics course enrollment of high school completers, by gender and socioeconomic status within race or ethnicity: 2013 .....	1-150
Appendix Table 1-23	Highest-level mathematics course enrollment of high school completers, by student and family characteristics: 2013 .....	1-153
Appendix Table 1-24	Science course enrollment of high school completers, by sex and socioeconomic status within race or ethnicity: 2013 .....	1-156
Appendix Table 1-25	Science course enrollment of high school completers, by student and family characteristics: 2013 .....	1-160
Appendix Table 1-26	Average high school credits earned in technology-related courses, and percentage earning any credit, for fall 2009 ninth graders, by student, family, and school characteristics: 2013.....	1-164
Appendix Table 1-27	High school graduates enrolled in college in October after completing high school, by demographic characteristics and institution type: 1975–2015 .....	1-167
Appendix Table 1-28	Fall 2009 ninth graders considering a STEM major (among those with an identified major), by program level and student, family, and school characteristics: 2013 ...	1-171

## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

APPENDIX TABLE 1-1

### Average scores of students in grades 4, 8, and 12 on the main NAEP mathematics assessment, by student characteristics: 1990–2015

(Average score)

Student grade and characteristic	1990	1992	1996	2000	2003	2005	2007	2009	2011	2013	2015
All students in grade 4	213	220	224	226	235	238	240	240	241	242	240
Sex											
Male	214	221	224	227	236	239	241	241	241	242	241
Female	213	219	223	224	233	237	239	239	240	241	239
Race or ethnicity <sup>a</sup>											
White	220	227	232	234	243	246	248	248	249	250	248
Black	188	193	198	203	216	220	222	222	224	224	224
Hispanic <sup>b</sup>	200	202	207	208	222	226	227	227	229	231	230
Asian or Pacific Islander	225	231	229	s	246	251	253	255	256	258	257
American Indian or Alaska Native	s	s	217	208	223	226	228	225	225	227	227
More than one race	s	s	s	224	237	241	241	243	245	245	245
Socioeconomic status <sup>c</sup>											
Eligible for free or reduced-price lunch	NA	NA	207	208	222	225	227	227	229	230	229
Not eligible for free or reduced-price lunch	NA	NA	232	235	244	248	249	250	252	254	253
Student disability status <sup>d</sup>											
Has a disability	s	s	204	198	214	219	220	221	218	218	218
Does not have a disability	s	s	225	228	237	240	242	242	244	245	244
English language learner status <sup>d</sup>											
English language learner	s	s	201	199	214	216	217	218	219	219	218
Not English language learner	s	s	225	227	237	240	242	242	243	244	243
Percentiles											
10th percentile	171	177	182	184	197	200	202	202	203	203	202
25th percentile	193	199	203	205	216	220	222	221	222	222	221
50th percentile	214	221	225	227	236	239	242	241	242	243	242

## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

Student grade and characteristic	1990	1992	1996	2000	2003	2005	2007	2009	2011	2013	2015
75th percentile	235	242	245	248	255	258	260	260	261	262	261
90th percentile	253	259	262	265	270	273	275	275	276	278	277
All students in grade 8	263	268	270	273	278	279	281	283	284	285	282
Sex											
Male	263	268	271	274	278	280	282	284	284	285	282
Female	262	269	269	272	277	278	280	282	283	284	282
Race or ethnicity <sup>a</sup>											
White	270	277	281	284	288	289	291	293	293	294	292
Black	237	237	240	244	252	255	260	261	262	263	260
Hispanic <sup>b</sup>	246	249	251	253	259	262	265	266	270	272	270
Asian or Pacific Islander	275	290	s	288	291	295	297	301	303	306	306
American Indian or Alaska Native	s	s	s	259	263	264	264	266	265	269	267
More than one race	s	260	s	270	280	280	285	286	288	288	285
Parents' highest education											
Did not finish high school	242	249	250	253	257	259	263	265	265	267	265
Graduated from high school	255	257	260	261	267	267	270	270	271	270	268
Some education after high school	267	271	277	277	280	280	283	284	285	285	282
Graduated from college	274	281	281	286	288	290	292	295	295	296	294
Unknown	241	252	252	254	259	260	263	264	265	266	263
Socioeconomic status <sup>c</sup>											
Eligible for free or reduced-price lunch	NA	NA	250	253	259	262	265	266	269	270	268
Not eligible for free or reduced-price lunch	NA	NA	277	283	287	288	291	294	296	297	296
Student disability status <sup>d</sup>											
Has a disability	s	s	231	230	242	245	246	249	250	249	247
Does not have a disability	s	s	273	276	282	283	285	287	288	289	287
English language learner status <sup>d</sup>											
English language learner	s	s	226	234	242	244	246	243	244	246	246

## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

Student grade and characteristic	1990	1992	1996	2000	2003	2005	2007	2009	2011	2013	2015
Not English language learner	s	s	272	274	279	281	283	285	286	287	284
Percentiles											
10th percentile	215	221	221	223	230	231	235	236	237	237	235
25th percentile	239	243	245	249	254	255	258	259	260	261	258
50th percentile	264	269	273	275	279	280	283	284	285	286	283
75th percentile	288	294	297	300	303	304	306	308	309	310	308
90th percentile	307	315	316	320	323	324	327	329	329	331	329
All students in grade 12	NA	NA	NA	NA	NA	150	NA	153	NA	153	152
Sex											
Male	NA	NA	NA	NA	NA	151	NA	155	NA	155	153
Female	NA	NA	NA	NA	NA	149	NA	152	NA	152	150
Race or ethnicity <sup>a</sup>											
White	NA	NA	NA	NA	NA	157	NA	161	NA	162	160
Black	NA	NA	NA	NA	NA	127	NA	131	NA	132	130
Hispanic <sup>b</sup>	NA	NA	NA	NA	NA	133	NA	138	NA	141	139
Asian or Pacific Islander	NA	NA	NA	NA	NA	163	NA	175	NA	172	170
American Indian or Alaska Native	NA	NA	NA	NA	NA	134	NA	144	NA	142	138
More than one race	NA	NA	NA	NA	NA	142	NA	158	NA	155	157
Parents' highest education											
Did not finish high school	NA	NA	NA	NA	NA	130	NA	135	NA	137	133
Graduated from high school	NA	NA	NA	NA	NA	138	NA	142	NA	139	139
Some education after high school	NA	NA	NA	NA	NA	148	NA	150	NA	152	149
Graduated from college	NA	NA	NA	NA	NA	161	NA	164	NA	164	163
Unknown	NA	NA	NA	NA	NA	123	NA	129	NA	127	125
Socioeconomic status <sup>c</sup>											
Eligible for free or reduced-price lunch	NA	NA	NA	NA	NA	132	NA	137	NA	139	137
Not eligible for free or reduced-price lunch	NA	NA	NA	NA	NA	155	NA	160	NA	162	160

## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

Student grade and characteristic	1990	1992	1996	2000	2003	2005	2007	2009	2011	2013	2015
Student disability status <sup>d</sup>											
Has a disability	NA	NA	NA	NA	NA	114	NA	120	NA	119	118
Does not have a disability	NA	NA	NA	NA	NA	153	NA	156	NA	157	155
English language learner status <sup>d</sup>											
English language learner	NA	NA	NA	NA	NA	120	NA	117	NA	109	115
Not English language learner	NA	NA	NA	NA	NA	151	NA	154	NA	155	153
Percentiles											
10th percentile	NA	NA	NA	NA	NA	105	NA	110	NA	111	107
25th percentile	NA	NA	NA	NA	NA	127	NA	130	NA	131	128
50th percentile	NA	NA	NA	NA	NA	151	NA	154	NA	154	152
75th percentile	NA	NA	NA	NA	NA	174	NA	177	NA	177	175
90th percentile	NA	NA	NA	NA	NA	194	NA	197	NA	197	196

NA = not available; s = suppressed for reasons of confidentiality and/or reliability.

NAEP = National Assessment of Educational Progress.

<sup>a</sup> Other racial and ethnic groups are included in the rows for All students in grade 4, All students in grade 8, and All students in grade 12 but are not shown separately in the table.

<sup>b</sup> Hispanic may be any race. American Indian or Alaska Native, Asian or Pacific Islander, black, white, and more than one race refer to individuals who are not of Hispanic origin.

<sup>c</sup> NAEP uses eligibility for the federal National School Lunch Program (NSLP) as a measure of socioeconomic status. NSLP is a federally assisted meal program that provides low-cost or free lunches to eligible students. It is often referred to as the free or reduced-price lunch program. Information on students' eligibility for free or reduced-price lunch was first collected in 1996.

<sup>d</sup> From 1996 on, students with a disability and English language learners were allowed to use testing accommodation (e.g., extended time, one-on-one testing, bilingual dictionary). More information about testing accommodation is available at <https://nces.ed.gov/nationsreportcard/about/inclusion.asp>.

### Note(s)

Main NAEP mathematics assessment scores range from 0 to 500 for grades 4 and 8 and from 0 to 300 for grade 12. From 1996 on, data shown here are for students allowed to use testing accommodations. Grade 12 mathematics data are presented from 2005, 2009, 2013, and 2015 only because the mathematics framework was substantially revised in 2005, making prior assessment results not comparable with those in or after 2005. Mathematics assessment was not conducted in 2007 and 2011 for grade 12.

### Source(s)

National Science Foundation, National Center for Science and Engineering Statistics, special tabulations (2016) of main NAEP 1990, 1992, 1996, 2000, 2003, 2005, 2007, 2009, 2011, 2013, and 2015 mathematics assessments, National Center for Education Statistics.





## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

*Science and Engineering Indicators 2018*

## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

APPENDIX TABLE 1-2

### Students in grades 4, 8, and 12 scoring at or above the main NAEP's proficient level in mathematics for their grade, by student grade and characteristics: 1990–2015

(Percent)

Student grade and characteristic	1990	1992	1996	2000	2003	2005	2007	2009	2011	2013	2015
All students in grade 4	12.7	17.9	20.8	23.8	32.5	36.3	39.4	39.1	40.5	41.8	40.0
Sex											
Male	13.2	19.5	21.5	25.9	34.9	38.4	41.5	40.9	41.8	43.0	41.7
Female	12.2	16.2	20.0	21.6	29.9	34.2	37.3	37.2	39.1	40.6	38.3
Race or ethnicity <sup>a</sup>											
White	15.9	22.4	27.0	31.3	42.9	47.2	50.9	50.7	52.1	53.7	50.8
Black	1.1	2.5	3.1	4.7	9.9	12.8	15.4	15.9	17.4	18.2	18.6
Hispanic <sup>b</sup>	4.8	5.6	7.2	7.2	15.6	19.5	22.0	21.6	23.9	26.4	26.2
Asian or Pacific Islander	22.4	27.7	27.2	s	48.3	54.6	58.4	60.3	62.1	63.5	62.2
American Indian or Alaska Native	s	s	10.1	8.2	16.8	20.9	24.8	21.2	22.4	23.5	23.0
More than one race	s	s	s	15.9	32.9	40.0	39.6	42.4	45.1	45.7	44.9
Socioeconomic status <sup>c</sup>											
Eligible for free or reduced-price lunch	NA	NA	7.5	7.6	15.2	19.1	21.5	21.7	23.9	25.5	24.4
Not eligible for free or reduced-price lunch	NA	NA	27.5	32.0	44.7	49.4	52.8	53.9	56.7	59.2	57.8
Student disability status <sup>d</sup>											
Has a disability	s	s	5.1	6.4	12.6	16.0	19.3	19.1	17.1	17.8	16.4
Does not have a disability	s	s	22.1	25.5	34.8	38.8	41.8	41.6	43.4	45.1	43.5
English language learner status <sup>d</sup>											
English language learner	s	s	4.2	3.8	9.3	11.4	12.9	12.0	13.8	14.1	14.5
Not English language learner	s	s	21.6	25.0	34.7	38.7	42.2	41.9	43.6	44.9	43.1
All students in grade 8	15.3	20.9	23.3	25.7	28.8	29.8	32.2	33.9	34.7	35.5	33.1
Sex											
Male	16.8	21.3	24.7	27.4	30.3	31.1	34.2	35.6	35.7	36.3	33.6
Female	13.7	20.6	21.8	23.9	27.1	28.4	30.2	32.1	33.7	34.7	32.7

## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

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## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

Student grade and characteristic	1990	1992	1996	2000	2003	2005	2007	2009	2011	2013	2015
White	NA	NA	NA	NA	NA	28.9	NA	32.7	NA	33.2	31.7
Black	NA	NA	NA	NA	NA	5.6	NA	6.2	NA	7.1	7.1
Hispanic <sup>b</sup>	NA	NA	NA	NA	NA	8.1	NA	11.0	NA	11.8	11.9
Asian or Pacific Islander	NA	NA	NA	NA	NA	36.0	NA	51.8	NA	46.8	46.2
American Indian or Alaska Native	NA	NA	NA	NA	NA	6.1	NA	11.6	NA	12.5	9.9
More than one race	NA	NA	NA	NA	NA	18.9	NA	28.2	NA	25.7	30.6
Parents' highest education											
Did not finish high school	NA	NA	NA	NA	NA	6.9	NA	8.1	NA	9.1	7.1
Graduated from high school	NA	NA	NA	NA	NA	11.5	NA	13.9	NA	12.2	12.4
Some education after high school	NA	NA	NA	NA	NA	18.2	NA	19.0	NA	19.6	18.0
Graduated from college	NA	NA	NA	NA	NA	34.3	NA	38.0	NA	37.7	36.8
Unknown	NA	NA	NA	NA	NA	5.8	NA	7.9	NA	5.6	0.0
Socioeconomic status <sup>c</sup>											
Eligible for free or reduced-price lunch	NA	NA	NA	NA	NA	7.7	NA	10.2	NA	11.4	11.0
Not eligible for free or reduced-price lunch	NA	NA	NA	NA	NA	26.7	NA	31.9	NA	33.7	32.3
Student disability status <sup>d</sup>											
Has a disability	NA	NA	NA	NA	NA	4.5	NA	6.6	NA	5.9	5.7
Does not have a disability	NA	NA	NA	NA	NA	24.4	NA	27.5	NA	27.7	26.3
English language learner status <sup>d</sup>											
English language learner	NA	NA	NA	NA	NA	3.1	NA	4.0	NA	2.8	5.7
Not English language learner	NA	NA	NA	NA	NA	23.8	NA	26.6	NA	26.4	25.2

NA = not available; s = suppressed for reasons of confidentiality and/or reliability.

NAEP = National Assessment of Educational Progress.

<sup>a</sup> Other racial and ethnic groups are included in the rows for All students in grade 4, All students in grade 8, and All students in grade 12 but are not shown separately in the table.

<sup>b</sup> Hispanic may be any race. American Indian or Alaska Native, Asian or Pacific Islander, black, white, and more than one race refer to individuals who are not of Hispanic origin.

## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

<sup>c</sup> NAEP uses eligibility for the federal National School Lunch Program (NSLP) as a measure of socioeconomic status. NSLP is a federally assisted meal program that provides low-cost or free lunches to eligible students. It is sometimes referred to as the free or reduced-price lunch program. Information on students' eligibility for free or reduced-price lunch was first collected in 1996.

<sup>d</sup> From 1996 on, students with a disability and English language learners were allowed to use testing accommodation (e.g., extended time, one-on-one testing, bilingual dictionary). More information about testing accommodation is available at <https://nces.ed.gov/nationsreportcard/about/inclusion.asp>.

### Note(s)

From 1996 on, data shown here are for students allowed to use testing accommodation. Grade 12 mathematics data are presented from 2005, 2009, 2013, and 2015 only because the mathematics framework was substantially revised in 2005, making prior assessment results not comparable with those in or after 2005. Mathematics assessment was not conducted in 2007 and 2011 for grade 12.

### Source(s)

National Science Foundation, National Center for Science and Engineering Statistics, special tabulations (2016) of main NAEP 1990, 1992, 1996, 2000, 2003, 2005, 2007, 2009, 2011, 2013, and 2015 mathematics assessments, National Center for Education Statistics.

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## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

APPENDIX TABLE 1-3



### Average scores of students in grades 4, 8, and 12 on the main NAEP science assessment, by student grade and characteristics: 2009–15

(Average score)

Student grade and characteristic	2009	2011	2015
All students in grade 4	150	NA	154
Sex			
Male	151	NA	154
Female	149	NA	154
Race or ethnicity <sup>a</sup>			
White	163	NA	166
Black	127	NA	133
Hispanic <sup>b</sup>	131	NA	139
Asian or Pacific Islander	160	NA	167
American Indian or Alaska Native	135	NA	139
More than one race	154	NA	158
Socioeconomic status <sup>c</sup>			
Eligible for free or reduced-price lunch	134	NA	140
Not eligible for free or reduced-price lunch	163	NA	169
Student disability status <sup>d</sup>			
Has a disability	129	NA	131
Does not have a disability	153	NA	157
English language learner status <sup>d</sup>			
English language learner	114	NA	121
Not English language learner	154	NA	158
Percentiles			
10th percentile	104	NA	108
25th percentile	128	NA	132
50th percentile	153	NA	157

## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

Student grade and characteristic	2009	2011	2015
75th percentile	175	NA	178
90th percentile	192	NA	196
All students in grade 8	150	152	154
Sex			
Male	152	154	155
Female	148	149	152
Race or ethnicity <sup>a</sup>			
White	162	163	166
Black	126	129	132
Hispanic <sup>b</sup>	132	137	140
Asian or Pacific Islander	160	159	164
American Indian or Alaska Native	137	141	139
More than one race	151	156	159
Parents' highest education			
Did not finish high school	131	132	137
Graduated from high school	139	140	142
Some education after high school	152	153	155
Graduated from college	161	162	165
Unknown	130	133	134
Socioeconomic status <sup>c</sup>			
Eligible for free or reduced-price lunch	133	137	140
Not eligible for free or reduced-price lunch	161	164	167
Student disability status <sup>d</sup>			
Has a disability	123	124	124
Does not have a disability	153	155	158
English language learner status <sup>d</sup>			
English language learner	103	106	110

## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

Student grade and characteristic	2009	2011	2015
Not English language learner	153	154	157
Percentiles			
10th percentile	103	106	109
25th percentile	128	131	133
50th percentile	153	155	157
75th percentile	175	176	178
90th percentile	192	193	195
All students in grade 12	150	NA	150
Sex			
Male	153	NA	153
Female	147	NA	148
Race or ethnicity <sup>a</sup>			
White	159	NA	160
Black	125	NA	125
Hispanic <sup>b</sup>	134	NA	136
Asian or Pacific Islander	164	NA	166
American Indian or Alaska Native	144	NA	135
More than one race	151	NA	156
Parents' highest education			
Did not finish high school	131	NA	131
Graduated from high school	138	NA	136
Some education after high school	147	NA	148
Graduated from college	161	NA	162
Unknown	122	NA	123
Socioeconomic status <sup>c</sup>			
Eligible for free or reduced-price lunch	132	NA	134
Not eligible for free or reduced-price lunch	157	NA	160

## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

Student grade and characteristic	2009	2011	2015
Student disability status <sup>d</sup>			
Has a disability	121	NA	124
Does not have a disability	153	NA	153
English language learner status <sup>d</sup>			
English language learner	104	NA	105
Not English language learner	151	NA	152
Percentiles			
10th percentile	104	NA	103
25th percentile	126	NA	126
50th percentile	151	NA	151
75th percentile	174	NA	176
90th percentile	194	NA	196

NA = not available.

NAEP = National Assessment of Educational Progress.

<sup>a</sup> Other racial and ethnic groups are included in the rows for All students in grade 4, All students in grade 8, and All students in grade 12 but are not shown separately in the table.

<sup>b</sup> Hispanic may be any race. American Indian or Alaska Native, Asian or Pacific Islander, black, white, and more than one race refer to individuals who are not of Hispanic origin.

<sup>c</sup> NAEP uses eligibility for the federal National School Lunch Program (NSLP) as a measure of socioeconomic status. NSLP is a federally assisted meal program that provides low-cost or free lunches to eligible students. It is sometimes referred to as the free or reduced-price lunch program.

<sup>d</sup> From 1996 on, students with a disability and English language learners were allowed to use testing accommodation (e.g., extended time, one-on-one testing, bilingual dictionary). More information about testing accommodation is available at <https://nces.ed.gov/nationsreportcard/about/inclusion.asp>.

### Note(s)

Main NAEP science assessment scores range from 0 to 300 for grades 4, 8, and 12. Science data are presented beginning in 2009 only because the science framework was substantially revised in 2009, making prior assessment results not comparable with those in or after 2009. Science assessment was not conducted in 2011 for grades 4 and 12.

### Source(s)

National Science Foundation, National Center for Science and Engineering Statistics, special tabulations (2016) of main NAEP 2009, 2011, and 2015 science assessments, National Center for Education Statistics.

*Science and Engineering Indicators 2018*

## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

APPENDIX TABLE 1-4



### Students in grades 4, 8, and 12 scoring at or above the main NAEP's proficient level in science for their grade, by student grade and characteristics: 2009–15

(Percent)

Student grade and characteristic	2009	2011	2015
All students in grade 4	33.7	NA	37.7
Sex			
Male	35.0	NA	38.8
Female	32.5	NA	36.7
Race or ethnicity <sup>a</sup>			
White	47.1	NA	50.9
Black	10.6	NA	14.6
Hispanic <sup>b</sup>	13.8	NA	21.2
Asian or Pacific Islander	44.6	NA	53.2
American Indian or Alaska Native	17.4	NA	20.3
More than one race	35.4	NA	41.3
Socioeconomic status <sup>c</sup>			
Eligible for free or reduced-price lunch	16.1	NA	21.8
Not eligible for free or reduced-price lunch	48.0	NA	55.2
Student disability status <sup>d</sup>			
Has a disability	16.5	NA	18.1
Does not have a disability	35.9	NA	40.6
English language learner status <sup>d</sup>			
English language learner	5.1	NA	8.7
Not English language learner	36.6	NA	41.1
All students in grade 8	30.3	31.8	34.2
Sex			
Male	33.6	35.4	36.8
Female	26.9	28.2	31.5



## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

Student grade and characteristic	2009	2011	2015
Race or ethnicity <sup>a</sup>			
White	41.6	43.3	46.7
Black	8.3	9.8	11.5
Hispanic <sup>b</sup>	12.3	16.2	18.3
Asian or Pacific Islander	40.6	41.1	47.0
American Indian or Alaska Native	17.1	19.6	16.0
More than one race	28.6	34.6	38.5
Parents' highest education			
Did not finish high school	10.9	12.1	14.6
Graduated from high school	17.6	18.2	18.6
Some education after high school	29.0	30.3	31.6
Graduated from college	42.2	43.7	46.6
Unknown	11.9	14.8	15.2
Socioeconomic status <sup>c</sup>			
Eligible for free or reduced-price lunch	13.8	16.3	18.3
Not eligible for free or reduced-price lunch	40.7	44.5	49.1
Student disability status <sup>d</sup>			
Has a disability	11.2	11.1	11.0
Does not have a disability	32.6	34.4	37.3
English language learner status <sup>d</sup>			
English language learner	2.4	2.7	3.6
Not English language learner	31.8	33.5	36.1
All students in grade 12	20.9	NA	22.0
Sex			
Male	24.2	NA	25.3
Female	17.6	NA	18.5
Race or ethnicity <sup>a</sup>			

## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

Student grade and characteristic	2009	2011	2015
White	27.0	NA	29.4
Black	4.4	NA	5.5
Hispanic <sup>b</sup>	8.3	NA	9.4
Asian or Pacific Islander	36.2	NA	38.1
American Indian or Alaska Native	13.1	NA	11.5
More than one race	21.5	NA	24.5
Parents' highest education			
Did not finish high school	6.0	NA	6.3
Graduated from high school	9.8	NA	10.7
Some education after high school	15.2	NA	17.0
Graduated from college	31.3	NA	32.8
Unknown	4.7	NA	5.0
Socioeconomic status <sup>c</sup>			
Eligible for free or reduced-price lunch	8.2	NA	9.5
Not eligible for free or reduced-price lunch	25.9	NA	29.2
Student disability status <sup>d</sup>			
Has a disability	5.6	NA	8.8
Does not have a disability	22.3	NA	23.4
English language learner status <sup>d</sup>			
English language learner	1.2	NA	2.1
Not English language learner	21.5	NA	22.7

NA = not available.

NAEP = National Assessment of Educational Progress.

<sup>a</sup> Other racial and ethnic groups are included in the rows for all students in grade 4, all students in grade 8, and all students in grade 12 but are not shown separately in the table.

<sup>b</sup> Hispanic may be any race. American Indian or Alaska Native, Asian or Pacific Islander, black, white, and more than one race refer to individuals who are not of Hispanic origin.

## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

<sup>c</sup> NAEP uses eligibility for the federal National School Lunch Program (NSLP) as a measure of socioeconomic status. NSLP is a federally assisted meal program that provides low-cost or free lunches to eligible students. It is sometimes referred to as the free or reduced-price lunch program.

<sup>d</sup> From 1996 on, students with a disability and English language learners were allowed to use testing accommodation (e.g., extended time, one-on-one testing, bilingual dictionary). More information about testing accommodation is available at <https://nces.ed.gov/nationsreportcard/about/inclusion.asp>.

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### Note(s)

Grades 4 and 12 science data are presented in 2009 and 2015 only because the science framework was substantially revised in 2009, making prior assessment results not comparable with those in or after 2009. Science assessment was not conducted in 2011 for grades 4 and 12.

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### Source(s)

National Science Foundation, National Center for Science and Engineering Statistics, special tabulations (2016) of main NAEP 2009, 2011, and 2015 science assessments, National Center for Education Statistics.

*Science and Engineering Indicators 2018*

## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

APPENDIX TABLE 1-5



### Average scores of students in grade 8 on the main NAEP technology and engineering literacy assessment and the percentage scoring proficient or above, by student characteristics: 2014

(Average score)

Characteristic	Average scale score	Percentage scoring proficient or above
All students in grade 8	150	43.3
Sex		
Male	149	41.8
Female	151	44.8
Race or ethnicity <sup>a</sup>		
White	160	55.6
Black	128	18.4
Hispanic <sup>b</sup>	138	27.9
Asian or Pacific Islander	159	54.0
American Indian or Alaska Native	146	41.6
More than one race	154	45.0
Parents' highest education		
Did not finish high school	133	20.4
Graduated from high school	137	27.4
Some education after high school	152	43.6
Graduated from college	159	55.2
Socioeconomic status <sup>c</sup>		
Eligible for free or reduced-price lunch	135	25.2
Not eligible for free or reduced-price lunch	163	59.3
Student disability status <sup>d</sup>		
Has a disability	116	13.0
Does not have a disability	155	47.0
English language learner status <sup>d</sup>		
English language learner	108	4.8

## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

Characteristic	Average scale score	Percentage scoring proficient or above
Not English language learner	152	45.3
Percentiles		
10th percentile	104	NA
25th percentile	127	NA
50th percentile	152	NA
75th percentile	175	NA
90th percentile	193	NA

NA = not available.

NAEP = National Assessment of Educational Progress.

<sup>a</sup> Other racial and ethnic groups are included but are not shown separately.

<sup>b</sup> Hispanic may be any race. American Indian or Alaska Native, Asian or Pacific Islander, black, white, and more than one race refer to individuals who are not of Hispanic origin.

<sup>c</sup> NAEP uses eligibility for the federal National School Lunch Program (NSLP) as a measure of socioeconomic status. NSLP is a federally assisted meal program that provides low-cost or free lunches to eligible students. It is sometimes referred to as the free or reduced-price lunch program.

<sup>d</sup> From 1996 on, students with a disability and English language learners were allowed to use testing accommodation (e.g., extended time, one-on-one testing, bilingual dictionary). More information about testing accommodation is available at <https://nces.ed.gov/nationsreportcard/about/inclusion.asp>.

### Note(s)

Main NAEP technology and engineering literacy assessment scores range from 0 to 300.

### Source(s)

National Science Foundation, National Center for Science and Engineering Statistics, special tabulations (2016) of main NAEP 2014 technology and engineering literacy (TEL) assessment, National Center for Education Statistics.

*Science and Engineering Indicators 2018*



## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

APPENDIX TABLE 1-6 

### Average scores of students in grade 4 on the main NAEP mathematics assessment, by race or ethnicity and sex, by state: 2000–15

(Score out of 500)

Student characteristic and state	2000	2003	2005	2007	2009	2011	2013	2015
White students								
United States	233	243	246	248	248	249	250	248
Alabama	227	232	235	238	237	240	242	239
Alaska	NA	242	244	247	249	248	249	246
Arizona	230	241	243	246	243	246	251	251
Arkansas	225	237	242	245	245	244	246	240
California	228	243	245	247	247	252	249	246
Colorado	NA	243	247	249	252	254	256	253
Connecticut	242	250	250	252	253	253	253	249
Delaware	NA	244	249	249	249	250	252	247
District of Columbia	254	262	266	262	270	272	276	274
Florida	NA	243	247	250	250	250	251	251
Georgia	230	241	243	246	247	249	250	245
Hawaii	227	238	241	244	247	248	253	248
Idaho	227	238	245	245	244	244	244	243
Illinois	235	244	245	248	249	249	248	248
Indiana	235	242	245	249	247	249	252	252
Iowa	233	241	242	245	245	246	249	248
Kansas	237	246	249	252	251	251	250	247
Kentucky	223	231	234	238	241	243	244	244
Louisiana	230	242	241	240	241	241	242	242
Maine	230	238	241	243	245	246	247	243
Maryland	236	244	250	251	255	258	260	252
Massachusetts	239	247	252	257	258	258	260	256

## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

Student characteristic and state	2000	2003	2005	2007	2009	2011	2013	2015
Michigan	237	244	245	244	243	242	244	241
Minnesota	238	246	251	252	255	255	259	257
Mississippi	222	236	238	239	241	241	243	245
Missouri	233	240	240	245	245	246	245	244
Montana	231	238	243	247	247	247	248	245
Nebraska	230	241	244	244	245	247	251	251
Nevada	226	236	240	243	245	247	245	246
New Hampshire	NA	244	246	250	252	252	254	250
New Jersey	NA	248	251	255	255	256	254	254
New Mexico	227	237	238	242	245	247	246	241
New York	238	246	247	251	248	245	248	245
North Carolina	238	251	250	251	254	253	254	253
North Dakota	232	240	245	248	248	249	249	249
Ohio	235	243	248	250	249	249	252	249
Oklahoma	229	235	240	242	241	243	245	245
Oregon	227	240	243	241	243	243	245	243
Pennsylvania	NA	243	247	249	249	251	250	250
Rhode Island	232	239	241	242	247	249	250	246
South Carolina	233	246	250	248	245	248	247	247
South Dakota	NA	241	245	245	247	246	247	246
Tennessee	227	235	238	240	239	239	247	246
Texas	241	248	254	253	254	253	255	255
Utah	230	238	242	244	246	247	248	247
Vermont	232	242	244	247	248	248	249	244
Virginia	237	246	247	251	251	251	252	253
Washington	NA	242	246	248	247	249	251	251
West Virginia	224	231	231	237	233	235	238	236

## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

Student characteristic and state	2000	2003	2005	2007	2009	2011	2013	2015
Wisconsin	s	243	247	250	250	251	252	250
Wyoming	231	243	245	246	244	246	249	250
Puerto Rico	NA	s	s	NA	NA	s	s	s
Black students								
United States	203	216	220	222	222	224	224	224
Alabama	203	208	211	213	211	215	215	217
Alaska	NA	221	226	227	225	225	228	221
Arizona	207	215	217	219	222	224	230	231
Arkansas	194	206	214	217	217	219	223	221
California	194	213	215	218	217	225	221	222
Colorado	NA	217	222	224	225	225	227	221
Connecticut	210	217	219	220	222	220	219	218
Delaware	NA	223	226	230	226	227	229	227
District of Columbia	188	202	207	209	213	215	221	223
Florida	NA	215	224	225	228	226	228	228
Georgia	204	217	221	222	221	224	226	224
Hawaii	211	221	221	230	232	233	232	s
Idaho	s	s	s	s	s	s	s	s
Illinois	202	210	212	216	216	219	220	215
Indiana	211	215	221	224	222	223	227	229
Iowa	216	215	224	224	226	224	218	222
Kansas	208	217	228	226	224	227	228	218
Kentucky	196	214	217	219	220	225	224	226
Louisiana	205	213	219	219	218	219	221	224
Maine	s	s	s	221	228	212	227	223
Maryland	202	216	220	223	228	230	227	224
Massachusetts	213	222	228	232	236	235	230	230

## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

Student characteristic and state	2000	2003	2005	2007	2009	2011	2013	2015
Michigan	199	209	211	216	212	211	212	212
Minnesota	208	219	219	222	227	225	232	227
Mississippi	198	212	216	217	215	217	220	224
Missouri	202	216	215	218	221	216	219	220
Montana	s	s	s	s	s	s	s	s
Nebraska	193	211	211	211	213	213	215	217
Nevada	203	215	214	219	218	226	221	218
New Hampshire	NA	s	s	226	s	235	s	s
New Jersey	NA	217	224	232	228	231	229	228
New Mexico	s	216	213	220	225	226	225	s
New York	210	219	222	225	225	224	225	221
North Carolina	215	225	225	224	226	229	230	229
North Dakota	s	s	s	s	s	s	239	231
Ohio	206	217	221	225	222	226	222	220
Oklahoma	205	211	217	220	222	224	219	223
Oregon	196	223	222	219	223	215	220	217
Pennsylvania	NA	212	219	222	223	224	226	219
Rhode Island	200	210	211	219	221	225	224	222
South Carolina	203	222	223	221	220	220	222	221
South Dakota	NA	s	s	221	225	227	221	218
Tennessee	198	208	214	214	213	216	221	226
Texas	220	226	228	230	231	232	231	233
Utah	s	s	s	s	221	s	s	s
Vermont	s	s	s	s	s	s	s	s
Virginia	211	223	224	228	225	229	229	231
Washington	NA	222	231	222	227	227	231	229
West Virginia	205	221	226	223	225	227	228	218

## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

Student characteristic and state	2000	2003	2005	2007	2009	2011	2013	2015
Wisconsin	s	209	210	212	217	217	216	212
Wyoming	s	s	s	s	s	s	s	s
Puerto Rico	NA	s	s	NA	NA	s	s	s
Hispanic students								
United States	207	221	225	227	227	229	230	230
Alabama	s	s	s	218	220	227	228	221
Alaska	NA	228	227	232	232	239	235	235
Arizona	204	217	218	220	220	227	232	229
Arkansas	s	221	229	230	233	233	234	231
California	201	216	219	218	219	222	224	222
Colorado	NA	217	223	224	228	230	233	227
Connecticut	210	223	223	223	227	222	224	224
Delaware	NA	226	229	234	231	231	234	232
District of Columbia	190	205	215	220	227	223	228	231
Florida	NA	232	233	238	238	236	238	240
Georgia	217	219	229	229	231	233	235	234
Hawaii	s	219	219	224	230	237	241	236
Idaho	207	217	226	224	225	223	225	221
Illinois	211	218	219	223	227	226	229	228
Indiana	s	226	230	233	230	234	242	240
Iowa	s	222	222	230	223	229	234	226
Kansas	213	230	234	234	233	235	235	228
Kentucky	s	s	s	221	227	236	234	234
Louisiana	s	s	s	234	230	230	232	238
Maine	s	s	s	s	s	s	s	s
Maryland	216	227	232	233	238	245	234	229
Massachusetts	203	222	225	231	232	236	234	232

## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

Student characteristic and state	2000	2003	2005	2007	2009	2011	2013	2015
Michigan	s	223	224	230	227	228	226	223
Minnesota	s	220	223	229	232	230	234	232
Mississippi	s	s	s	s	s	229	230	229
Missouri	s	220	221	234	237	231	233	233
Montana	s	236	234	241	241	237	237	231
Nebraska	205	213	219	220	224	226	227	230
Nevada	207	216	219	221	227	229	230	227
New Hampshire	NA	225	226	232	234	235	236	237
New Jersey	NA	224	230	234	232	234	234	232
New Mexico	207	217	218	222	224	228	229	229
New York	207	221	226	230	231	226	229	228
North Carolina	220	235	234	235	236	238	239	235
North Dakota	s	s	s	s	s	233	237	224
Ohio	s	225	231	231	233	233	237	236
Oklahoma	211	220	226	227	229	227	229	232
Oregon	202	218	218	217	221	220	224	224
Pennsylvania	NA	216	220	229	227	226	229	226
Rhode Island	197	207	211	220	219	224	226	223
South Carolina	s	232	236	227	232	234	229	233
South Dakota	NA	223	s	228	233	226	226	227
Tennessee	s	218	229	222	225	228	229	235
Texas	223	230	235	236	233	235	235	239
Utah	205	216	220	220	219	223	221	226
Vermont	s	s	s	s	s	s	s	s
Virginia	224	230	230	235	234	237	236	235
Washington	NA	223	224	225	227	226	229	228
West Virginia	s	s	s	s	s	s	s	s

## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

Student characteristic and state	2000	2003	2005	2007	2009	2011	2013	2015
Wisconsin	s	221	224	229	228	228	228	229
Wyoming	214	229	234	229	231	235	235	234
Puerto Rico	NA	s	s	NA	NA	182	182	s
Asian and Pacific Islander students								
United States	s	246	251	254	255	256	258	256
Alabama	s	s	s	s	s	s	s	s
Alaska	NA	230	238	237	236	234	233	230
Arizona	s	244	241	253	245	249	256	252
Arkansas	s	s	s	236	s	247	258	s
California	221	246	249	251	257	256	254	252
Colorado	NA	242	242	247	246	246	255	245
Connecticut	239	249	253	255	257	255	257	259
Delaware	NA	250	260	261	258	262	270	256
District of Columbia	s	s	s	s	s	s	s	s
Florida	NA	249	259	255	261	257	264	260
Georgia	s	248	255	255	256	263	263	260
Hawaii	214	225	229	233	235	237	241	235
Idaho	s	s	s	s	s	247	s	s
Illinois	s	252	258	257	265	257	266	262
Indiana	s	s	s	s	s	s	s	s
Iowa	s	s	246	s	259	248	254	250
Kansas	s	s	262	260	258	253	261	254
Kentucky	s	s	s	s	265	261	260	258
Louisiana	s	s	s	s	s	s	s	s
Maine	s	s	s	s	s	246	s	s
Maryland	230	254	256	261	259	267	270	260
Massachusetts	237	248	258	259	264	267	266	273

## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

Student characteristic and state	2000	2003	2005	2007	2009	2011	2013	2015
Michigan	s	248	250	261	252	263	259	254
Minnesota	213	229	242	239	243	253	250	243
Mississippi	s	s	s	s	s	s	s	s
Missouri	s	s	s	s	255	252	s	s
Montana	s	s	s	s	s	s	s	s
Nebraska	s	s	s	s	251	241	243	s
Nevada	227	237	243	242	245	252	244	247
New Hampshire	NA	s	s	258	257	264	257	261
New Jersey	NA	256	264	267	261	265	267	270
New Mexico	s	s	s	s	s	254	s	s
New York	241	250	254	260	257	252	259	252
North Carolina	s	255	256	253	259	263	261	258
North Dakota	s	s	s	s	s	s	251	s
Ohio	s	s	s	s	s	254	260	s
Oklahoma	s	247	s	247	s	252	257	s
Oregon	236	245	248	249	245	249	256	250
Pennsylvania	NA	s	257	259	258	264	259	261
Rhode Island	217	225	240	244	242	251	239	238
South Carolina	s	s	s	s	s	s	s	s
South Dakota	NA	s	s	s	s	s	s	s
Tennessee	s	s	s	s	s	249	255	257
Texas	248	258	264	263	259	263	272	271
Utah	219	224	235	244	241	236	240	234
Vermont	s	s	s	s	s	s	s	s
Virginia	247	255	256	256	258	262	264	270
Washington	NA	244	245	250	253	256	260	263
West Virginia	s	s	s	s	s	s	s	s



## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

Student characteristic and state	2000	2003	2005	2007	2009	2011	2013	2015
Wisconsin	s	230	236	245	240	242	247	250
Wyoming	s	s	s	s	s	s	s	s
Puerto Rico	NA	s	s	NA	NA	s	s	s
Male students								
United States	225	235	238	240	240	241	242	241
Alabama	216	223	225	229	228	231	233	231
Alaska	NA	235	236	238	238	237	237	238
Arizona	219	231	233	233	230	237	240	239
Arkansas	216	228	236	238	239	238	239	235
California	212	229	231	231	233	235	235	233
Colorado	NA	237	241	242	244	246	248	243
Connecticut	235	243	244	243	246	243	244	241
Delaware	NA	237	241	242	241	241	243	240
District of Columbia	191	204	212	213	218	220	228	230
Florida	NA	235	240	243	243	240	242	243
Georgia	220	231	234	236	237	238	241	237
Hawaii	215	227	229	233	235	238	242	238
Idaho	224	237	242	242	242	241	243	239
Illinois	224	234	234	239	240	240	239	238
Indiana	234	239	240	246	243	245	249	248
Iowa	233	240	242	244	243	244	247	244
Kansas	233	244	247	249	246	247	247	242
Kentucky	220	230	233	237	240	242	242	243
Louisiana	219	227	231	230	230	231	233	235
Maine	232	239	243	244	247	246	246	244
Maryland	223	235	240	242	244	248	246	240
Massachusetts	235	244	248	254	253	255	253	253

## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

Student characteristic and state	2000	2003	2005	2007	2009	2011	2013	2015
Michigan	230	238	240	238	238	238	237	237
Minnesota	236	244	247	249	251	250	254	250
Mississippi	210	223	227	228	227	229	231	234
Missouri	228	235	237	240	241	240	240	241
Montana	231	236	243	245	247	245	245	243
Nebraska	225	238	239	240	239	241	245	244
Nevada	221	229	231	233	236	238	237	234
New Hampshire	NA	246	247	250	252	252	255	250
New Jersey	NA	240	246	250	248	249	248	247
New Mexico	216	224	225	229	231	234	234	232
New York	227	237	240	244	242	238	241	238
North Carolina	230	243	242	243	244	245	245	245
North Dakota	231	240	244	248	247	246	247	246
Ohio	232	239	243	246	245	245	246	244
Oklahoma	225	230	235	238	238	237	240	242
Oregon	225	237	239	238	240	237	241	239
Pennsylvania	NA	238	241	245	245	247	244	244
Rhode Island	225	231	234	236	240	242	242	238
South Carolina	221	237	238	236	236	237	236	238
South Dakota	NA	239	243	242	243	242	241	240
Tennessee	221	228	233	234	232	233	240	241
Texas	233	239	244	243	241	241	242	245
Utah	227	236	240	241	241	244	244	244
Vermont	232	244	246	248	249	248	249	243
Virginia	232	240	242	245	245	247	247	247
Washington	NA	240	242	244	242	244	247	245
West Virginia	224	232	232	238	234	235	238	235

## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

Student characteristic and state	2000	2003	2005	2007	2009	2011	2013	2015
Wisconsin	s	238	242	245	245	245	245	244
Wyoming	230	242	244	244	243	245	247	248
Puerto Rico	NA	s	s	NA	NA	181	181	183
Female students								
United States	223	233	236	238	238	239	241	239
Alabama	219	223	225	228	228	232	232	231
Alaska	NA	231	235	237	236	235	236	235
Arizona	219	227	227	230	230	234	240	236
Arkansas	216	230	235	237	236	238	240	235
California	213	225	229	229	231	234	232	230
Colorado	NA	233	238	239	242	243	246	240
Connecticut	233	238	241	242	243	241	243	239
Delaware	NA	235	238	241	238	239	243	238
District of Columbia	192	206	211	214	221	223	229	233
Florida	NA	233	238	241	241	240	242	242
Georgia	218	229	233	234	236	239	239	236
Hawaii	217	226	231	236	236	240	244	238
Idaho	225	233	241	240	240	239	238	238
Illinois	222	232	232	235	237	238	239	237
Indiana	232	237	240	244	242	242	248	247
Iowa	230	236	238	241	242	242	244	243
Kansas	231	240	245	247	244	246	245	240
Kentucky	219	227	230	234	238	240	241	240
Louisiana	217	226	229	230	229	231	230	234
Maine	227	236	239	241	242	243	246	241
Maryland	220	232	237	239	243	246	244	239
Massachusetts	232	239	247	251	251	252	253	248

## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

Student characteristic and state	2000	2003	2005	2007	2009	2011	2013	2015
Michigan	228	233	236	237	235	235	236	235
Minnesota	232	240	245	245	248	248	253	249
Mississippi	211	223	226	227	228	231	232	234
Missouri	228	235	233	238	240	241	239	237
Montana	226	235	239	242	242	242	242	239
Nebraska	225	235	236	236	239	239	241	244
Nevada	218	226	229	230	234	236	235	233
New Hampshire	NA	240	244	247	250	251	251	248
New Jersey	NA	237	242	247	245	247	246	244
New Mexico	211	221	223	227	229	232	232	230
New York	224	235	237	242	239	237	240	236
North Carolina	230	241	241	241	244	244	245	242
North Dakota	229	235	241	243	244	244	246	243
Ohio	228	237	241	243	242	243	245	243
Oklahoma	223	228	233	236	236	238	238	238
Oregon	222	235	238	234	236	237	239	237
Pennsylvania	NA	234	240	243	242	245	244	242
Rhode Island	223	229	233	235	237	242	241	238
South Carolina	219	234	238	238	235	238	238	237
South Dakota	NA	235	240	240	241	240	241	239
Tennessee	219	228	231	231	231	232	240	240
Texas	230	236	240	242	240	241	242	243
Utah	227	233	237	238	239	241	241	241
Vermont	231	240	241	245	247	245	247	244
Virginia	227	239	239	242	241	244	246	246
Washington	NA	237	241	241	242	242	246	245
West Virginia	223	230	229	235	232	234	237	236

## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

Student characteristic and state	2000	2003	2005	2007	2009	2011	2013	2015
Wisconsin	s	235	239	243	242	244	244	243
Wyoming	227	240	242	243	241	243	246	246
Puerto Rico	NA	s	s	NA	NA	182	183	182

NA = not available; s = suppressed for reasons of confidentiality and/or reliability.

NAEP = National Assessment of Educational Progress.

### Note(s)

The NAEP scores are for public schools only. The national value for the United States is the reported value in the NAEP reports. Black includes African American. Hispanic includes Latino. Asian and Pacific Islander includes Native Hawaiian.

### Source(s)

National Center for Education Statistics, NAEP (various years).

*Science and Engineering Indicators 2018*

## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

APPENDIX TABLE 1-7



### Students in grade 4 scoring at or above the main NAEP's proficient level in mathematics, by race or ethnicity and sex, by state: 2000–15

(Percent)

Student characteristic and state	2000	2003	2005	2007	2009	2011	2013	2015
White students								
United States	30	42	47	51	50	52	54	51
Alabama	20	27	30	36	34	37	40	35
Alaska	NA	41	44	50	52	50	52	47
Arizona	24	39	43	48	44	49	55	56
Arkansas	18	34	42	46	46	45	47	38
California	24	42	46	52	51	57	53	48
Colorado	NA	44	49	54	57	60	62	58
Connecticut	39	53	53	57	58	60	58	52
Delaware	NA	43	50	53	50	53	57	50
District of Columbia	62	71	78	73	81	84	88	85
Florida	NA	43	49	54	53	52	54	54
Georgia	27	40	43	46	48	51	53	47
Hawaii	25	35	42	46	51	53	60	50
Idaho	21	34	44	45	44	44	44	44
Illinois	30	44	44	50	52	51	51	49
Indiana	32	40	45	52	48	51	58	57
Iowa	27	39	40	46	45	47	52	50
Kansas	34	47	52	58	55	56	53	50
Kentucky	19	24	29	34	39	41	45	44
Louisiana	22	39	38	37	37	40	40	40
Maine	23	34	39	43	46	47	49	42
Maryland	34	44	53	55	60	64	67	56
Massachusetts	36	49	57	65	67	67	68	62

## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

Student characteristic and state	2000	2003	2005	2007	2009	2011	2013	2015
Michigan	34	43	46	44	43	41	45	39
Minnesota	36	47	54	58	61	60	67	63
Mississippi	15	30	32	34	37	38	42	44
Missouri	27	35	37	45	46	48	46	44
Montana	26	34	41	49	49	50	50	46
Nebraska	27	39	44	45	45	48	54	56
Nevada	21	32	38	43	46	48	46	49
New Hampshire	NA	43	48	53	57	59	60	53
New Jersey	NA	51	55	63	63	64	61	61
New Mexico	22	33	34	43	47	48	48	41
New York	32	45	49	56	50	46	50	47
North Carolina	34	55	52	56	59	58	60	59
North Dakota	26	37	43	49	49	52	52	50
Ohio	29	42	51	53	54	53	56	52
Oklahoma	20	29	36	39	40	41	45	44
Oregon	24	36	42	40	43	43	46	43
Pennsylvania	NA	44	50	53	53	56	52	53
Rhode Island	28	37	37	41	50	53	53	48
South Carolina	28	46	53	50	46	52	49	48
South Dakota	NA	38	45	46	47	46	48	47
Tennessee	23	30	35	36	36	36	50	48
Texas	39	49	60	59	61	60	61	60
Utah	25	35	41	45	48	49	51	49
Vermont	29	42	44	50	51	50	53	44
Virginia	32	46	50	53	54	56	56	57
Washington	NA	40	48	51	51	53	56	56
West Virginia	18	24	25	33	28	32	36	34

## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

Student characteristic and state	2000	2003	2005	2007	2009	2011	2013	2015
Wisconsin	s	43	48	54	53	55	57	54
Wyoming	27	42	45	48	44	47	52	54
Puerto Rico	NA	s	s	NA	NA	s	s	s
Black students								
United States	4	10	13	15	15	17	18	19
Alabama	4	5	7	10	7	9	9	10
Alaska	NA	15	20	22	17	15	22	14
Arizona	6	11	13	16	19	22	24	32
Arkansas	2	5	10	12	12	16	17	15
California	3	9	12	15	13	19	18	18
Colorado	NA	12	18	20	23	21	22	21
Connecticut	7	10	11	15	14	15	14	13
Delaware	NA	12	15	20	17	19	21	19
District of Columbia	2	4	5	8	9	13	19	20
Florida	NA	8	16	15	20	18	20	21
Georgia	5	11	12	13	15	18	20	19
Hawaii	6	16	16	24	33	32	34	s
Idaho	s	s	s	s	s	s	s	s
Illinois	4	7	9	9	11	14	16	12
Indiana	10	7	13	14	13	15	21	22
Iowa	11	9	15	17	17	18	16	18
Kansas	4	13	24	21	18	18	22	14
Kentucky	2	8	9	12	14	17	19	20
Louisiana	4	6	9	11	8	12	13	16
Maine	s	s	s	17	28	10	25	18
Maryland	6	11	14	17	21	23	22	21
Massachusetts	7	13	18	26	30	27	26	26



## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

Student characteristic and state	2000	2003	2005	2007	2009	2011	2013	2015
Michigan	3	7	8	12	9	8	10	10
Minnesota	12	16	15	16	25	23	32	25
Mississippi	2	6	7	9	8	10	11	15
Missouri	4	9	9	12	17	14	13	15
Montana	s	s	s	s	s	s	s	s
Nebraska	5	7	7	9	10	7	12	12
Nevada	4	10	10	16	12	23	17	15
New Hampshire	NA	s	s	25	s	27	s	s
New Jersey	NA	11	17	25	19	24	24	21
New Mexico	s	10	6	18	19	19	24	s
New York	5	12	13	18	19	17	17	14
North Carolina	9	14	17	15	18	18	22	22
North Dakota	s	s	s	s	s	s	35	24
Ohio	2	10	16	18	14	20	16	12
Oklahoma	4	6	11	10	14	14	14	15
Oregon	6	20	12	16	18	14	16	17
Pennsylvania	NA	8	13	18	17	17	19	15
Rhode Island	3	7	9	16	15	20	19	17
South Carolina	4	13	13	14	14	13	15	16
South Dakota	NA	s	s	15	17	21	14	11
Tennessee	4	6	9	9	7	12	15	20
Texas	10	15	18	21	23	25	24	29
Utah	s	s	s	s	15	s	s	s
Vermont	s	s	s	s	s	s	s	s
Virginia	5	13	14	18	16	20	22	25
Washington	NA	17	26	17	24	20	29	24
West Virginia	5	13	17	19	20	20	25	11

## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

Student characteristic and state	2000	2003	2005	2007	2009	2011	2013	2015
Wisconsin	s	8	7	10	11	12	12	13
Wyoming	s	s	s	s	s	s	s	s
Puerto Rico	NA	s	s	NA	NA	s	s	s
Hispanic students								
United States	7	15	19	22	21	24	26	26
Alabama	s	s	s	17	11	21	23	14
Alaska	NA	24	23	26	27	36	33	30
Arizona	5	11	14	15	15	21	28	25
Arkansas	s	15	25	22	26	28	31	25
California	4	11	14	15	14	17	19	17
Colorado	NA	13	18	19	24	26	30	22
Connecticut	6	15	15	18	18	19	19	19
Delaware	NA	17	18	25	22	25	27	25
District of Columbia	6	7	11	19	24	21	23	30
Florida	NA	27	28	33	33	31	36	38
Georgia	12	13	22	20	26	29	33	28
Hawaii	s	17	21	19	28	39	43	35
Idaho	6	11	17	18	18	17	20	15
Illinois	6	13	14	19	20	20	25	24
Indiana	s	18	21	26	23	29	39	35
Iowa	s	14	17	25	17	24	30	21
Kansas	13	19	30	29	24	26	31	23
Kentucky	s	s	s	15	22	30	30	30
Louisiana	s	s	s	31	23	20	29	35
Maine	s	s	s	s	s	s	s	s
Maryland	11	21	26	28	32	43	33	25
Massachusetts	7	13	14	23	25	32	32	28

## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

Student characteristic and state	2000	2003	2005	2007	2009	2011	2013	2015
Michigan	s	17	18	26	20	21	22	21
Minnesota	s	14	15	22	29	28	34	30
Mississippi	s	s	s	s	s	22	27	24
Missouri	s	14	10	26	37	24	29	30
Montana	s	25	30	40	41	31	34	26
Nebraska	4	9	10	15	16	20	20	22
Nevada	7	10	13	18	19	24	24	22
New Hampshire	NA	19	17	27	31	30	34	31
New Jersey	NA	18	25	29	25	28	30	28
New Mexico	6	10	13	16	18	23	26	23
New York	6	15	17	25	25	20	24	21
North Carolina	12	30	26	28	27	33	35	33
North Dakota	s	s	s	s	s	24	27	14
Ohio	s	16	21	25	25	27	36	33
Oklahoma	5	11	16	22	20	19	21	27
Oregon	10	15	14	12	16	15	20	19
Pennsylvania	NA	12	16	28	23	20	24	21
Rhode Island	3	6	9	15	14	21	23	18
South Carolina	s	26	30	21	28	28	25	34
South Dakota	NA	20	s	21	27	18	16	21
Tennessee	s	14	26	15	19	19	22	32
Texas	14	21	28	30	26	29	30	37
Utah	6	11	13	16	16	17	16	22
Vermont	s	s	s	s	s	s	s	s
Virginia	16	20	22	28	28	31	32	29
Washington	NA	18	17	19	20	22	24	25
West Virginia	s	s	s	s	s	s	s	s

## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

Student characteristic and state	2000	2003	2005	2007	2009	2011	2013	2015
Wisconsin	s	13	16	27	22	22	23	23
Wyoming	9	20	31	23	22	31	29	28
Puerto Rico	NA	s	s	NA	NA	*	1	s
Asian and Pacific Islander students								
United States	s	48	54	59	61	62	64	61
Alabama	s	s	s	s	s	s	s	s
Alaska	NA	27	36	37	35	29	32	27
Arizona	s	41	43	59	45	53	61	60
Arkansas	s	s	s	41	s	53	63	s
California	19	49	51	56	61	63	58	54
Colorado	NA	44	42	53	51	55	61	49
Connecticut	36	52	57	64	65	62	64	66
Delaware	NA	59	70	70	66	69	81	63
District of Columbia	s	s	s	s	s	s	s	s
Florida	NA	53	66	59	73	64	77	65
Georgia	s	53	57	63	60	70	71	65
Hawaii	12	21	25	31	35	37	42	36
Idaho	s	s	s	s	s	52	s	s
Illinois	s	58	66	62	73	63	73	69
Indiana	s	s	s	s	s	s	s	s
Iowa	s	s	52	s	66	52	54	48
Kansas	s	s	71	67	64	59	68	56
Kentucky	s	s	s	s	69	66	68	62
Louisiana	s	s	s	s	s	s	s	s
Maine	s	s	s	s	s	48	s	s
Maryland	27	58	59	68	67	74	77	68
Massachusetts	36	49	64	66	70	76	72	81

## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

Student characteristic and state	2000	2003	2005	2007	2009	2011	2013	2015
Michigan	s	47	56	69	55	71	62	57
Minnesota	12	27	40	43	44	57	52	46
Mississippi	s	s	s	s	s	s	s	s
Missouri	s	s	s	s	62	57	s	s
Montana	s	s	s	s	s	s	s	s
Nebraska	s	s	s	s	55	40	51	s
Nevada	22	34	42	43	45	58	45	48
New Hampshire	NA	s	s	64	67	70	67	69
New Jersey	NA	61	74	78	72	75	76	79
New Mexico	s	s	s	s	s	63	s	s
New York	36	51	61	69	67	58	68	57
North Carolina	s	60	63	60	62	71	67	65
North Dakota	s	s	s	s	s	s	55	s
Ohio	s	s	s	s	s	58	65	s
Oklahoma	s	45	s	48	s	55	59	s
Oregon	35	46	54	53	48	51	60	48
Pennsylvania	NA	s	64	66	62	75	67	65
Rhode Island	18	22	39	41	40	49	37	42
South Carolina	s	s	s	s	s	s	s	s
South Dakota	NA	s	s	s	s	s	s	s
Tennessee	s	s	s	s	s	51	62	61
Texas	47	62	72	70	71	69	82	82
Utah	18	16	33	44	39	31	35	30
Vermont	s	s	s	s	s	s	s	s
Virginia	46	60	64	60	64	70	70	79
Washington	NA	44	46	54	56	62	66	69
West Virginia	s	s	s	s	s	s	s	s

## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

Student characteristic and state	2000	2003	2005	2007	2009	2011	2013	2015
Wisconsin	s	26	29	50	39	42	49	52
Wyoming	s	s	s	s	s	s	s	s
Puerto Rico	NA	s	s	NA	NA	s	s	s
Male students								
United States	25	34	37	41	40	41	42	41
Alabama	14	19	22	27	25	28	31	28
Alaska	NA	33	35	38	40	38	38	38
Arizona	16	28	32	34	30	36	40	40
Arkansas	14	27	36	38	39	37	39	33
California	13	28	30	31	32	35	35	31
Colorado	NA	37	41	44	46	49	53	45
Connecticut	33	45	45	46	49	46	46	42
Delaware	NA	34	38	40	40	40	43	38
District of Columbia	6	8	11	14	17	21	28	29
Florida	NA	33	38	43	42	38	41	43
Georgia	19	29	30	33	35	37	40	36
Hawaii	15	24	26	33	37	39	45	39
Idaho	20	34	42	42	42	41	44	40
Illinois	23	34	33	40	41	39	39	38
Indiana	31	37	38	48	42	46	52	51
Iowa	28	39	40	46	43	44	49	46
Kansas	31	44	48	54	48	48	49	43
Kentucky	19	24	29	33	39	39	43	43
Louisiana	14	22	26	25	24	26	28	31
Maine	25	37	41	43	48	48	48	44
Maryland	23	33	40	43	44	50	47	41
Massachusetts	33	44	50	60	59	60	59	57

## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

Student characteristic and state	2000	2003	2005	2007	2009	2011	2013	2015
Michigan	30	38	41	39	37	37	38	36
Minnesota	36	45	50	54	56	54	60	54
Mississippi	10	18	20	22	23	25	27	30
Missouri	24	30	34	40	43	42	40	41
Montana	27	33	42	47	49	48	48	44
Nebraska	25	36	39	40	39	41	48	47
Nevada	18	25	28	33	34	38	36	33
New Hampshire	NA	46	50	54	58	58	61	53
New Jersey	NA	41	47	55	51	53	51	49
New Mexico	14	21	21	26	27	31	33	28
New York	23	35	39	45	43	37	40	36
North Carolina	26	42	41	43	44	44	46	46
North Dakota	27	38	43	50	47	49	49	47
Ohio	28	37	45	49	48	47	49	46
Oklahoma	17	25	31	34	35	34	38	40
Oregon	25	35	37	38	40	37	42	40
Pennsylvania	NA	39	44	50	48	49	45	47
Rhode Island	25	29	32	36	43	43	44	39
South Carolina	20	34	37	36	36	36	36	37
South Dakota	NA	37	43	43	44	42	40	41
Tennessee	20	25	30	31	29	30	41	42
Texas	28	35	43	41	39	39	42	46
Utah	24	34	39	42	42	46	47	46
Vermont	29	44	47	51	53	52	52	43
Virginia	26	38	42	44	46	48	48	47
Washington	NA	39	43	46	45	46	49	47
West Virginia	19	26	28	35	30	33	36	33

## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

Student characteristic and state	2000	2003	2005	2007	2009	2011	2013	2015
Wisconsin	s	38	42	48	47	49	49	46
Wyoming	27	41	45	46	43	46	48	51
Puerto Rico	NA	s	s	NA	NA	*	1	*
Female students								
United States	20	29	33	36	37	39	40	38
Alabama	13	18	20	25	24	27	28	24
Alaska	NA	27	32	37	36	35	36	32
Arizona	15	23	24	27	26	31	39	35
Arkansas	13	25	32	35	34	37	39	31
California	13	22	26	28	29	33	30	27
Colorado	NA	31	36	38	44	45	47	40
Connecticut	29	37	40	43	44	44	44	39
Delaware	NA	29	34	40	33	37	42	36
District of Columbia	5	7	9	13	17	22	28	32
Florida	NA	29	35	38	39	36	40	41
Georgia	16	25	29	30	32	37	38	33
Hawaii	14	22	28	34	37	40	47	37
Idaho	19	27	39	38	39	38	36	36
Illinois	17	29	30	33	35	37	39	36
Indiana	28	34	38	45	41	42	52	48
Iowa	24	32	34	40	40	42	46	43
Kansas	26	39	45	48	44	47	46	40
Kentucky	15	20	24	29	34	38	40	38
Louisiana	13	20	21	24	21	26	24	29
Maine	20	31	36	40	42	42	47	38
Maryland	20	29	36	37	43	45	46	40
Massachusetts	29	38	48	55	55	57	58	50



## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

Student characteristic and state	2000	2003	2005	2007	2009	2011	2013	2015
Michigan	26	30	34	35	33	33	36	32
Minnesota	29	38	45	47	51	52	59	53
Mississippi	8	16	18	20	21	25	25	29
Missouri	22	29	28	37	39	41	37	35
Montana	21	29	34	42	41	43	42	38
Nebraska	23	31	33	35	37	37	41	45
Nevada	13	21	24	27	30	33	32	31
New Hampshire	NA	39	44	49	54	56	57	50
New Jersey	NA	36	43	49	46	49	48	44
New Mexico	10	14	17	23	25	28	28	25
New York	18	31	33	42	37	34	39	34
North Carolina	24	40	38	39	42	44	45	42
North Dakota	23	30	38	41	42	44	47	42
Ohio	21	34	40	43	43	44	47	43
Oklahoma	14	20	26	31	30	33	35	34
Oregon	20	31	37	32	34	36	38	34
Pennsylvania	NA	32	39	44	43	46	44	43
Rhode Island	19	27	29	32	36	42	41	36
South Carolina	15	29	35	36	32	36	35	35
South Dakota	NA	31	38	38	39	37	40	38
Tennessee	16	22	25	26	28	29	40	38
Texas	23	31	37	39	37	39	40	42
Utah	21	28	34	37	40	40	41	41
Vermont	29	39	39	47	49	46	51	44
Virginia	22	35	37	39	39	44	46	47
Washington	NA	33	41	41	42	43	48	47
West Virginia	15	22	22	30	26	29	34	33

## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

Student characteristic and state	2000	2003	2005	2007	2009	2011	2013	2015
Wisconsin	s	32	39	46	43	45	45	45
Wyoming	22	36	40	43	38	42	47	46
Puerto Rico	NA	s	s	NA	NA	*	1	*

\* = rounds to zero; NA = not available; s = suppressed for reasons of confidentiality and/or reliability.

NAEP = National Assessment of Educational Progress.

### Note(s)

The NAEP scores are for public schools only. The national value for the United States is the reported value in the NAEP reports. Black includes African American. Hispanic includes Latino. Asian and Pacific Islander includes Native Hawaiian.

### Source(s)

National Center for Education Statistics, NAEP (various years).

*Science and Engineering Indicators 2018*

## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

APPENDIX TABLE 1-8



### Average scores of students in grade 4 on the main NAEP science assessment, by race or ethnicity and sex, by state: 2009 and 2015

(Score out of 300)

Student characteristic and state	2009	2015
White students		
United States	162	165
Alabama	155	158
Alaska	NA	NA
Arizona	155	166
Arkansas	157	159
California	157	161
Colorado	166	NA
Connecticut	167	165
Delaware	166	163
District of Columbia	NA	NA
Florida	163	169
Georgia	159	166
Hawaii	159	162
Idaho	159	161
Illinois	164	166
Indiana	158	165
Iowa	161	164
Kansas	NA	162
Kentucky	164	164
Louisiana	159	NA
Maine	161	159
Maryland	164	167
Massachusetts	169	169

## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

Student characteristic and state	2009	2015
Michigan	160	161
Minnesota	166	166
Mississippi	152	158
Missouri	164	164
Montana	164	164
Nebraska	NA	170
Nevada	156	155
New Hampshire	165	167
New Jersey	166	167
New Mexico	163	161
New York	161	164
North Carolina	162	167
North Dakota	165	165
Ohio	165	164
Oklahoma	156	160
Oregon	157	162
Pennsylvania	164	NA
Rhode Island	161	162
South Carolina	163	168
South Dakota	162	163
Tennessee	159	165
Texas	168	173
Utah	161	166
Vermont	NA	164
Virginia	172	175
Washington	160	167
West Virginia	150	152

## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

Student characteristic and state	2009	2015
Wisconsin	164	165
Wyoming	159	166
Puerto Rico	NA	NA
Black students		
United States	127	132
Alabama	121	124
Alaska	NA	NA
Arizona	129	139
Arkansas	117	129
California	122	125
Colorado	128	NA
Connecticut	129	130
Delaware	135	134
District of Columbia	NA	NA
Florida	131	138
Georgia	126	135
Hawaii	134	s
Idaho	s	s
Illinois	120	125
Indiana	129	132
Iowa	130	134
Kansas	NA	130
Kentucky	135	138
Louisiana	123	NA
Maine	139	130
Maryland	131	133
Massachusetts	138	140

## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

Student characteristic and state	2009	2015
Michigan	118	123
Minnesota	129	125
Mississippi	116	123
Missouri	127	123
Montana	s	s
Nebraska	NA	136
Nevada	122	125
New Hampshire	s	s
New Jersey	133	132
New Mexico	134	135
New York	127	130
North Carolina	126	135
North Dakota	s	140
Ohio	129	127
Oklahoma	125	137
Oregon	131	s
Pennsylvania	121	NA
Rhode Island	126	134
South Carolina	128	135
South Dakota	s	142
Tennessee	121	135
Texas	139	143
Utah	s	s
Vermont	NA	s
Virginia	141	144
Washington	127	136
West Virginia	130	129

## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

Student characteristic and state	2009	2015
Wisconsin	121	119
Wyoming	s	s
Puerto Rico	NA	NA
Hispanic students		
United States	130	138
Alabama	125	129
Alaska	NA	NA
Arizona	124	137
Arkansas	136	141
California	121	128
Colorado	134	NA
Connecticut	128	135
Delaware	142	140
District of Columbia	NA	NA
Florida	144	156
Georgia	133	143
Hawaii	134	142
Idaho	128	133
Illinois	129	137
Indiana	136	144
Iowa	134	141
Kansas	NA	139
Kentucky	150	149
Louisiana	144	NA
Maine	s	s
Maryland	143	145
Massachusetts	132	140

## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

Student characteristic and state	2009	2015
Michigan	138	142
Minnesota	134	139
Mississippi	142	140
Missouri	141	145
Montana	149	146
Nebraska	NA	143
Nevada	128	133
New Hampshire	139	146
New Jersey	136	139
New Mexico	134	137
New York	130	135
North Carolina	132	141
North Dakota	s	150
Ohio	140	144
Oklahoma	131	140
Oregon	128	132
Pennsylvania	125	NA
Rhode Island	124	131
South Carolina	140	148
South Dakota	145	146
Tennessee	134	146
Texas	136	146
Utah	129	134
Vermont	NA	s
Virginia	152	151
Washington	125	138
West Virginia	s	s



## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

Student characteristic and state	2009	2015
Wisconsin	138	140
Wyoming	140	147
Puerto Rico	NA	NA
Asian and Pacific Islander students		
United States	160	166
Alabama	s	s
Alaska	NA	NA
Arizona	156	s
Arkansas	152	s
California	160	163
Colorado	162	NA
Connecticut	164	164
Delaware	169	171
District of Columbia	NA	NA
Florida	158	s
Georgia	167	174
Hawaii	138	142
Idaho	156	s
Illinois	166	173
Indiana	s	s
Iowa	156	s
Kansas	NA	162
Kentucky	172	s
Louisiana	s	NA
Maine	s	s
Maryland	164	174
Massachusetts	167	174

## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

Student characteristic and state	2009	2015
Michigan	162	169
Minnesota	147	148
Mississippi	s	s
Missouri	s	s
Montana	s	s
Nebraska	NA	s
Nevada	151	151
New Hampshire	171	169
New Jersey	173	175
New Mexico	s	s
New York	156	159
North Carolina	163	164
North Dakota	s	s
Ohio	s	s
Oklahoma	s	s
Oregon	159	159
Pennsylvania	166	NA
Rhode Island	152	158
South Carolina	s	s
South Dakota	s	s
Tennessee	s	s
Texas	163	184
Utah	147	s
Vermont	NA	s
Virginia	174	181
Washington	156	164
West Virginia	s	s

## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

Student characteristic and state	2009	2015
Wisconsin	153	156
Wyoming	s	s
Puerto Rico	NA	NA
Male students		
United States	149	153
Alabama	144	145
Alaska	NA	NA
Arizona	137	149
Arkansas	146	151
California	136	141
Colorado	156	NA
Connecticut	156	154
Delaware	153	151
District of Columbia	NA	NA
Florida	151	158
Georgia	145	152
Hawaii	137	145
Idaho	154	157
Illinois	148	152
Indiana	153	160
Iowa	158	159
Kansas	NA	155
Kentucky	161	161
Louisiana	141	NA
Maine	161	158
Maryland	151	154
Massachusetts	162	163

## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

Student characteristic and state	2009	2015
Michigan	151	154
Minnesota	159	157
Mississippi	134	141
Missouri	155	155
Montana	160	159
Nebraska	NA	161
Nevada	142	141
New Hampshire	163	165
New Jersey	156	155
New Mexico	142	144
New York	148	150
North Carolina	149	154
North Dakota	164	163
Ohio	159	159
Oklahoma	148	155
Oregon	151	153
Pennsylvania	156	NA
Rhode Island	151	151
South Carolina	150	155
South Dakota	158	157
Tennessee	149	156
Texas	148	154
Utah	155	161
Vermont	NA	163
Virginia	161	164
Washington	151	158
West Virginia	149	151

## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

Student characteristic and state	2009	2015
Wisconsin	157	156
Wyoming	157	162
Puerto Rico	NA	NA
Female students		
United States	148	153
Alabama	142	145
Alaska	NA	NA
Arizona	138	148
Arkansas	146	149
California	137	140
Colorado	153	NA
Connecticut	155	155
Delaware	152	150
District of Columbia	NA	NA
Florida	150	158
Georgia	143	152
Hawaii	143	147
Idaho	153	155
Illinois	147	151
Indiana	152	158
Iowa	157	159
Kansas	NA	154
Kentucky	160	159
Louisiana	141	NA
Maine	158	158
Maryland	149	151
Massachusetts	159	160

## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

Student characteristic and state	2009	2015
Michigan	149	154
Minnesota	158	158
Mississippi	132	140
Missouri	158	155
Montana	160	159
Nebraska	NA	163
Nevada	139	142
New Hampshire	163	165
New Jersey	154	154
New Mexico	141	142
New York	147	149
North Carolina	146	153
North Dakota	160	159
Ohio	155	156
Oklahoma	148	152
Oregon	151	154
Pennsylvania	151	NA
Rhode Island	149	154
South Carolina	149	157
South Dakota	156	157
Tennessee	148	158
Texas	147	155
Utah	153	158
Vermont	NA	163
Virginia	162	166
Washington	151	157
West Virginia	147	151

## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

Student characteristic and state	2009	2015
Wisconsin	156	157
Wyoming	154	160
Puerto Rico	NA	NA

NA = not available; s = suppressed for reasons of confidentiality and/or reliability.

NAEP = National Assessment of Educational Progress.

### Note(s)

The NAEP scores are for public schools only. The national value for the United States is the reported value in the NAEP reports. Black includes African American. Hispanic includes Latino. Asian and Pacific Islander includes Native Hawaiian.

### Source(s)

National Center for Education Statistics, NAEP (various years).

*Science and Engineering Indicators 2018*

## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

APPENDIX TABLE 1-9



### Students in grade 4 scoring at or above the main NAEP's proficient level in science, by race or ethnicity and sex, by state: 2009 and 2015

(Percent)

Student characteristic and state	2009	2015
White students		
United States	46	50
Alabama	39	39
Alaska	NA	NA
Arizona	37	51
Arkansas	38	43
California	41	43
Colorado	53	NA
Connecticut	53	51
Delaware	50	48
District of Columbia	NA	NA
Florida	46	56
Georgia	42	51
Hawaii	43	52
Idaho	40	45
Illinois	48	51
Indiana	41	49
Iowa	45	48
Kansas	NA	46
Kentucky	49	48
Louisiana	42	NA
Maine	43	41
Maryland	48	54
Massachusetts	56	56



## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

Student characteristic and state	2009	2015
Michigan	43	44
Minnesota	51	51
Mississippi	31	39
Missouri	47	47
Montana	47	48
Nebraska	NA	57
Nevada	37	38
New Hampshire	49	52
New Jersey	52	54
New Mexico	48	44
New York	44	49
North Carolina	45	52
North Dakota	49	50
Ohio	50	48
Oklahoma	37	42
Oregon	40	45
Pennsylvania	48	NA
Rhode Island	44	46
South Carolina	49	55
South Dakota	46	46
Tennessee	43	50
Texas	53	61
Utah	45	52
Vermont	NA	49
Virginia	59	63
Washington	44	53
West Virginia	29	32

## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

Student characteristic and state	2009	2015
Wisconsin	49	50
Wyoming	41	51
Puerto Rico	NA	NA
Black students		
United States	10	14
Alabama	6	8
Alaska	NA	NA
Arizona	13	19
Arkansas	6	10
California	9	11
Colorado	12	NA
Connecticut	9	10
Delaware	11	14
District of Columbia	NA	NA
Florida	10	17
Georgia	10	16
Hawaii	16	s
Idaho	s	s
Illinois	9	10
Indiana	9	11
Iowa	14	15
Kansas	NA	13
Kentucky	15	22
Louisiana	8	NA
Maine	26	13
Maryland	12	15
Massachusetts	17	21

## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

Student characteristic and state	2009	2015
Michigan	6	9
Minnesota	12	14
Mississippi	4	8
Missouri	12	10
Montana	s	s
Nebraska	NA	18
Nevada	8	12
New Hampshire	s	s
New Jersey	12	14
New Mexico	16	14
New York	9	12
North Carolina	9	15
North Dakota	s	17
Ohio	10	9
Oklahoma	8	15
Oregon	12	s
Pennsylvania	7	NA
Rhode Island	10	15
South Carolina	10	17
South Dakota	s	21
Tennessee	8	18
Texas	18	23
Utah	s	s
Vermont	NA	s
Virginia	18	23
Washington	8	14
West Virginia	11	12

## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

Student characteristic and state	2009	2015
Wisconsin	8	8
Wyoming	s	s
Puerto Rico	NA	NA
Hispanic students		
United States	13	20
Alabama	9	9
Alaska	NA	NA
Arizona	9	20
Arkansas	15	19
California	8	12
Colorado	15	NA
Connecticut	11	15
Delaware	20	17
District of Columbia	NA	NA
Florida	23	38
Georgia	15	25
Hawaii	22	25
Idaho	10	14
Illinois	10	19
Indiana	15	22
Iowa	15	17
Kansas	NA	17
Kentucky	31	30
Louisiana	23	NA
Maine	s	s
Maryland	21	26
Massachusetts	12	20

## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

Student characteristic and state	2009	2015
Michigan	20	25
Minnesota	16	21
Mississippi	21	15
Missouri	21	26
Montana	26	26
Nebraska	NA	21
Nevada	12	15
New Hampshire	20	27
New Jersey	15	20
New Mexico	15	18
New York	13	16
North Carolina	11	19
North Dakota	s	31
Ohio	26	28
Oklahoma	12	18
Oregon	12	14
Pennsylvania	12	NA
Rhode Island	9	14
South Carolina	23	30
South Dakota	23	24
Tennessee	17	30
Texas	16	29
Utah	12	17
Vermont	NA	s
Virginia	32	32
Washington	10	19
West Virginia	s	s

## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

Student characteristic and state	2009	2015
Wisconsin	17	20
Wyoming	18	23
Puerto Rico	NA	NA
Asian and Pacific Islander students		
United States	45	52
Alabama	s	s
Alaska	NA	NA
Arizona	43	s
Arkansas	34	s
California	45	46
Colorado	48	NA
Connecticut	48	47
Delaware	53	63
District of Columbia	NA	NA
Florida	44	s
Georgia	50	60
Hawaii	21	26
Idaho	39	s
Illinois	51	63
Indiana	s	s
Iowa	43	s
Kansas	NA	48
Kentucky	65	s
Louisiana	s	NA
Maine	s	s
Maryland	47	64
Massachusetts	53	63

## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

Student characteristic and state	2009	2015
Michigan	49	57
Minnesota	31	31
Mississippi	s	s
Missouri	s	s
Montana	s	s
Nebraska	NA	s
Nevada	32	31
New Hampshire	57	54
New Jersey	63	63
New Mexico	s	s
New York	38	46
North Carolina	52	50
North Dakota	s	s
Ohio	s	s
Oklahoma	s	s
Oregon	44	46
Pennsylvania	53	NA
Rhode Island	37	38
South Carolina	s	s
South Dakota	s	s
Tennessee	s	s
Texas	47	74
Utah	28	s
Vermont	NA	s
Virginia	61	71
Washington	41	49
West Virginia	s	s

## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

Student characteristic and state	2009	2015
Wisconsin	37	37
Wyoming	s	s
Puerto Rico	NA	NA
Male students		
United States	34	38
Alabama	29	28
Alaska	NA	NA
Arizona	23	33
Arkansas	30	36
California	22	26
Colorado	40	NA
Connecticut	42	38
Delaware	35	34
District of Columbia	NA	NA
Florida	33	42
Georgia	29	36
Hawaii	24	29
Idaho	37	41
Illinois	34	36
Indiana	36	43
Iowa	42	43
Kansas	NA	38
Kentucky	46	46
Louisiana	26	NA
Maine	44	38
Maryland	33	39
Massachusetts	47	48



## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

Student characteristic and state	2009	2015
Michigan	37	39
Minnesota	45	42
Mississippi	18	25
Missouri	40	40
Montana	43	44
Nebraska	NA	46
Nevada	26	25
New Hampshire	47	51
New Jersey	41	41
New Mexico	25	26
New York	31	35
North Carolina	33	38
North Dakota	49	47
Ohio	45	43
Oklahoma	29	36
Oregon	34	37
Pennsylvania	41	NA
Rhode Island	36	35
South Carolina	34	39
South Dakota	42	40
Tennessee	33	41
Texas	30	39
Utah	39	48
Vermont	NA	49
Virginia	45	49
Washington	34	42
West Virginia	30	32

## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

Student characteristic and state	2009	2015
Wisconsin	41	41
Wyoming	38	47
Puerto Rico	NA	NA
Female students		
United States	31	36
Alabama	25	27
Alaska	NA	NA
Arizona	21	32
Arkansas	27	31
California	22	22
Colorado	37	NA
Connecticut	38	38
Delaware	32	31
District of Columbia	NA	NA
Florida	31	41
Georgia	25	34
Hawaii	25	32
Idaho	34	36
Illinois	30	34
Indiana	34	40
Iowa	40	40
Kansas	NA	36
Kentucky	43	43
Louisiana	24	NA
Maine	39	40
Maryland	32	35
Massachusetts	43	45

## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

Student characteristic and state	2009	2015
Michigan	32	37
Minnesota	41	43
Mississippi	16	21
Missouri	40	38
Montana	42	41
Nebraska	NA	48
Nevada	21	23
New Hampshire	48	51
New Jersey	37	38
New Mexico	23	23
New York	29	32
North Carolina	27	34
North Dakota	42	42
Ohio	38	39
Oklahoma	28	31
Oregon	34	37
Pennsylvania	36	NA
Rhode Island	32	36
South Carolina	33	41
South Dakota	38	39
Tennessee	33	42
Texas	28	39
Utah	36	42
Vermont	NA	48
Virginia	47	52
Washington	35	42
West Virginia	26	31

## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

Student characteristic and state	2009	2015
Wisconsin	40	41
Wyoming	36	43
Puerto Rico	NA	NA

NA = not available; s = suppressed for reasons of confidentiality and/or reliability.

NAEP = National Assessment of Educational Progress.

### Note(s)

The NAEP scores are for public schools only. The national value for the United States is the reported value in the NAEP reports. Black includes African American. Hispanic includes Latino. Asian and Pacific Islander includes Native Hawaiian.

### Source(s)

National Center for Education Statistics, NAEP (various years).

*Science and Engineering Indicators 2018*

## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

APPENDIX TABLE 1-10



### Average scores of students in grade 8 on the main NAEP mathematics assessment, by race or ethnicity and sex, by state: 2000–15

(Score out of 500)

Student characteristic and state	2000	2003	2005	2007	2009	2011	2013	2015
White students								
United States	283	287	288	290	292	293	293	291
Alabama	275	274	276	278	280	280	280	276
Alaska	NA	290	288	294	293	296	294	295
Arizona	281	284	288	289	292	294	294	297
Arkansas	268	275	281	282	284	287	286	283
California	277	283	284	287	289	290	291	291
Colorado	NA	292	292	296	299	302	300	297
Connecticut	291	293	293	293	298	297	297	295
Delaware	NA	287	291	294	294	294	293	291
District of Columbia	300	s	317	s	s	319	317	316
Florida	NA	286	286	289	289	287	291	285
Georgia	279	284	284	288	289	291	292	291
Hawaii	274	273	277	278	282	290	290	286
Idaho	280	284	284	287	292	291	291	288
Illinois	285	289	289	291	294	294	296	290
Indiana	285	286	286	290	291	290	293	294
Iowa	NA	287	286	288	287	288	289	291
Kansas	287	290	289	295	294	295	295	289
Kentucky	272	277	276	282	282	284	283	281
Louisiana	275	281	281	283	283	283	285	280
Maine	281	282	281	287	287	290	290	286
Maryland	286	289	292	300	303	303	299	297
Massachusetts	284	292	297	305	305	304	307	304

## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

Student characteristic and state	2000	2003	2005	2007	2009	2011	2013	2015
Michigan	285	286	285	285	286	286	287	285
Minnesota	290	295	296	297	300	302	301	302
Mississippi	268	275	279	279	279	283	285	284
Missouri	277	284	284	288	290	288	288	285
Montana	288	289	290	291	296	297	293	292
Nebraska	285	287	289	291	291	290	292	295
Nevada	273	278	280	282	287	292	289	288
New Hampshire	NA	287	286	289	293	293	297	295
New Jersey	NA	292	295	298	302	304	303	301
New Mexico	274	282	279	285	288	290	289	285
New York	284	293	290	290	294	291	294	290
North Carolina	287	294	292	295	297	296	296	292
North Dakota	285	290	290	295	296	296	294	293
Ohio	285	287	289	291	291	295	294	291
Oklahoma	274	278	278	280	282	286	281	281
Oregon	284	284	287	289	290	287	290	289
Pennsylvania	NA	285	287	293	294	294	297	292
Rhode Island	275	280	281	284	286	292	294	290
South Carolina	277	291	294	293	293	293	292	288
South Dakota	NA	288	291	292	295	295	294	290
Tennessee	269	277	278	282	282	281	284	285
Texas	286	290	295	300	301	304	300	298
Utah	277	285	283	286	289	289	291	292
Vermont	281	286	288	292	293	295	296	291
Virginia	283	290	293	296	294	297	296	295
Washington	NA	285	289	291	295	294	296	294
West Virginia	267	271	270	271	271	274	275	272

## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

Student characteristic and state	2000	2003	2005	2007	2009	2011	2013	2015
Wisconsin	s	290	291	292	294	295	296	296
Wyoming	278	286	284	290	289	291	290	290
Puerto Rico	NA	s	s	NA	NA	s	s	s
Black students								
United States	243	252	254	259	260	262	263	260
Alabama	240	240	240	246	248	250	250	248
Alaska	NA	263	266	271	268	273	270	269
Arizona	244	256	261	266	269	269	266	269
Arkansas	227	239	243	254	251	257	255	255
California	235	246	248	253	250	254	258	260
Colorado	NA	255	256	272	263	270	260	260
Connecticut	247	255	249	255	261	262	260	256
Delaware	NA	260	264	265	267	266	264	263
District of Columbia	231	240	241	245	249	256	261	257
Florida	NA	249	251	259	264	258	264	258
Georgia	244	250	255	261	262	262	262	264
Hawaii	s	s	s	s	271	277	s	s
Idaho	s	s	s	s	s	s	s	s
Illinois	252	249	249	253	255	260	260	261
Indiana	256	251	257	259	266	264	265	257
Iowa	NA	257	256	257	259	258	255	254
Kansas	245	252	256	267	264	269	268	263
Kentucky	250	250	255	257	258	261	260	257
Louisiana	239	250	252	258	257	259	259	255
Maine	s	s	s	s	261	265	262	s
Maryland	244	256	258	265	266	267	268	263
Massachusetts	258	260	263	264	272	275	277	268

## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

Student characteristic and state	2000	2003	2005	2007	2009	2011	2013	2015
Michigan	239	245	247	244	246	250	251	251
Minnesota	s	251	251	260	264	266	260	262
Mississippi	237	246	247	251	251	255	255	257
Missouri	238	250	247	253	260	254	260	258
Montana	s	s	s	s	s	s	s	s
Nebraska	247	247	243	240	253	255	250	254
Nevada	244	248	247	255	256	259	263	256
New Hampshire	NA	s	s	s	s	s	s	s
New Jersey	NA	253	260	264	267	272	274	269
New Mexico	s	254	257	264	259	265	258	s
New York	251	255	259	258	262	264	262	264
North Carolina	252	260	263	266	262	267	268	263
North Dakota	s	s	s	s	s	s	272	263
Ohio	251	257	255	258	260	263	267	259
Oklahoma	245	249	249	258	261	262	256	260
Oregon	s	265	258	272	264	263	s	s
Pennsylvania	NA	247	250	257	260	257	262	253
Rhode Island	240	244	249	250	256	256	263	258
South Carolina	247	258	263	265	263	263	261	256
South Dakota	NA	s	s	s	s	270	254	s
Tennessee	235	242	246	254	254	252	257	253
Texas	250	260	264	271	272	277	273	267
Utah	s	s	s	s	s	s	s	s
Vermont	s	s	s	s	s	s	258	s
Virginia	253	262	263	268	268	268	267	265
Washington	NA	262	265	264	269	265	269	257
West Virginia	247	253	251	250	263	260	264	256



## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

Student characteristic and state	2000	2003	2005	2007	2009	2011	2013	2015
Wisconsin	s	241	246	247	254	256	252	249
Wyoming	s	s	s	s	s	s	s	s
Puerto Rico	NA	s	s	NA	NA	s	s	s
Hispanic students								
United States	252	258	261	264	266	269	271	269
Alabama	s	s	s	249	260	255	257	260
Alaska	NA	263	272	274	275	277	277	279
Arizona	248	258	260	262	265	266	269	273
Arkansas	s	248	266	256	269	272	274	269
California	242	250	254	256	256	260	263	263
Colorado	NA	259	260	264	267	271	273	269
Connecticut	249	259	254	254	263	262	258	261
Delaware	NA	257	268	267	278	274	276	270
District of Columbia	236	246	252	251	265	261	265	265
Florida	NA	264	265	270	274	274	274	272
Georgia	s	262	258	266	270	277	276	270
Hawaii	s	263	257	264	276	263	280	271
Idaho	250	251	261	264	264	267	268	264
Illinois	258	259	265	265	269	272	272	273
Indiana	s	261	261	267	273	275	278	271
Iowa	NA	255	264	261	266	269	265	269
Kansas	263	263	266	269	274	274	276	274
Kentucky	s	s	s	s	272	269	269	274
Louisiana	s	s	s	s	s	269	277	271
Maine	s	s	s	s	s	s	s	s
Maryland	263	262	262	272	275	273	280	273
Massachusetts	246	255	265	270	271	273	277	271

## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

Student characteristic and state	2000	2003	2005	2007	2009	2011	2013	2015
Michigan	s	267	265	259	269	274	261	269
Minnesota	s	262	263	269	269	270	273	272
Mississippi	s	s	s	s	s	273	279	269
Missouri	s	s	s	270	284	267	276	270
Montana	s	s	s	s	278	285	282	275
Nebraska	242	255	261	261	262	261	267	266
Nevada	249	250	256	257	262	266	268	266
New Hampshire	NA	s	s	264	270	266	270	270
New Jersey	NA	262	264	271	272	274	283	272
New Mexico	251	254	255	260	262	269	268	266
New York	251	262	262	264	262	263	265	268
North Carolina	s	263	265	273	274	275	279	273
North Dakota	s	s	s	s	s	s	s	276
Ohio	s	270	259	276	267	273	277	266
Oklahoma	260	258	257	259	263	264	265	266
Oregon	248	258	257	261	264	268	266	266
Pennsylvania	NA	253	267	264	266	269	264	261
Rhode Island	240	245	244	251	255	261	263	265
South Carolina	s	s	269	272	269	273	272	272
South Dakota	NA	s	s	269	268	274	274	272
Tennessee	s	s	s	264	270	266	270	273
Texas	262	267	271	277	277	283	281	277
Utah	244	249	255	256	259	257	258	262
Vermont	s	s	s	s	s	s	s	s
Virginia	263	268	270	275	274	279	279	279
Washington	NA	263	262	263	264	269	273	269
West Virginia	s	s	s	s	s	s	s	s

## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

Student characteristic and state	2000	2003	2005	2007	2009	2011	2013	2015
Wisconsin	s	262	265	268	268	270	273	271
Wyoming	257	265	265	274	269	271	278	273
Puerto Rico	NA	s	s	NA	NA	218	218	s
Asian and Pacific Islander students								
United States	287	289	294	296	300	302	306	305
Alabama	s	s	s	s	s	s	s	s
Alaska	NA	280	270	282	282	282	273	275
Arizona	s	s	s	303	295	302	302	305
Arkansas	s	s	s	s	s	s	s	s
California	283	287	293	293	294	298	305	303
Colorado	NA	290	s	297	301	313	303	303
Connecticut	s	296	292	307	305	307	308	309
Delaware	NA	s	306	309	312	311	313	317
District of Columbia	s	s	s	s	s	s	s	s
Florida	NA	287	299	293	302	312	310	297
Georgia	s	286	301	s	300	302	310	317
Hawaii	260	265	264	268	274	277	280	279
Idaho	s	s	s	s	s	s	s	s
Illinois	s	302	300	303	304	314	313	309
Indiana	s	s	s	s	s	s	s	s
Iowa	NA	s	s	s	s	291	299	291
Kansas	s	284	s	302	s	300	301	301
Kentucky	s	s	s	s	s	s	307	304
Louisiana	s	s	s	s	s	s	s	s
Maine	s	s	s	s	s	s	s	s
Maryland	297	302	304	313	320	311	319	314
Massachusetts	292	304	314	315	314	320	323	324

## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

Student characteristic and state	2000	2003	2005	2007	2009	2011	2013	2015
Michigan	s	s	s	s	309	310	310	313
Minnesota	s	284	285	283	283	282	291	293
Mississippi	s	s	s	s	s	s	s	s
Missouri	s	s	s	s	s	s	s	s
Montana	s	s	s	s	s	s	s	s
Nebraska	s	s	s	s	s	s	303	s
Nevada	273	280	281	285	283	287	297	294
New Hampshire	NA	s	s	s	308	303	311	312
New Jersey	NA	306	309	314	323	318	324	331
New Mexico	s	s	s	s	s	s	s	s
New York	280	290	298	302	309	302	305	298
North Carolina	s	297	303	299	311	314	298	309
North Dakota	s	s	s	s	s	s	s	s
Ohio	s	s	s	s	s	s	311	305
Oklahoma	s	s	s	s	289	304	298	s
Oregon	285	292	299	299	296	297	300	304
Pennsylvania	NA	s	297	314	305	310	307	316
Rhode Island	267	265	278	282	292	287	283	299
South Carolina	s	s	s	s	s	s	s	s
South Dakota	NA	s	s	s	s	s	s	s
Tennessee	s	s	s	s	s	s	s	s
Texas	292	303	308	309	313	316	319	312
Utah	262	275	273	277	276	284	283	s
Vermont	s	s	s	s	s	s	s	s
Virginia	293	297	300	299	304	313	311	317
Washington	NA	285	294	289	302	302	305	309
West Virginia	s	s	s	s	s	s	s	s

## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

Student characteristic and state	2000	2003	2005	2007	2009	2011	2013	2015
Wisconsin	s	273	286	290	289	290	290	295
Wyoming	s	s	s	s	s	s	s	s
Puerto Rico	NA	s	s	NA	NA	s	s	s
Male students								
United States	273	277	278	281	283	283	284	281
Alabama	265	263	261	267	268	269	269	266
Alaska	NA	280	280	282	283	283	282	280
Arizona	271	271	274	277	279	282	280	283
Arkansas	256	265	270	274	275	280	277	275
California	259	268	269	270	272	273	277	275
Colorado	NA	284	281	287	289	291	289	287
Connecticut	283	285	281	282	288	288	285	284
Delaware	NA	278	283	285	284	282	284	280
District of Columbia	235	242	246	248	252	259	264	260
Florida	NA	273	276	278	281	278	282	275
Georgia	265	270	273	275	277	279	279	279
Hawaii	260	265	265	267	271	277	280	277
Idaho	277	281	280	285	288	287	287	284
Illinois	272	278	279	282	284	283	285	282
Indiana	282	282	283	286	288	285	288	288
Iowa	NA	285	283	287	285	286	286	287
Kansas	283	284	285	291	290	291	290	284
Kentucky	271	275	275	280	281	282	281	277
Louisiana	260	267	267	273	272	272	273	267
Maine	282	283	282	288	288	288	290	285
Maryland	272	279	278	287	290	289	286	282
Massachusetts	279	289	291	300	300	299	301	295

## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

Student characteristic and state	2000	2003	2005	2007	2009	2011	2013	2015
Michigan	278	277	279	278	280	282	280	280
Minnesota	287	289	291	292	296	295	295	294
Mississippi	255	262	263	266	265	267	271	269
Missouri	272	280	278	282	287	283	283	282
Montana	284	286	286	287	292	293	289	289
Nebraska	282	284	285	285	286	284	285	287
Nevada	266	268	270	271	275	279	279	275
New Hampshire	NA	287	286	288	293	292	295	295
New Jersey	NA	282	286	290	295	294	295	294
New Mexico	259	264	264	268	271	275	273	272
New York	273	281	280	281	283	280	280	280
North Carolina	277	281	281	285	284	285	285	281
North Dakota	282	287	287	293	294	293	291	288
Ohio	281	283	284	286	287	290	290	284
Oklahoma	271	272	272	277	278	280	275	275
Oregon	282	282	284	285	287	285	285	282
Pennsylvania	NA	280	283	289	290	287	290	283
Rhode Island	268	273	272	276	278	283	284	280
South Carolina	264	280	282	281	281	280	281	275
South Dakota	NA	286	287	290	292	291	288	284
Tennessee	263	268	270	277	275	276	278	278
Texas	272	278	283	287	287	291	289	283
Utah	275	282	280	282	285	285	285	287
Vermont	279	286	287	292	294	294	295	292
Virginia	276	283	285	289	287	289	288	289
Washington	NA	282	285	285	290	288	290	287
West Virginia	265	271	268	271	271	274	274	272

## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

Student characteristic and state	2000	2003	2005	2007	2009	2011	2013	2015
Wisconsin	s	284	285	287	289	290	289	289
Wyoming	276	284	283	288	288	290	290	286
Puerto Rico	NA	s	s	NA	NA	218	217	221
Female students								
United States	271	275	277	279	281	282	283	281
Alabama	263	261	264	265	269	269	269	267
Alaska	NA	278	278	283	283	284	281	281
Arizona	266	271	274	274	276	276	279	283
Arkansas	259	267	273	274	277	278	278	275
California	260	266	268	270	268	273	275	276
Colorado	NA	283	281	286	286	292	290	284
Connecticut	278	283	281	283	289	286	285	283
Delaware	NA	276	279	281	283	284	281	280
District of Columbia	234	244	245	248	255	262	266	266
Florida	NA	269	272	277	278	277	280	276
Georgia	265	269	272	274	278	278	279	279
Hawaii	265	266	266	270	276	279	284	282
Idaho	277	279	282	282	286	286	286	284
Illinois	278	276	276	279	280	283	285	282
Indiana	281	280	280	284	285	285	287	287
Iowa	NA	283	284	284	284	284	284	285
Kansas	283	284	283	289	287	289	289	284
Kentucky	269	274	273	277	278	281	280	279
Louisiana	257	266	268	272	273	274	273	269
Maine	281	281	280	285	284	289	287	284
Maryland	272	276	278	284	287	287	287	285
Massachusetts	278	284	292	296	298	298	300	299

## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

Student characteristic and state	2000	2003	2005	2007	2009	2011	2013	2015
Michigan	277	276	275	275	277	279	281	277
Minnesota	287	292	289	292	293	295	294	294
Mississippi	253	260	262	264	265	272	271	273
Missouri	270	278	275	279	285	281	283	279
Montana	287	286	287	287	291	293	289	286
Nebraska	277	281	283	282	283	282	285	286
Nevada	264	268	269	270	273	277	277	275
New Hampshire	NA	286	285	287	292	292	296	293
New Jersey	NA	281	282	288	290	294	297	293
New Mexico	260	263	262	267	269	274	273	270
New York	270	279	280	280	282	281	283	280
North Carolina	275	282	282	283	284	287	286	282
North Dakota	282	287	287	290	291	291	290	288
Ohio	280	281	282	283	284	288	289	286
Oklahoma	269	272	271	273	274	278	276	274
Oregon	278	280	281	283	283	280	282	284
Pennsylvania	NA	277	279	283	287	285	289	285
Rhode Island	270	271	273	275	278	283	284	283
South Carolina	265	274	281	282	280	282	279	277
South Dakota	NA	284	287	287	289	290	287	286
Tennessee	260	268	271	271	275	272	278	278
Texas	275	276	279	285	286	290	288	284
Utah	272	280	278	280	283	281	284	285
Vermont	282	286	287	290	292	294	296	289
Virginia	274	280	283	286	285	289	289	287
Washington	NA	281	285	285	288	288	289	285
West Virginia	268	271	270	269	270	272	274	271



## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

Student characteristic and state	2000	2003	2005	2007	2009	2011	2013	2015
Wisconsin	s	284	284	284	287	287	289	289
Wyoming	276	283	281	286	284	285	287	288
Puerto Rico	NA	s	s	NA	NA	219	218	223

NA = not available; s = suppressed for reasons of confidentiality and/or reliability.

NAEP = National Assessment of Educational Progress.

### Note(s)

The NAEP scores are for public schools only. The national value for the United States is the reported value in the NAEP reports. Black includes African American. Hispanic includes Latino. Asian and Pacific Islander includes Native Hawaiian.

### Source(s)

National Center for Education Statistics, NAEP (various years).

*Science and Engineering Indicators 2018*

## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

APPENDIX TABLE 1-11

### Students in grade 8 scoring at or above the main NAEP's proficient level in mathematics, by race or ethnicity and sex, by state: 2000–15

(Percent)

Student characteristic and state	2000	2003	2005	2007	2009	2011	2013	2015
White students								
United States	33	36	37	41	43	43	44	42
Alabama	23	23	22	27	29	28	28	23
Alaska	NA	41	38	44	44	47	46	45
Arizona	28	32	38	40	42	46	45	51
Arkansas	18	24	28	31	34	37	34	31
California	26	34	34	39	39	41	42	43
Colorado	NA	43	43	48	51	55	53	49
Connecticut	42	44	46	44	49	48	48	46
Delaware	NA	35	40	43	43	43	45	41
District of Columbia	56	s	69	s	s	76	75	74
Florida	NA	34	36	37	39	37	40	36
Georgia	27	32	34	37	39	40	42	41
Hawaii	22	25	25	28	31	41	41	34
Idaho	28	31	33	38	43	41	41	39
Illinois	35	40	39	41	44	44	48	40
Indiana	32	35	34	40	41	40	44	45
Iowa	NA	35	36	38	37	37	40	41
Kansas	36	39	39	46	45	47	47	38
Kentucky	22	25	24	29	29	33	33	30
Louisiana	18	28	25	28	29	31	31	27
Maine	31	30	30	35	36	40	40	36
Maryland	38	40	43	53	56	56	51	49
Massachusetts	34	44	49	58	59	58	63	59

## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

Student characteristic and state	2000	2003	2005	2007	2009	2011	2013	2015
Michigan	34	35	36	35	37	35	36	34
Minnesota	41	49	49	48	53	55	54	56
Mississippi	14	22	24	24	25	30	33	34
Missouri	25	32	32	36	39	36	38	36
Montana	39	37	39	41	47	49	44	43
Nebraska	33	36	40	41	41	39	42	46
Nevada	24	27	29	32	36	43	40	38
New Hampshire	NA	35	35	39	44	45	48	47
New Jersey	NA	42	47	51	54	59	58	55
New Mexico	23	31	26	33	39	40	40	35
New York	33	44	41	39	44	40	44	40
North Carolina	37	44	42	46	49	48	48	43
North Dakota	33	39	37	44	46	47	44	44
Ohio	34	35	38	42	41	46	45	40
Oklahoma	22	25	26	25	29	34	29	29
Oregon	34	35	38	39	41	37	40	40
Pennsylvania	NA	35	36	44	45	47	49	44
Rhode Island	26	29	30	35	35	42	45	41
South Carolina	27	39	44	44	43	43	43	36
South Dakota	NA	37	40	43	46	47	45	39
Tennessee	20	26	26	30	30	28	33	34
Texas	35	38	46	53	54	58	53	48
Utah	27	34	33	36	40	41	42	43
Vermont	31	35	39	42	44	47	48	43
Virginia	32	40	43	47	44	48	47	46
Washington	NA	36	39	42	46	46	48	47
West Virginia	18	20	18	19	20	22	24	21

## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

Student characteristic and state	2000	2003	2005	2007	2009	2011	2013	2015
Wisconsin	s	40	42	42	45	47	47	47
Wyoming	25	35	32	39	38	41	40	39
Puerto Rico	NA	s	s	NA	NA	s	s	s
Black students								
United States	5	7	8	11	12	13	14	12
Alabama	3	3	3	4	6	7	6	5
Alaska	NA	11	19	15	17	17	20	17
Arizona	7	7	15	15	23	18	19	19
Arkansas	2	3	4	9	8	9	9	10
California	4	6	7	10	10	12	11	14
Colorado	NA	9	11	21	16	17	15	15
Connecticut	4	7	6	7	10	11	13	12
Delaware	NA	8	13	10	13	14	14	13
District of Columbia	3	3	4	6	8	13	14	13
Florida	NA	7	8	11	13	11	14	11
Georgia	4	7	8	11	11	12	12	13
Hawaii	s	s	s	s	21	26	s	s
Idaho	s	s	s	s	s	s	s	s
Illinois	8	6	6	7	9	10	12	12
Indiana	7	7	9	9	14	11	15	10
Iowa	NA	11	8	11	9	11	10	8
Kansas	10	8	12	16	15	16	18	13
Kentucky	6	5	9	11	8	12	11	12
Louisiana	2	5	5	7	7	10	9	7
Maine	s	s	s	s	14	18	14	s
Maryland	6	9	11	13	15	18	18	14
Massachusetts	9	10	15	13	23	26	28	22

## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

Student characteristic and state	2000	2003	2005	2007	2009	2011	2013	2015
Michigan	3	4	6	5	5	7	7	5
Minnesota	s	9	9	14	13	18	15	14
Mississippi	1	3	4	4	5	8	8	10
Missouri	3	6	4	6	11	8	12	11
Montana	s	s	s	s	s	s	s	s
Nebraska	6	7	2	5	10	8	8	13
Nevada	5	9	7	12	10	12	12	8
New Hampshire	NA	s	s	s	s	s	s	s
New Jersey	NA	7	11	14	17	21	24	20
New Mexico	s	5	13	12	13	16	12	s
New York	8	10	11	10	13	13	12	15
North Carolina	7	11	12	14	12	15	17	16
North Dakota	s	s	s	s	s	s	25	17
Ohio	7	8	7	9	11	12	16	11
Oklahoma	5	5	4	9	10	11	9	8
Oregon	s	17	9	28	12	18	s	s
Pennsylvania	NA	4	7	13	13	9	13	8
Rhode Island	4	5	5	9	8	12	15	14
South Carolina	4	8	10	15	12	14	13	8
South Dakota	NA	s	s	s	s	21	10	s
Tennessee	3	5	3	7	10	9	10	9
Texas	7	8	13	16	17	21	21	16
Utah	s	s	s	s	s	s	s	s
Vermont	s	s	s	s	s	s	18	s
Virginia	6	11	9	15	14	18	15	12
Washington	NA	13	15	16	16	15	23	13
West Virginia	7	6	6	4	11	10	13	8

## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

Student characteristic and state	2000	2003	2005	2007	2009	2011	2013	2015
Wisconsin	s	5	5	6	11	11	8	7
Wyoming	s	s	s	s	s	s	s	s
Puerto Rico	NA	s	s	NA	NA	s	s	s
Hispanic students								
United States	8	11	13	15	17	20	21	19
Alabama	s	s	s	3	10	9	6	11
Alaska	NA	11	21	23	23	25	24	26
Arizona	6	9	13	12	16	18	19	23
Arkansas	s	7	15	8	15	20	20	18
California	6	8	9	10	11	13	15	13
Colorado	NA	12	10	13	18	20	23	19
Connecticut	7	11	10	10	14	13	12	14
Delaware	NA	11	16	17	22	21	25	17
District of Columbia	5	3	9	9	18	17	20	19
Florida	NA	16	16	21	22	22	24	22
Georgia	s	14	12	16	18	25	24	19
Hawaii	s	16	9	15	26	19	28	20
Idaho	7	7	11	16	15	16	15	12
Illinois	11	9	13	13	17	19	22	22
Indiana	s	9	14	20	19	21	24	23
Iowa	NA	10	9	13	15	14	13	19
Kansas	12	16	14	16	22	22	24	22
Kentucky	s	s	s	s	22	18	17	21
Louisiana	s	s	s	s	s	16	25	19
Maine	s	s	s	s	s	s	s	s
Maryland	20	15	19	21	26	27	30	24
Massachusetts	8	9	15	19	21	21	28	24

## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

Student characteristic and state	2000	2003	2005	2007	2009	2011	2013	2015
Michigan	s	14	16	11	17	23	14	18
Minnesota	s	16	10	18	21	18	20	22
Mississippi	s	s	s	s	s	20	24	19
Missouri	s	s	s	17	37	16	23	22
Montana	s	s	s	s	27	31	28	24
Nebraska	5	10	10	11	10	11	17	16
Nevada	8	7	10	11	13	15	17	16
New Hampshire	NA	s	s	14	22	15	20	22
New Jersey	NA	14	15	20	22	24	34	24
New Mexico	5	7	8	10	12	18	17	16
New York	10	16	14	15	15	13	14	19
North Carolina	s	16	16	23	24	23	27	23
North Dakota	s	s	s	s	s	s	s	22
Ohio	s	18	11	25	16	26	27	24
Oklahoma	13	9	11	8	12	14	15	14
Oregon	6	12	10	14	15	17	16	16
Pennsylvania	NA	6	13	17	18	22	16	14
Rhode Island	3	5	4	7	8	13	15	13
South Carolina	s	s	19	23	16	25	23	22
South Dakota	NA	s	s	18	13	20	27	18
Tennessee	s	s	s	13	19	15	21	24
Texas	13	14	19	23	25	31	29	23
Utah	6	7	9	12	11	9	13	15
Vermont	s	s	s	s	s	s	s	s
Virginia	16	17	20	24	23	27	25	29
Washington	NA	17	15	13	13	22	23	20
West Virginia	s	s	s	s	s	s	s	s

## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

Student characteristic and state	2000	2003	2005	2007	2009	2011	2013	2015
Wisconsin	s	16	16	18	20	21	19	20
Wyoming	8	13	11	22	15	20	26	18
Puerto Rico	NA	s	s	NA	NA	*	*	s
Asian and Pacific Islander students								
United States	40	42	46	49	53	55	60	58
Alabama	s	s	s	s	s	s	s	s
Alaska	NA	29	19	33	31	32	23	25
Arizona	s	s	s	52	52	58	57	62
Arkansas	s	s	s	s	s	s	s	s
California	34	39	45	46	46	50	59	56
Colorado	NA	38	s	48	55	67	59	59
Connecticut	s	51	46	61	61	60	61	58
Delaware	NA	s	59	65	69	67	69	69
District of Columbia	s	s	s	s	s	s	s	s
Florida	NA	41	51	48	55	65	65	51
Georgia	s	40	52	s	49	52	62	68
Hawaii	15	15	17	20	25	29	31	30
Idaho	s	s	s	s	s	s	s	s
Illinois	s	58	50	55	60	67	69	59
Indiana	s	s	s	s	s	s	s	s
Iowa	NA	s	s	s	s	45	53	40
Kansas	s	34	s	52	s	53	55	59
Kentucky	s	s	s	s	s	s	58	58
Louisiana	s	s	s	s	s	s	s	s
Maine	s	s	s	s	s	s	s	s
Maryland	49	56	55	66	76	65	68	68
Massachusetts	44	57	68	74	66	72	78	73



## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

Student characteristic and state	2000	2003	2005	2007	2009	2011	2013	2015
Michigan	s	s	s	s	59	63	60	70
Minnesota	s	32	34	34	35	35	43	48
Mississippi	s	s	s	s	s	s	s	s
Missouri	s	s	s	s	s	s	s	s
Montana	s	s	s	s	s	s	s	s
Nebraska	s	s	s	s	s	s	55	s
Nevada	25	31	30	36	33	41	45	48
New Hampshire	NA	s	s	s	62	60	63	69
New Jersey	NA	61	63	69	77	73	78	83
New Mexico	s	s	s	s	s	s	s	s
New York	37	41	50	53	63	55	59	52
North Carolina	s	48	53	50	65	71	54	60
North Dakota	s	s	s	s	s	s	s	s
Ohio	s	s	s	s	s	s	64	63
Oklahoma	s	s	s	s	38	60	48	s
Oregon	38	41	50	53	50	49	57	51
Pennsylvania	NA	s	49	66	60	62	61	68
Rhode Island	20	20	26	31	40	41	34	49
South Carolina	s	s	s	s	s	s	s	s
South Dakota	NA	s	s	s	s	s	s	s
Tennessee	s	s	s	s	s	s	s	s
Texas	44	58	61	67	67	69	74	67
Utah	20	25	26	32	27	35	31	s
Vermont	s	s	s	s	s	s	s	s
Virginia	44	48	53	53	55	65	64	70
Washington	NA	37	45	41	53	55	62	62
West Virginia	s	s	s	s	s	s	s	s

## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

Student characteristic and state	2000	2003	2005	2007	2009	2011	2013	2015
Wisconsin	s	17	32	40	40	43	40	44
Wyoming	s	s	s	s	s	s	s	s
Puerto Rico	NA	s	s	NA	NA	s	s	s
Male students								
United States	26	29	30	33	34	34	35	32
Alabama	17	18	15	21	21	21	21	18
Alaska	NA	32	30	33	34	36	34	32
Arizona	22	21	26	30	31	34	32	36
Arkansas	14	19	22	26	27	31	29	26
California	17	23	23	25	26	26	29	27
Colorado	NA	35	33	38	41	44	42	39
Connecticut	36	37	35	35	39	39	37	37
Delaware	NA	27	32	34	32	31	34	30
District of Columbia	6	7	7	8	12	17	18	18
Florida	NA	26	28	29	31	29	32	26
Georgia	19	24	24	26	27	29	30	29
Hawaii	16	17	19	20	24	30	31	28
Idaho	27	30	30	36	39	37	38	34
Illinois	24	31	30	33	35	33	37	34
Indiana	33	33	32	37	39	34	39	39
Iowa	NA	35	34	37	35	34	37	39
Kansas	35	34	35	41	43	41	42	34
Kentucky	22	25	24	30	30	32	31	27
Louisiana	12	19	16	20	21	22	20	19
Maine	32	31	31	37	38	38	41	35
Maryland	27	33	31	38	42	42	37	34
Massachusetts	31	42	43	53	53	52	54	49

## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

Student characteristic and state	2000	2003	2005	2007	2009	2011	2013	2015
Michigan	29	30	31	30	32	33	31	30
Minnesota	39	43	45	44	49	47	48	48
Mississippi	10	14	15	16	15	18	22	21
Missouri	23	30	28	32	37	33	33	33
Montana	37	36	36	39	45	46	41	42
Nebraska	33	35	37	37	37	35	35	39
Nevada	20	21	23	24	26	29	29	27
New Hampshire	NA	36	36	38	45	44	46	47
New Jersey	NA	34	39	43	47	48	48	47
New Mexico	13	16	15	19	21	24	24	22
New York	27	33	31	31	36	30	31	32
North Carolina	28	32	32	36	37	37	36	33
North Dakota	31	37	36	43	45	45	41	41
Ohio	32	32	34	38	38	40	42	35
Oklahoma	20	22	22	24	26	29	25	25
Oregon	34	33	35	37	40	35	36	32
Pennsylvania	NA	33	33	42	42	40	43	35
Rhode Island	21	26	24	29	29	35	37	31
South Carolina	17	29	31	33	31	31	32	25
South Dakota	NA	35	36	41	44	42	39	33
Tennessee	19	22	21	26	26	26	28	31
Texas	23	27	33	37	38	41	39	32
Utah	26	33	32	34	37	37	38	39
Vermont	31	35	38	43	45	46	46	44
Virginia	28	33	35	40	38	40	38	39
Washington	NA	33	37	37	41	41	42	40
West Virginia	17	21	18	21	21	22	25	21

## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

Student characteristic and state	2000	2003	2005	2007	2009	2011	2013	2015
Wisconsin	s	36	36	40	41	43	40	40
Wyoming	24	34	31	37	38	41	39	35
Puerto Rico	NA	s	s	NA	NA	*	*	*
Female students								
United States	23	26	27	29	31	33	34	32
Alabama	15	14	15	15	20	19	19	17
Alaska	NA	28	27	32	33	35	33	31
Arizona	18	21	25	23	27	29	29	33
Arkansas	13	18	22	22	27	28	27	24
California	16	21	20	23	21	25	26	27
Colorado	NA	34	31	37	38	43	41	35
Connecticut	30	33	34	34	41	37	37	35
Delaware	NA	25	27	29	31	33	31	29
District of Columbia	5	5	6	8	11	17	20	21
Florida	NA	21	23	26	27	27	30	27
Georgia	18	20	23	23	27	27	29	28
Hawaii	16	16	18	22	27	30	34	32
Idaho	25	27	30	32	37	36	35	34
Illinois	28	28	27	29	31	32	36	31
Indiana	26	29	28	33	34	34	38	38
Iowa	NA	31	33	33	33	33	35	36
Kansas	32	34	33	39	36	40	39	32
Kentucky	18	23	21	24	25	29	29	28
Louisiana	10	15	16	18	20	22	21	17
Maine	29	28	29	32	32	39	37	35
Maryland	27	27	28	35	38	38	38	35
Massachusetts	29	35	43	48	50	51	55	53

## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

Student characteristic and state	2000	2003	2005	2007	2009	2011	2013	2015
Michigan	28	26	27	27	29	29	30	27
Minnesota	38	44	41	43	45	48	46	48
Mississippi	7	11	12	12	15	20	20	22
Missouri	19	26	24	28	34	30	32	30
Montana	36	34	36	36	42	45	39	36
Nebraska	27	30	33	32	32	31	36	37
Nevada	17	19	20	22	24	28	27	25
New Hampshire	NA	33	33	38	42	44	47	45
New Jersey	NA	33	33	38	42	46	50	46
New Mexico	12	15	13	16	19	24	22	19
New York	22	31	30	29	32	30	33	30
North Carolina	26	32	32	33	34	37	36	33
North Dakota	30	36	33	39	42	40	40	38
Ohio	29	29	32	33	34	37	39	35
Oklahoma	17	18	19	18	21	26	25	21
Oregon	28	30	32	33	33	30	32	35
Pennsylvania	NA	27	29	35	37	38	41	37
Rhode Island	22	22	23	27	26	33	35	33
South Carolina	17	23	29	31	29	32	29	27
South Dakota	NA	34	37	37	39	41	38	35
Tennessee	14	20	20	20	25	22	27	28
Texas	25	23	28	32	35	39	37	33
Utah	23	29	27	30	33	33	34	37
Vermont	30	35	38	40	42	46	48	40
Virginia	22	30	32	34	33	40	38	36
Washington	NA	31	35	35	38	40	41	38
West Virginia	17	18	18	16	18	21	22	21

## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

Student characteristic and state	2000	2003	2005	2007	2009	2011	2013	2015
Wisconsin	s	34	36	34	38	39	40	41
Wyoming	23	30	27	34	31	34	36	36
Puerto Rico	NA	s	s	NA	NA	*	*	*

\* = rounds to zero; NA = not available; s = suppressed for reasons of confidentiality and/or reliability.

NAEP = National Assessment of Educational Progress.

### Note(s)

The NAEP scores are for public schools only. The national value for the United States is the reported value in the NAEP reports. Black includes African American. Hispanic includes Latino. Asian and Pacific Islander includes Native Hawaiian.

### Source(s)

National Center for Education Statistics, NAEP (various years).

*Science and Engineering Indicators 2018*

## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

APPENDIX TABLE 1-12



### Average scores of students in grade 8 on the main NAEP science assessment, by race or ethnicity and sex, by state: 2009–15

(Score out of 300)

Student characteristic and state	2009	2011	2015
White students			
United States	161	163	165
Alabama	152	152	154
Alaska	NA	166	NA
Arizona	157	158	162
Arkansas	154	158	159
California	157	159	164
Colorado	166	171	NA
Connecticut	164	165	165
Delaware	159	161	162
District of Columbia	NA	174	NA
Florida	158	161	164
Georgia	161	166	165
Hawaii	153	157	163
Idaho	162	163	165
Illinois	162	161	162
Indiana	159	160	163
Iowa	160	161	163
Kansas	NA	163	163
Kentucky	159	160	160
Louisiana	155	156	NA
Maine	159	160	161
Maryland	164	167	168
Massachusetts	167	169	170

## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

Student characteristic and state	2009	2011	2015
Michigan	162	165	164
Minnesota	166	168	171
Mississippi	150	156	158
Missouri	161	162	165
Montana	166	167	166
Nebraska	NA	164	167
Nevada	153	157	163
New Hampshire	161	164	167
New Jersey	165	166	164
New Mexico	163	161	162
New York	164	163	164
North Carolina	158	160	163
North Dakota	166	168	166
Ohio	164	165	165
Oklahoma	155	156	158
Oregon	160	162	163
Pennsylvania	162	163	NA
Rhode Island	155	161	162
South Carolina	158	163	164
South Dakota	165	166	166
Tennessee	157	160	165
Texas	167	167	172
Utah	164	167	172
Vermont	NA	164	164
Virginia	166	169	169
Washington	161	163	168
West Virginia	146	150	150



## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

Student characteristic and state	2009	2011	2015
Wisconsin	165	166	166
Wyoming	162	164	164
Puerto Rico	NA	NA	NA
Black students			
United States	125	128	131
Alabama	115	118	118
Alaska	NA	133	NA
Arizona	126	128	131
Arkansas	111	119	121
California	122	124	130
Colorado	135	149	NA
Connecticut	126	128	131
Delaware	133	134	129
District of Columbia	NA	107	NA
Florida	126	127	135
Georgia	129	133	137
Hawaii	133	s	s
Idaho	s	s	s
Illinois	118	120	126
Indiana	126	125	126
Iowa	127	128	133
Kansas	NA	129	126
Kentucky	137	135	134
Louisiana	120	125	NA
Maine	126	s	s
Maryland	127	131	135
Massachusetts	132	133	134

## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

Student characteristic and state	2009	2011	2015
Michigan	121	124	125
Minnesota	128	129	128
Mississippi	114	119	122
Missouri	129	130	132
Montana	s	s	s
Nebraska	NA	126	138
Nevada	127	123	130
New Hampshire	s	s	s
New Jersey	127	131	136
New Mexico	s	s	s
New York	123	130	129
North Carolina	121	125	128
North Dakota	s	s	146
Ohio	126	132	127
Oklahoma	124	126	129
Oregon	135	s	131
Pennsylvania	123	120	NA
Rhode Island	125	122	130
South Carolina	124	128	131
South Dakota	141	s	s
Tennessee	122	121	130
Texas	133	137	140
Utah	s	s	s
Vermont	NA	s	s
Virginia	135	138	139
Washington	135	133	134
West Virginia	127	136	137

## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

Student characteristic and state	2009	2011	2015
Wisconsin	120	121	120
Wyoming	s	s	s
Puerto Rico	NA	NA	NA
Hispanic students			
United States	131	136	139
Alabama	129	136	131
Alaska	NA	147	NA
Arizona	127	132	138
Arkansas	134	138	141
California	122	128	129
Colorado	137	141	NA
Connecticut	128	129	135
Delaware	141	139	142
District of Columbia	NA	116	NA
Florida	139	144	149
Georgia	137	143	148
Hawaii	148	144	152
Idaho	137	139	141
Illinois	131	135	139
Indiana	135	136	140
Iowa	133	143	144
Kansas	NA	134	141
Kentucky	145	149	155
Louisiana	s	142	NA
Maine	s	s	s
Maryland	136	142	145
Massachusetts	131	130	136

## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

Student characteristic and state	2009	2011	2015
Michigan	139	146	142
Minnesota	132	137	139
Mississippi	s	s	141
Missouri	150	s	142
Montana	155	s	149
Nebraska	NA	135	144
Nevada	129	133	138
New Hampshire	131	137	141
New Jersey	138	134	139
New Mexico	135	139	138
New York	125	129	134
North Carolina	132	138	143
North Dakota	s	s	141
Ohio	140	151	142
Oklahoma	127	135	138
Oregon	130	135	138
Pennsylvania	121	118	NA
Rhode Island	119	120	127
South Carolina	129	139	143
South Dakota	135	151	142
Tennessee	139	137	145
Texas	141	146	148
Utah	129	137	144
Vermont	NA	s	s
Virginia	144	145	146
Washington	132	141	137
West Virginia	s	s	s

## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

Student characteristic and state	2009	2011	2015
Wisconsin	134	140	139
Wyoming	137	143	147
Puerto Rico	NA	NA	NA
Asian and Pacific Islander students			
United States	159	159	163
Alabama	s	s	s
Alaska	NA	145	NA
Arizona	159	s	166
Arkansas	s	s	s
California	154	157	161
Colorado	161	162	NA
Connecticut	169	170	170
Delaware	160	168	175
District of Columbia	NA	s	NA
Florida	163	161	169
Georgia	172	168	169
Hawaii	136	139	139
Idaho	s	s	s
Illinois	167	163	162
Indiana	s	s	s
Iowa	s	s	s
Kansas	NA	156	s
Kentucky	s	s	s
Louisiana	s	s	NA
Maine	s	s	s
Maryland	169	164	178
Massachusetts	168	170	174

## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

Student characteristic and state	2009	2011	2015
Michigan	s	166	167
Minnesota	141	149	147
Mississippi	s	s	s
Missouri	167	s	s
Montana	s	s	s
Nebraska	NA	s	s
Nevada	148	154	160
New Hampshire	s	s	165
New Jersey	174	173	174
New Mexico	s	s	s
New York	161	154	158
North Carolina	165	160	s
North Dakota	s	s	s
Ohio	s	s	s
Oklahoma	s	s	s
Oregon	160	159	163
Pennsylvania	159	163	NA
Rhode Island	146	151	s
South Carolina	s	s	s
South Dakota	s	s	s
Tennessee	s	s	s
Texas	170	172	177
Utah	147	153	157
Vermont	NA	s	s
Virginia	168	172	171
Washington	157	156	160
West Virginia	s	s	s

## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

Student characteristic and state	2009	2011	2015
Wisconsin	152	149	161
Wyoming	s	s	s
Puerto Rico	NA	NA	NA
Male students			
United States	151	153	154
Alabama	142	141	144
Alaska	NA	154	NA
Arizona	143	146	149
Arkansas	145	149	148
California	138	143	144
Colorado	158	162	NA
Connecticut	157	156	156
Delaware	151	151	150
District of Columbia	NA	110	NA
Florida	148	150	154
Georgia	150	153	153
Hawaii	140	143	144
Idaho	160	162	162
Illinois	150	150	150
Indiana	155	157	160
Iowa	158	159	161
Kansas	NA	159	158
Kentucky	159	158	159
Louisiana	141	144	NA
Maine	160	162	161
Maryland	150	152	155
Massachusetts	162	164	164

## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

Student characteristic and state	2009	2011	2015
Michigan	155	160	156
Minnesota	161	163	163
Mississippi	134	142	142
Missouri	158	158	161
Montana	165	166	162
Nebraska	NA	158	162
Nevada	142	148	150
New Hampshire	164	165	166
New Jersey	156	157	157
New Mexico	147	147	144
New York	150	150	150
North Carolina	145	149	149
North Dakota	166	167	163
Ohio	161	161	159
Oklahoma	149	150	153
Oregon	156	157	159
Pennsylvania	157	155	NA
Rhode Island	149	151	150
South Carolina	144	150	152
South Dakota	164	165	163
Tennessee	149	154	157
Texas	152	155	160
Utah	159	164	168
Vermont	NA	165	166
Virginia	157	161	160
Washington	156	159	158
West Virginia	148	153	151



## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

Student characteristic and state	2009	2011	2015
Wisconsin	160	162	161
Wyoming	162	163	161
Puerto Rico	NA	NA	NA
Female students			
United States	147	148	151
Alabama	136	139	139
Alaska	NA	153	NA
Arizona	139	142	146
Arkansas	142	147	149
California	135	138	141
Colorado	153	159	NA
Connecticut	153	153	154
Delaware	146	149	148
District of Columbia	NA	113	NA
Florida	144	147	152
Georgia	144	148	151
Hawaii	137	141	144
Idaho	155	156	158
Illinois	146	144	149
Indiana	150	149	152
Iowa	154	155	157
Kansas	NA	153	153
Kentucky	154	155	155
Louisiana	138	141	NA
Maine	156	158	158
Maryland	146	151	155
Massachusetts	158	159	160

## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

Student characteristic and state	2009	2011	2015
Michigan	152	154	154
Minnesota	157	158	160
Mississippi	130	133	138
Missouri	154	155	157
Montana	159	160	160
Nebraska	NA	155	158
Nevada	140	141	147
New Hampshire	157	160	163
New Jersey	153	152	154
New Mexico	140	142	142
New York	147	147	149
North Carolina	143	147	152
North Dakota	159	161	159
Ohio	154	155	155
Oklahoma	144	147	149
Oregon	152	154	154
Pennsylvania	151	147	NA
Rhode Island	143	146	151
South Carolina	142	147	150
South Dakota	157	159	158
Tennessee	146	147	155
Texas	148	151	153
Utah	156	159	164
Vermont	NA	160	160
Virginia	155	158	159
Washington	153	154	156
West Virginia	142	145	148

## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

Student characteristic and state	2009	2011	2015
Wisconsin	155	156	157
Wyoming	154	157	159
Puerto Rico	NA	NA	NA

NA = not available; s = suppressed for reasons of confidentiality and/or reliability.

NAEP = National Assessment of Educational Progress.

### Note(s)

The NAEP scores are for public schools only. The national value for the United States is the reported value in the NAEP reports. Black includes African American. Hispanic includes Latino. Asian and Pacific Islander includes Native Hawaiian.

### Source(s)

National Center for Education Statistics, NAEP (various years).

*Science and Engineering Indicators 2018*

## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

APPENDIX TABLE 1-13



### Students in grade 8 scoring at or above the main NAEP's proficient level in science, by race or ethnicity and sex, by state: 2009–15

(Percent)

Student characteristic and state	2009	2011	2015
White students			
United States	41	43	46
Alabama	28	28	30
Alaska	NA	47	NA
Arizona	35	37	41
Arkansas	32	36	38
California	38	39	46
Colorado	48	55	NA
Connecticut	44	45	45
Delaware	35	40	42
District of Columbia	NA	60	NA
Florida	36	39	45
Georgia	41	46	47
Hawaii	30	37	41
Idaho	42	43	46
Illinois	41	39	41
Indiana	38	40	42
Iowa	38	39	42
Kansas	NA	43	42
Kentucky	36	37	38
Louisiana	31	32	NA
Maine	36	37	38
Maryland	44	49	52
Massachusetts	48	52	53

## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

Student characteristic and state	2009	2011	2015
Michigan	42	45	44
Minnesota	46	49	54
Mississippi	27	33	35
Missouri	40	42	46
Montana	46	48	47
Nebraska	NA	45	49
Nevada	30	35	44
New Hampshire	40	43	48
New Jersey	44	46	43
New Mexico	39	40	41
New York	45	42	45
North Carolina	36	38	44
North Dakota	46	49	46
Ohio	43	45	45
Oklahoma	33	33	35
Oregon	40	43	43
Pennsylvania	42	43	NA
Rhode Island	33	40	43
South Carolina	35	42	45
South Dakota	45	47	46
Tennessee	36	38	45
Texas	47	50	56
Utah	45	49	57
Vermont	NA	44	45
Virginia	48	51	52
Washington	41	43	50
West Virginia	23	25	27

## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

Student characteristic and state	2009	2011	2015
Wisconsin	44	47	47
Wyoming	40	43	43
Puerto Rico	NA	NA	NA
Black students			
United States	8	9	11
Alabama	4	5	5
Alaska	NA	8	NA
Arizona	8	6	12
Arkansas	4	3	5
California	8	8	13
Colorado	13	26	NA
Connecticut	9	9	12
Delaware	10	10	11
District of Columbia	NA	4	NA
Florida	7	9	15
Georgia	10	12	13
Hawaii	15	s	s
Idaho	s	s	s
Illinois	4	4	6
Indiana	8	8	6
Iowa	9	10	12
Kansas	NA	9	7
Kentucky	16	12	10
Louisiana	5	8	NA
Maine	11	s	s
Maryland	8	11	14
Massachusetts	13	15	13

## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

Student characteristic and state	2009	2011	2015
Michigan	6	6	8
Minnesota	11	10	13
Mississippi	3	5	6
Missouri	9	10	12
Montana	s	s	s
Nebraska	NA	11	13
Nevada	9	7	9
New Hampshire	s	s	s
New Jersey	8	9	14
New Mexico	s	s	s
New York	7	11	9
North Carolina	5	7	9
North Dakota	s	s	23
Ohio	6	8	10
Oklahoma	7	9	9
Oregon	13	s	14
Pennsylvania	7	5	NA
Rhode Island	8	10	10
South Carolina	6	8	11
South Dakota	24	s	s
Tennessee	6	7	12
Texas	13	16	18
Utah	s	s	s
Vermont	NA	s	s
Virginia	11	15	14
Washington	16	15	15
West Virginia	10	11	13

## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

Student characteristic and state	2009	2011	2015
Wisconsin	6	8	7
Wyoming	s	s	s
Puerto Rico	NA	NA	NA
Hispanic students			
United States	12	16	18
Alabama	10	15	12
Alaska	NA	23	NA
Arizona	10	11	14
Arkansas	12	13	17
California	7	11	10
Colorado	14	18	NA
Connecticut	9	11	13
Delaware	16	13	18
District of Columbia	NA	9	NA
Florida	17	24	29
Georgia	15	21	25
Hawaii	25	18	28
Idaho	14	15	17
Illinois	10	11	14
Indiana	16	14	17
Iowa	12	15	20
Kansas	NA	12	16
Kentucky	24	27	30
Louisiana	s	22	NA
Maine	s	s	s
Maryland	12	18	24
Massachusetts	14	12	16



## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

Student characteristic and state	2009	2011	2015
Michigan	20	24	18
Minnesota	14	18	15
Mississippi	s	s	15
Missouri	29	s	22
Montana	33	s	22
Nebraska	NA	13	20
Nevada	10	12	15
New Hampshire	12	14	17
New Jersey	13	12	17
New Mexico	14	16	15
New York	11	12	13
North Carolina	11	15	21
North Dakota	s	s	26
Ohio	18	31	27
Oklahoma	9	14	16
Oregon	12	14	16
Pennsylvania	7	8	NA
Rhode Island	5	5	11
South Carolina	13	16	18
South Dakota	10	25	18
Tennessee	21	18	23
Texas	17	23	26
Utah	13	15	23
Vermont	NA	s	s
Virginia	20	24	23
Washington	9	17	15
West Virginia	s	s	s

## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

Student characteristic and state	2009	2011	2015
Wisconsin	15	24	17
Wyoming	12	16	18
Puerto Rico	NA	NA	NA
Asian and Pacific Islander students			
United States	40	41	46
Alabama	s	s	s
Alaska	NA	22	NA
Arizona	43	s	47
Arkansas	s	s	s
California	34	39	41
Colorado	41	49	NA
Connecticut	52	56	53
Delaware	40	54	62
District of Columbia	NA	s	NA
Florida	40	44	52
Georgia	58	51	51
Hawaii	14	18	18
Idaho	s	s	s
Illinois	48	42	40
Indiana	s	s	s
Iowa	s	s	s
Kansas	NA	37	s
Kentucky	s	s	s
Louisiana	s	s	NA
Maine	s	s	s
Maryland	51	48	66
Massachusetts	49	55	62

## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

Student characteristic and state	2009	2011	2015
Michigan	s	50	55
Minnesota	23	29	28
Mississippi	s	s	s
Missouri	48	s	s
Montana	s	s	s
Nebraska	NA	s	s
Nevada	26	31	40
New Hampshire	s	s	50
New Jersey	58	56	60
New Mexico	s	s	s
New York	43	34	39
North Carolina	44	34	s
North Dakota	s	s	s
Ohio	s	s	s
Oklahoma	s	s	s
Oregon	45	40	46
Pennsylvania	41	48	NA
Rhode Island	21	35	s
South Carolina	s	s	s
South Dakota	s	s	s
Tennessee	s	s	s
Texas	55	54	65
Utah	31	35	36
Vermont	NA	s	s
Virginia	49	56	55
Washington	39	37	43
West Virginia	s	s	s

## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

Student characteristic and state	2009	2011	2015
Wisconsin	28	24	43
Wyoming	s	s	s
Puerto Rico	NA	NA	NA
Male students			
United States	32	34	36
Alabama	24	22	24
Alaska	NA	35	NA
Arizona	26	26	29
Arkansas	28	30	29
California	22	25	26
Colorado	39	44	NA
Connecticut	38	38	38
Delaware	29	29	31
District of Columbia	NA	8	NA
Florida	28	31	35
Georgia	30	34	33
Hawaii	19	23	25
Idaho	42	42	44
Illinois	32	30	30
Indiana	35	38	41
Iowa	38	38	42
Kansas	NA	41	38
Kentucky	37	37	38
Louisiana	22	25	NA
Maine	38	40	40
Maryland	32	32	37
Massachusetts	44	47	47

## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

Student characteristic and state	2009	2011	2015
Michigan	38	42	38
Minnesota	43	46	47
Mississippi	17	22	23
Missouri	38	39	43
Montana	47	49	45
Nebraska	NA	40	44
Nevada	21	28	29
New Hampshire	44	46	48
New Jersey	37	38	37
New Mexico	24	25	22
New York	34	31	32
North Carolina	25	30	30
North Dakota	47	51	45
Ohio	41	43	41
Oklahoma	28	30	32
Oregon	37	38	40
Pennsylvania	39	38	NA
Rhode Island	30	34	32
South Carolina	24	32	34
South Dakota	45	47	44
Tennessee	32	36	39
Texas	32	35	41
Utah	43	47	54
Vermont	NA	47	48
Virginia	39	43	42
Washington	38	38	40
West Virginia	26	30	30

## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

Student characteristic and state	2009	2011	2015
Wisconsin	43	44	43
Wyoming	42	42	41
Puerto Rico	NA	NA	NA
Female students			
United States	26	27	31
Alabama	15	16	18
Alaska	NA	32	NA
Arizona	18	19	22
Arkansas	20	23	27
California	17	20	21
Colorado	32	40	NA
Connecticut	32	33	31
Delaware	21	26	26
District of Columbia	NA	7	NA
Florida	21	26	31
Georgia	24	27	29
Hawaii	15	20	21
Idaho	33	33	36
Illinois	25	21	26
Indiana	28	27	30
Iowa	31	33	35
Kansas	NA	30	30
Kentucky	30	31	30
Louisiana	18	19	NA
Maine	33	34	35
Maryland	25	32	35
Massachusetts	38	40	41

## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

Student characteristic and state	2009	2011	2015
Michigan	31	34	34
Minnesota	36	38	42
Mississippi	13	15	17
Missouri	33	33	37
Montana	38	39	38
Nebraska	NA	35	37
Nevada	19	18	24
New Hampshire	33	38	44
New Jersey	31	30	32
New Mexico	18	19	20
New York	27	27	28
North Carolina	22	23	31
North Dakota	37	38	38
Ohio	32	33	35
Oklahoma	22	23	25
Oregon	32	32	32
Pennsylvania	31	28	NA
Rhode Island	22	27	32
South Carolina	22	24	29
South Dakota	35	36	36
Tennessee	24	25	35
Texas	26	29	32
Utah	36	38	46
Vermont	NA	39	39
Virginia	33	38	38
Washington	30	33	35
West Virginia	18	19	23

## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

Student characteristic and state	2009	2011	2015
Wisconsin	33	36	37
Wyoming	30	34	34
Puerto Rico	NA	NA	NA

NA = not available; s = suppressed for reasons of confidentiality and/or reliability.

NAEP = National Assessment of Educational Progress.

### Note(s)

The NAEP scores are for public schools only. The national value for the United States is the reported value in the NAEP reports. Black includes African American. Hispanic includes Latino. Asian and Pacific Islander includes Native Hawaiian.

### Source(s)

National Center for Education Statistics, NAEP (various years).

*Science and Engineering Indicators 2018*



## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

APPENDIX TABLE 1-14

### Average mathematics assessment test scores of children who were in kindergarten for the first time in the 2010–11 school year and in third grade in the 2013–14 school year, by child and family characteristics

(Average score)

Child and family characteristic	Academic year 2010–11		Academic year 2011–12		Academic year 2012–13		Academic year 2013–14 <sup>a</sup>
	Fall	Spring	Fall	Spring	Fall	Spring	Spring
All children	29.3	42.0	51.5	64.0	72.9	81.9	99.2
Sex							
Male	29.4	42.0	51.6	64.6	73.9	82.9	100.9
Female	29.2	42.0	51.4	63.3	71.8	80.8	97.4
Race or ethnicity <sup>b</sup>							
White	31.7	44.6	54.4	67.5	76.6	85.3	102.9
Black	25.8	37.5	45.9	57.8	65.2	73.6	90.2
Hispanic <sup>c</sup>	24.7	37.8	47.4	58.7	67.3	77.3	94.3
Asian	34.5	46.0	56.0	68.1	78.4	87.8	104.3
American Indian or Alaska Native	26.3	40.2	48.1	62.0	69.0	78.6	99.2
Family poverty status in fall 2010 <sup>d</sup>							
Income below the federal poverty level	24.1	36.8	45.5	58.1	66.7	75.8	93.3
Income at or above 200% of the federal poverty level	33.3	45.9	55.6	67.9	77.0	85.9	103.2
Family type in fall 2010 <sup>e</sup>							
One-parent household	25.9	38.3	47.5	60.2	67.8	77.1	94.5
Two-parent household	30.6	43.4	52.8	65.5	74.7	83.6	100.8
Primary home language in fall 2010							
English	30.2	42.9	52.4	65.1	73.9	82.6	100.0
Not English	24.1	37.3	46.3	58.0	67.2	77.6	94.4
Parents' highest education in fall 2010 <sup>f</sup>							
Less than high school education	21.0	34.3	44.3	54.7	65.8	75.8	90.7

## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

Child and family characteristic	Academic year 2010–11		Academic year 2011–12		Academic year 2012–13		Academic year 2013–14 <sup>a</sup>
	Fall	Spring	Fall	Spring	Fall	Spring	Spring
High school diploma or equivalent	24.7	37.4	46.7	59.2	67.9	77.4	94.1
Some college, associate's degree, or career or technical education	28.4	41.1	50.3	63.2	71.9	81.2	98.2
Bachelor's degree	33.1	45.8	55.5	67.9	77.3	85.5	103.0
Graduate or professional school	35.7	48.1	58.7	70.3	80.1	88.3	105.8

<sup>a</sup> Third grade assessments were conducted only in the spring of the academic year 2013–14.

<sup>b</sup> Other racial and ethnic groups are included in all children but are not shown separately in the table.

<sup>c</sup> Hispanic may be any race. American Indian or Alaska Native, Asian, black, and white refer to individuals who are not of Hispanic origin.

<sup>d</sup> Poverty status is based on 2010 U.S. Census poverty thresholds, which identify incomes determined to meet household needs, given family size. For example, in 2010, a family of two was below the poverty threshold if its income was lower than \$14,220.

<sup>e</sup> Two parents includes two biological parents, two adoptive parents, and one biological or adoptive parent and one other parent or partner. One parent refers to one biological or adoptive parent only.

<sup>f</sup> The highest level of education achieved by either of the parents or guardians in a two-parent household or by the only parent or guardian in a single-parent household.

### Note(s)

The mathematics assessment scale was 0 to 75 in kindergarten, 0 to 96 in first grade, 0 to 113 in second grade, and 0 to 135 in third grade.

### Source(s)

Mulligan GM, Hastedt S, McCarroll JC, *First-Time Kindergartners in 2010–11: First Findings From the Kindergarten Rounds of the Early Childhood Longitudinal Study, Kindergarten Class of 2010–11 (ECLS-K:2011)*, NCES 2012-049 (2012); Mulligan GM, McCarroll JC, Flanagan KD, Potter D, *Findings From the First-Grade Rounds of the Early Childhood Longitudinal Study, Kindergarten Class of 2010–11 (ECLS-K:2011)*, NCES 2015-109 (2014); Mulligan GM, McCarroll JC, Flanagan KD, Potter D, *Findings From the Second-Grade Rounds of the Early Childhood Longitudinal Study, Kindergarten Class of 2010–11 (ECLS-K:2011)*, NCES 2015-077 (2015); Mulligan GM, McCarroll JC, Flanagan KD, Potter D, *Findings From the Third-Grade Round of the Early Childhood Longitudinal Study, Kindergarten Class of 2010–11 (ECLS-K:2011)*, NCES 2016-094 (2016).

*Science and Engineering Indicators 2018*

## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

APPENDIX TABLE 1-15



### Average science assessment test scores of children who were in kindergarten for the first time in the 2010–11 school year and in third grade in the 2013–14 school year, by child and family characteristics

(Average score)

Child and family characteristic	Academic year 2011–12 <sup>a</sup>		Academic year 2012–13		Academic year 2013–14 <sup>b</sup>
	Fall	Spring	Fall	Spring	Spring
All children	23.9	27.1	39.8	44.1	55.6
Sex					
Male	23.9	27.3	40.3	44.5	56.3
Female	23.9	26.8	39.9	43.8	55.0
Race or ethnicity <sup>c</sup>					
White	26.0	29.2	42.7	46.6	58.5
Black	21.0	23.9	35.9	40.3	50.0
Hispanic <sup>d</sup>	20.5	23.9	35.0	40.0	51.5
Asian	23.4	26.9	39.8	45.6	57.5
American Indian or Alaska Native	24.7	27.2	38.8	42.6	54.3
Family poverty status in fall 2010 <sup>e</sup>					
Income below the federal poverty level	20.7	23.7	35.3	39.8	51.0
Income at or above 200% of the federal poverty level	25.9	29.3	42.9	46.7	58.9
Family type in fall 2010 <sup>f</sup>					
One-parent household	22.2	25.4	37.6	41.8	52.5
Two-parent household	24.6	27.8	40.7	45.0	56.8
Primary home language in fall 2010					
English	24.8	28.0	41.0	45.0	56.6
Not English	18.8	22.1	33.2	39.1	50.6
Parents' highest education in fall 2010 <sup>g</sup>					
Less than high school education	18.7	21.2	33.0	38.2	48.1
High school diploma or equivalent	21.9	24.6	36.8	41.5	51.9

## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

Child and family characteristic	Academic year 2011–12 <sup>a</sup>		Academic year 2012–13		Academic year 2013–14 <sup>b</sup>
	Fall	Spring	Fall	Spring	Spring
Some college, associate's degree, or career or technical education	23.7	26.9	39.5	44.0	54.9
Bachelor's degree	25.8	29.0	42.8	46.6	58.7
Graduate or professional school	27.0	30.5	44.7	48.2	61.0

<sup>a</sup> There was no science assessment in academic year 2010–11. Science assessment began in grade 1.

<sup>b</sup> Third grade assessments were conducted only in the spring of the academic year 2013–14.

<sup>c</sup> Other racial and ethnic groups are included in all children but are not shown separately in the table.

<sup>d</sup> Hispanic may be any race. American Indian or Alaska Native, Asian, black or African American, and white refer to individuals who are not of Hispanic origin.

<sup>e</sup> Poverty status is based on 2010 U.S. Census poverty thresholds, which identify incomes determined to meet household needs, given family size. For example, in 2010, a family of two was below the poverty threshold if its income was lower than \$14,220.

<sup>f</sup> Two parents includes two biological parents, two adoptive parents, and one biological or adoptive parent and one other parent or partner. One parent refers to one biological or adoptive parent only.

<sup>g</sup> The highest level of education achieved by either of the parents or guardians in a two-parent household or by the only parent or guardian in a single-parent household.

### Note(s)

The science assessment scale was 0 to 47 in first grade, 0 to 64 in second grade, and 0 to 87 in third grade.

### Source(s)

Mulligan GM, McCarroll JC, Flanagan KD, Potter D, *Findings From the First-Grade Rounds of the Early Childhood Longitudinal Study, Kindergarten Class of 2010–11 (ECLS-K:2011)*, NCES 2015-109 (2014); Mulligan GM, McCarroll JC, Flanagan KD, Potter D, *Findings From the Second-Grade Rounds of the Early Childhood Longitudinal Study, Kindergarten Class of 2010–11 (ECLS-K:2011)*, NCES 2015-077 (2015); Mulligan GM, McCarroll JC, Flanagan KD, Potter D, *Findings From the Third-Grade Round of the Early Childhood Longitudinal Study, Kindergarten Class of 2010–11 (ECLS-K:2011)*, NCES 2016-094 (2016).

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## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

APPENDIX TABLE 1-16

### Average TIMSS mathematics scores of students in grade 4, by education system: 2015

(Average score)

Education system	Grade 4	Comparison with U.S. score
TIMSS scale centerpoint	500	^
Singapore <sup>a</sup>	618	^
Hong Kong (China) <sup>b</sup>	615	^
South Korea	608	^
Taiwan (China)	597	^
Japan	593	^
Northern Ireland (UK) <sup>c</sup>	570	^
Russia	564	^
Norway (5 years of school)	549	^
Ireland	547	^
Belgium (Flemish) <sup>b</sup>	546	^
England (UK)	546	~
Kazakhstan	544	~
Portugal <sup>a</sup>	541	~
United States <sup>a,b</sup>	539	~
Denmark <sup>a,b</sup>	539	~
Lithuania <sup>a</sup>	535	~
Finland	535	~
Poland	535	~
Netherlands <sup>b</sup>	530	v
Hungary	529	v
Czech Republic	528	v
Bulgaria	524	v
Cyprus	523	v
Germany	522	v

## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

Education system	Grade 4	Comparison with U.S. score
Slovenia	520	v
Sweden <sup>a</sup>	519	v
Serbia <sup>d</sup>	518	v
Australia	517	v
Canada <sup>a,b,e</sup>	511	v
Italy <sup>a</sup>	507	v
Spain <sup>a</sup>	505	v
Croatia	502	v
Slovakia	498	v
New Zealand	491	v
France	488	v
Turkey	483	v
Georgia <sup>e</sup>	463	v
Chile	459	v
United Arab Emirates	452	v
Bahrain <sup>a</sup>	451	v
Qatar	439	v
Iran	431	v
Oman	425	v
Indonesia	397	v
Jordan	388	v
Saudi Arabia <sup>f</sup>	383	v
Morocco	377	v
Kuwait <sup>f</sup>	353	v

≈ = not significantly different from the U.S. score at the 0.05 level; ^ = significantly higher than the U.S. score at the 0.05 level; v = significantly lower than the U.S. score at the 0.05 level.

TIMSS = Trends in International Mathematics and Science Study; UK = United Kingdom.

## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

- <sup>a</sup> National defined population covers 90% to 95% of the national target population.
- <sup>b</sup> These education systems met guidelines for sample participation rates only after replacement schools were included.
- <sup>c</sup> These education systems nearly satisfied guidelines for sample participation rates after replacement schools were included.
- <sup>d</sup> National defined population covers less than 90% of the national target population (but at least 77%).
- <sup>e</sup> National target population does not include all of the international target population.
- <sup>f</sup> Reservations about reliability exist because the percentage of students with achievement too low for estimation exceeds 15% but does not exceed 25%.

### Note(s)

Education systems are ordered by average score. Education systems that are not countries are designated by the appended three-letter international abbreviation for their country. The TIMSS scale centerpoint is set at 500 points and represents the mean of the overall achievement distribution in 1995. The TIMSS scale is the same in each administration; thus, a value of 500 in 2015 equals 500 in 1995. For TIMSS 2015, Norway revised its assessed population to students in their fifth and ninth years of schooling to obtain better comparisons with Sweden and Finland. However, in previous TIMSS cycles, Norway assessed students in their fourth and eighth years of schooling, which were defined as fourth and eighth grades but have been redefined as third and seventh grades because year 1 in Norway is now considered the equivalent of a year of kindergarten. To maintain trends with previous TIMSS cycles, in 2015, Norway also collected data from students in their fourth and eighth years of schooling, which is used in trend tables.

### Source(s)

Provasnik S, Malley L, Stephens M, Landeros K, Perkins R, Tang JH, *Highlights from TIMSS and TIMSS Advanced 2015: Mathematics and Science Achievement of U.S. Students in Grades 4 and 8 and in Advanced Courses at the End of High School in an International Context*, NCES 2017-002 (2016).

*Science and Engineering Indicators 2018*

## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

APPENDIX TABLE 1-17 

### Average TIMSS mathematics scores of students in grade 8, by education system: 2015

(Average score)

Education system	Grade 8	Comparison with U.S. score
TIMSS scale centerpoint	500	^
Singapore <sup>a</sup>	621	^
South Korea	606	^
Taiwan (China)	599	^
Hong Kong (China)	594	^
Japan	586	^
Russia	538	^
Kazakhstan	528	~
Canada <sup>b,c</sup>	527	^
Ireland	523	~
England (UK)	518	~
United States <sup>b</sup>	518	~
Slovenia	516	~
Hungary	514	~
Norway (9 years of school)	512	~
Lithuania <sup>a</sup>	511	~
Israel <sup>d</sup>	511	~
Australia	505	v
Sweden	501	v
Italy <sup>a</sup>	494	v
Malta	494	v
New Zealand <sup>b</sup>	493	v
Malaysia	465	v
United Arab Emirates	465	v
Turkey	458	v



## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

Education system	Grade 8	Comparison with U.S. score
Bahrain	454	v
Georgia <sup>a,c</sup>	453	v
Lebanon	442	v
Qatar <sup>e</sup>	437	v
Iran	436	v
Thailand	431	v
Chile <sup>e</sup>	427	v
Oman <sup>e</sup>	403	v
Kuwait <sup>e</sup>	392	v
Egypt <sup>e</sup>	392	v
Jordan <sup>f</sup>	386	v
Morocco <sup>f</sup>	384	v
Saudi Arabia <sup>f</sup>	368	v

≈ = not significantly different from the U.S. score at the 0.05 level; ^ = significantly higher than the U.S. score at the 0.05 level; v = significantly lower than the U.S. score at the 0.05 level.

TIMSS = Trends in International Mathematics and Science Study; UK = United Kingdom.

<sup>a</sup> National defined population covers 90% to 95% of the national target population.

<sup>b</sup> These education systems met guidelines for sample participation rates only after replacement schools were included.

<sup>c</sup> National target population does not include all of the international target population.

<sup>d</sup> National defined population covers less than 90% of the national target population (but at least 77%).

<sup>e</sup> Reservations about reliability exist because the percentage of students with achievement too low for estimation exceeds 15% but does not exceed 25%.

<sup>f</sup> Reservations about reliability because the percentage of students with achievement too low for estimation exceeds 25%.

### Note(s)

Education systems are ordered by average score. Education systems that are not countries are designated by the appended three-letter international abbreviation for their country. The TIMSS scale centerpoint is set at 500 points and represents the mean of the overall achievement distribution in 1995. The TIMSS scale is the same in each administration; thus, a value of 500 in 2015 equals 500 in 1995. For TIMSS 2015, Norway revised its assessed population to students in their fifth and ninth years of schooling to obtain better comparisons with Sweden and Finland. However, in previous TIMSS cycles, Norway assessed students in their fourth and eighth years of schooling, which were defined as fourth and eighth grades but have been redefined as third and seventh grades because year 1 in Norway is now considered the equivalent of a year of kindergarten. To maintain trends with previous TIMSS cycles, in 2015, Norway also collected data from students in their fourth and eighth years of schooling, which is used in trend tables.

## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

### Source(s)

Provasnik S, Malley L, Stephens M, Landeros K, Perkins R, Tang JH, *Highlights From TIMSS and TIMSS Advanced 2015: Mathematics and Science Achievement of U.S. Students in Grades 4 and 8 and in Advanced Courses at the End of High School in an International Context*, NCES 2017-002 (2016).

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## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

### APPENDIX TABLE 1-18

#### Average TIMSS science scores of students in grade 4, by education system: 2015

(Average score)

Education system	Grade 4	Comparison with U.S. score
TIMSS scale centerpoint	500	^
Singapore <sup>a</sup>	590	^
South Korea	589	^
Japan	569	^
Russia	567	^
Hong Kong (China) <sup>b</sup>	557	^
Taiwan (China)	555	^
Finland	554	^
Kazakhstan	550	≈
Poland	547	≈
United States <sup>a,b</sup>	546	≈
Slovenia	543	≈
Hungary	542	≈
Sweden <sup>a</sup>	540	≈
Norway (5 years of school)	538	v
Bulgaria	536	≈
England (UK)	536	v
Czech Republic	534	v
Croatia	533	v
Ireland	529	v
Germany	528	v
Lithuania <sup>a</sup>	528	v
Denmark <sup>a,b</sup>	527	v
Canada <sup>a,b,c</sup>	525	v
Serbia <sup>d</sup>	525	v

## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

Education system	Grade 4	Comparison with U.S. score
Australia	524	v
Northern Ireland (UK) <sup>e</sup>	520	v
Slovakia	520	v
Spain <sup>a</sup>	518	v
Netherlands <sup>b</sup>	517	v
Italy <sup>a</sup>	516	v
Belgium (Flemish) <sup>b</sup>	512	v
Portugal <sup>a</sup>	508	v
New Zealand	506	v
France	487	v
Turkey	483	v
Cyprus	481	v
Chile	478	v
Bahrain <sup>a</sup>	459	v
Georgia <sup>c</sup>	451	v
United Arab Emirates	451	v
Qatar	436	v
Oman	431	v
Iran	421	v
Indonesia	397	v
Saudi Arabia	390	v
Morocco <sup>f</sup>	352	v
Kuwait <sup>f</sup>	337	v

≈ = not significantly different from the U.S. score at the 0.05 level; ^ = significantly higher than the U.S. score at the 0.05 level; v = significantly lower than the U.S. score at the 0.05 level.

TIMSS = Trends in International Mathematics and Science Study; UK = United Kingdom.

<sup>a</sup> National defined population covers 90% to 95% of the national target population.

<sup>b</sup> These education systems met guidelines for sample participation rates only after replacement schools were included.

## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

<sup>c</sup> National target population does not include all of the international target population.

<sup>d</sup> National defined population covers less than 90% of the national target population (but at least 77%).

<sup>e</sup> Nearly satisfied guidelines for sample participation rates after replacement schools were included.

<sup>f</sup> Reservations about reliability exist because the percentage of students with achievement too low for estimation exceeds 15% but does not exceed 25%.

### Note(s)

Education systems are ordered by average score. Education systems that are not countries are designated by the appended three-letter international abbreviation for their country. The TIMSS scale centerpoint is set at 500 points and represents the mean of the overall achievement distribution in 1995. The TIMSS scale is the same in each administration; thus, a value of 500 in 2015 equals 500 in 1995. For TIMSS 2015, Norway revised its assessed population to students in their fifth and ninth years of schooling to obtain better comparisons with Sweden and Finland. However, in previous TIMSS cycles, Norway assessed students in their fourth and eighth years of schooling, which were defined as fourth and eighth grades but have been redefined as third and seventh grades because year 1 in Norway is now considered the equivalent of a year of kindergarten. To maintain trends with previous TIMSS cycles, in 2015, Norway also collected data from students in their fourth and eighth years of schooling, which is used in trend tables.

### Source(s)

Provasnik S, Malley L, Stephens M, Landeros K, Perkins R, Tang JH, *Highlights from TIMSS and TIMSS Advanced 2015: Mathematics and Science Achievement of U.S. Students in Grades 4 and 8 and in Advanced Courses at the End of High School in an International Context*, NCES 2017-002 (2016).

*Science and Engineering Indicators 2018*

## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

APPENDIX TABLE 1-19



### Average TIMSS science scores of students in grade 8, by education system: 2015

(Average score)

Education system	Grade 8	Comparison with U.S. score
TIMSS scale centerpoint	500	^
Singapore <sup>a</sup>	597	^
Japan	571	^
Taiwan (China)	569	^
South Korea	556	^
Slovenia	551	^
Hong Kong (China)	546	^
Russia	544	^
England (UK)	537	≈
Kazakhstan	533	≈
Ireland	530	≈
United States <sup>b</sup>	530	≈
Hungary	527	≈
Canada <sup>b,c</sup>	526	≈
Sweden	522	≈
Lithuania <sup>a</sup>	519	v
New Zealand <sup>b</sup>	513	v
Australia	512	v
Norway (9 years of school)	509	v
Israel <sup>d</sup>	507	v
Italy <sup>a</sup>	499	v
Turkey	493	v
Malta	481	v
United Arab Emirates	477	v
Malaysia	471	v

## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

Education system	Grade 8	Comparison with U.S. score
Bahrain	466	v
Qatar	457	v
Iran	456	v
Thailand	456	v
Oman	455	v
Chile	454	v
Georgia <sup>a,c</sup>	443	v
Jordan	426	v
Kuwait	411	v
Lebanon	398	v
Saudi Arabia	396	v
Morocco	393	v
Egypt	371	v

≈ = not significantly different from the U.S. score at the 0.05 level; ^ = significantly higher than the U.S. score at the 0.05 level; v = significantly lower than the U.S. score at the 0.05 level.

TIMSS = Trends in International Mathematics and Science Study; UK = United Kingdom.

<sup>a</sup> National defined population covers 90% to 95% of the national target population.

<sup>b</sup> These education systems met guidelines for sample participation rates only after replacement schools were included.

<sup>c</sup> National target population does not include all of the international target population.

<sup>d</sup> National defined population covers less than 90% of the national target population (but at least 77%).

### Note(s)

Education systems are ordered by average score. Education systems that are not countries are designated by the appended three-letter international abbreviation for their country. The TIMSS scale centerpoint is set at 500 points and represents the mean of the overall achievement distribution in 1995. The TIMSS scale is the same in each administration; thus, a value of 500 in 2015 equals 500 in 1995. For TIMSS 2015, Norway revised its assessed population to students in their fifth and ninth years of schooling to obtain better comparisons with Sweden and Finland. However, in previous TIMSS cycles, Norway assessed students in their fourth and eighth years of schooling, which were defined as fourth and eighth grades but have been redefined as third and seventh grades because year 1 in Norway is now considered the equivalent of a year of kindergarten. To maintain trend with previous TIMSS cycles, in 2015, Norway also collected data from students in their fourth and eighth years of schooling, which is used in trend tables.

### Source(s)



## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

Provasnik S, Malley L, Stephens M, Landeros K, Perkins R, Tang JH, *Highlights From TIMSS and TIMSS Advanced 2015: Mathematics and Science Achievement of U.S. Students in Grades 4 and 8 and in Advanced Courses at the End of High School in an International Context*, NCES 2017-002 (2016).

*Science and Engineering Indicators 2018*



## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

### APPENDIX TABLE 1-20

#### Average mathematics literacy assessment scores for 15-year-old students participating in PISA, by education system: 2015

(Average score)

Education system	Average score	Comparison with U.S. score	OECD country and education system
OECD average	490	^	na
Singapore	564	^	N
Hong Kong (China)	548	^	N
Macau (China)	544	^	N
Taiwan (China)	542	^	N
Japan	532	^	Y
Beijing, Shanghai, Jiangsu, and Guangdong (China)	531	^	N
South Korea	524	^	Y
Switzerland	521	^	Y
Estonia	520	^	Y
Canada	516	^	Y
Netherlands	512	^	Y
Denmark	511	^	Y
Finland	511	^	Y
Slovenia	510	^	Y
Belgium	507	^	Y
Germany	506	^	Y
Ireland	504	^	Y
Poland	504	^	Y
Norway	502	^	Y
Austria	497	^	Y
New Zealand	495	^	Y
Vietnam	495	^	N
Australia	494	^	Y

## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

Education system	Average score	Comparison with U.S. score	OECD country and education system
Russia	494	^	N
Sweden	494	^	Y
France	493	^	Y
Czech Republic	492	^	Y
Portugal	492	^	Y
United Kingdom	492	^	Y
Italy	490	^	Y
Iceland	488	^	Y
Luxembourg	486	^	Y
Spain	486	^	Y
Latvia	482	^	Y
Malta	479	^	N
Lithuania	478	^	N
Hungary	477	≈	Y
Slovakia	475	≈	Y
Israel	470	≈	Y
United States	470	≈	Y
Croatia	464	≈	N
Buenos Aires (Argentina)	456	≈	N
Greece	454	v	Y
Romania	444	v	N
Bulgaria	441	v	N
Cyprus	437	v	N
United Arab Emirates	427	v	N
Chile	423	v	Y
Moldova	420	v	N
Turkey	420	v	Y

## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

Education system	Average score	Comparison with U.S. score	OECD country and education system
Montenegro	418	v	N
Uruguay	418	v	N
Trinidad and Tobago	417	v	N
Thailand	415	v	N
Albania	413	v	N
Mexico	408	v	Y
Georgia	404	v	N
Qatar	402	v	N
Costa Rica	400	v	N
Lebanon	396	v	N
Colombia	390	v	N
Peru	387	v	N
Indonesia	386	v	N
Jordan	380	v	N
Brazil	377	v	N
Macedonia	371	v	N
Tunisia	367	v	N
Kosovo	362	v	N
Algeria	360	v	N
Dominican Republic	328	v	N

≈ = not significantly different from the U.S. score at the 0.05 level; ^ = significantly higher than the U.S. score at the 0.05 level; v = significantly lower than the U.S. score at the 0.05 level; N = no; na = not applicable; Y = yes.

OECD = Organisation for Economic Co-operation and Development; PISA = Program for International Student Assessment.

### Note(s)

Education systems are ordered by 2015 average score. The OECD average is the average of the national averages of the OECD member countries, with each country weighted equally. Scores are reported on a scale from 0 to 1,000. Although Argentina, Malaysia, and Kazakhstan participated in PISA 2015, technical problems with their samples prevent results from being discussed in this report.

### Source(s)



## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

Kastberg D, Chan JY, Murray G, *Performance of U.S. 15-Year-Old Students in Science, Reading, and Mathematics Literacy in an International Context: First Look at PISA 2015*, NCES 2017-048 (2016).

*Science and Engineering Indicators 2018*

## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

APPENDIX TABLE 1-21

### Average science literacy assessment scores for 15-year-old students participating in PISA, by education system: 2015

(Average score)

Education system	Average score	Comparison with U.S. score	OECD country and education system
OECD average	493	≈	na
Singapore	556	^	N
Japan	538	^	Y
Estonia	534	^	Y
Taiwan (China)	532	^	N
Finland	531	^	Y
Macau (China)	529	^	N
Canada	528	^	Y
Vietnam	525	^	N
Hong Kong (China)	523	^	N
Beijing, Shanghai, Jiangsu, and Guangdong (China)	518	^	N
South Korea	516	^	Y
New Zealand	513	^	Y
Slovenia	513	^	Y
Australia	510	^	Y
Germany	509	^	Y
Netherlands	509	^	Y
United Kingdom	509	^	Y
Switzerland	506	^	Y
Ireland	503	≈	Y
Belgium	502	≈	Y
Denmark	502	≈	Y
Poland	501	≈	Y
Portugal	501	≈	Y

## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

Education system	Average score	Comparison with U.S. score	OECD country and education system
Norway	498	≈	Y
United States	496	≈	Y
Austria	495	≈	Y
France	495	≈	Y
Czech Republic	493	≈	Y
Spain	493	≈	Y
Sweden	493	≈	Y
Latvia	490	≈	Y
Russia	487	v	N
Luxembourg	483	v	N
Italy	481	v	Y
Hungary	477	v	Y
Buenos Aires (Argentina)	475	v	N
Croatia	475	v	N
Lithuania	475	v	N
Iceland	473	v	Y
Israel	467	v	Y
Malta	465	v	N
Slovakia	461	v	Y
Greece	455	v	Y
Chile	447	v	Y
Bulgaria	446	v	N
United Arab Emirates	437	v	N
Romania	435	v	N
Uruguay	435	v	N
Cyprus	433	v	N
Moldova	428	v	N

## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

Education system	Average score	Comparison with U.S. score	OECD country and education system
Albania	427	v	N
Trinidad and Tobago	425	v	N
Turkey	425	v	Y
Thailand	421	v	N
Costa Rica	420	v	N
Qatar	418	v	N
Colombia	416	v	N
Mexico	416	v	Y
Georgia	411	v	N
Montenegro	411	v	N
Jordan	409	v	N
Indonesia	403	v	N
Brazil	401	v	N
Peru	397	v	N
Lebanon	386	v	N
Tunisia	386	v	N
Macedonia	384	v	N
Kosovo	378	v	N
Algeria	376	v	N
Dominican Republic	332	v	N

≈ = not significantly different from the U.S. score at the 0.05 level; ^ = significantly higher than the U.S. score at the 0.05 level; v = significantly lower than the U.S. score at the 0.05 level; N = no; na = not applicable; Y = yes.

OECD = Organisation for Economic Co-operation and Development; PISA = Program for International Student Assessment.

### Note(s)

Education systems are ordered by 2015 average score. The OECD average is the average of the national averages of the OECD member countries, with each country weighted equally. Scores are reported on a scale from 0 to 1,000. Although Argentina, Malaysia, and Kazakhstan participated in PISA 2015, technical problems with their samples prevent results from being discussed in this report.

### Source(s)



## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

Kastberg D, Chan JY, Murray G, *Performance of U.S. 15-Year-Old Students in Science, Reading, and Mathematics Literacy in an International Context: First Look at PISA 2015*, NCES 2017-048 (2016).

*Science and Engineering Indicators 2018*



## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

APPENDIX TABLE 1-22



### Highest-level mathematics course enrollment of high school completers, by gender and socioeconomic status within race or ethnicity: 2013

(Percentage distribution)

Student and family characteristic	Algebra 1 or lower	Geometry	Algebra 2	Trigonometry or other	Pre-calculus	Calculus or higher
All students	2.9	7.8	24.4	23.8	21.8	19.3
White						
Lowest fifth SES	8.0	8.6	37.2	23.6	14.8	7.8
Middle three-fifths SES	3.6	8.0	25.4	23.7	22.3	17.1
Highest fifth SES	0.5	2.6	10.5	18.6	30.2	37.6
Black						
Lowest fifth SES	3.5	4.1	32.4	38.5	18.5	3.1
Middle three-fifths SES	2.3	5.3	27.3	34.7	21.0	9.3
Highest fifth SES	0.5	4.8	15.2	33.4	23.9	22.2
Hispanic <sup>a</sup>						
Lowest fifth SES	3.2	18.6	23.7	25.6	17.0	11.9
Middle three-fifths SES	3.1	11.2	29.0	23.8	18.5	14.5
Highest fifth SES	0.6	7.2	18.6	16.6	31.9	25.1
Asian						
Lowest fifth SES	0.0	8.0	19.2	16.9	25.8	30.0
Middle three-fifths SES	1.4	1.7	12.4	18.5	20.9	45.1
Highest fifth SES	0.0	1.9	4.8	6.3	24.3	62.7
Other <sup>b</sup>						
Lowest fifth SES	s	s	s	s	s	s
Middle three-fifths SES	2.8	16.5	39.3	13.0	14.0	14.5
Highest fifth SES	s	s	s	s	s	s
Two or more races						
Lowest fifth SES	8.5	7.1	47.2	18.0	15.0	4.3

## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

Student and family characteristic	Algebra 1 or lower	Geometry	Algebra 2	Trigonometry or other	Pre-calculus	Calculus or higher
Middle three-fifths SES	2.6	8.5	32.0	26.7	17.1	13.2
Highest fifth SES	1.1	6.1	17.4	23.9	21.4	30.1
White						
Male	4.0	7.6	22.0	21.8	22.2	22.5
Female	2.3	5.6	22.5	22.6	25.6	21.4
Black						
Male	2.9	7.1	26.1	37.8	17.5	8.5
Female	1.9	3.3	30.8	32.2	22.5	9.3
Hispanic						
Male	3.9	15.0	27.3	23.6	18.2	12.0
Female	2.2	11.4	26.4	23.4	19.6	17.0
Asian						
Male	0.9	4.2	11.3	11.5	19.5	52.6
Female	0.4	0.7	9.3	15.6	25.8	48.1
Other						
Male	2.1	12.6	44.2	16.9	15.3	9.0
Female	3.4	9.0	43.4	14.7	10.1	19.4
Two or more races						
Male	3.9	9.0	26.9	24.7	17.9	17.7
Female	2.3	7.3	34.5	25.4	17.8	12.8

s = suppressed for reasons of confidentiality and/or reliability.

SES = socioeconomic status.

<sup>a</sup> Hispanic may be any race. Asian, black or African American, white, and other races refer to individuals who are not of Hispanic origin.

<sup>b</sup> Other includes Alaska Native, American Indian, Native Hawaiian, Pacific Islander, and those having origins in a race not listed.

### Note(s)

## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

Percentages may not add to total because of rounding. Trigonometry or other includes trigonometry, probability and statistics, and other advanced mathematics. Calculus or higher includes calculus, Advanced Placement or International Baccalaureate (AP/IB) calculus, and other AP/IB mathematics. SES is a composite variable derived from parental education level, parental occupation, and family income. The quintile measure divides the SES distribution into five equal quintile groups. Quintile 1 corresponds to the lowest one-fifth of the population, and quintile 5 corresponds to the highest. For this report, the middle three quintiles are combined into one category.

### Source(s)

National Science Foundation, National Center for Science and Engineering Statistics, special tabulations (2016) of High School Longitudinal Study of 2009 (HSL:09), National Center for Education Statistics.

*Science and Engineering Indicators 2018*

# CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

APPENDIX TABLE 1-23



## Highest-level mathematics course enrollment of high school completers, by student and family characteristics: 2013

(Percentage distribution)

Student and family characteristic	Algebra 1 or lower	Geometry	Algebra 2	Trigonometry or other	Pre-calculus	Calculus or higher
All students	2.9	7.8	24.4	23.8	21.8	19.3
Sex						
Male	3.7	9.1	23.7	23.7	20.4	19.5
Female	2.2	6.5	25.1	24.0	23.2	19.2
Race or ethnicity						
White	3.1	6.6	22.2	22.2	23.9	21.9
Black	2.3	4.9	28.8	34.6	20.4	9.0
Hispanic <sup>a</sup>	3.0	13.2	26.8	23.5	18.9	14.6
Asian	0.7	2.4	10.3	13.6	22.7	50.3
Other <sup>b</sup>	2.8	10.7	43.8	15.7	12.6	14.3
Two or more races	3.1	8.1	30.8	25.1	17.8	15.1
SES <sup>c</sup>						
Lowest fifth	4.9	12.0	31.0	26.5	16.6	9.0
Middle three-fifths	3.2	8.2	26.5	25.0	20.9	16.2
Highest fifth	0.5	3.3	11.6	18.9	28.9	36.7
Parents' highest education <sup>d</sup>						
Less than high school	6.5	14.3	27.4	24.2	16.6	11.0
High school diploma or equivalent	3.7	10.3	30.5	26.0	17.5	11.9
Associate's degree	3.5	8.6	28.4	24.7	21.8	13.0
Bachelor's degree or higher	1.3	4.1	15.4	21.7	26.5	31.0
Highest mathematics course in grade 9						
No mathematics	13.5	24.5	35.0	18.3	6.5	2.3

## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

Student and family characteristic	Algebra 1 or lower	Geometry	Algebra 2	Trigonometry or other	Pre-calculus	Calculus or higher
Basic mathematics or pre-algebra	21.4	20.9	33.5	15.5	5.1	3.6
Algebra 1	1.4	8.6	34.6	27.0	21.9	6.5
Above algebra 1	0.0	2.3	7.7	21.8	26.5	41.7
Grade 9 mathematics achievement						
Lowest fifth	9.7	15.1	41.3	24.0	8.0	1.8
Middle three-fifths	2.3	8.5	27.2	27.0	22.5	12.5
Highest fifth	0.2	1.2	6.4	15.4	28.6	48.2
Students' educational expectations in grade 9						
High school or less	8.1	13.7	34.2	27.4	11.9	4.7
Some college	3.3	14.5	31.4	24.3	18.4	8.2
Bachelor's degree	1.8	6.0	23.6	23.2	26.3	19.1
Graduate or professional degree	1.1	4.2	19.0	22.8	25.0	27.8
Don't know	4.6	11.1	28.4	24.3	17.7	13.8
School						
Public	3.0	8.1	25.5	23.9	21.1	18.4
Private	0.9	1.5	9.3	23.0	32.0	33.3

SES = socioeconomic status.

<sup>a</sup> Hispanic may be any race. Asian, black or African American, white, and other races refer to individuals who are not of Hispanic origin.

<sup>b</sup> Other includes Alaska Native, American Indian, Native Hawaiian, Pacific Islander, more than one race, and those having origins in a race not listed.

<sup>c</sup> SES is a composite variable derived from parental education level, parental occupation, and family income. The quintile measure divides the SES distribution into five equal quintile groups. Quintile 1 corresponds to the lowest one-fifth of the population, and quintile 5 corresponds to the highest. For this report, the middle three quintiles are combined into one category.

<sup>d</sup> This refers to the highest level of education achieved by either parent.

### Note(s)

Trigonometry or other includes trigonometry, probability and statistics, and other advanced mathematics. Calculus or higher includes calculus, Advanced Placement or International Baccalaureate (AP/IB) calculus, and other AP/IB mathematics.

## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

### Source(s)

National Science Foundation, National Center for Science and Engineering Statistics, special tabulations (2016) of High School Longitudinal Study of 2009 (HSLs:09), National Center for Education Statistics.

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## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

APPENDIX TABLE 1-24

## Science course enrollment of high school completers, by sex and socioeconomic status within race or ethnicity: 2013

(Percentage distribution)

Student and family characteristic	General science	AP/IB or advanced science	No biology	General biology	AP/IB or advanced biology	No chemistry	General chemistry	AP/IB or advanced chemistry	No physics	General physics	AP/IB or advanced physics
All students	78.6	21.3	2.5	86.1	11.5	24.4	67.9	7.7	58.5	36.4	5.1
White											
Lowest fifth SES	89.7	10.1	2.7	91.9	5.4	40.2	55.4	4.4	72.3	26.7	1.0
Middle three-fifths SES	80.9	18.9	2.4	87.0	10.6	26.8	66.3	6.9	62.7	33.2	4.0
Highest fifth SES	62.2	37.8	2.2	79.2	18.6	11.4	73.8	14.7	44.0	46.2	9.8
Black											
Lowest fifth SES	89.2	10.1	2.3	90.9	6.9	25.0	69.9	5.1	66.6	28.9	4.5
Middle three-fifths SES	85.5	14.5	0.6	90.2	9.2	25.7	71.5	2.8	61.8	37.0	1.3
Highest fifth SES	69.3	30.7	1.9	80.8	17.3	14.9	80.6	4.5	51.5	43.5	5.0
Hispanic <sup>a</sup>											
Lowest fifth SES	88.9	10.7	4.3	88.5	7.2	32.5	65.3	2.2	65.8	33.1	1.1

## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

[illegible]



## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

[illegible]

## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

Student and family characteristic	General science	AP/IB or advanced science	No biology	General biology	AP/IB or advanced biology	No chemistry	General chemistry	AP/IB or advanced chemistry	No physics	General physics	AP/IB or advanced physics
Male	92.8	7.2	4.0	91.6	4.3	39.0	58.9	2.1	68.6	30.5	0.9
Female	90.3	8.2	1.5	90.7	7.8	27.3	67.4	5.3	80.0	20.0	0.0
Two or more races											
Male	79.6	20.4	4.0	86.8	9.2	28.7	63.8	7.5	58.4	35.5	6.1
Female	82.5	17.5	1.8	87.0	11.2	27.5	67.1	5.4	65.3	31.2	3.5

s = suppressed for reasons of confidentiality and/or reliability.

AP/IB = Advanced Placement/International Baccalaureate; SES = socioeconomic status.

<sup>a</sup> Hispanic may be any race. Asian, black, white, and other races refer to individuals who are not of Hispanic origin.

<sup>b</sup> Other includes Alaska Native, American Indian, Native Hawaiian, Pacific Islander, more than one race, and those having origins in a race not listed.

### Note(s)

Percentages may not add to total because of rounding. SES is a composite variable derived from parental education level, parental occupation, and family income. The quintile measure divides the SES distribution into five equal quintile groups. Quintile 1 corresponds to the lowest one-fifth of the population, and quintile 5 corresponds to the highest. For this report, the middle three quintiles are combined into one category.

### Source(s)

National Science Foundation, National Center for Science and Engineering Statistics, special tabulations (2016) of High School Longitudinal Study of 2009 (HSL:09), National Center for Education Statistics.

*Science and Engineering Indicators 2018*

## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

APPENDIX TABLE 1-25

## Science course enrollment of high school completers, by student and family characteristics: 2013

(Percentage distribution)

Student and family characteristic	General science	AP/IB or advanced science	No biology	General biology	AP/IB or advanced biology	No chemistry	General chemistry	AP/IB or advanced chemistry	No physics	General physics	AP/IB or advanced physics
All students	78.6	21.3	2.5	86.1	11.5	24.4	67.9	7.7	58.5	36.4	5.1
Sex											
Male	80.2	19.7	2.7	87.7	9.7	27.1	65.4	7.5	56.7	36.8	6.6
Female	77.1	22.8	2.2	84.5	13.2	21.9	70.2	7.9	60.3	36.0	3.7
Race or ethnicity											
White	76.6	23.3	2.4	85.2	12.4	23.9	67.3	8.8	58.3	36.3	5.4
Black	85.4	14.4	1.2	89.8	9.0	23.8	72.8	3.4	62.8	34.8	2.4
Hispanic <sup>a</sup>	84.0	15.9	2.9	89.2	7.9	27.1	68.0	4.8	59.6	36.9	3.5
Asian	48.5	51.5	3.8	66.1	30.1	10.1	65.2	24.7	32.8	47.4	19.8
Other <sup>b</sup>	91.5	7.7	2.7	91.1	6.1	33.0	63.2	3.7	74.4	25.1	0.4
Two or more races	81.1	18.9	2.8	86.9	10.3	28.1	65.6	6.4	62.0	33.2	4.7
SES <sup>c</sup>											
Lowest fifth	89.1	10.5	3.3	90.3	6.4	34.1	62.4	3.5	68.1	30.1	1.9
Middle three-fifths	81.2	18.6	2.1	87.5	10.4	25.8	68.0	6.2	60.8	35.2	4.0
Highest fifth	62.0	38.0	2.4	78.6	19.0	11.8	72.8	15.4	43.6	45.9	10.5

## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

Student and family characteristic	General science	AP/IB or advanced science	No biology	General biology	AP/IB or advanced biology	No chemistry	General chemistry	AP/IB or advanced chemistry	No physics	General physics	AP/IB or advanced physics
Parents' highest education <sup>d</sup>											
Less than high school	87.0	12.5	3.1	89.6	7.3	36.6	59.3	4.1	62.8	36.4	0.8
High school diploma or equivalent	85.7	14.0	2.5	89.8	7.7	29.9	65.4	4.7	65.1	31.5	3.4
Associate's degree	84.0	15.9	2.3	87.8	9.9	28.4	66.9	4.7	65.0	32.3	2.7
Bachelor's degree or higher	67.5	32.4	2.2	81.2	16.6	15.0	72.3	12.7	47.8	43.7	8.5
Highest mathematics course in grade 9											
No mathematics	93.9	5.6	4.8	91.4	3.8	53.3	46.0	0.7	82.4	17.4	0.2
Basic mathematics or pre-algebra	92.4	7.1	4.4	90.5	5.1	58.2	40.2	1.6	78.6	20.6	0.7
Algebra 1	87.2	12.8	2.0	90.7	7.3	25.4	70.8	3.9	63.2	34.7	2.1
Above algebra 1	62.9	36.9	2.5	78.3	19.3	13.6	72.1	14.3	46.5	43.0	10.5
Grade 9 mathematics achievement											
Lowest fifth	93.9	5.8	3.3	92.6	4.2	46.3	52.4	1.3	77.8	21.9	0.3

## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

Student and family characteristic	General science	AP/IB or advanced science	No biology	General biology	AP/IB or advanced biology	No chemistry	General chemistry	AP/IB or advanced chemistry	No physics	General physics	AP/IB or advanced physics
Middle three-fifths	83.9	16.0	2.5	88.4	9.1	25.4	70.0	4.6	62.1	35.3	2.6
Highest fifth	55.3	44.7	1.8	75.9	22.3	8.1	72.1	19.8	37.1	48.2	14.7
Students' educational expectations in grade 9											
High school or less	91.4	8.5	3.0	91.4	5.7	41.7	56.4	1.8	73.0	26.3	0.8
Some college	88.9	10.7	4.4	89.0	6.6	34.6	60.2	5.2	68.6	30.0	1.4
Bachelor's degree	78.6	21.3	1.8	88.2	10.1	21.5	70.7	7.8	54.9	39.7	5.5
Graduate or professional degree	70.0	29.8	2.0	81.7	16.3	14.7	74.0	11.3	52.3	40.1	7.7
Don't know	85.7	14.1	3.1	89.3	7.6	34.2	61.6	4.2	63.5	33.4	3.1
School											
Public	78.7	21.2	2.2	86.2	11.6	25.3	67.1	7.6	59.8	35.2	5.0
Private	74.5	25.5	3.1	85.4	11.5	8.5	81.4	10.1	38.5	54.2	7.3

AP/IB = Advanced Placement/International Baccalaureate; SES = socioeconomic status.

<sup>a</sup> Hispanic may be any race. Asian, black, white, and other races refer to individuals who are not of Hispanic origin.

<sup>b</sup> Other includes Alaska Native, American Indian, Native Hawaiian, Pacific Islander, more than one race, and those having origins in a race not listed.

## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

<sup>c</sup> SES is a composite variable derived from parental education level, parental occupation, and family income. The quintile measure divides the SES distribution into five equal quintile groups. Quintile 1 corresponds to the lowest one-fifth of the population, and quintile 5 corresponds to the highest. For this report, the middle three quintiles are combined into one category.

<sup>d</sup> This represents the highest level of education achieved by either parent.

### Source(s)

National Science Foundation, National Center for Science and Engineering Statistics, special tabulations (2016) of High School Longitudinal Study of 2009 (HSL:09), National Center for Education Statistics.

*Science and Engineering Indicators 2018*

## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

APPENDIX TABLE 1-26

### Average high school credits earned in technology-related courses, and percentage earning any credit, for fall 2009 ninth graders, by student, family, and school characteristics: 2013

(Number and percent)

Characteristic	Computer and information sciences		Engineering and technology	
	Average credits	Earned any credit	Average credits	Earned any credit
Total	1.0	47.1	1.3	14.7
Sex				
Male	1.1	49.0	1.4	21.1
Female	1.0	45.1	1.0	8.3
Race or ethnicity				
Asian	1.2	38.1	1.1	11.5
Black	1.1	47.8	1.4	10.8
Hispanic <sup>a</sup>	1.0	46.7	1.1	12.0
White	1.0	48.3	1.3	17.3
More than one race	1.0	44.8	1.2	14.5
Other <sup>b</sup>	0.9	33.3	1.0	8.7
SES <sup>c</sup>				
Lowest fifth	1.0	47.4	1.2	12.1
Middle three-fifths	1.1	47.3	1.3	15.5
Highest fifth	1.0	45.9	1.3	15.1

## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

Characteristic	Computer and information sciences		Engineering and technology	
	Average credits	Earned any credit	Average credits	Earned any credit
Parent's highest education				
Less than high school	1.0	40.6	0.9	9.5
High school	1.1	48.5	1.2	14.4
Associate's degree	1.0	48.5	1.3	15.5
Bachelor's degree	1.0	46.6	1.4	16.1
Master's degree or higher	1.0	45.6	1.3	14.8
Mathematics achievement				
Lowest fifth	1.0	43.8	1.3	12.1
Middle three-fifths	1.0	48.6	1.2	14.5
Highest fifth	1.1	45.7	1.4	17.5
School sector				
Public	1.1	46.6	1.3	15.3
Private	0.8	52.6	0.8	7.6

SES = socioeconomic status.

<sup>a</sup> Hispanic may be any race. Asian, black, white, and other races refer to individuals who are not of Hispanic origin.

<sup>b</sup> Other includes Alaska Native, American Indian, Native Hawaiian, Pacific Islander, more than one race, and those having origins in a race not listed.

<sup>c</sup> SES is a composite variable derived from parental education level, parental occupation, and family income. The quintile measure divides the SES distribution into five equal quintile groups. Quintile 1 corresponds to the lowest one-fifth of the population, and quintile 5 corresponds to the highest. For this report, the middle three quintiles are combined into one category.





## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

### Source(s)

Dalton B, Ingels SJ, Fritch L, *High School Longitudinal Study of 2009 (HSL:09) 2013 Update and High School Transcript Study: A First Look at Fall 2009 Ninth-Graders in 2013*, NCES 2015-037rev (2016).

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## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

APPENDIX TABLE 1-27

## High school graduates enrolled in college in October after completing high school, by demographic characteristics and institution type: 1975–2015

(Percent)

Year	All graduates	Sex		Family income <sup>a</sup>			Race or ethnicity <sup>b</sup>				Parents' highest education <sup>c</sup>				Institution type	
		Male	Female	Low	Middle	High	White	Black	Hispanic <sup>d</sup>	Asian	Less than high school	High school diploma or equivalent	Some college	Bachelor's or higher degree	2-year	4-year
1975	50.7	52.6	49.0	31.2	46.2	64.5	49.1	44.5	52.7	NA	NA	NA	NA	NA	18.2	32.6
1976	48.8	47.2	50.3	39.1	40.5	63.0	50.3	45.3	53.6	NA	NA	NA	NA	NA	15.6	33.3
1977	50.6	52.1	49.3	27.7	44.2	66.3	50.1	46.8	48.8	NA	NA	NA	NA	NA	17.5	33.1
1978	50.1	51.1	49.3	31.4	44.3	64.0	50.4	47.5	46.1	NA	NA	NA	NA	NA	17.0	33.1
1979	49.3	50.4	48.4	30.5	43.2	63.2	50.1	45.2	46.3	NA	NA	NA	NA	NA	17.5	31.8
1980	49.3	46.7	51.8	32.5	42.5	65.2	51.5	44.0	49.6	NA	NA	NA	NA	NA	19.4	29.9
1981	53.9	54.8	53.1	33.6	49.2	67.6	52.4	40.3	48.7	NA	NA	NA	NA	NA	20.5	33.5
1982	50.6	49.1	52.0	32.8	41.7	70.9	54.2	38.8	49.4	NA	NA	NA	NA	NA	19.1	31.5
1983	52.7	51.9	53.4	34.6	45.2	70.3	55.5	38.0	46.7	NA	NA	NA	NA	NA	19.2	33.5
1984	55.2	56.0	54.5	34.5	48.4	74.0	57.9	39.9	49.3	NA	NA	NA	NA	NA	19.4	35.8
1985	57.7	58.6	56.8	40.2	50.6	74.6	58.6	39.5	46.1	NA	NA	NA	NA	NA	19.6	38.1
1986	53.8	55.8	51.9	33.9	48.5	71.0	58.5	43.5	42.3	NA	NA	NA	NA	NA	19.3	34.5
1987	56.8	58.3	55.3	36.9	50.0	73.8	58.8	44.2	45.0	NA	NA	NA	NA	NA	18.9	37.9
1988	58.9	57.1	60.7	42.5	54.7	72.8	60.1	49.7	48.5	NA	NA	NA	NA	NA	21.9	37.1
1989	59.6	57.6	61.6	48.1	55.4	70.7	61.6	48.0	52.7	NA	NA	NA	NA	NA	20.7	38.9

## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

Year	All graduates	Sex		Family income <sup>a</sup>			Race or ethnicity <sup>b</sup>				Parents' highest education <sup>c</sup>				Institution type	
		Male	Female	Low	Middle	High	White	Black	Hispanic <sup>d</sup>	Asian	Less than high school	High school diploma or equivalent	Some college	Bachelor's or higher degree	2-year	4-year
1990	60.1	58.0	62.2	46.7	54.4	76.6	63.0	48.9	52.5	NA	NA	NA	NA	NA	20.1	40.0
1991	62.5	57.9	67.1	39.5	58.4	78.2	64.2	47.2	52.6	NA	NA	NA	NA	NA	24.9	37.7
1992	61.9	60.0	63.8	40.9	57.0	79.0	64.2	50.0	58.2	NA	33.0	56.0	68.0	81.0	23.0	38.9
1993	62.6	59.9	65.2	50.4	56.9	79.3	63.9	51.3	55.7	NA	47.0	52.0	63.0	88.0	22.8	39.8
1994	61.9	60.6	63.2	43.3	57.8	77.9	64.0	52.4	55.0	NA	43.0	50.0	65.0	83.0	21.0	40.9
1995	61.9	62.6	61.3	34.2	56.0	83.5	65.4	52.9	51.6	NA	27.0	47.0	70.0	88.0	21.5	40.4
1996	65.0	60.1	69.7	48.6	62.7	78.0	66.6	55.4	57.6	NA	45.0	56.0	67.0	85.0	23.1	41.9
1997	67.0	63.6	70.3	57.0	60.7	82.2	68.1	58.8	55.3	NA	51.0	62.0	63.0	86.0	22.8	44.3
1998	65.6	62.4	69.1	46.4	64.7	77.5	67.7	59.8	51.9	NA	50.0	57.0	68.0	82.0	24.4	41.3
1999	62.9	61.4	64.4	47.6	60.2	75.4	66.8	58.6	47.4	NA	36.0	54.0	60.0	82.0	21.0	41.9
2000	63.3	59.9	66.2	49.7	59.5	76.9	65.4	56.4	48.6	NA	44.0	52.0	64.0	81.0	21.4	41.9
2001	61.8	60.1	63.5	43.8	56.4	80.0	66.3	56.4	52.8	NA	39.0	52.0	62.0	81.0	19.6	42.1
2002	65.2	62.1	68.4	56.3	60.9	78.2	66.5	57.3	54.8	NA	43.0	52.0	66.0	83.0	21.6	43.6
2003	63.9	61.2	66.5	52.8	57.6	80.1	68.0	59.9	57.7	80.0	43.0	54.0	63.0	82.0	21.5	42.5
2004	66.7	61.4	71.5	47.8	63.3	80.1	69.4	58.8	57.7	81.6	40.0	55.0	67.0	86.0	22.4	44.2
2005	68.6	66.5	70.4	53.5	65.1	81.2	70.2	58.2	57.5	80.9	43.0	62.0	66.0	89.0	24.0	44.6
2006	66.0	65.8	66.1	50.9	61.4	80.7	70.4	55.6	58.5	85.1	43.0	56.0	67.0	78.0	24.7	41.3
2007	67.2	66.1	68.3	58.4	63.3	78.2	70.0	55.7	62.0	85.8	45.0	52.0	65.0	86.0	24.1	43.1

## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

Year	All graduates	Sex		Family income <sup>a</sup>			Race or ethnicity <sup>b</sup>				Parents' highest education <sup>c</sup>				Institution type	
		Male	Female	Low	Middle	High	White	Black	Hispanic <sup>d</sup>	Asian	Less than high school	High school diploma or equivalent	Some college	Bachelor's or higher degree	2-year	4-year
2008	68.6	65.9	71.6	55.9	65.2	81.9	70.8	60.3	62.3	90.1	44.0	57.0	72.0	82.0	27.7	40.9
2009	70.1	66.0	73.8	53.9	66.7	84.2	71.2	62.4	60.9	88.1	39.9	57.9	74.4	82.2	27.7	42.4
2010	68.1	62.8	74.0	50.7	66.7	82.2	70.1	66.1	62.3	87.4	50.8	58.0	70.5	83.7	26.7	41.4
2011	68.2	64.7	72.2	53.5	66.2	82.4	68.2	62.1	66.1	83.9	s	54.2	66.8	83.1	25.9	42.3
2012	66.2	61.3	71.3	50.9	64.7	80.7	67.6	60.5	65.9	82.3	60.6	57.1	66.2	76.8	28.8	37.5
2013	65.9	63.5	68.4	45.5	63.8	78.5	67.4	60.7	65.5	83.6	42.9	51.7	64.2	82.9	23.8	42.1
2014	68.4	64.0	72.6	57.8	63.6	83.6	69.3	60.6	64.7	84.2	53.9	56.2	67.0	81.3	24.6	43.7
2015	69.2	65.8	72.5	69.2	62.2	83.2	69.5	62.6	67.1	86.7	56.3	56.9	65.0	82.4	25.2	44.0

NA = not available; s = suppressed for reasons of confidentiality and/or reliability.

<sup>a</sup> Family income is categorized as follows: low income includes families in the lowest 20% of income distribution, middle income includes families in the middle 60%, and high income includes families in the highest 20%.

<sup>b</sup> Because of the small sample size for racial and ethnic categories, data are subject to relatively large sampling errors. Therefore, 3-year moving averages are used to produce more stable estimates. The 3-year moving average is an arithmetic average of the rates in the year indicated, the year immediately preceding, and the year immediately following. For 1975 and 2013, a 2-year moving average is used. Data for 1975 reflect an average of 1975 and 1976, and data for 2013 reflect an average of 2012 and 2013. Starting from 2003, data for white, black, and Asian students exclude individuals identifying themselves as two or more races.

<sup>c</sup> This refers to the highest level of education achieved by either parent.

<sup>d</sup> Hispanic may be any race. Asian, black, and white refer to individuals who are not of Hispanic origin.

### Note(s)

The table includes students ages 16–24 completing high school in the survey year. Before 1992, high school graduates referred to those who had completed 12 years of schooling. As of 1992, high school graduates refer to those who have received a high school diploma or equivalency certificate.

### Source(s)



CHAPTER 1 | **Elementary and Secondary Mathematics and Science Education**

Parents' education: National Center for Education Statistics special tabulations (2017) of Current Population Survey, Bureau of Labor Statistics. All other data: The Condition of Education, tables 302.10, 302.20, and 302.30, [https://nces.ed.gov/programs/coe/indicator\\_cpa.asp](https://nces.ed.gov/programs/coe/indicator_cpa.asp), accessed 3 May 2017.

*Science and Engineering Indicators 2018*

## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

APPENDIX TABLE 1-28



### Fall 2009 ninth graders considering a STEM major (among those with an identified major), by program level and student, family, and school characteristics: 2013

(Percent)

Characteristic	Overall	Bachelor's degree program	Associate's degree program	Other programs <sup>a</sup>
All students	23.3	31.9	17.4	15.3
Sex				
Male	33.3	41.4	28.2	25.3
Female	14.5	23.6	7.9	6.5
Race or ethnicity				
White	24.8	31.9	17.9	15.8
Black	15.5	22.9	12.3	11.1
Hispanic <sup>b</sup>	19.8	27.9	16.2	17.6
Asian	41.9	52.5	26.9	28.8
Other <sup>c</sup>	25.3	43.6	s	s
Two or more races	22.7	32.7	19.6	10.1
SES <sup>d</sup>				
Lowest fifth	16.8	28.6	15.1	11.6
Middle three-fifths	21.7	29.6	17.1	16.0
Highest fifth	30.3	35.4	20.4	19.2
Parents' highest education <sup>e</sup>				
Less than high school	18.0	31.8	16.6	14.1
High school diploma or equivalent	18.2	27.4	14.5	14.8
Associate's degree	19.7	29.6	15.2	12.6
Bachelor's degree or higher	27.5	31.5	23.3	20.7
Master's degree or higher	30.3	36.4	18.6	14.4
Grade 11 mathematics achievement				
Lowest fifth	11.8	17.1	10.2	11.8
Middle three-fifths	17.1	20.9	15.5	14.0

## CHAPTER 1 | Elementary and Secondary Mathematics and Science Education

Characteristic	Overall	Bachelor's degree program	Associate's degree program	Other programs <sup>a</sup>
Highest fifth	39.9	44.5	30.9	26.5
School				
Public	23.2	32.7	17.3	15.4
Private	25.2	28.6	19.1	13.7

s = suppressed for reasons of confidentiality and/or reliability.

SES = socioeconomic status; STEM = science, technology, engineering, or mathematics.

<sup>a</sup> Other programs include "certificate or diploma program (occupational training)," "no program, just taking courses," "other," and "don't know."

<sup>b</sup> Hispanic may be any race. Asian, black, white, and other races refer to individuals who are not of Hispanic origin.

<sup>c</sup> Other includes Alaska Native, American Indian, Native Hawaiian, Pacific Islander, more than one race, and those having origins in a race not listed.

<sup>d</sup> SES is a composite variable derived from parental education level, parental occupation, and family income. The quintile measure divides the SES distribution into five equal quintile groups. Quintile 1 corresponds to the lowest one-fifth of the population, and quintile 5 corresponds to the highest. For this report, the middle three quintiles are combined into one category.

<sup>e</sup> This refers to the highest level of education achieved by either parent.

### Note(s)

About 10% of fall 2009 ninth graders who were taking or planning to take postsecondary classes in 2013 indicated that they did not have a major they were considering.

### Source(s)

Dalton B, Ingels SJ, Fritch L, *High School Longitudinal Study of 2009 (HSL:09) 2013 Update and High School Transcript Study: A First Look at Fall 2009 Ninth-Graders in 2013*, NCES 2015-037rev (2016).

*Science and Engineering Indicators 2018*

## CHAPTER 2

# Higher Education in Science and Engineering

## List of Appendix Tables

Appendix Table 2-1	S&E degrees awarded, by degree level, Carnegie institution type, and field: 2015 .....	2-3
Appendix Table 2-2	Degrees awarded by private for-profit academic institutions, by broad field and degree level: 2000–15.....	2-7
Appendix Table 2-3	Degrees awarded by private for-profit academic institutions, by field and degree level: 2015 .....	2-10
Appendix Table 2-4	Distance education programs by institutional control, field, and degree level: 2015.....	2-12
Appendix Table 2-5	Undergraduate and total enrollment in higher education, by Carnegie institution type: 2000–15 .....	2-18
Appendix Table 2-6	Average revenue per FTE, by institution type: 2000–15 .....	2-21
Appendix Table 2-7	Average expenditures per FTE, by institution type: 2000–15 .....	2-24
Appendix Table 2-8	Full-time S&E graduate students, by source and mechanism of primary support: 2000–15.....	2-27
Appendix Table 2-9	Full-time S&E graduate students, by field and mechanism of primary support: 2015 .....	2-31
Appendix Table 2-10	Full-time S&E graduate students primarily supported by federal government, by field: 2000–15.....	2-34
Appendix Table 2-11	Proportion of full-time S&E graduate students primarily supported by federal government, by field and mechanism of primary support: 2015.....	2-37
Appendix Table 2-12	Full-time S&E graduate students primarily supported by federal government, by agency: 2000–15 .....	2-40
Appendix Table 2-13	Full-time S&E graduate students primarily supported by federal government, by field and agency: 2015 .....	2-42
Appendix Table 2-14	Doctorate recipients' source of primary support, by broad field of study, sex, citizenship, ethnicity, and race: 2013–15 .....	2-46
Appendix Table 2-15	Amount of undergraduate and graduate debt of S&E doctorate recipients, by field: 2015 .....	2-54
Appendix Table 2-16	International undergraduate student enrollment in U.S. universities, by field and selected places of origin: 2016 and 2017 .....	2-58
Appendix Table 2-17	Undergraduate enrollment in engineering and engineering technology programs: 2006–15.....	2-62
Appendix Table 2-18	Earned associate's degrees, by sex and field: 2000–15.....	2-63
Appendix Table 2-19	Earned associate's degrees, by citizenship, field, race, and ethnicity: 2000–15.....	2-71
Appendix Table 2-20	Degrees awarded to U.S. citizens and permanent residents, by sex, race, ethnicity, broad field category, and degree level: 2000 and 2015 .....	2-103
Appendix Table 2-21	Earned bachelor's degrees, by sex and field: 2000–15.....	2-114
Appendix Table 2-22	Earned bachelor's degrees, by citizenship, field, race, and ethnicity: 2000–15.....	2-122



Appendix Table 2-23	S&E graduate enrollment, by field: 2000–15 .....	2-154
Appendix Table 2-24	First-time full-time S&E graduate students, by citizenship and field: 2000–15 .....	2-157
Appendix Table 2-25	S&E graduate enrollment, by citizenship and field: 2000–15 .....	2-165
Appendix Table 2-26	International graduate student enrollment in U.S. universities, by field and selected places of origin: 2016 and 2017 .....	2-173
Appendix Table 2-27	Earned master's degrees, by sex and field: 2000–15 .....	2-177
Appendix Table 2-28	Earned master's degrees, by citizenship, field, race, and ethnicity: 2000–15 .....	2-184
Appendix Table 2-29	Earned doctoral degrees, by citizenship, field, and sex: 2000–15 .....	2-213
Appendix Table 2-30	Median number of years from S&E doctorate recipients' entry to graduate school to receipt of doctorate, by field: 1985–2015 .....	2-228
Appendix Table 2-31	Median number of years from S&E doctorate recipients' entry to graduate school to receipt of doctorate, by sex, citizenship, ethnicity, race, and broad field of study: 2015 .....	2-231
Appendix Table 2-32	Earned doctoral degrees, by citizenship, field, race, and ethnicity: 2000–15 .....	2-234
Appendix Table 2-33	Expenditures on tertiary education institutions as a percentage of GDP: 2005, 2008, and 2010–13 .....	2-265
Appendix Table 2-34	First university degrees, by selected region, country, or economy: 2014 or most recent year .....	2-268
Appendix Table 2-35	S&E first university degrees, by selected Western or Asian country or economy and field: 2000–14 .....	2-276
Appendix Table 2-36	First university degrees, by field, sex, and selected region, country, or economy: 2014 or most recent year .....	2-285
Appendix Table 2-37	Earned doctoral degrees, by selected region, country, or economy and field: 2014 or most recent year .....	2-297
Appendix Table 2-38	S&E doctoral degrees in the United States and selected European countries or economies, by field: 2000–14 .....	2-303
Appendix Table 2-39	S&E doctoral degrees, by selected Asian country or economy and field: 2000–14 .....	2-315
Appendix Table 2-40	Earned S&E doctoral degrees, by sex, selected region, country, or economy, and field: 2014 or most recent year .....	2-318
Appendix Table 2-41	Trends in population age 20–24, by selected country and region: Selected years: 2015–60 .....	2-329
Appendix Table 2-42	Foreign S&E student enrollment in United Kingdom universities, by enrollment level, place of origin, and field: Academic years 2005–06 and 2015–16 .....	2-330
Appendix Table 2-43	Foreign S&E student enrollment in Japanese universities, by enrollment level, place of origin, and field: 2004 and 2016 .....	2-333
Appendix Table 2-44	S&E student enrollment in Canadian universities, by enrollment level, place of origin, and S&E field: 2004 and 2014 .....	2-338

## CHAPTER 2 | Higher Education in Science and Engineering

APPENDIX TABLE 2-1

### S&E degrees awarded, by degree level, Carnegie institution type, and field: 2015

(Number)

Degree and institution type	All fields	S&E field							
		All S&E	Agricultural sciences	Biological sciences	Computer sciences	Earth, atmospheric, and ocean sciences	Mathematics and statistics	Physical sciences	Psychology
Associate's	1,024,187	90,589	2,678	5,071	36,421	153	2,697	4,909	8,736
Doctorate-granting universities — very high research activity	2,819	78	50	0	18	0	0	0	0
Doctorate-granting universities — high research activity	4,462	242	38	0	187	0	2	1	0
Doctoral/ research universities	2,069	108	24	6	64	0	0	1	11
Master's colleges and universities	52,684	2,815	101	66	1,446	1	7	71	358
Baccalaureate colleges	50,529	3,408	190	114	2,142	0	19	202	338
Associate's colleges	844,568	73,245	2,210	4,751	25,437	149	2,654	4,630	7,928
Medical schools and medical centers	235	0	0	0	0	0	0	0	0
Schools of engineering	4	0	0	0	0	0	0	0	0
Other specialized institutions	19,002	2,457	0	18	2,415	0	0	0	6
Tribal colleges	1,603	279	49	10	38	3	0	0	17
Not classified	46,212	7,957	16	106	4,674	0	15	4	78

## CHAPTER 2 | Higher Education in Science and Engineering

Degree and institution type	All fields	S&E field							
		All S&E	Agricultural sciences	Biological sciences	Computer sciences	Earth, atmospheric, and ocean sciences	Mathematics and statistics	Physical sciences	Psychology
Bachelor's	1,916,129	650,057	29,460	115,124	60,309	7,155	23,136	22,481	118,768
Doctorate-granting universities — very high research activity	474,852	239,879	12,655	43,939	14,340	2,786	9,616	7,925	29,727
Doctorate-granting universities — high research activity	277,111	98,419	4,713	17,808	7,250	1,203	2,790	3,039	16,321
Doctoral/ research universities	111,622	31,009	1,176	5,537	3,175	342	994	1,045	6,719
Master's colleges and universities	697,075	184,770	7,201	30,410	20,003	1,862	6,603	6,584	48,638
Baccalaureate colleges	211,522	73,498	3,231	15,904	6,500	936	2,943	3,701	15,082
Associate's colleges	15,266	2,086	90	168	1,471	0	13	0	127
Medical schools and medical centers	6,017	19	0	19	0	0	0	0	0
Schools of engineering	1,457	1,332	0	10	89	12	17	21	0
Other specialized institutions	52,706	3,033	0	482	1,745	0	6	24	501
Tribal colleges	356	126	35	4	12	3	0	0	4
Not classified	68,145	15,886	359	843	5,724	11	154	142	1,649
Master's	763,980	180,955	5,792	14,370	31,552	2,212	8,269	4,744	24,029
Doctorate-granting universities — very high research activity	215,096	76,457	3,136	6,890	11,197	1,244	4,817	2,751	1,957

## CHAPTER 2 | Higher Education in Science and Engineering

Degree and institution type	All fields	S&E field							
		All S&E	Agricultural sciences	Biological sciences	Computer sciences	Earth, atmospheric, and ocean sciences	Mathematics and statistics	Physical sciences	Psychology
Doctorate-granting universities — high research activity	111,476	33,972	1,106	2,295	6,393	597	1,665	993	2,608
Doctoral/ research universities	70,977	15,023	268	781	2,678	76	547	331	4,600
Master's colleges and universities	272,784	45,939	1,120	2,924	9,717	261	1,138	636	10,943
Baccalaureate colleges	18,880	1,565	152	78	101	18	24	14	628
Associate's colleges	802	137	1	72	34	0	0	0	26
Medical schools and medical centers	9,615	1,345	4	1,151	4	2	0	1	101
Schools of engineering	515	446	0	0	115	9	0	3	0
Other specialized institutions	28,901	2,871	0	63	400	0	0	5	2,130
Tribal colleges	30	4	0	0	0	0	0	0	0
Not classified	34,904	3,196	5	116	913	5	78	10	1,036
Doctorate	69,115	39,177	1,381	7,889	1,951	827	1,802	4,971	4,533
Doctorate-granting universities — very high research activity	42,086	28,121	999	5,774	1,352	703	1,483	3,920	1,562
Doctorate-granting universities — high research activity	11,979	6,563	314	916	419	115	296	911	938
Doctoral/ research universities	7,403	2,153	26	141	111	3	16	72	1,242

## CHAPTER 2 | Higher Education in Science and Engineering

Degree and institution type	All fields	S&E field							
		All S&E	Agricultural sciences	Biological sciences	Computer sciences	Earth, atmospheric, and ocean sciences	Mathematics and statistics	Physical sciences	Psychology
Master's colleges and universities	3,339	540	32	29	50	5	4	25	223
Baccalaureate colleges	549	114	0	2	0	0	3	7	93
Associate's colleges	23	15	0	4	0	0	0	0	11
Medical schools and medical centers	1,662	1,094	4	969	5	0	0	17	33
Schools of engineering	23	23	0	0	14	1	0	0	0
Other specialized institutions	1,020	422	0	8	0	0	0	5	386
Not classified	1,031	132	6	46	0	0	0	14	45

### Note(s)

Medical and other health sciences are not included in S&E. Carnegie institution type corresponds to the 2010 Carnegie Classification of Institutions of Higher Education.

### Source(s)

National Center for Education Statistics, Integrated Postsecondary Education Data System (IPEDS), Completions Survey; National Science Foundation, National Center for Science and Engineering Statistics, Integrated Science and Engineering Resources Data System (WebCASPAR), <https://ncesdata.nsf.gov/webcaspar/>.

*Science and Engineering Indicators 2018*

## CHAPTER 2 | Higher Education in Science and Engineering

APPENDIX TABLE 2-2

### Degrees awarded by private for-profit academic institutions, by broad field and degree level: 2000–15

(Number and percent)

Broad field and degree level	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
	Number															
All fields	103,517	113,566	122,874	139,595	167,391	187,200	215,323	236,543	256,950	290,900	328,410	386,560	418,080	397,870	372,175	347,491
Associate's	70,238	74,861	77,870	88,741	93,878	100,646	105,765	111,755	121,765	138,371	156,384	189,714	202,170	173,813	152,304	137,345
Bachelor's	21,350	24,461	27,828	32,509	43,143	49,189	62,139	70,707	76,465	84,902	97,213	114,171	132,196	141,310	139,738	133,689
Master's	11,248	13,303	16,386	17,362	29,031	35,728	45,765	51,810	55,954	64,817	71,862	79,453	80,366	78,714	75,434	71,750
Doctorate	681	941	790	983	1,339	1,637	1,654	2,271	2,766	2,810	2,951	3,222	3,348	4,033	4,699	4,707
S&E																
Associate's	8,112	10,797	14,568	18,913	17,504	15,637	14,052	12,781	13,577	16,187	19,755	24,460	26,106	21,433	19,137	16,357
Bachelor's	4,116	5,206	6,925	10,018	13,258	12,881	13,681	13,039	13,605	15,409	19,562	23,284	27,055	28,409	27,645	23,213
Master's	1,398	1,525	1,542	1,940	2,550	2,377	2,517	3,179	4,229	6,874	7,434	8,700	9,934	10,584	10,499	9,067
Doctorate	424	640	469	510	628	767	751	990	1,057	726	660	869	864	1,125	1,360	1,274
Non-S&E																
Associate's	62,126	64,064	63,302	69,828	76,374	85,009	91,713	98,974	108,188	122,184	136,629	165,254	176,064	152,380	133,167	120,988
Bachelor's	17,234	19,255	20,903	22,491	29,885	36,308	48,458	57,668	62,860	69,493	77,651	90,887	105,141	112,901	112,093	110,476
Master's	9,850	11,778	14,844	15,422	26,481	33,351	43,248	48,631	51,725	57,943	64,428	70,753	70,432	68,130	64,935	62,683
Doctorate	257	301	321	473	711	870	903	1,281	1,709	2,084	2,291	2,353	2,484	2,908	3,339	3,433

## CHAPTER 2 | Higher Education in Science and Engineering

Broad field and degree level	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
	Percent															
All fields																
Associate's	12.2	12.8	13.0	13.9	14.0	14.3	14.7	15.2	16.1	17.4	18.3	20.0	19.7	17.1	15.0	13.4
Bachelor's	1.7	1.9	2.1	2.4	3.0	3.4	4.1	4.6	4.8	5.2	5.8	6.6	7.3	7.6	7.4	7.0
Master's	2.4	2.8	2.5	2.8	3.3	3.3	5.2	6.2	7.6	8.5	8.8	9.7	10.2	10.7	10.5	10.3
Doctorate	1.5	2.1	1.8	2.1	2.8	3.1	2.9	3.7	4.5	4.6	5.1	5.4	5.4	6.2	7.0	6.8
S&E																
Associate's	21.1	23.9	28.5	30.1	29.0	28.6	28.2	26.9	27.6	28.8	31.8	32.2	30.8	25.0	21.8	18.1
Bachelor's	1.0	1.3	1.7	2.3	2.9	2.7	2.9	2.7	2.7	3.0	3.7	4.2	4.6	4.6	4.3	3.6
Master's	1.4	1.5	1.5	1.8	2.1	2.0	2.1	2.6	3.3	5.1	5.3	5.8	6.2	6.4	6.1	5.0
Doctorate	1.7	2.5	1.9	2.0	2.4	2.7	2.5	3.0	3.2	2.2	2.0	2.2	2.4	3.0	3.5	3.3
Non-S&E																
Associate's	11.6	11.9	11.5	12.1	12.5	13.1	13.7	14.4	15.3	16.5	17.2	18.9	18.7	16.4	14.4	13.0
Bachelor's	2.0	2.2	2.3	2.4	3.1	3.7	4.7	5.5	5.8	6.2	6.8	7.7	8.6	9.1	8.9	8.7
Master's	2.7	3.2	3.8	3.8	6.0	7.3	9.0	9.9	10.2	10.9	11.5	12.1	11.8	11.5	11.0	10.8
Doctorate	1.3	1.5	1.6	2.3	3.2	3.6	3.5	4.5	6.0	7.3	9.2	9.2	9.3	10.4	11.6	11.4

### Note(s)

Medical and other health sciences are included in non-S&E.



CHAPTER 2 | Higher Education in Science and Engineering

**Source(s)**

National Center for Education Statistics, Integrated Postsecondary Education Data System (IPEDS), Completions Survey; National Science Foundation, National Center for Science and Engineering Statistics, Integrated Science and Engineering Resources Data System (WebCASPAR), <https://ncesdata.nsf.gov/webcaspar/>.  
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## CHAPTER 2 | Higher Education in Science and Engineering

APPENDIX TABLE 2-3



### Degrees awarded by private for-profit academic institutions, by field and degree level: 2015

(Number)

Field	Associate's	Bachelor's	Master's	Doctorate
All fields	137,345	133,689	71,750	4,707
S&E	16,357	23,213	9,067	1,274
Agricultural sciences	12	828	124	0
Biological sciences	45	159	7	4
Computer sciences	12,313	10,975	2,455	48
Mathematics	0	6	0	0
Physical sciences	23	2	0	0
Psychology	271	3,039	3,476	1,001
Social sciences	3,541	8,010	2,869	221
Engineering	152	164	136	0
Non-S&E	120,988	110,476	62,683	3,433
Architecture and environmental design	0	75	101	0
Arts and music	5,508	9,705	1,902	4
Business and management	23,185	44,073	28,672	1,214
Communication and librarianship	184	1,055	338	0
Education	2,152	4,433	11,667	1,610
Engineering technologies	7,916	3,291	399	0
English and literature	4	585	7	0
Health technologies	37,198	1,115	2,335	18
History	41	356	396	0
Law	46	418	175	0
Medical and other health sciences	14,936	29,688	12,183	415
Religion and theology	8	67	38	33
Science technologies	3	0	0	0
Social services	0	169	349	22

## CHAPTER 2 | Higher Education in Science and Engineering

Field	Associate's	Bachelor's	Master's	Doctorate
Vocational studies and home economics	15,698	12,933	3,687	100
Other non-S&E	14,109	2,513	434	17

### Source(s)

National Center for Education Statistics, Integrated Postsecondary Education Data System (IPEDS), Completions Survey; National Science Foundation, National Center for Science and Engineering Statistics, Integrated Science and Engineering Resources Data System (WebCASPAR), <https://ncesdata.nsf.gov/webcaspar/>.

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## CHAPTER 2 | Higher Education in Science and Engineering

APPENDIX TABLE 2-4

### Distance education programs by institutional control, field, and degree level: 2015

(Number and percent)

Control and field	Associate's		Bachelor's		Master's		Doctoral/ research	
	Total	Distance education (%)	Total	Distance education (%)	Total	Distance education (%)	Total	Distance education (%)
Public institutions								
4-year								
All fields	4,700	11.4	31,008	6.2	19,157	13.4	7,173	2.6
S&E	654	12.7	10,991	3.4	7,156	7.7	4,229	1.1
Engineering	57	0.0	1,688	1.7	1,463	17.6	911	2.1
Science	597	13.9	9,303	3.8	5,693	5.2	3,318	0.9
Natural sciences	526	12.7	5,450	2.6	3,594	4.9	2,402	0.7
Agricultural sciences	85	5.9	913	1.4	528	8.9	328	0.9
Biological sciences	34	0.0	1,379	0.6	1,345	1.9	1,149	0.3
Earth, atmospheric, and ocean sciences	7	0.0	440	0.4	263	1.1	178	1.1
Computer sciences	346	17.9	974	11.6	475	16.8	158	201.0
Mathematics	12	0.0	742	1.1	471	4.9	218	0.0
Physical sciences	42	0.0	1,002	0.0	512	0.0	371	0.0
Social and behavioral sciences	71	22.5	3,853	5.3	2,099	5.5	916	1.4
Psychology	12	33.3	603	10.6	489	3.5	266	1.1
Social sciences	59	20.3	3,250	4.3	1,610	6.1	650	1.5
Non-S&E	4,046	11.2	20,017	7.8	12,001	16.8	2,944	4.8
S&E technologies	1,244	4.7	1,315	10.6	459	20.7	53	5.7
Science technologies	31	3.2	15	26.7	9	11.0	1	0.0

## CHAPTER 2 | Higher Education in Science and Engineering

Control and field	Associate's		Bachelor's		Master's		Doctoral/ research	
	Total	Distance education (%)	Total	Distance education (%)	Total	Distance education (%)	Total	Distance education (%)
Engineering technologies	571	3.3	640	6.6	114	24.6	13	7.7
Health technologies	641	5.8	655	14.2	335	19.4	39	5.1
Other S&E technologies	1	100.0	5	0.0	1	100.0	0	0.0
Other non-S&E	2,802	14.1	18,702	7.6	11,542	16.6	2,891	4.7
2-year								
All fields	31,511	9.6	0	0.0	0	0.0	0	0.0
S&E	5,009	8.9	0	0.0	0	0.0	0	0.0
Engineering	514	3.3	0	0.0	0	0.0	0	0.0
Science	4,495	9.5	0	0.0	0	0.0	0	0.0
Natural sciences	3,437	8.9	0	0.0	0	0.0	0	0.0
Agricultural sciences	320	5.3	0	0.0	0	0.0	0	0.0
Biological sciences	348	3.2	0	0.0	0	0.0	0	0.0
Earth, atmospheric, and ocean sciences	79	1.3	0	0.0	0	0.0	0	0.0
Computer sciences	2,066	12.2	0	0.0	0	0.0	0	0.0
Mathematics	240	5.4	0	0.0	0	0.0	0	0.0
Physical sciences	384	3.1	0	0.0	0	0.0	0	0.0
Social and behavioral sciences	1,058	11.4	0	0.0	0	0.0	0	0.0
Psychology	228	13.2	0	0.0	0	0.0	0	0.0
Social sciences	830	11.0	0	0.0	0	0.0	0	0.0
Non-S&E	26,502	9.8	0	0.0	0	0.0	0	0.0
S&E technologies	6,824	3.7	0	0.0	0	0.0	0	0.0

## CHAPTER 2 | Higher Education in Science and Engineering

Control and field	Associate's		Bachelor's		Master's		Doctoral/ research	
	Total	Distance education (%)	Total	Distance education (%)	Total	Distance education (%)	Total	Distance education (%)
Science technologies	181	2.2	0	0.0	0	0.0	0	0.0
Engineering technologies	2,900	2.8	0	0.0	0	0.0	0	0.0
Health technologies	3,732	4.4	0	0.0	0	0.0	0	0.0
Other S&E technologies	11	9.1	0	0.0	0	0.0	0	0.0
Other non-S&E	19,678	11.9	0	0.0	0	0.0	0	0.0
Private non-profit institutions								
All fields	3,844	18.2	41,726	6.3	15,876	17.5	3,446	3.9
S&E	489	17.4	12,673	3.5	3,618	11.6	1,789	1.3
Engineering	35	5.7	961	0.9	687	17.0	359	2.5
Science	454	18.3	11,712	3.7	2,931	10.3	1,430	1.0
Natural sciences	339	18.0	6,420	3.0	1,577	10.3	934	0.9
Agricultural sciences	31	3.2	635	1.9	96	11.4	18	0.0
Biological sciences	42	9.5	1,981	1.0	680	2.6	556	0.2
Earth, atmospheric, and ocean sciences	1	0.0	204	1.0	64	0.0	46	0.0
Computer sciences	238	22.7	1,269	10.7	352	33.2	72	9.7
Mathematics	12	8.3	1,001	1.6	193	4.7	96	0.0
Physical sciences	15	6.7	1,330	0.4	192	4.2	146	0.0
Social and behavioral sciences	115	19.1	5,292	4.6	1,354	10.2	496	1.4
Psychology	36	30.5	1,126	11.4	574	8.4	207	2.9
Social sciences	79	13.9	4,166	2.8	780	11.5	289	0.3
Non-S&E	3,355	18.4	29,053	7.4	12,258	19.3	1,657	6.7
S&E technologies	645	8.8	860	9.4	465	12.9	21	9.5
Science technologies	6	16.7	16	31.2	1	0.0	0	0.0

## CHAPTER 2 | Higher Education in Science and Engineering

Control and field	Associate's		Bachelor's		Master's		Doctoral/ research	
	Total	Distance education (%)	Total	Distance education (%)	Total	Distance education (%)	Total	Distance education (%)
Engineering technologies	145	6.9	206	7.8	59	18.6	5	0.0
Health technologies	492	9.3	633	9.2	399	11.5	16	12.5
Other S&E technologies	2	0.0	5	40.0	6	50.0	0	0.0
Other non-S&E	2,710	20.6	28,193	7.4	11,793	19.6	1,636	6.7
Private for-profit institutions								
4-year								
All fields	4,679	29.6	4,823	44.0	1,722	61.4	262	40.4
S&E	815	29.3	1,127	48.4	309	68.0	57	42.1
Engineering	10	80.0	25	32.0	14	50.0	0	0.0
Science	805	28.7	1,102	48.8	295	68.8	57	42.1
Natural sciences	758	27.6	944	45.0	147	73.5	7	85.7
Agricultural sciences	1	0.0	20	95.0	11	100.0	0	0.0
Biological sciences	2	50.0	8	12.5	1	0.0	1	0.0
Earth, atmospheric, and ocean sciences	0	0.0	0	0.0	0	0.0	0	0.0
Computer sciences	755	27.5	912	44.4	135	71.8	6	100.0
Mathematics	0	0.0	2	0.0	0	0.0	0	0.0
Physical sciences	0	0.0	2	0.0	0	0.0	0	0.0
Social and behavioral sciences	47	46.8	158	71.5	148	64.2	50	36.0
Psychology	21	9.5	66	39.4	79	51.9	46	30.4
Social sciences	26	76.9	92	94.6	69	78.3	4	100.0
Non-S&E	3,864	29.7	3,696	42.8	1,413	59.9	205	40.0
S&E technologies	1,177	24.0	319	14.4	54	20.4	2	50.0

## CHAPTER 2 | Higher Education in Science and Engineering

Control and field	Associate's		Bachelor's		Master's		Doctoral/ research	
	Total	Distance education (%)	Total	Distance education (%)	Total	Distance education (%)	Total	Distance education (%)
Science technologies	3	0.0	0	0.0	0	0.0	0	0.0
Engineering technologies	365	5.8	231	10.8	2	100.0	0	0.0
Health technologies	806	32.1	86	22.1	52	17.3	2	50.0
Other S&E technologies	3	100.0	2	100.0	0	0.0	0	0.0
Other non-S&E	2,687	32.2	3,377	45.4	1,359	61.5	203	39.9
2-year								
All fields	2,255	14.4	4	25.0	0	0.0	0	0.0
S&E	200	9.5	2	0.0	0	0.0	0	0.0
Engineering	2	50.0	1	0.0	0	0.0	0	0.0
Science	198	9.1	1	0.0	0	0.0	0	0.0
Natural sciences	198	9.1	1	0.0	0	0.0	0	0.0
Agricultural sciences	1	100.0	0	0.0	0	0.0	0	0.0
Biological sciences	2	50.0	0	0.0	0	0.0	0	0.0
Earth, atmospheric, and ocean sciences	0	0.0	0	0.0	0	0.0	0	0.0
Computer sciences	194	8.8	1	0.0	0	0.0	0	0.0
Mathematics	0	0.0	0	0.0	0	0.0	0	0.0
Physical sciences	1	0.0	0	0.0	0	0.0	0	0.0
Social and behavioral sciences	0	0.0	0	0.0	0	0.0	0	0.0
Psychology	0	0.0	0	0.0	0	0.0	0	0.0
Social sciences	0	0.0	0	0.0	0	0.0	0	0.0
Non-S&E	2,055	14.9	2	50.0	0	0.0	0	0.0

## CHAPTER 2 | Higher Education in Science and Engineering

Control and field	Associate's		Bachelor's		Master's		Doctoral/ research	
	Total	Distance education (%)	Total	Distance education (%)	Total	Distance education (%)	Total	Distance education (%)
S&E technologies	956	13.9	0	0.0	0	0.0	0	0.0
Science technologies	0	0.0	0	0.0	0	0.0	0	0.0
Engineering technologies	122	6.6	0	0.0	0	0.0	0	0.0
Health technologies	834	15.0	0	0.0	0	0.0	0	0.0
Other S&E technologies	0	0.0	0	0.0	0	0.0	0	0.0
Other non-S&E	1,099	15.7	2	50.0	0	0.0	0	0.0

### Note(s)

Engineering technologies are focused more on applied skills than on fundamental science and mathematics. Data are based on degree-granting institutions eligible to participate in Title IV federal financial aid programs and do not match previously published data from *Science and Engineering Indicators 2008* and earlier years that were based on accredited higher education institutions.

### Source(s)

National Center for Education Statistics, Integrated Postsecondary Education Data System (IPEDS), Completions Survey; National Science Foundation, National Center for Science and Engineering Statistics, Integrated Science and Engineering Resources Data System (WebCASPAR), <https://ncesdata.nsf.gov/webcaspar/>.

*Science and Engineering Indicators 2018*



## CHAPTER 2 | Higher Education in Science and Engineering

APPENDIX TABLE 2-5

### Undergraduate and total enrollment in higher education, by Carnegie institution type: 2000–15

(Number)

Year	All institutions	Doctorate-granting universities — very high research activity	Doctorate-granting universities — high research activity	Doctoral/ research universities	Master's colleges and universities	Baccalaureate colleges	Associate's colleges	Medical schools and medical centers	Schools of engineering	Other special-focus institutions	Tribal colleges	Not classified
Undergraduate enrollment												
2000	13,329,803	1,719,504	1,125,321	462,975	2,720,644	1,081,865	5,739,088	13,491	9,169	193,696	13,603	250,447
2001	13,895,335	1,764,724	1,156,958	489,260	2,824,105	1,118,359	6,104,082	13,268	9,244	213,588	13,835	187,912
2002	14,444,738	1,802,603	1,187,781	511,419	2,925,381	1,158,924	6,424,455	12,634	9,217	231,635	15,343	165,346
2003	14,666,119	1,824,259	1,202,071	536,510	3,003,697	1,182,851	6,485,355	12,563	9,295	246,010	17,527	145,981
2004	14,974,136	1,830,746	1,215,495	577,482	3,084,864	1,204,865	6,611,034	13,331	9,237	271,975	17,180	137,927
2005	15,157,730	1,845,961	1,220,299	580,383	3,228,183	1,220,137	6,638,361	13,325	9,291	289,518	16,879	95,393
2006	15,379,340	1,867,178	1,235,926	629,485	3,261,174	1,226,350	6,733,782	13,281	9,599	301,830	17,071	83,664
2007	15,799,911	1,889,120	1,255,393	691,830	3,342,695	1,235,442	6,947,933	13,315	9,557	313,525	17,222	83,879
2008	16,570,857	1,933,487	1,276,090	774,634	3,508,566	1,285,628	7,368,489	13,939	9,487	330,105	16,798	53,634
2009	17,778,741	1,966,982	1,309,390	866,197	3,699,649	1,356,407	8,155,018	14,113	9,377	359,041	19,507	23,060
2010	18,312,649	1,995,701	1,340,538	830,631	3,796,023	1,407,614	8,401,309	14,559	9,158	375,238	21,014	120,864
2011	18,299,791	2,023,129	1,369,440	836,182	3,834,973	1,417,963	8,211,697	14,873	9,041	358,354	18,777	205,362

## CHAPTER 2 | Higher Education in Science and Engineering

Year	All institutions	Doctorate-granting universities — very high research activity	Doctorate-granting universities — high research activity	Doctoral/ research universities	Master's colleges and universities	Baccalaureate colleges	Associate's colleges	Medical schools and medical centers	Schools of engineering	Other special-focus institutions	Tribal colleges	Not classified
2012	17,963,547	2,045,667	1,380,936	791,941	3,843,334	1,407,583	7,887,474	14,534	9,128	350,945	18,819	213,186
2013	17,700,719	2,054,113	1,378,748	750,608	3,740,163	1,376,984	7,672,416	13,282	9,273	332,611	17,907	354,614
2014	17,519,741	2,086,405	1,396,448	583,815	3,727,183	1,356,438	7,452,412	12,383	9,396	305,748	17,516	571,997
2015	17,255,558	2,116,488	1,415,300	581,646	3,683,148	1,322,171	7,219,879	12,505	9,512	286,285	16,730	591,894
Total enrollment												
2000	15,506,922	2,424,538	1,484,966	643,689	3,384,447	1,121,506	5,740,898	76,973	10,213	308,065	13,680	297,947
2001	16,129,629	2,483,646	1,526,997	685,362	3,517,030	1,157,533	6,105,526	78,162	10,455	329,024	13,996	221,898
2002	16,822,915	2,558,455	1,577,560	730,727	3,681,547	1,199,359	6,426,331	80,595	10,663	355,532	15,468	186,678
2003	17,118,126	2,593,906	1,599,392	778,843	3,776,865	1,224,609	6,488,052	82,081	10,830	379,140	17,776	166,632
2004	17,492,964	2,604,610	1,615,367	844,762	3,878,652	1,247,440	6,613,895	87,260	10,765	413,889	17,605	158,719
2005	17,710,640	2,620,649	1,618,433	863,683	4,037,841	1,263,954	6,642,190	90,647	10,773	435,319	17,167	109,984
2006	17,985,045	2,651,949	1,636,192	921,489	4,096,542	1,270,865	6,737,208	93,438	11,094	450,204	17,255	98,809
2007	18,474,977	2,691,983	1,665,194	998,984	4,200,593	1,282,243	6,951,546	96,616	11,016	464,631	17,418	94,753
2008	19,338,981	2,748,682	1,695,467	1,110,746	4,401,273	1,337,340	7,372,093	101,675	10,883	484,456	17,014	59,352
2009	20,671,503	2,809,366	1,746,651	1,219,751	4,636,037	1,415,501	8,159,022	106,789	10,809	521,473	19,686	26,418
2010	21,280,059	2,854,408	1,785,934	1,193,468	4,739,501	1,472,032	8,406,072	111,305	10,681	545,510	21,225	139,923

## CHAPTER 2 | Higher Education in Science and Engineering

Year	All institutions	Doctorate-granting universities — very high research activity	Doctorate-granting universities — high research activity	Doctoral/ research universities	Master's colleges and universities	Baccalaureate colleges	Associate's colleges	Medical schools and medical centers	Schools of engineering	Other special-focus institutions	Tribal colleges	Not classified
2011	21,260,978	2,886,167	1,810,490	1,195,172	4,743,566	1,484,333	8,214,689	114,420	10,582	530,478	18,920	252,161
2012	20,902,515	2,908,258	1,814,961	1,139,238	4,744,685	1,473,295	7,890,753	116,840	10,720	519,355	18,881	265,529
2013	20,630,064	2,920,503	1,804,986	1,090,311	4,636,652	1,444,925	7,675,927	109,383	10,868	497,788	18,083	420,638

### Note(s)

Data are based on degree-granting institutions eligible to participate in Title IV federal financial aid programs and do not match previously published data from *Science and Engineering Indicators 2008* and earlier years that were based on accredited higher education institutions. Carnegie institution type corresponds to the 2010 Carnegie Classification of Institutions of Higher Education.

### Source(s)

National Center for Education Statistics, Integrated Postsecondary Education Data System, Fall Enrollment Survey (various years); National Science Foundation, National Center for Science and Engineering Statistics, Integrated Science and Engineering Resources Data System (WebCASPAR), <https://ncesdata.nsf.gov/webcaspar/>.

*Science and Engineering Indicators 2018*

## CHAPTER 2 | Higher Education in Science and Engineering

APPENDIX TABLE 2-6

### Average revenue per FTE, by institution type: 2000–15

(2015 dollars)

Institution type and revenue source	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Community colleges <sup>a</sup>																
Net tuition	2,536	2,576	2,627	2,814	3,009	3,091	3,176	3,274	3,290	3,404	3,559	3,660	3,837	3,943	3,986	4,109
State and local appropriations	7,715	7,795	7,420	6,905	6,838	6,856	7,300	7,630	7,860	7,329	6,241	6,023	5,969	6,253	6,636	7,159
State and local grants and contracts	937	1,067	1005	1,049	1,076	978	1,033	1,111	1,133	1,170	926	874	884	947	1019	1151
Private and affiliated gifts, investment returns, and endowment income	243	233	232	203	178	244	321	405	325	194	168	159	150	136	166	148
Federal appropriations, grants, and contracts	862	904	915	972	974	951	938	934	956	999	1,095	1,062	914	894	879	895
Auxiliary enterprises <sup>b</sup>	919	933	977	994	1,025	1020	991	1001	994	1015	1020	1010	981	939	892	882
Hospitals, independent operations, and other sources <sup>c</sup>	543	581	628	484	509	401	414	431	493	415	476	471	467	483	493	504
4-year and graduate institutions (public) <sup>d</sup>																
Net tuition	4,613	4,664	4,838	5,194	5,740	6,052	6,264	6,416	6,539	6,785	7,190	7,467	7,720	7,869	7,897	8,082
State and local appropriations	8,802	8,915	8,638	7,966	7,584	7,385	7,628	7,932	8,123	7,508	6,743	6,588	6,118	6,115	6,403	6,571
State and local grants and contracts	760	851	1108	1,195	1,213	1,205	1,334	1,327	1,357	1,354	1,311	1,285	1,238	1,261	1,309	1,369
Private and affiliated gifts, investment returns, and endowment income	760	844	551	581	566	610	698	948	638	341	642	681	489	642	795	533
Federal appropriations, grants, and contracts	1,416	1,575	1,627	1,657	1,666	1,649	1,623	1,629	1,631	1,583	1,822	1,753	1,479	1,427	1,340	1,332
Auxiliary enterprises <sup>b</sup>	2,872	2,874	2,779	2,707	2,745	2,797	2,839	2,945	2,988	3,085	3,138	3,179	3,203	3,139	3,216	3,315
Hospitals, independent operations, and other sources <sup>c</sup>	1,234	1,199	1,253	1,276	1,296	1,369	1,273	1,321	1,261	1,385	1,526	1,523	1,366	1,410	1,689	1686

## CHAPTER 2 | Higher Education in Science and Engineering

Institution type and revenue source	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Very high research institutions (public)																
Net tuition	6,470	6,527	6,742	7,150	7,801	8,285	8,575	8,778	9,020	9,560	10,274	11,020	11,602	12,010	12,327	12,741
State and local appropriations	13,944	14,221	13,817	12,679	11,856	11,588	11,829	12,328	12,627	11,436	10,560	10,099	8,928	8,794	9,141	9,216
State and local grants and contracts	1,379	1,447	3,477	3,529	3,532	3,706	3,740	3,935	4,033	4,361	4,249	4,370	4,166	4,336	4,239	4,118
Private and affiliated gifts, investment returns, and endowment income	3,928	4,239	2,100	3,475	3,841	3,955	4,323	6,035	2,671	-1,373	4,117	5,246	2,795	4,220	5,683	3,296
Federal appropriations, grants, and contracts	7,162	7,508	8,171	8,647	9,104	9,377	9,136	8,941	8,743	8,894	9,361	9,437	8,997	8,641	8,187	7,972
Auxiliary enterprises <sup>b</sup>	5,159	5,205	5,117	5,140	5,356	5,339	5,427	5,789	5,212	5,193	5,211	5,648	5,316	5,376	5,496	5,708
Hospitals, independent operations, and other sources <sup>c</sup>	10,346	10,667	10,636	10,181	11,064	11,241	11,743	11,997	13,258	14,082	14,434	14,614	14,756	15,311	15,849	17,100
Very high research institutions (private)																
Net tuition	22,700	22,798	23,054	23,849	23,883	24,551	24,260	25,108	25,216	25,276	25,410	25,717	25,661	26,468	27,111	27,670
State and local appropriations	783	799	742	2,108	1,469	1,243	1,461	1,554	1,672	1,395	1,234	1,386	1,274	1,254	1,056	1,085
State and local grants and contracts	2,049	1,934	2,051	1,965	2,191	2,229	2,216	2,095	2,187	2,226	1,944	1,766	1,711	1,551	1,535	1,417
Private and affiliated gifts, investment returns, and endowment income	129,142	16,016	10,564	42,051	83,145	87,753	94,240	129,738	42,901	-89,901	64,314	108,438	37,728	76,617	111,575	66,723
Federal appropriations, grants, and contracts	22,508	23,381	25,392	27,459	29,673	30,948	30,113	29,285	28,231	28,502	29,225	30,446	28,973	27,926	26,109	25,740
Auxiliary enterprises <sup>b</sup>	8,110	8,308	8,453	8,482	8,268	8,198	8,438	8,847	8,773	8,809	8,890	8,892	9,097	9,209	8,987	9,140
Hospitals, independent operations, and other sources <sup>c</sup>	38,077	38,757	38,803	39,156	42,355	45,204	46,623	49,828	51,108	49,073	51,867	57,053	55,329	58,202	59,951	62,148

FTE = full-time equivalent.

<sup>a</sup> Public associate's colleges and universities.

<sup>b</sup> Includes activities that are generally self-supporting, such as residence halls, food services, student health services, and intercollegiate athletics.



CHAPTER 2 | Higher Education in Science and Engineering

<sup>c</sup> Includes revenue generated by hospitals operated by the institution and revenues independent or unrelated to instruction, research, or public services.  
<sup>d</sup> Includes doctorate-granting universities — high research activity, doctoral/research universities, master’s colleges and universities, and baccalaureate colleges.

**Note(s)**

Institution type corresponds to the 2010 Carnegie Classification of Institutions of Higher Education. For definitions of standard revenue categories, see Delta Cost Project Trends in College Spending: 2000–13.

**Source(s)**

Integrated Postsecondary Education Data System (IPEDS) Analytics: Delta Cost Project Database: 2000–2015 (16-year matched set), special tabulations (2017).

*Science and Engineering Indicators 2018*

## CHAPTER 2 | Higher Education in Science and Engineering

APPENDIX TABLE 2-7

### Average expenditures per FTE, by institution type: 2000–15

(2015 dollars)

Institution type and expenditure	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Community colleges <sup>a</sup>																
Instruction	5,867	5,911	5,642	5,355	5,326	5,355	5,490	5,697	5,785	5,615	5,240	5,174	5,257	5,517	5,649	5,979
Research	61	42	68	58	41	58	74	56	48	78	64	69	55	58	78	44
Public service	458	481	450	435	404	402	406	389	399	384	351	331	332	336	325	343
Academic support	1,146	1,180	1,127	1,028	1006	1016	1,047	1,076	1,107	1,078	994	975	1008	1067	1127	1,215
Student services	1,358	1,343	1,318	1,287	1,268	1,290	1,323	1,381	1,386	1,383	1,291	1,254	1,303	1,380	1,430	1,541
Institutional support	1,996	2,033	1,948	1,838	1,886	1,868	1,928	2,005	2,080	2,027	1,841	1,843	1,886	2,010	2,101	2,241
Plant operation and maintenance	1,232	1,271	1,271	1,217	1,197	1,219	1,308	1,348	1,365	1,328	1,126	1,093	1,107	1,153	1,215	1,293
Scholarships and fellowships	1,670	1,828	1,501	1,329	1,232	1,135	1,052	1013	1104	1,275	1,761	1,899	1,754	1,672	1,599	1,565
Auxiliary enterprises, hospitals, and clinics, and independent and other operations <sup>b</sup>	955	973	1274	1,098	1,184	1,172	1,155	1,243	1,351	1,453	1,482	1,512	1,496	1,484	1,479	1,466
4-year and graduate institutions (public) <sup>c</sup>																
Instruction	6,980	7,085	7,019	6,897	6,841	6,835	6,913	7,108	7,319	7,361	7,391	7,426	7,319	7,435	7,628	7,799
Research	1003	1,070	1,074	1,105	1,119	1,134	1,113	1,113	1,104	1,110	1,158	1,140	1,123	1,094	1,079	1,077
Public service	833	879	883	885	851	866	862	836	824	813	795	786	749	750	752	765
Academic support	1,782	1,835	1,685	1,650	1,651	1,671	1,697	1,733	1,798	1,820	1,830	1,819	1,811	1,879	1,930	1,976
Student services	1,431	1,463	1,455	1,422	1,416	1,433	1,458	1,503	1,570	1,592	1,616	1,633	1,640	1,701	1,779	1,832

## CHAPTER 2 | Higher Education in Science and Engineering

Institution type and expenditure	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Institutional support	2,269	2,286	2,237	2,222	2,227	2,179	2,229	2,292	2,390	2,372	2,357	2,324	2,329	2,364	2,440	2,514
Plant operation and maintenance	1,615	1,681	1,759	1,693	1,701	1,801	1,916	1,939	1,966	1,937	1,591	1,598	1,558	1,591	1,657	1,692
Scholarships and fellowships	2,180	2,339	1,260	1,134	1,081	1,048	1013	1028	1,067	1,141	1,428	1,527	1,406	1,374	1,338	1,338
Auxiliary enterprises, hospitals, and clinics, and independent and other operations <sup>b</sup>	3,199	3,175	3,148	3,105	3,046	3,070	3,121	3,206	3,522	3,584	3,761	3,767	3,832	3,764	4,074	4,112
Very high research institutions (public)																
Instruction	12,248	12,507	12,449	12,283	12,020	12,287	12,452	12,823	13,038	13,156	13,325	13,334	13,304	13,571	13,958	14,454
Research	8,892	9,099	9,176	9,402	9,616	9,719	9,608	9,609	9,767	10,054	10,545	10,759	10,502	10,527	10,136	9,894
Public service	3,028	3,085	3,004	2,960	3,079	2,994	2,993	3,071	3,189	3,141	3,291	3,263	3,255	3,181	3,232	3,331
Academic support	3,497	3,597	3,231	3,143	3,126	3,167	3,288	3,415	3,898	4,002	4,115	3,851	3,984	4,118	4,229	4,362
Student services	1,358	1,376	1,396	1,379	1,370	1,409	1,420	1,459	1,514	1,529	1,571	1,579	1,631	1,698	1,806	1,867
Institutional support	2,700	2,729	2,690	2,706	2,565	2,626	2,783	2,972	3,087	3,071	3,101	3,109	3,076	3,205	3,270	3,410
Plant operation and maintenance	2,297	2,412	2,511	2,369	2,476	2,574	2,729	2,771	2,730	2,680	2,188	2,240	2,256	2,287	2,341	2,294
Scholarships and fellowships	2,626	2,750	1,400	1,285	1,250	1,279	1,299	1,335	1,382	1,402	1,573	1,644	1,535	1,559	1,538	1,502
Auxiliary enterprises, hospitals, and clinics, and independent and other operations <sup>b</sup>	11,410	12,194	11,926	11,816	12,491	12,727	13,171	13,581	14,677	14,930	15,154	15,787	16,135	16,389	17,216	17,811
Very high research institutions (private)																
Instruction	31,982	32,351	34,210	36,645	37,147	38,857	38,967	41,044	41,284	42,602	41,487	41,659	42,250	42,599	44,323	45,894
Research	21,856	22,468	24,500	26,255	27,633	28,461	28,009	27,830	27,652	28,232	28,642	29,726	28,608	27,634	27,062	27,422
Public service	2,358	2,368	2,468	3,113	2,764	2,989	3,209	3,009	3,002	3,106	2,955	2,831	2,775	2,418	2,464	2,611
Academic support	7,444	8,077	8,265	8,359	8,417	8,418	8,850	9,181	9,957	10,391	10,014	10,106	10,224	10,670	10,879	11,258



## CHAPTER 2 | Higher Education in Science and Engineering

Institution type and expenditure	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Student services	3,741	3,957	4,222	4,258	4,331	4,737	5,137	5,203	5,225	5,504	5,352	5,369	5,229	5,520	5,711	6,010
Institutional support	9,357	9,710	9,993	10,559	10,651	10,955	11,092	11,487	12,253	12,752	12,134	11,979	12,004	12,006	12,280	12,876
Plant operation and maintenance	5,924	5,951	6,312	6,076	7,186	7,594	8,562	8,104	9,142	9,831	8,766	8,014	7,858	8,519	8,213	7,928
Scholarships and fellowships	1,778	1,897	2,038	2,190	2,409	2,295	2,381	2,364	2,377	2,548	2,435	2,338	2,709	2,703	2,811	3,071
Auxiliary enterprises, hospitals, and clinics, and independent and other operations <sup>b</sup>	33,566	35,608	36,622	36,871	36,912	37,621	38,396	39,204	39,418	40,607	43,375	43,545	44,883	44,825	47,256	48,982

FTE = full-time equivalent.

<sup>a</sup> Public associate's colleges and universities.

<sup>b</sup> Includes user-fee activities that do not receive general support. Auxiliary enterprises include dormitories, bookstores, and meal services.

<sup>c</sup> Includes doctorate-granting universities — high research activity, doctoral/research universities, master's colleges and universities, and baccalaureate colleges.

### Note(s)

Institution type corresponds to the 2010 Carnegie Classification of Institutions of Higher Education. For definitions of standard expense categories, see Delta Cost Project Trends in College Spending: 2000–13. Changes in financial accounting standards during the early 2000s affected public institutions' reporting of scholarships and fellowships in the Integrated Postsecondary Education Data System (IPEDS). Scholarship and fellowship data from 2002 on are not comparable with earlier years' data.

### Source(s)

IPEDS Analytics: Delta Cost Project Database: 2000–2015 (16-year matched set), special tabulations (2017).

*Science and Engineering Indicators 2018*

## CHAPTER 2 | Higher Education in Science and Engineering

APPENDIX TABLE 2-8

### Full-time S&E graduate students, by source and mechanism of primary support: 2000–15

(Number and percent)

Source and year	All mechanisms		Research assistantship		Fellowship		Traineeship		Teaching assistantship		Other		Self-support <sup>a</sup>	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
All sources														
2000	341,283	100.0	94,323	27.6	31,330	9.2	14,171	4.2	66,423	19.5	22,604	6.6	112,432	32.9
2001	354,522	100.0	99,923	28.2	32,270	9.1	14,154	4.0	68,267	19.3	23,272	6.6	116,636	32.9
2002	378,991	100.0	108,185	28.5	34,849	9.2	15,006	4.0	70,732	18.7	23,565	6.2	126,654	33.4
2003	397,420	100.0	114,256	28.7	34,460	8.7	15,126	3.8	73,105	18.4	25,743	6.5	134,730	33.9
2004	402,573	100.0	114,768	28.5	35,034	8.7	14,903	3.7	73,009	18.1	27,781	6.9	137,078	34.1
2005	406,620	100.0	114,304	28.1	36,414	9.0	14,570	3.6	74,238	18.3	27,691	6.8	139,403	34.3
2006	419,015	100.0	114,774	27.4	36,689	8.8	14,571	3.5	75,911	18.1	30,464	7.3	146,606	35.0
2007 <sup>b</sup>	427,146	100.0	114,802	26.9	38,033	8.9	13,450	3.1	77,022	18.0	31,569	7.4	152,270	35.6
2008	437,242	100.0	116,979	26.8	37,861	8.7	13,299	3.0	79,595	18.2	29,523	6.8	159,985	36.6
2009	441,744	100.0	120,008	27.2	38,115	8.6	12,799	2.9	78,318	17.7	29,791	6.7	162,713	36.8
2010	446,455	100.0	122,346	27.4	38,984	8.7	12,422	2.8	79,445	17.8	30,027	6.7	163,231	36.6
2011	444,991	100.0	121,010	27.2	40,583	9.1	12,557	2.8	80,719	18.1	29,799	6.7	160,323	36.0
2012	448,065	100.0	117,829	26.3	41,433	9.2	11,590	2.6	82,967	18.5	32,140	7.2	162,106	36.2
2013	457,368	100.0	114,867	25.1	42,774	9.4	10,462	2.3	84,972	18.6	31,892	7.0	172,401	37.7

## CHAPTER 2 | Higher Education in Science and Engineering

Source and year	All mechanisms		Research assistantship		Fellowship		Traineeship		Teaching assistantship		Other		Self-support <sup>a</sup>	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
2014 <sup>c</sup>	480,461	100.0	114,205	23.8	42,492	8.8	11,187	2.3	87,388	18.2	33,310	6.9	191,879	39.9
2015	495,213	100.0	114,916	23.2	42,935	8.7	11,120	2.2	89,019	18.0	36,110	7.3	201,113	40.6
Federal														
2000	67,588	100.0	44,620	66.0	7,475	11.1	9,544	14.1	1,371	2.0	4,578	6.8	-	-
2001	68,843	100.0	46,205	67.1	7,406	10.8	9,497	13.8	1,077	1.6	4,658	6.8	-	-
2002	75,538	100.0	51,621	68.3	7,899	10.5	9,996	13.2	1,227	1.6	4,795	6.3	-	-
2003	81,761	100.0	57,255	70.0	7,608	9.3	10,090	12.3	1,531	1.9	5,277	6.5	-	-
2004	83,816	100.0	58,559	69.9	7,965	9.5	9,916	11.8	1,533	1.8	5,843	7.0	-	-
2005	83,723	100.0	58,197	69.5	8,267	9.9	9,731	11.6	1,596	1.9	5,932	7.1	-	-
2006	83,962	100.0	57,547	68.5	8,251	9.8	9,754	11.6	1,659	2.0	6,751	8.0	-	-
2007 <sup>b</sup>	81,602	100.0	57,259	70.2	8,598	10.5	8,606	10.5	1,574	1.9	5,565	6.8	-	-
2008	78,215	100.0	55,375	70.8	8,291	10.6	8,206	10.5	1,015	1.3	5,328	6.8	-	-
2009	81,205	100.0	58,341	71.8	8,592	10.6	8,068	9.9	1,248	1.5	4,956	6.1	-	-
2010	85,877	100.0	62,558	72.8	9,534	11.1	7,649	8.9	1,091	1.3	5,045	5.9	-	-
2011	84,816	100.0	61,799	72.9	9,766	11.5	7,600	9.0	1,091	1.3	4,560	5.4	-	-
2012	80,638	100.0	58,070	72.0	10,409	12.9	6,952	8.6	903	1.1	4,304	5.3	-	-
2013	76,507	100.0	55,320	72.3	9,913	13.0	6,259	8.2	916	1.2	4,099	5.4	-	-

## CHAPTER 2 | Higher Education in Science and Engineering

Source and year	All mechanisms		Research assistantship		Fellowship		Traineeship		Teaching assistantship		Other		Self-support <sup>a</sup>	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
2014 <sup>c</sup>	72,445	100.0	52,317	72.2	9,690	13.4	6,094	8.4	762	1.1	3,582	4.9	-	-
2015	72,075	100.0	51,404	71.3	9,420	13.1	6,068	8.4	864	1.2	4,319	6.0	-	-
Nonfederal														
2000	161,263	100.0	49,703	30.8	23,855	14.8	4,627	2.9	65,052	40.3	18,026	11.2	-	-
2001	169,043	100.0	53,718	31.8	24,864	14.7	4,657	2.8	67,190	39.7	18,614	11.0	-	-
2002	176,799	100.0	56,564	32.0	26,950	15.2	5,010	2.8	69,505	39.3	18,770	10.6	-	-
2003	180,929	100.0	57,001	31.5	26,852	14.8	5,036	2.8	71,574	39.6	20,466	11.3	-	-
2004	181,679	100.0	56,209	30.9	27,069	14.9	4,987	2.7	71,476	39.3	21,938	12.1	-	-
2005	183,494	100.0	56,107	30.6	28,147	15.3	4,839	2.6	72,642	39.6	21,759	11.9	-	-
2006	188,447	100.0	57,227	30.4	28,438	15.1	4,817	2.6	74,252	39.4	23,713	12.6	-	-
2007 <sup>b</sup>	193,274	100.0	57,543	29.8	29,435	15.2	4,844	2.5	75,448	39.0	26,004	13.5	-	-
2008	199,042	100.0	61,604	31.0	29,570	14.9	5,093	2.6	78,580	39.5	24,195	12.2	-	-
2009	197,826	100.0	61,667	31.2	29,523	14.9	4,731	2.4	77,070	39.0	24,835	12.6	-	-
2010	197,347	100.0	59,788	30.3	29,450	14.9	4,773	2.4	78,354	39.7	24,982	12.7	-	-
2011	199,852	100.0	59,211	29.6	30,817	15.4	4,957	2.5	79,628	39.8	25,239	12.6	-	-
2012	205,321	100.0	59,759	29.1	31,024	15.1	4,638	2.3	82,064	40.0	27,836	13.6	-	-
2013	208,460	100.0	59,547	28.6	32,861	15.8	4,203	2.0	84,056	40.3	27,793	13.3	-	-

## CHAPTER 2 | Higher Education in Science and Engineering

Source and year	All mechanisms		Research assistantship		Fellowship		Traineeship		Teaching assistantship		Other		Self-support <sup>a</sup>	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
2014 <sup>c</sup>	216,137	100.0	61,888	28.6	32,802	15.2	5,093	2.4	86,626	40.1	29,728	13.8	-	-
2015	222,025	100.0	63,512	28.6	33,515	15.1	5,052	2.3	88,155	39.7	31,791	14.3	-	-

- = no value possible.

<sup>a</sup> Includes any loans (including federal) and support from personal or family financial contributions, and self-support is not counted under federal or nonfederal sources.

<sup>b</sup> In 2007, eligible fields were reclassified, newly eligible fields were added, and the survey was redesigned to improve coverage and coding of eligible units. Because of methodological changes, counts should be used with caution for trend analysis. For more details, see appendix A in <https://www.nsf.gov/statistics/nsf10307/>.

<sup>c</sup> In 2014, the survey frame was updated following a comprehensive frame evaluation study. The study identified potentially eligible but not previously surveyed U.S. academic institutions with master's- or doctorate-granting programs in science, engineering, or health. For more details on the impact of the frame update, see <https://www.nsf.gov/statistics/2016/nsf16314/>.

### Note(s)

S&E includes health fields (medical sciences and other health sciences), and excludes newly eligible fields (architecture, communication, and family and consumer sciences and human sciences) added starting in 2007. Therefore, the S&E numbers in this table differ from the data used in National Science Foundation, National Center for Science and Engineering Statistics, Survey of Graduate Students and Postdoctorates in Science and Engineering (annual series), and elsewhere. Percentages may not add to 100% because of rounding. The survey changes in 2007 and 2014 may affect interpretation of trends.

### Source(s)

National Science Foundation, National Center for Science and Engineering Statistics special tabulations (2016), 2015 Survey of Graduate Students and Postdoctorates in Science and Engineering.

*Science and Engineering Indicators 2018*

## CHAPTER 2 | Higher Education in Science and Engineering

APPENDIX TABLE 2-9

### Full-time S&E graduate students, by field and mechanism of primary support: 2015

(Number and percent)

Field	All mechanisms		Research assistantship		Fellowship		Traineeship		Teaching assistantship		Other		Self-support <sup>a</sup>	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
S&E	495,213	100.0	114,916	23.2	42,935	8.7	11,120	2.2	89,019	18.0	36,110	7.3	201,113	40.6
Engineering	126,733	100.0	38,949	30.7	9,230	7.3	1,110	0.9	14,994	11.8	8,422	6.6	54,028	42.6
Aerospace	4,039	100.0	1,633	40.4	339	8.4	72	1.8	497	12.3	289	7.2	1,209	29.9
Chemical	8,835	100.0	4,044	45.8	1,060	12.0	76	0.9	1,028	11.6	402	4.6	2,225	25.2
Civil	15,443	100.0	4,775	30.9	1,008	6.5	82	0.5	2,070	13.4	1,337	8.7	6,171	40.0
Electrical	40,519	100.0	9,854	24.3	1,865	4.6	122	0.3	4,232	10.4	2,458	6.1	21,988	54.3
Industrial	10,215	100.0	1,480	14.5	406	4.0	83	0.8	1,111	10.9	777	7.6	6,358	62.2
Materials	6,826	100.0	3,545	51.9	757	11.1	50	0.7	648	9.5	246	3.6	1,580	23.1
Mechanical	20,320	100.0	6,100	30.0	1,356	6.7	160	0.8	3,148	15.5	1,472	7.2	8,084	39.8
Other	20,536	100.0	7,518	36.6	2,439	11.9	465	2.3	2,260	11.0	1,441	7.0	6,413	31.2
Science	368,480	100.0	75,967	20.6	33,705	9.1	10,010	2.7	74,025	20.1	27,688	7.5	147,085	39.9
Natural sciences	259,192	100.0	62,940	24.3	21,361	8.2	8,141	3.1	50,653	19.5	17,381	6.7	98,716	38.1
Agricultural sciences	13,071	100.0	6,154	47.1	965	7.4	43	0.3	1,896	14.5	679	5.2	3,334	25.5
Biological sciences <sup>b</sup>	71,122	100.0	23,689	33.3	9,287	13.1	5,563	7.8	10,933	15.4	4,871	6.8	16,779	23.6
Earth, atmospheric, and ocean sciences	12,286	100.0	4,362	35.5	1,491	12.1	92	0.7	3,125	25.4	723	5.9	2,493	20.3

## CHAPTER 2 | Higher Education in Science and Engineering

Field	All mechanisms		Research assistantship		Fellowship		Traineeship		Teaching assistantship		Other		Self-support <sup>a</sup>	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Atmospheric sciences	1,201	100.0	726	60.4	67	5.6	28	2.3	220	18.3	21	1.7	139	11.6
Earth sciences	7,053	100.0	2,213	31.4	842	11.9	28	0.4	2,250	31.9	450	6.4	1,270	18.0
Oceanography	2,081	100.0	953	45.8	249	12.0	6	0.3	382	18.4	109	5.2	382	18.4
Other geosciences	1,951	100.0	470	24.1	333	17.1	30	1.5	273	14.0	143	7.3	702	36.0
Mathematics and computer sciences	79,482	100.0	9,968	12.5	3,472	4.4	441	0.6	16,032	20.2	4,447	5.6	45,122	56.8
Computer sciences	58,329	100.0	8,201	14.1	1,762	3.0	258	0.4	6,069	10.4	3,491	6.0	38,548	66.1
Mathematics and statistics	21,153	100.0	1,767	8.4	1,710	8.1	183	0.9	9,963	47.1	956	4.5	6,574	31.1
Medical and other health sciences	46,857	100.0	5,381	11.5	2,191	4.7	1,644	3.5	4,100	8.8	5,493	11.7	28,048	59.9
Medical sciences	24,937	100.0	3,506	14.1	1,405	5.6	1,025	4.1	1,958	7.9	2,863	11.5	14,180	56.9
Other health sciences	21,920	100.0	1,875	8.6	786	3.6	619	2.8	2,142	9.8	2,630	12.0	13,868	63.3
Physical sciences	36,374	100.0	13,386	36.8	3,955	10.9	358	1.0	14,567	40.0	1,168	3.2	2,940	8.1
Astronomy	1,256	100.0	603	48.0	270	21.5	20	1.6	287	22.9	21	1.7	55	4.4
Chemistry	20,584	100.0	6,827	33.2	2,312	11.2	206	1.0	8,985	43.7	564	2.7	1,690	8.2
Physics	14,075	100.0	5,806	41.3	1,344	9.5	109	0.8	5,215	37.1	532	3.8	1,069	7.6
Other physical sciences	459	100.0	150	32.7	29	6.3	23	5.0	80	17.4	51	11.1	126	27.5
Social and behavioral sciences	103,901	100.0	11,930	11.5	11,943	11.5	1,716	1.7	22,594	21.7	9,650	9.3	46,068	44.3
Psychology	35,478	100.0	4,798	13.5	2,241	6.3	789	2.2	6,634	18.7	3,270	9.2	17,746	50.0

## CHAPTER 2 | Higher Education in Science and Engineering

Field	All mechanisms		Research assistantship		Fellowship		Traineeship		Teaching assistantship		Other		Self-support <sup>a</sup>	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Social sciences	68,423	100.0	7,132	10.4	9,702	14.2	927	1.4	15,960	23.3	6,380	9.3	28,322	41.4
Anthropology	5,873	100.0	431	7.3	1,337	22.8	117	2.0	1,998	34.0	375	6.4	1,615	27.5
Economics	13,939	100.0	2,243	16.1	2,177	15.6	68	0.5	4,012	28.8	899	6.4	4,540	32.6
History of science	341	100.0	42	12.3	157	46.0	0	0.0	96	28.2	7	2.1	39	11.4
Linguistics	2,540	100.0	230	9.1	369	14.5	47	1.9	898	35.4	189	7.4	807	31.8
Political science and public administration	26,706	100.0	1,969	7.4	3,344	12.5	356	1.3	3,494	13.1	3,173	11.9	14,370	53.8
Sociology	6,532	100.0	880	13.5	1,056	16.2	149	2.3	2,412	36.9	518	7.9	1,517	23.2
Other social sciences	12,492	100.0	1,337	10.7	1,262	10.1	190	1.5	3,050	24.4	1,219	9.8	5,434	43.5
Multidisciplinary and interdisciplinary studies	5,387	100.0	1,097	20.4	401	7.4	153	2.8	778	14.4	657	12.2	2,301	42.7

<sup>a</sup> Includes any loans (including federal) and support from personal or family financial contributions.

<sup>b</sup> Includes neuroscience.

### Note(s)

S&E includes health fields (medical sciences and other health sciences) and excludes newly eligible fields (architecture, communication, and family and consumer sciences and human sciences) added starting in 2007. Therefore, the S&E numbers in this table differ from the data used in National Science Foundation, National Center for Science and Engineering Statistics, Survey of Graduate Students and Postdoctorates in Science and Engineering (annual series), and elsewhere. Percentages may not add to 100% because of rounding.

### Source(s)

National Science Foundation, National Center for Science and Engineering Statistics, special tabulations (2016), 2015 Survey of Graduate Students and Postdoctorates in Science and Engineering.

*Science and Engineering Indicators 2018*



## CHAPTER 2 | Higher Education in Science and Engineering

APPENDIX TABLE 2-10

### Full-time S&E graduate students primarily supported by federal government, by field: 2000–15

(Percent)

Field	2000	2001	2002	2003	2004	2005	2006	2007 <sup>a</sup>	2008	2009	2010	2011	2012	2013	2014 <sup>b</sup>	2015
S&E	19.8	19.4	19.9	20.6	20.8	20.6	20.0	19.1	17.9	18.4	19.2	19.1	18.0	16.7	15.1	14.6
Engineering	23.1	22.0	22.1	23.8	24.5	25.1	24.3	23.4	22.2	23.0	24.2	23.8	22.5	20.8	18.5	17.6
Aerospace	34.2	34.4	33.3	36.9	37.5	37.5	34.3	32.6	33.5	33.9	32.6	34.3	33.6	31.4	31.2	28.4
Chemical	28.5	29.0	31.3	32.0	33.6	34.2	33.9	31.6	30.2	29.8	32.5	31.4	29.0	28.5	25.9	24.1
Civil	16.5	16.1	16.2	15.9	15.9	15.2	14.3	16.5	14.5	14.7	15.7	16.1	15.5	14.7	13.7	13.4
Electrical	22.0	19.7	20.2	21.4	22.4	23.4	21.9	20.2	20.2	21.4	21.9	21.6	20.6	18.1	15.3	14.9
Industrial	13.3	12.3	11.5	13.9	14.7	15.5	14.0	11.1	10.7	12.0	14.0	13.3	13.2	11.9	10.1	8.5
Materials	37.0	37.1	36.5	38.1	36.5	35.2	35.2	35.1	35.1	39.0	38.0	35.4	33.2	31.6	30.5	29.7
Mechanical	24.6	24.3	23.8	25.6	24.9	25.4	25.6	24.2	23.0	23.2	24.8	24.3	22.1	20.3	18.4	16.6
Other	27.2	25.7	24.9	28.8	30.3	32.1	31.4	30.8	27.6	27.9	29.2	28.7	26.8	25.9	23.1	22.5
Science	18.9	18.7	19.3	19.6	19.8	19.4	18.9	18.0	16.7	17.0	17.7	17.6	16.6	15.4	13.9	13.5
Natural sciences	24.4	24.0	24.7	25.3	25.7	25.2	24.5	23.5	21.9	22.5	23.5	23.4	21.8	20.1	17.7	16.9
Agricultural sciences	20.7	21.0	22.3	25.0	25.1	24.1	24.1	23.4	20.0	20.1	21.8	21.9	20.1	19.4	18.2	18.2
Biological sciences <sup>c</sup>	35.6	34.8	36.1	37.1	38.9	38.4	37.7	35.3	33.7	34.2	34.7	33.7	31.4	29.4	26.9	26.0
Earth, atmospheric, and ocean sciences	28.3	27.8	27.4	28.8	28.6	29.1	29.0	29.2	27.9	26.8	26.9	27.3	26.3	25.7	23.9	24.2
Atmospheric sciences	62.0	55.2	53.3	59.1	54.6	52.8	52.8	53.2	47.3	46.5	43.3	44.6	44.0	45.7	46.4	50.8

## CHAPTER 2 | Higher Education in Science and Engineering

Field	2000	2001	2002	2003	2004	2005	2006	2007 <sup>a</sup>	2008	2009	2010	2011	2012	2013	2014 <sup>b</sup>	2015
Earth sciences	24.5	25.0	25.7	25.8	27.1	27.0	27.5	25.8	23.1	22.8	24.1	23.9	21.8	21.5	19.7	20.0
Oceanography	39.1	41.1	34.7	36.1	36.7	35.6	37.5	42.7	41.7	39.1	32.3	35.4	39.0	33.8	28.9	28.4
Other geosciences	14.6	13.1	15.8	17.1	15.9	19.0	17.2	14.3	17.2	16.1	21.8	20.8	18.3	19.0	19.1	18.5
Mathematics and computer sciences	13.2	13.2	14.2	15.5	15.5	16.3	15.3	14.8	13.9	14.6	15.2	15.0	14.3	12.4	9.8	8.9
Computer sciences	13.8	14.1	15.2	17.3	17.6	19.0	17.5	16.9	15.8	16.3	17.7	17.4	16.7	14.0	10.7	9.7
Mathematics and statistics	11.7	11.1	11.8	11.5	11.5	11.5	11.3	10.7	10.1	11.2	10.7	10.6	9.9	9.1	7.3	6.6
Medical and other health sciences	16.8	17.1	17.2	16.2	15.6	14.2	13.9	12.2	10.5	10.1	11.3	10.6	8.9	8.2	7.1	6.7
Medical sciences	22.3	24.4	24.2	23.0	23.6	21.9	21.3	19.2	15.3	14.9	15.8	14.5	12.5	10.8	9.5	8.6
Other health sciences <sup>d</sup>	14.1	13.3	13.4	12.3	11.2	10.1	10.0	8.6	7.9	6.9	7.6	6.5	5.1	5.3	4.5	4.6
Physical sciences	34.8	34.2	34.8	34.9	35.3	34.6	34.2	34.1	32.2	32.5	32.2	31.7	29.9	28.0	26.8	26.8
Astronomy	46.4	42.2	40.5	43.3	43.6	45.1	45.4	45.4	41.4	43.3	45.7	46.6	43.9	40.9	39.6	36.1
Chemistry	32.8	32.2	33.2	33.6	33.3	32.1	31.3	31.1	29.3	29.8	28.7	28.2	26.7	25.3	23.6	24.0
Physics	37.4	37.2	37.4	36.7	38.3	38.1	38.2	37.7	36.2	35.9	36.6	36.0	33.7	31.2	30.6	30.4
Other physical sciences	16.1	12.8	10.9	8.8	5.6	7.0	10.6	14.9	11.5	16.6	21.6	23.5	20.0	20.8	19.5	19.8
Social and behavioral sciences	7.6	7.4	7.7	7.5	7.2	7.0	6.9	6.3	6.1	6.2	6.2	6.1	5.8	5.3	4.9	5.1
Psychology <sup>d</sup>	9.4	9.3	10.3	10.0	9.6	9.5	9.1	8.5	8.0	8.5	8.6	8.0	7.7	6.9	6.6	7.2
Social sciences	6.4	6.2	6.2	6.0	5.8	5.5	5.5	5.0	4.9	4.9	5.0	5.1	4.8	4.5	4.0	4.0
Anthropology	6.7	6.6	6.9	7.1	7.7	6.3	6.6	6.4	6.1	6.6	6.6	6.2	5.7	5.1	4.6	4.8
Economics	8.5	8.0	7.5	7.3	7.4	6.9	6.7	6.6	6.3	5.8	5.9	5.9	5.4	4.9	4.2	3.8

CHAPTER 2 | Higher Education in Science and Engineering

Field	2000	2001	2002	2003	2004	2005	2006	2007 <sup>a</sup>	2008	2009	2010	2011	2012	2013	2014 <sup>b</sup>	2015
History of science	5.6	5.8	4.5	4.4	1.7	3.8	3.5	3.5	3.1	2.5	3.6	2.4	1.7	2.8	2.4	1.5
Linguistics	5.9	6.0	5.2	6.2	6.3	5.6	6.3	7.6	6.4	7.1	6.9	6.2	5.1	3.9	3.7	4.4
Political science and public administration	3.9	4.1	3.8	3.6	3.7	3.5	3.5	2.5	2.7	2.8	2.9	3.7	3.5	3.4	2.9	3.1
Sociology	7.6	6.5	7.1	7.1	6.8	6.4	7.0	6.9	6.3	7.0	7.2	6.4	5.6	5.3	5.4	5.3
Other social sciences	7.4	7.2	7.8	7.3	6.6	6.9	6.5	6.0	5.7	5.7	5.8	6.1	6.0	5.8	5.2	4.8
Multidisciplinary and interdisciplinary studies	ne	ne	ne	ne	ne	ne	ne	15.6	11.8	9.8	12.5	16.2	18.9	18.8	14.7	13.1

ne = not eligible; data were not collected for this field before 2007.

<sup>a</sup> In 2007, eligible fields were reclassified, newly eligible fields were added, and the survey was redesigned to improve coverage and coding of eligible units. Because of methodological changes, counts should be used with caution for trend analysis. For more details, see appendix A in <https://www.nsf.gov/statistics/nsf10307/>.

<sup>b</sup> In 2014, the survey frame was updated following a comprehensive frame evaluation study. The study identified potentially eligible but not previously surveyed U.S. academic institutions with master's- or doctorate-granting programs in science, engineering, or health. For more details on the impact of the frame update, see <https://www.nsf.gov/statistics/2016/nsf16314/>.

<sup>c</sup> Starting in 2007, includes neuroscience, which may have been reported under other fields in prior years.

<sup>d</sup> Beginning with 2008, more rigorous follow-up was done in recent years with institutions regarding the exclusion of practitioner-oriented graduate degree programs in psychology and in other health sciences (a subfield of health). This change may affect interpretation of trends in these fields.

**Note(s)**

S&E includes health fields (medical sciences and other health sciences) and excludes newly eligible fields (architecture, communication, and family and consumer sciences and human sciences) added starting in 2007. Therefore, the S&E numbers in this table differ from the data used in National Science Foundation, National Center for Science and Engineering Statistics, Survey of Graduate Students and Postdoctorates in Science and Engineering (annual series), and elsewhere. The survey changes in 2007 and 2014 may affect interpretation of trends.

**Source(s)**

National Science Foundation, National Center for Science and Engineering Statistics, special tabulations (2016), 2015 Survey of Graduate Students and Postdoctorates in Science and Engineering.

*Science and Engineering Indicators 2018*

## CHAPTER 2 | Higher Education in Science and Engineering

APPENDIX TABLE 2-11

### Proportion of full-time S&E graduate students primarily supported by federal government, by field and mechanism of primary support: 2015

(Percent)

Field	All mechanisms	Research assistantship	Fellowship	Traineeship	Teaching assistantship	Other
S&E	14.6	44.7	21.9	54.6	1.0	1.8
Engineering	17.6	46.7	25.0	49.7	0.9	1.7
Aerospace	28.4	54.7	32.4	18.1	1.0	8.3
Chemical	24.1	43.4	26.4	73.7	1.8	0.6
Civil	13.4	34.2	18.9	41.5	0.8	2.6
Electrical	14.9	54.8	19.8	18.9	0.6	0.9
Industrial	8.5	37.3	10.8	66.3	1.6	2.9
Materials	29.7	49.8	29.1	38.0	1.1	0.8
Mechanical	16.6	46.7	27.1	35.0	0.4	0.9
Other	22.5	44.7	29.8	63.7	1.5	2.5
Science	13.5	43.7	21.1	55.1	1.0	1.9
Natural sciences	16.9	48.0	27.3	61.5	1.2	1.9
Agricultural sciences	18.2	33.2	18.8	34.9	2.4	2.3
Biological sciences <sup>a</sup>	26.0	46.3	32.7	67.3	1.2	3.0
Earth, atmospheric, and ocean sciences	24.2	53.8	28.6	50.0	2.6	2.3

## CHAPTER 2 | Higher Education in Science and Engineering

Field	All mechanisms	Research assistantship	Fellowship	Traineeship	Teaching assistantship	Other
Atmospheric sciences	50.8	72.9	59.7	46.4	11.4	1.9
Earth sciences	20.0	50.3	24.1	53.6	2.0	2.1
Oceanography	28.4	48.9	39.0	16.7	2.6	3.5
Other geosciences	18.5	50.4	26.1	56.7	0.7	2.1
Mathematics and computer sciences	8.9	54.6	20.7	44.0	0.6	1.2
Computer sciences	9.7	55.4	25.1	34.9	1.0	1.3
Mathematics and statistics	6.6	51.0	16.1	56.8	0.4	1.0
Medical and other health sciences	6.7	25.8	17.7	46.5	1.0	1.7
Medical sciences	8.6	29.7	20.5	52.3	0.9	1.6
Other health sciences	4.6	18.7	12.7	37.0	1.2	1.8
Physical sciences	26.8	59.8	27.0	69.3	1.4	5.6
Astronomy	36.1	57.4	35.2	30.0	1.0	3.9
Chemistry	24.0	58.0	28.4	78.6	1.1	2.7
Physics	30.4	62.8	23.1	62.4	2.0	9.7
Other physical sciences	19.8	42.0	17.2	52.2	1.3	5.6
Social and behavioral sciences	5.1	21.3	9.8	24.4	0.5	1.8
Psychology	7.2	27.7	21.1	27.6	0.6	2.3
Social sciences	4.0	16.9	7.2	21.6	0.4	1.5

## CHAPTER 2 | Higher Education in Science and Engineering

Field	All mechanisms	Research assistantship	Fellowship	Traineeship	Teaching assistantship	Other
Anthropology	4.8	19.5	11.4	13.7	0.2	1.4
Economics	3.8	16.3	4.4	23.5	0.4	0.7
History of science	1.5	4.8	1.9	0.0	0.0	0.0
Linguistics	4.4	22.6	10.8	2.1	0.9	1.1
Political science and public administration	3.1	10.2	5.4	28.4	0.3	1.9
Sociology	5.3	20.8	8.7	26.8	0.3	1.1
Other social sciences	4.8	23.9	10.9	13.7	0.8	1.4
Multidisciplinary and interdisciplinary studies	13.1	41.4	28.9	57.5	0.3	1.6

<sup>a</sup> Includes neuroscience.

### Note(s)

S&E includes health fields (medical sciences and other health sciences) and excludes newly eligible fields (architecture, communication, and family and consumer sciences and human sciences) added starting in 2007. Therefore, the S&E numbers in this table differ from the data used in National Science Foundation, National Center for Science and Engineering Statistics, Survey of Graduate Students and Postdoctorates in Science and Engineering (annual series), and elsewhere.

### Source(s)

National Science Foundation, National Center for Science and Engineering Statistics special tabulations (2016), 2015 Survey of Graduate Students and Postdoctorates in Science and Engineering.

*Science and Engineering Indicators 2018*

CHAPTER 2 | Higher Education in Science and Engineering

APPENDIX TABLE 2-12

Full-time S&E graduate students primarily supported by federal government, by agency: 2000–15																		
(Number and percent)																		
Year	All federal		National Institutes of Health (NIH)		Department of Health and Human Services (excluding NIH)		National Science Foundation		Department of Defense		Department of Agriculture		National Aeronautics and Space Administration		Department of Energy		Other federal agencies	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
2000	67,588	100.0	19,472	28.8	4,018	5.9	14,599	21.6	8,141	12.0	2,630	3.9	2,780	4.1	2,995	4.4	12,953	19.2
2001	68,843	100.0	19,904	28.9	4,433	6.4	15,429	22.4	7,960	11.6	2,735	4.0	2,819	4.1	3,116	4.5	12,447	18.1
2002	75,538	100.0	22,129	29.3	4,830	6.4	17,135	22.7	7,977	10.6	3,100	4.1	3,082	4.1	3,548	4.7	13,737	18.2
2003	81,761	100.0	24,309	29.7	4,922	6.0	19,308	23.6	9,204	11.3	3,468	4.2	3,230	4.0	4,024	4.9	13,296	16.3
2004	83,816	100.0	26,689	31.8	4,211	5.0	19,975	23.8	9,007	10.7	3,563	4.3	2,916	3.5	4,135	4.9	13,320	15.9
2005	83,723	100.0	26,868	32.1	3,912	4.7	20,387	24.4	8,993	10.7	3,351	4.0	2,691	3.2	4,392	5.2	13,129	15.7
2006	83,962	100.0	27,587	32.9	3,662	4.4	20,339	24.2	8,867	10.6	3,000	3.6	2,364	2.8	4,480	5.3	13,663	16.3
2007 <sup>a</sup>	81,602	100.0	26,965	33.0	3,066	3.8	19,763	24.2	8,865	10.9	2,798	3.4	2,317	2.8	4,282	5.2	13,546	16.6
2008	78,215	100.0	25,949	33.2	2,481	3.2	19,845	25.4	8,200	10.5	2,736	3.5	2,344	3.0	4,334	5.5	12,326	15.8
2009	81,205	100.0	26,443	32.6	2,183	2.7	21,617	26.6	8,653	10.7	2,689	3.3	2,426	3.0	4,603	5.7	12,591	15.5
2010	85,877	100.0	27,547	32.1	2,228	2.6	23,149	27.0	9,202	10.7	3,037	3.5	2,470	2.9	5,493	6.4	12,751	14.8
2011	84,816	100.0	25,612	30.2	2,173	2.6	24,138	28.5	9,076	10.7	2,835	3.3	2,391	2.8	5,725	6.7	12,866	15.2
2012	80,638	100.0	24,208	30.0	1,899	2.4	24,171	30.0	8,719	10.8	2,639	3.3	2,172	2.7	5,330	6.6	11,500	14.3
2013	76,507	100.0	22,316	29.2	1,628	2.1	23,220	30.4	8,277	10.8	2,550	3.3	2,003	2.6	4,798	6.3	11,715	15.3
2014 <sup>b</sup>	72,445	100.0	21,141	29.2	1,366	1.9	22,837	31.5	7,429	10.3	2,384	3.3	2,008	2.8	4,397	6.1	10,883	15.0



CHAPTER 2 | Higher Education in Science and Engineering

Year	All federal		National Institutes of Health (NIH)		Department of Health and Human Services (excluding NIH)		National Science Foundation		Department of Defense		Department of Agriculture		National Aeronautics and Space Administration		Department of Energy		Other federal agencies	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
2015	72,075	100.0	20,589	28.6	1,697	2.4	22,861	31.7	8,103	11.2	2,626	3.6	2,035	2.8	4,308	6.0	9,856	13.7

<sup>a</sup> In 2007, eligible fields were reclassified, newly eligible fields were added, and the survey was redesigned to improve coverage and coding of eligible units. Because of methodological changes, counts should be used with caution for trend analysis. For more details, see appendix A in <https://www.nsf.gov/statistics/nsf10307/>.

<sup>b</sup> In 2014, the survey frame was updated following a comprehensive frame evaluation study. The study identified potentially eligible but not previously surveyed U.S. academic institutions with master's- or doctorate-granting programs in science, engineering, or health. For more details on the impact of the frame update, see <https://www.nsf.gov/statistics/2016/nsf16314/>.

**Note(s)**

S&E includes health fields (medical sciences and other health sciences) and excludes newly eligible fields (architecture, communication, and family and consumer sciences and human sciences) added starting in 2007. Therefore, the S&E numbers in this table differ from the data used in National Science Foundation, National Center for Science and Engineering Statistics, Survey of Graduate Students and Postdoctorates in Science and Engineering (annual series), and elsewhere. Percentages may not add to 100% because of rounding. The survey changes in 2007 and 2014 may affect interpretation of trends.

**Source(s)**

National Science Foundation, National Center for Science and Engineering Statistics, special tabulations (2016), 2015 Survey of Graduate Students and Postdoctorates in Science and Engineering.

*Science and Engineering Indicators 2018*



# CHAPTER 2 | Higher Education in Science and Engineering

APPENDIX TABLE 2-13

## Full-time S&E graduate students primarily supported by federal government, by field and agency: 2015

(Number and percent)

Field	All federal		National Institutes of Health		Department of Health and Human Services (excluding NIH)		National Science Foundation		Department of Defense		Department of Agriculture		National Aeronautics and Space Administration		Department of Energy		Other federal agencies	
	Total	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
S&E	72,075	100.0	20,589	29	1,697	2	22,861	32	8,103	11	2,626	4	2,035	3	4,308	6	9,856	14
Engineering	22,276	100.0	2,529	11	186	1	8,599	39	4,414	20	273	1	852	4	2,094	9	3,329	15
Aerospace	1,146	100.0	3	0	0	0	170	15	538	47	0	0	314	27	51	5	70	6
Chemical	2,127	100.0	244	12	24	1	1,019	48	195	9	48	2	31	2	372	18	194	9
Civil	2,066	100.0	30	2	7	0	753	36	166	8	31	2	55	3	106	5	918	44
Electrical	6,045	100.0	327	5	20	0	2,957	49	1,625	27	13	0	161	3	279	5	663	11
Industrial	873	100.0	75	9	17	2	272	31	266	31	3	0	20	2	47	5	173	20
Materials	2,026	100.0	69	3	9	0	875	43	457	23	14	1	28	1	348	17	226	11
Mechanical	3,376	100.0	176	5	31	1	1,393	41	754	22	19	1	179	5	343	10	481	14
Other	4,617	100.0	1,605	35	78	2	1,160	25	413	9	145	3	64	1	548	12	604	13
Science	49,799	100.0	18,060	36	1,511	3	14,262	29	3,689	7	2,353	5	1,183	2	2,214	4	6,527	13
Natural sciences	43,846	100.0	16,641	38	1,264	3	12,746	29	2,995	7	2,113	5	1,121	3	2,178	5	4,788	11
Agricultural sciences	2,377	100.0	43	2	8	0	350	15	53	2	1,132	48	38	2	47	2	706	30

## CHAPTER 2 | Higher Education in Science and Engineering

Field	All federal		National Institutes of Health		Department of Health and Human Services (excluding NIH)		National Science Foundation		Department of Defense		Department of Agriculture		National Aeronautics and Space Administration		Department of Energy		Other federal agencies	
	Total	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Biological sciences <sup>a</sup>	18,526	100.0	12,930	70	633	3	2,602	14	342	2	767	4	66	0	124	1	1,062	6
Earth, atmospheric, and ocean sciences	2,974	100.0	17	1	1	0	1,517	51	146	5	51	2	476	16	132	4	634	21
Atmospheric sciences	610	100.0	0	0	0	0	232	38	33	5	5	1	147	24	48	8	145	24
Earth sciences	1,412	100.0	5	0	1	0	822	58	26	2	18	1	251	18	69	5	220	16
Oceanography	591	100.0	4	1	0	0	296	50	52	9	11	2	43	7	7	1	178	30
Other geosciences	361	100.0	8	2	0	0	167	46	35	10	17	5	35	10	8	2	91	25
Mathematics and computer sciences	7,058	100.0	433	6	42	1	4,077	58	1,387	20	42	1	50	1	168	2	859	12
Computer sciences	5,664	100.0	269	5	32	1	3,235	57	1,228	22	32	1	37	1	119	2	712	13
Mathematics and statistics	1,394	100.0	164	12	10	1	842	60	159	11	10	1	13	1	49	4	147	11
Medical and other health sciences	3,147	100.0	1,614	51	472	15	116	4	206	7	82	3	5	0	6	0	646	21
Medical sciences	2,147	100.0	1,224	57	346	16	94	4	177	8	75	4	5	0	3	0	223	10
Other health sciences	1,000	100.0	390	39	126	13	22	2	29	3	7	1	0	0	3	0	423	42
Physical sciences	9,764	100.0	1,604	16	108	1	4,084	42	861	9	39	0	486	5	1,701	17	881	9
Astronomy	453	100.0	1	0	0	0	209	46	5	1	0	0	147	33	58	13	33	7
Chemistry	4,939	100.0	1,410	29	89	2	2,049	42	331	7	21	0	55	1	555	11	429	9
Physics	4,281	100.0	167	4	11	0	1,807	42	506	12	18	0	277	7	1,084	25	411	10

## CHAPTER 2 | Higher Education in Science and Engineering

Field	All federal		National Institutes of Health		Department of Health and Human Services (excluding NIH)		National Science Foundation		Department of Defense		Department of Agriculture		National Aeronautics and Space Administration		Department of Energy		Other federal agencies	
	Total	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Other physical sciences	91	100.0	26	28.6	8	9	19	21	19	21	0	0	7	8	4	4	8	9
Social and behavioral sciences	5,247	100.0	1,141	22	238	5	1,348	26	646	12	215	4	42	1	17	0	1,600	31
Psychology	2,540	100.0	903	36	142	6	544	21	421	17	2	0	7	0	3	0	518	20
Social sciences	2,707	100.0	238	9	96	4	804	30	225	8	213	8	35	1	14	1	1,082	40
Anthropology	283	100.0	8	3	3	1	164	58	5	2	9	3	0	0.0	1	0	93	33
Economics	532	100.0	37	7	6	1	120	23	11	2	169	32	0	0.0	7	1	182	34
History of science	5	100.0	1	20	0	0	3	60	0	0	0	0	0	0.0	0	0	1	20
Linguistics	112	100.0	8	7	0	0	64	57	8	7	0	0	0	0.0	0	0	32	29
Political science and public administration	829	100.0	66	8	71	9	142	17	153	19	6	1	1	0.1	3	0	387	47
Sociology	344	100.0	92	27	8	2	157	46	13	4	15	4	0	0.0	0	0	59	17
Other social sciences	602	100.0	26	4	8	1	154	26	6	*	14	2	34	5.6	3	1	328	55
Multidisciplinary and interdisciplinary studies	706	100.0	278	39	9	1	168	24	48	7	25	4	20	3	19	3	139	20

\* = less than .05.

<sup>a</sup> Includes neuroscience.

**Note(s)**



CHAPTER 2 | Higher Education in Science and Engineering

S&E includes health fields (medical sciences and other health sciences) and excludes newly eligible fields (architecture, communication, and family and consumer sciences and human sciences) added starting in 2007. Therefore, the S&E numbers in this table differ from the data used in National Science Foundation (NSF), National Center for Science and Engineering Statistics (NCSES), Survey of Graduate Students and Postdoctorates in Science and Engineering (annual series), and elsewhere. Percentages may not add to 100% because of rounding.

Source(s)

NSF, NCSES, special tabulations (2016), 2015 Survey of Graduate Students and Postdoctorates in Science and Engineering.

*Science and Engineering Indicators 2018*

## CHAPTER 2 | Higher Education in Science and Engineering

APPENDIX TABLE 2-14

## Doctorate recipients' source of primary support, by broad field of study, sex, citizenship, ethnicity, and race: 2013–15

(Percent)

Source of primary support and broad field of study	Total <sup>a</sup>	Temporary visa holder	U.S. citizens and permanent residents											Unknown citizenship
			Total	Male	Female	Hispanic or Latino	Not Hispanic or Latino						Ethnicity not reported	
							American Indian or Alaska Native	Asian	Black or African American	White	More than one race	Other race or race not reported		
All fields (number)	161,716	47,671	103,093	50,458	52,635	6,778	352	8,846	6,625	74,990	2,643	800	2,059	10,952
Fellowship or traineeship	19.9	15.4	24.0	23.2	24.6	30.7	29.3	27.1	26.1	23.0	30.9	24.5	7.5	2.2
Grant	5.1	3.6	6.3	6.6	6.0	6.2	4.0	8.9	4.0	6.3	6.8	5.6	2.0	0.3
Teaching assistantship	18.3	21.1	18.8	19.3	18.3	17.4	13.6	16.8	10.6	20.3	17.2	16.8	6.3	1.8
Research assistantship	27.4	46.2	21.3	25.0	17.7	15.2	8.8	28.4	11.9	22.3	21.2	17.5	7.9	2.7
Personal	13.6	2.8	19.8	15.6	23.9	21.0	30.4	11.0	36.6	19.7	18.5	18.0	7.2	1.7
Other	4.1	4.5	4.3	4.7	3.9	3.4	4.8	3.9	5.0	4.5	2.7	4.0	1.5	0.5
Unknown	11.6	6.4	5.5	5.6	5.5	6.2	9.1	4.0	5.8	3.9	2.6	13.6	67.6	90.8
S&E (number)	121,808	41,373	72,565	37,828	34,737	4,636	217	7,171	3,963	52,625	1,943	556	1,454	7,870
Fellowship or traineeship	19.9	13.2	25.7	23.9	27.6	34.4	37.8	26.4	31.3	24.6	32.4	24.1	7.8	2.0
Grant	6.4	4.0	8.4	8.5	8.4	8.4	s	10.6	5.9	8.5	9.0	s	2.7	0.4
Teaching assistantship	16.5	19.8	16.2	16.5	15.9	14.1	12.4	15.1	11.0	17.3	14.3	16.5	5.7	1.6
Research assistantship	33.4	50.6	26.8	31.1	22.1	19.2	11.5	32.1	14.8	28.3	25.8	22.5	9.7	3.4
Personal	9.0	1.9	13.9	10.4	17.6	14.7	19.4	8.4	28.3	13.7	13.6	12.1	4.9	1.2

## CHAPTER 2 | Higher Education in Science and Engineering

Source of primary support and broad field of study	Total <sup>a</sup>	Temporary visa holder	U.S. citizens and permanent residents											Unknown citizenship
			Total	Male	Female	Hispanic or Latino	Not Hispanic or Latino						Ethnicity not reported	
							American Indian or Alaska Native	Asian	Black or African American	White	More than one race	Other race or race not reported		
Other	3.6	4.2	3.7	4.3	3.1	3.1	s	3.7	3.7	3.9	2.2	s	1.0	0.4
Unknown	11.1	6.3	5.2	5.3	5.2	6.2	9.7	3.7	5.1	3.6	2.6	12.9	68.3	90.9
Agricultural sciences (number)	3,796	1,421	2,142	1,076	1,066	144	10	107	97	1,699	36	14	35	233
Fellowship or traineeship	16.8	15.3	19.4	17.1	21.8	23.6	60.0	16.8	21.6	18.7	27.8	21.4	17.1	1.3
Grant	5.1	2.9	7.0	6.6	7.5	9.7	0.0	5.6	s	7.2	s	0.0	0.0	0.4
Teaching assistantship	9.6	8.7	10.9	7.7	14.2	9.7	0.0	13.1	7.2	11.4	s	s	0.0	3.0
Research assistantship	43.3	58.3	37.7	41.3	34.1	27.8	s	48.6	s	38.8	41.7	28.6	8.6	3.9
Personal	8.2	0.9	13.8	13.9	13.6	13.2	s	10.3	21.6	13.7	s	14.3	8.6	2.1
Other	7.0	9.5	6.1	8.2	4.0	4.9	s	3.7	4.1	6.6	0.0	s	2.9	0.4
Unknown	9.9	4.4	5.0	5.2	4.8	11.1	0.0	1.9	5.2	3.6	0.0	7.1	62.9	88.8
Biological sciences (number)	25,658	6,570	17,554	8,103	9,451	1,264	36	2,063	714	12,600	525	125	227	1,534
Fellowship or traineeship	30.4	21.0	36.3	35.8	36.6	46.5	50.0	35.9	47.8	34.7	43.8	34.4	13.7	3.1
Grant	16.1	9.6	19.8	20.0	19.7	18.2	s	22.0	20.6	19.9	18.5	s	7.9	1.0
Teaching assistantship	11.2	14.3	10.9	10.9	10.9	7.8	s	8.7	7.7	12.0	9.9	s	5.3	0.7
Research assistantship	26.9	44.4	22.6	22.9	22.3	14.8	13.9	24.0	13.6	23.9	22.1	19.2	12.3	2.0
Personal	3.4	0.7	4.6	4.4	4.8	6.6	s	3.8	4.1	4.7	2.7	s	2.6	0.5

## CHAPTER 2 | Higher Education in Science and Engineering

Source of primary support and broad field of study	Total <sup>a</sup>	Temporary visa holder	U.S. citizens and permanent residents											Unknown citizenship
			Total	Male	Female	Hispanic or Latino	Not Hispanic or Latino						Ethnicity not reported	
							American Indian or Alaska Native	Asian	Black or African American	White	More than one race	Other race or race not reported		
Other	2.4	4.5	1.8	1.6	1.9	1.3	0.0	2.4	1.1	1.8	1.3	2.4	0.0	0.4
Unknown	9.6	5.4	4.0	4.3	3.7	4.8	13.9	3.2	5.2	3.0	1.7	9.6	58.1	92.4
Computer sciences (number)	5,837	3,116	2,338	1,859	479	94	s	368	97	1,629	55	s	65	383
Fellowship or traineeship	12.4	9.1	18.6	16.7	26.3	33.0	0.0	13.3	32.0	18.3	27.3	29.6	6.2	1.0
Grant	3.1	2.6	4.1	4.2	3.5	s	s	2.7	s	4.7	s	0.0	s	1.0
Teaching assistantship	11.6	15.1	8.7	8.2	10.6	s	s	10.9	s	8.9	s	11.1	s	1.0
Research assistantship	50.7	63.0	41.4	44.1	31.3	24.5	0.0	49.5	20.6	43.1	s	s	21.5	7.0
Personal	6.5	1.3	14.3	13.3	18.0	20.2	0.0	13.0	33.0	13.4	14.5	11.1	9.2	1.3
Other	4.7	2.9	7.7	8.1	6.1	7.4	0.0	6.8	4.1	8.3	9.1	7.4	0.0	1.3
Unknown	11.1	6.1	5.2	5.4	4.2	5.3	33.3	3.8	4.1	3.3	5.5	7.4	58.5	87.2
Earth, atmospheric, and ocean sciences (number)	2,838	883	1,825	990	835	97	5	60	34	1,533	47	12	37	130
Fellowship or traineeship	19.7	12.1	24.6	20.5	29.5	36.1	s	18.3	44.1	23.9	27.7	s	10.8	2.3
Grant	8.4	7.5	9.4	9.1	9.7	s	0.0	s	s	10.2	s	0.0	s	0.0
Teaching assistantship	14.2	14.0	15.1	15.1	15.1	s	0.0	13.3	s	15.3	s	0.0	s	3.8
Research assistantship	42.1	54.4	38.7	40.8	36.2	25.8	s	50.0	29.4	40.1	s	50.0	16.2	6.2
Personal	4.1	1.0	5.9	6.9	4.7	7.2	s	s	s	5.6	s	0.0	5.4	0.8

## CHAPTER 2 | Higher Education in Science and Engineering

Source of primary support and broad field of study	Total <sup>a</sup>	Temporary visa holder	U.S. citizens and permanent residents											Unknown citizenship
			Total	Male	Female	Hispanic or Latino	Not Hispanic or Latino						Ethnicity not reported	
							American Indian or Alaska Native	Asian	Black or African American	White	More than one race	Other race or race not reported		
Other	3.4	5.1	2.7	3.7	1.6	s	0.0	3.3	0.0	2.6	6.4	s	2.7	0.8
Unknown	8.1	5.9	3.7	3.9	3.4	3.1	0.0	1.7	2.9	2.3	8.5	16.7	54.1	86.2
Engineering (number)	28,531	14,844	12,056	9,007	3,049	728	19	1,799	504	8,291	298	102	315	1,631
Fellowship or traineeship	14.9	7.5	25.8	22.4	35.8	35.9	s	21.1	40.5	25.6	33.6	s	5.7	1.7
Grant	5.2	3.6	7.8	7.6	8.4	7.0	s	9.1	4.2	8.0	8.1	s	2.2	0.6
Teaching assistantship	7.6	10.1	5.5	5.7	4.7	5.1	s	6.2	6.2	5.5	4.4	s	1.3	1.0
Research assistantship	52.8	66.3	42.5	44.1	38.0	34.5	47.4	49.6	27.8	43.8	44.6	35.3	10.5	5.3
Personal	3.4	1.6	6.1	6.6	4.6	4.5	s	5.3	9.1	6.5	2.3	s	1.0	0.4
Other	5.1	4.3	6.7	7.7	3.6	7.3	0.0	5.2	6.9	7.2	4.7	9.8	1.3	0.6
Unknown	10.9	6.5	5.6	5.9	4.8	5.8	10.5	3.6	5.4	3.3	2.3	11.8	78.1	90.5
Mathematics (number)	5,511	2,492	2,692	1,947	745	112	s	291	88	2,047	54	s	75	327
Fellowship or traineeship	14.3	11.0	18.8	19.0	18.4	24.1	0.0	19.6	29.5	18.1	40.7	8.7	2.7	1.5
Grant	1.7	1.0	2.4	2.3	2.8	s	0.0	2.4	s	2.6	s	0.0	0.0	0.0
Teaching assistantship	53.8	60.1	53.8	54.5	51.9	47.3	s	49.8	43.2	56.2	s	52.2	26.7	6.4
Research assistantship	14.2	17.8	12.2	12.2	12.2	11.6	0.0	12.4	6.8	12.8	s	s	8.0	2.8
Personal	3.0	0.7	5.5	5.1	6.4	7.1	0.0	5.5	s	5.3	s	8.7	1.3	0.3



## CHAPTER 2 | Higher Education in Science and Engineering

Source of primary support and broad field of study	Total <sup>a</sup>	Temporary visa holder	U.S. citizens and permanent residents											Unknown citizenship
			Total	Male	Female	Hispanic or Latino	Not Hispanic or Latino						Ethnicity not reported	
							American Indian or Alaska Native	Asian	Black or African American	White	More than one race	Other race or race not reported		
Other	2.3	2.6	2.2	2.1	2.6	s	0.0	4.5	s	1.9	0.0	0.0	1.3	0.3
Unknown	10.8	6.7	5.1	4.9	5.6	4.5	0.0	5.8	3.4	3.2	0.0	13.0	60.0	88.7
Medical and other health sciences (number)	7,761	1,500	5,666	1,593	4,073	310	27	504	659	3,899	133	38	96	595
Fellowship or traineeship	21.0	18.9	23.5	20.5	24.7	31.3	37.0	29.2	23.1	22.3	29.3	26.3	8.3	1.5
Grant	5.3	3.9	6.3	7.4	5.9	7.4	0.0	8.3	4.6	6.2	9.8	5.3	5.2	0.0
Teaching assistantship	9.4	17.3	8.2	11.9	6.8	7.4	0.0	8.3	4.9	9.2	4.5	7.9	3.1	0.5
Research assistantship	18.4	37.5	15.1	19.8	13.2	14.8	s	20.2	s	15.4	19.5	21.1	12.5	2.0
Personal	24.9	6.5	32.2	25.4	34.9	31.3	29.6	19.6	49.6	31.5	30.1	28.9	15.6	1.8
Other	9.0	9.5	9.7	8.5	10.1	5.8	s	9.7	s	11.1	4.5	5.3	1.0	0.8
Unknown	12.0	6.3	4.9	6.5	4.3	1.9	11.1	4.6	3.8	4.3	2.3	5.3	54.2	93.3
Physical sciences (number)	14,275	5,409	7,949	5,462	2,487	435	18	682	251	6,142	212	62	147	917
Fellowship or traineeship	12.8	7.2	17.9	15.7	22.8	29.7	55.6	15.1	30.7	16.9	21.7	17.7	8.2	1.9
Grant	4.9	3.1	6.8	7.0	6.3	7.1	s	s	4.4	6.7	11.3	3.2	2.7	0.2
Teaching assistantship	21.9	27.9	20.1	19.5	21.4	21.4	s	22.9	27.1	19.9	18.4	s	3.4	2.4
Research assistantship	46.6	54.1	46.4	48.6	41.6	32.2	s	47.5	29.5	49.0	43.4	s	15.6	5.0
Personal	1.8	0.3	3.0	3.1	2.7	2.5	s	s	2.8	3.3	2.4	1.6	0.7	0.1

## CHAPTER 2 | Higher Education in Science and Engineering

Source of primary support and broad field of study	Total <sup>a</sup>	Temporary visa holder	U.S. citizens and permanent residents											Unknown citizenship
			Total	Male	Female	Hispanic or Latino	Not Hispanic or Latino						Ethnicity not reported	
							American Indian or Alaska Native	Asian	Black or African American	White	More than one race	Other race or race not reported		
Other	1.2	1.3	1.3	1.4	0.9	1.6	5.6	1.8	2.0	1.2	0.5	0.0	0.7	0.0
Unknown	10.7	6.2	4.5	4.6	4.4	5.5	0.0	3.7	3.6	3.1	2.4	14.5	68.7	90.4
Psychology (number)	11,098	791	9,216	2,567	6,649	712	38	508	626	6,772	250	53	257	1,091
Fellowship or traineeship	15.4	20.2	16.7	17.2	16.5	21.5	34.2	23.6	21.2	15.6	18.4	17.0	3.1	0.8
Grant	2.3	1.6	2.5	3.0	2.4	3.7	s	2.6	1.1	2.6	2.4	s	0.0	0.3
Teaching assistantship	18.4	25.8	19.9	23.2	18.6	12.6	s	25.8	12.5	21.6	18.4	s	5.1	1.1
Research assistantship	16.6	23.0	17.9	16.9	18.2	12.4	s	18.3	11.7	19.7	19.6	s	1.2	1.1
Personal	28.2	13.3	32.4	28.3	34.0	36.8	28.9	23.8	44.6	32.5	35.2	17.0	7.0	3.2
Other	1.4	5.2	1.2	1.9	0.9	1.4	0.0	0.0	1.8	1.3	0.4	3.8	0.0	0.2
Unknown	17.7	10.9	9.4	9.5	9.3	11.7	15.8	5.9	7.2	6.7	5.6	37.7	83.7	93.3
Social sciences (number)	16,503	4,347	11,127	5,224	5,903	740	59	789	893	8,013	333	100	200	1,029
Fellowship or traineeship	26.4	29.1	27.4	27.3	27.6	32.2	33.9	34.1	26.8	26.6	32.7	22.0	10.0	3.3
Grant	0.8	0.7	0.9	0.7	1.0	0.8	s	1.5	0.6	0.8	s	2.0	1.0	0.1
Teaching assistantship	28.8	36.4	28.2	29.8	26.9	29.6	22.0	31.9	13.5	30.0	23.7	31.0	11.0	2.7
Research assistantship	13.2	17.9	12.4	12.4	12.4	10.1	s	11.9	8.4	13.4	s	7.0	6.5	2.5
Personal	17.1	4.9	23.2	21.4	24.7	19.1	27.1	15.5	41.1	22.4	28.5	25.0	8.0	2.2

## CHAPTER 2 | Higher Education in Science and Engineering

Source of primary support and broad field of study	Total <sup>a</sup>	Temporary visa holder	U.S. citizens and permanent residents											Unknown citizenship
			Total	Male	Female	Hispanic or Latino	Not Hispanic or Latino						Ethnicity not reported	
							American Indian or Alaska Native	Asian	Black or African American	White	More than one race	Other race or race not reported		
Other	3.6	4.7	3.4	3.8	3.0	2.4	3.4	1.9	4.6	3.6	1.8	4.0	2.5	0.4
Unknown	10.2	6.3	4.5	4.6	4.4	5.8	6.8	3.2	5.0	3.1	1.5	9.0	61.0	88.7
Non-S&E (number)	39,908	6,298	30,528	12,630	17,898	2,142	135	1,675	2,662	22,365	700	244	605	3,082
Fellowship or traineeship	20.0	29.3	19.8	21.3	18.8	22.6	15.6	30.3	18.3	19.1	26.9	25.4	6.9	2.6
Grant	1.1	1.2	1.2	1.0	1.3	1.3	s	1.4	1.3	1.2	0.7	s	0.5	0.1
Teaching assistantship	23.8	29.2	24.9	27.5	23.1	24.6	15.6	24.0	10.0	27.4	25.3	17.2	7.8	2.4
Research assistantship	9.0	17.5	8.1	6.7	9.1	6.6	4.4	12.8	7.6	8.1	8.3	6.1	3.6	0.8
Personal	27.6	8.8	34.0	31.1	36.1	34.6	48.1	21.9	48.9	33.7	32.0	31.6	12.7	2.9
Other	5.5	6.7	5.8	6.2	5.5	3.9	s	4.7	7.1	6.1	4.0	s	2.6	0.6
Unknown	12.9	7.3	6.2	6.3	6.1	6.3	8.1	5.0	6.8	4.6	2.9	15.2	65.8	90.7

s = suppressed for reasons of confidentiality and/or reliability.

<sup>a</sup> Total includes doctorate recipients for whom sex was not reported.

### Note(s)

Includes only doctorate recipients who reported a primary source of support. Reporting categories for ethnicity and race were expanded in 2013; comparisons with data before 2013 should be made with caution. Personal support mechanisms include personal savings, other personal earnings, other family earnings or savings, and loans. Research assistantships include research assistantships and other assistantships. Traineeships include internships and residencies. Other support mechanisms include employer reimbursement or assistance, foreign support, and other sources. Percentages may not add to total because of rounding.

### Source(s)



**CHAPTER 2 | Higher Education in Science and Engineering**

National Science Foundation, National Center for Science and Engineering Statistics, special tabulations (2016), 2015 Survey of Earned Doctorates (SED).  
*Science and Engineering Indicators 2018*

## CHAPTER 2 | Higher Education in Science and Engineering

APPENDIX TABLE 2-15

### Amount of undergraduate and graduate debt of S&E doctorate recipients, by field: 2015

(Percent)

Debt and field	Doctorates (number)	Debt										
		None	≤ \$10,000	\$10,001– \$20,000	\$20,001– \$30,000	\$30,001– \$40,000	\$40,001– \$50,000	\$50,001– \$60,000	\$60,001– \$70,000	\$70,001– \$80,000	\$80,001– \$90,000	≥ \$90,001
Cumulative debt												
All fields	49,355	53.1	9.1	7.1	5.9	3.7	3.2	2.4	2.1	1.8	2.5	9.1
S&E	37,442	56.8	9.2	6.9	5.7	3.5	2.9	2.1	1.8	1.6	2.1	7.3
Engineering	8,955	66.9	9.9	6.1	4.7	2.8	2.1	1.4	1.2	0.9	1.1	3.0
Sciences	28,487	53.6	9.0	7.2	6.1	3.7	3.2	2.3	2.0	1.8	2.5	8.7
Agricultural sciences	1,218	56.9	11.0	8.0	6.3	3.6	2.7	2.0	1.6	2.1	1.1	4.8
Biological sciences	7,825	57.8	9.6	8.2	6.9	3.5	3.0	2.0	1.7	1.4	1.6	4.3
Computer sciences	1,786	73.2	7.6	4.5	3.1	2.2	1.5	0.9	0.6	0.9	1.3	4.3
Earth, atmospheric, and ocean sciences	893	57.1	12.3	7.8	6.5	4.4	2.8	1.1	2.0	0.8	1.2	3.9
Mathematics	1,648	70.9	8.6	5.9	4.4	1.6	2.1	1.2	1.0	0.9	1.5	1.9
Medical and other health sciences	2,392	41.7	8.1	6.4	5.5	5.3	4.0	4.1	2.6	2.9	4.7	14.9
Physical sciences	4,413	62.4	10.1	7.2	6.1	3.2	2.7	1.6	1.5	0.8	1.1	3.3
Psychology	3,124	30.9	6.5	6.4	6.4	4.3	4.7	3.9	3.7	3.7	5.6	23.9

## CHAPTER 2 | Higher Education in Science and Engineering

Debt and field	Doctorates (number)	Debt										
		None	≤ \$10,000	\$10,001– \$20,000	\$20,001– \$30,000	\$30,001– \$40,000	\$40,001– \$50,000	\$50,001– \$60,000	\$60,001– \$70,000	\$70,001– \$80,000	\$80,001– \$90,000	≥ \$90,001
Social sciences	5,188	45.3	8.8	7.7	6.3	4.4	3.7	2.8	2.6	2.2	3.2	13.1
Non-S&E	11,913	41.5	8.8	7.4	6.3	4.3	4.1	3.5	3.0	2.4	3.7	14.9
Undergraduate debt												
All fields	49,250	70.2	7.2	7.2	5.7	3.1	2.1	1.4	0.9	0.6	0.8	0.9
S&E	37,353	71.3	7.1	6.9	5.6	3.0	1.9	1.3	0.9	0.5	0.7	0.8
Engineering	8,932	78.6	6.2	5.0	3.9	2.2	1.2	0.9	0.6	0.3	0.5	0.4
Sciences	28,421	69.0	7.4	7.5	6.1	3.2	2.1	1.4	0.9	0.6	0.8	0.9
Agricultural sciences	1,217	72.4	7.3	7.6	4.5	2.7	2.1	1.0	0.7	0.8	s	s
Biological sciences	7,815	66.9	7.8	8.4	7.0	3.4	2.3	1.2	0.9	0.6	0.8	0.7
Computer sciences	1,782	84.5	4.5	3.1	2.6	1.5	1.0	0.7	0.4	0.4	0.6	0.8
Earth, atmospheric, and ocean sciences	892	68.7	9.5	7.3	5.8	3.3	1.8	1.0	s	0.7	s	0.7
Mathematics	1,645	78.8	6.7	6.1	3.5	1.8	1.3	0.7	s	0.4	0.3	s

## CHAPTER 2 | Higher Education in Science and Engineering

Debt and field	Doctorates (number)	Debt										
		None	≤ \$10,000	\$10,001– \$20,000	\$20,001– \$30,000	\$30,001– \$40,000	\$40,001– \$50,000	\$50,001– \$60,000	\$60,001– \$70,000	\$70,001– \$80,000	\$80,001– \$90,000	≥ \$90,001
Medical and other health sciences	2,379	69.0	6.9	5.8	5.3	3.0	2.9	2.0	1.5	0.8	1.2	1.6
Physical sciences	4,409	69.9	7.5	7.3	6.6	3.0	1.9	1.0	1.0	0.6	0.5	0.7
Psychology	3,113	58.0	9.0	9.3	8.1	5.1	3.2	2.4	1.1	0.8	1.4	1.6
Social sciences	5,169	68.6	6.8	8.0	6.2	3.3	1.8	1.7	1.1	0.4	0.9	1.1
Non-S&E	11,897	67.1	7.7	8.0	5.9	3.5	2.5	1.7	0.9	0.7	1.0	1.2
Graduate debt												
All fields	48,809	63.3	8.6	5.2	4.0	2.8	2.5	2.2	1.7	1.6	2.6	5.4
S&E	37,044	68.3	8.3	4.7	3.5	2.4	2.1	1.8	1.4	1.3	2.0	4.2
Engineering	8,841	76.9	8.8	4.3	2.7	1.6	1.3	1.1	0.8	0.7	0.8	1.1
Sciences	28,203	65.6	8.2	4.9	3.7	2.6	2.3	2.0	1.6	1.5	2.4	5.1
Agricultural sciences	1,207	67.0	10.2	6.1	4.0	3.3	2.4	1.7	1.0	1.4	0.8	2.0
Biological sciences	7,745	75.7	8.1	4.3	2.9	1.5	1.6	1.2	0.7	0.8	1.1	1.9
Computer sciences	1,772	79.3	6.7	3.1	1.9	1.5	1.6	0.8	0.6	0.6	1.5	2.3

## CHAPTER 2 | Higher Education in Science and Engineering

Debt and field	Doctorates (number)	Debt										
		None	≤ \$10,000	\$10,001– \$20,000	\$20,001– \$30,000	\$30,001– \$40,000	\$40,001– \$50,000	\$50,001– \$60,000	\$60,001– \$70,000	\$70,001– \$80,000	\$80,001– \$90,000	≥ \$90,001
Earth, atmospheric, and ocean sciences	886	75.3	9.0	3.8	2.9	2.0	1.5	0.8	1.4	0.6	1.4	1.4
Mathematics	1,636	82.0	6.3	3.4	1.9	1.1	1.2	1.0	0.6	0.6	1.2	0.8
Medical and other health sciences	2,357	48.0	8.1	6.1	5.3	4.7	3.9	4.2	2.7	3.4	3.9	9.7
Physical sciences	4,364	79.2	8.5	3.6	2.3	1.4	1.0	0.9	0.8	0.5	0.9	1.0
Psychology	3,092	37.6	7.3	5.5	6.0	4.6	4.4	4.3	3.7	3.6	6.2	16.8
Social sciences	5,144	52.0	9.2	7.0	5.3	3.9	3.2	3.0	2.5	2.2	3.7	8.0
Non-S&E	11,765	47.6	9.4	6.5	5.7	4.3	3.7	3.6	2.7	2.6	4.6	9.3

s = suppressed for reasons of confidentiality and/or reliability.

### Note(s)

Of doctorate recipients, 5,756 did not report undergraduate debt, and 6,197 did not report graduate debt. Percentages may not add to total because of rounding.

### Source(s)

National Science Foundation, National Center for Science and Engineering Statistics, special tabulations (2016), 2015 Survey of Earned Doctorates (SED).

*Science and Engineering Indicators 2018*



## CHAPTER 2 | Higher Education in Science and Engineering

APPENDIX TABLE 2-16

### International undergraduate student enrollment in U.S. universities, by field and selected places of origin: 2016 and 2017

(Number)

Place of origin	All fields	S&E									Non-S&E
		Total	Agricultural sciences	Biological sciences	Computer sciences	Engineering	Mathematics	Physical sciences	Psychology	Social sciences	
2016											
All locations	450,850	176,570	2,970	16,570	29,140	64,110	14,650	8,420	9,350	31,360	274,280
China	141,060	57,600	1,300	3,580	8,420	14,560	10,510	3,420	2,620	13,190	83,460
Saudi Arabia	35,030	17,000	50	870	3,050	11,110	150	580	200	990	18,030
South Korea	32,300	10,710	130	1,230	1,710	2,750	770	640	900	2,580	21,600
India	19,460	10,680	80	810	2,920	4,460	310	310	370	1,420	8,780
Kuwait	8,000	6,010	0	150	40	5,510	50	80	20	170	1,990
Vietnam	16,620	5,110	60	840	1,410	1,450	260	380	190	530	11,510
Canada	14,410	4,040	120	980	290	1,050	130	190	450	850	10,370
Nepal	7,460	3,880	30	560	2,130	680	110	160	70	160	3,580
Malaysia	5,590	3,410	70	330	250	1,620	350	170	270	360	2,180
Nigeria	6,540	3,160	20	600	630	1,250	50	150	100	360	3,380
Mexico	7,070	2,330	50	240	260	1,130	60	110	160	320	4,740
Japan	9,470	2,150	70	220	270	260	100	120	260	840	7,320
Indonesia	5,480	2,070	130	130	330	860	120	60	110	330	3,400

## CHAPTER 2 | Higher Education in Science and Engineering

Place of origin	All fields	S&E									Non-S&E
		Total	Agricultural sciences	Biological sciences	Computer sciences	Engineering	Mathematics	Physical sciences	Psychology	Social sciences	
Taiwan	6,790	1,910	60	300	320	510	120	100	170	350	4,880
Brazil	7,330	1,850	10	200	290	720	30	50	140	400	5,480
Hong Kong	4,840	1,740	60	180	240	350	130	80	220	470	3,100
Turkey	3,770	1,690	10	70	340	810	30	40	90	310	2,080
Oman	2,470	1,630	10	40	80	1,340	10	60	20	70	840
Venezuela	5,710	1,590	10	140	210	820	30	40	100	240	4,130
United Kingdom	6,660	1,530	40	230	110	230	90	80	270	480	5,130
Other locations	104,800	36,480	670	4,880	5,840	12,650	1,240	1,620	2,630	6,960	68,320
2017											
All locations	440,720	176,930	2,980	16,670	32,460	61,100	15,340	8,410	9,440	30,530	263,790
China	140,950	59,420	1,320	3,740	10,080	13,730	11,010	3,470	2,870	13,210	81,540
Saudi Arabia	28,810	13,910	40	710	2,500	9,040	130	530	180	790	14,890
India	21,020	11,810	90	920	3,470	4,650	410	380	410	1,510	9,210
South Korea	28,850	10,000	130	1,140	1,870	2,560	780	560	770	2,190	18,850
Kuwait	8,150	6,250	10	160	50	5,700	40	90	30	190	1,900
Vietnam	17,540	5,650	60	950	1,680	1,580	270	390	220	520	11,890

## CHAPTER 2 | Higher Education in Science and Engineering

Place of origin	All fields	S&E									Non-S&E
		Total	Agricultural sciences	Biological sciences	Computer sciences	Engineering	Mathematics	Physical sciences	Psychology	Social sciences	
Nepal	8,390	4,330	30	530	2,350	910	140	150	70	150	4,060
Canada	13,670	3,930	100	920	340	990	140	180	440	820	9,730
Malaysia	5,420	3,410	80	310	300	1,530	340	220	270	360	2,020
Nigeria	6,390	3,050	20	600	680	1,190	40	120	100	310	3,340
Mexico	9,340	2,150	70	210	310	280	90	110	240	860	7,180
Brazil	6,380	2,140	50	240	250	1,020	50	110	150	280	4,240
Japan	8,140	2,120	30	250	330	780	50	60	170	450	6,020
Taiwan	6,900	2,050	70	270	410	500	130	100	180	390	4,850
Indonesia	4,970	1,960	90	140	360	770	130	60	100	320	3,010
Oman	3,640	1,660	10	60	380	760	30	30	90	300	1,980
Turkey	2,510	1,640	10	50	90	1,300	20	80	20	80	860
Pakistan	3,230	1,640	10	110	430	660	70	50	40	290	1,580
United Kingdom	4,310	1,530	60	170	250	300	120	80	190	370	2,790
Venezuela	6,390	1,500	40	210	130	220	80	80	260	480	4,890
Other locations	105,750	36,770	700	4,990	6,200	12,660	1,280	1,590	2,670	6,680	68,970

## CHAPTER 2 | Higher Education in Science and Engineering

### Note(s)

Data include active foreign national students on F-1 visas and exclude those on optional practical training. Undergraduate enrollment includes associate's and bachelor's degrees. Numbers are rounded to the nearest 10. Places of origin are ordered by total number of S&E students. Detail may not add to total because of rounding. Physical sciences include earth, atmospheric, and ocean sciences. Data include students who are in the SEVIS database between 16 April and 15 November of each year.

### Source(s)

U.S. Department of Homeland Security, U.S. Immigration and Customs Enforcement, special tabulations (2017), Student and Exchange Visitor Information System (SEVIS) database.

*Science and Engineering Indicators 2018*

## CHAPTER 2 | Higher Education in Science and Engineering

APPENDIX TABLE 2-17

### Undergraduate enrollment in engineering and engineering technology programs: 2006–15

(Number)

Enrollment level	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Full-time engineering students	374,202	385,690	403,191	427,503	450,685	471,730	504,690	543,942	569,930	610,461
Freshman	102,125	106,110	110,543	113,588	118,831	122,820	133,082	141,143	143,063	149,473
Sophomore	79,883	83,753	88,227	94,111	97,909	102,125	110,011	120,328	124,120	132,769
Junior	79,244	80,647	86,835	92,758	97,519	102,102	108,862	118,600	128,228	135,804
Senior	112,950	115,180	117,586	127,046	136,426	144,683	152,735	163,871	174,519	192,415
Part-time engineering students	31,331	30,971	31,828	32,085	34,903	38,470	42,724	45,644	48,781	54,450

#### Source(s)

American Society for Engineering Education, Engineering by the Numbers, Fall 2015 (2017), <https://www.asee.org/papers-and-publications/publications/college-profiles/15EngineeringbytheNumbersPart1.pdf>.

*Science and Engineering Indicators 2018*

## CHAPTER 2 | Higher Education in Science and Engineering

APPENDIX TABLE 2-18

## Earned associate's degrees, by sex and field: 2000–15

(Number)

Sex and field	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Both sexes																
All fields	573,496	585,610	600,294	637,953	670,335	701,734	718,182	733,151	755,598	793,279	856,381	949,963	1,025,882	1,015,211	1,012,523	1,024,187
S&E	38,434	45,226	51,194	62,805	60,246	54,750	49,850	47,485	49,166	54,284	62,211	76,021	84,641	85,798	87,976	90,589
Engineering	1,794	1,898	1,781	2,278	2,843	2,557	2,291	2,272	2,403	2,329	2,665	2,994	3,538	3,871	4,409	5,004
Aerospace	1	0	0	0	0	0	2	0	0	0	2	0	3	1	0	3
Chemical	16	18	28	7	305	2	7	3	1	10	9	31	13	22	21	50
Civil	58	53	46	62	58	52	43	64	37	62	47	71	93	121	110	103
Electrical	280	309	182	672	910	691	531	459	422	242	236	199	209	202	319	346
Industrial	67	132	80	81	49	88	57	56	57	83	72	69	67	64	66	99
Materials	11	14	10	12	12	13	10	8	9	5	10	6	1	6	11	11
Mechanical	77	67	65	69	70	64	68	77	100	121	137	139	177	184	213	209
Other	1,284	1,305	1,370	1,375	1,439	1,647	1,573	1,605	1,777	1,806	2,152	2,479	2,975	3,271	3,669	4,183
Science	36,640	43,328	49,413	60,527	57,403	52,193	47,559	45,213	46,763	51,955	59,546	73,027	81,103	81,927	83,567	85,585
Natural sciences	29,130	35,718	41,243	52,130	48,289	42,494	37,622	34,536	35,299	37,536	40,801	48,061	52,834	51,535	51,491	51,929
Agricultural sciences	1,976	2,106	2,001	2,018	1,966	1,908	1,934	1,790	1,762	1,811	1,952	2,138	2,530	2,392	2,484	2,678
Biological sciences	1,484	1,536	1,577	1,786	1,753	1,979	2,028	2,224	2,379	2,546	2,881	3,440	4,003	4,340	4,689	5,071

## CHAPTER 2 | Higher Education in Science and Engineering

Sex and field	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Earth, atmospheric, and ocean sciences	82	82	58	52	41	45	67	69	67	98	99	95	103	112	136	153
Atmospheric sciences	0	1	0	0	2	2	7	10	5	4	16	10	9	4	6	3
Earth sciences	28	38	28	34	25	23	40	41	39	59	55	50	67	70	96	112
Oceanography	54	43	30	18	14	20	20	18	23	35	28	35	27	38	34	38
Mathematics and computer sciences	24,251	30,809	36,264	47,135	42,955	36,947	31,923	28,507	29,182	30,980	33,565	39,320	42,631	40,699	39,783	39,118
Computer sciences	23,576	30,113	35,578	46,400	42,153	36,140	31,170	27,680	28,327	30,050	32,514	37,675	41,102	38,897	37,643	36,421
Mathematics and statistics	675	696	686	735	802	807	753	827	855	930	1,051	1,645	1,529	1,802	2,140	2,697
Physical sciences	1,337	1,185	1,343	1,139	1,574	1,615	1,670	1,946	1,909	2,101	2,304	3,068	3,567	3,992	4,399	4,909
Astronomy	1	1	2	2	1	3	4	2	2	4	3	1	4	4	9	5
Chemistry	301	183	201	251	279	304	298	354	387	422	404	459	533	626	704	828
Physics	171	167	177	191	193	196	143	164	151	184	248	260	318	378	516	738
Other physical sciences	864	834	963	695	1,101	1,112	1,225	1,426	1,369	1,491	1,649	2,348	2,712	2,984	3,170	3,338
Social and behavioral sciences	7,510	7,610	8,170	8,397	9,114	9,699	9,937	10,677	11,464	14,419	18,745	24,966	28,269	30,392	32,076	33,656
Psychology	1,454	1,553	1,704	1,785	1,887	1,942	1,944	2,213	2,412	3,949	6,582	3,866	4,701	6,118	7,529	8,736
Social sciences	6,056	6,057	6,466	6,612	7,227	7,757	7,993	8,464	9,052	10,470	12,163	21,100	23,568	24,274	24,547	24,920
Anthropology	52	80	83	76	95	120	114	117	153	149	191	231	337	326	384	441
Area and ethnic studies	250	299	314	121	98	106	114	148	163	170	208	216	189	254	341	365
Economics	210	209	221	222	268	298	316	281	311	361	387	357	402	484	434	575
Linguistics	0	0	0	0	0	6	1	4	1	1	3	0	1	3	30	8

## CHAPTER 2 | Higher Education in Science and Engineering

Sex and field	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Political science and public administration	1,033	913	926	1,159	1,402	1,566	1,749	1,788	1,746	1,831	2,052	4,592	5,799	6,549	6,911	6,835
Sociology	366	371	416	456	552	500	475	510	546	599	658	862	1,063	1,598	2,050	2,554
Other social sciences	4,145	4,185	4,506	4,578	4,812	5,161	5,224	5,616	6,132	7,359	8,664	14,842	15,777	15,060	14,397	14,142
Non-S&E	535,062	540,384	549,100	575,148	610,089	646,984	668,332	685,666	706,432	738,995	794,170	873,942	941,241	929,413	924,547	933,598
S&E technologies	83,653	82,055	76,677	82,133	87,943	92,521	96,772	101,898	106,183	111,172	124,476	148,636	165,631	156,573	148,966	144,098
Engineering technologies	40,470	39,732	37,901	39,600	37,020	32,488	29,710	30,097	31,643	33,243	34,553	38,222	40,609	37,475	34,638	34,764
Health technologies	41,959	41,013	37,687	41,353	49,497	58,432	65,227	69,591	72,241	75,734	87,437	107,577	121,797	115,739	110,779	105,513
Science technologies	1,159	1,190	1,027	1,095	1,133	1,246	1,225	1,429	1,448	1,474	1,818	1,981	2,239	2,357	2,465	2,592
Other S&E technologies	65	120	62	85	293	355	610	781	851	721	668	856	986	1,002	1,084	1,229
Male																
All fields	228,913	234,384	239,864	254,633	261,845	269,283	271,951	277,006	284,443	300,266	325,486	363,998	395,067	391,816	394,169	400,407
S&E	20,101	24,722	29,609	38,126	36,955	33,964	30,680	29,069	30,266	32,506	36,468	43,490	48,776	48,607	49,753	50,540
Engineering	1,545	1,582	1,483	1,905	2,247	2,185	1,970	1,944	2,089	2,002	2,308	2,557	3,049	3,329	3,819	4,309
Aerospace	1	0	0	0	0	0	2	0	0	0	2	0	3	1	0	1
Chemical	11	16	26	6	117	1	5	2	1	8	5	24	11	14	12	37
Civil	38	34	29	48	41	39	31	44	31	48	40	55	70	95	84	91
Electrical	250	269	144	554	766	600	475	403	387	221	215	172	189	173	293	308
Industrial	52	115	74	70	43	82	48	47	50	76	62	61	59	56	64	91
Materials	10	11	9	8	10	11	7	7	8	5	7	5	1	5	8	10



## CHAPTER 2 | Higher Education in Science and Engineering

Sex and field	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Mechanical	69	60	56	62	66	62	65	71	91	102	122	124	164	164	195	174
Other	1,114	1,077	1,145	1,157	1,204	1,390	1,337	1,370	1,521	1,542	1,855	2,116	2,552	2,821	3,163	3,597
Science	18,556	23,140	28,126	36,221	34,708	31,779	28,710	27,125	28,177	30,504	34,160	40,933	45,727	45,278	45,934	46,231
Natural sciences	16,356	21,000	25,834	33,749	32,187	29,026	25,889	24,056	24,826	26,465	29,003	34,432	38,351	37,134	37,188	37,036
Agricultural sciences	1,185	1,319	1,237	1,244	1,257	1,259	1,194	1,116	1,127	1,124	1,157	1,364	1,588	1,469	1,485	1,623
Biological sciences	496	501	500	580	608	667	702	751	741	823	942	1,192	1,348	1,405	1,542	1,689
Earth, atmospheric, and ocean sciences	45	48	37	30	21	25	38	44	34	65	65	63	69	77	94	97
Atmospheric sciences	0	1	0	0	1	1	4	8	2	3	13	7	9	3	5	2
Earth sciences	12	26	17	15	12	11	24	22	18	42	31	29	42	43	60	69
Oceanography	33	21	20	15	8	13	10	14	14	20	21	27	18	31	29	26
Mathematics and computer sciences	14,011	18,534	23,362	31,299	29,417	26,115	22,965	21,040	21,818	23,243	25,455	30,140	33,338	31,911	31,504	30,772
Computer sciences	13,603	18,084	22,916	30,833	28,914	25,586	22,482	20,492	21,243	22,608	24,730	29,115	32,288	30,668	30,012	28,857
Mathematics and statistics	408	450	446	466	503	529	483	548	575	635	725	1,025	1,050	1,243	1,492	1,915
Physical sciences	619	598	698	596	884	960	990	1,105	1,106	1,210	1,384	1,673	2,008	2,272	2,563	2,855
Astronomy	1	1	1	1	1	3	4	1	2	3	3	0	2	3	7	5
Chemistry	126	99	108	121	125	156	153	150	183	197	214	222	276	314	384	443
Physics	94	107	109	132	134	132	117	131	118	145	189	194	252	290	389	559
Other physical sciences	398	391	480	342	624	669	716	823	803	865	978	1,257	1,478	1,665	1,783	1,848
Social and behavioral sciences	2,200	2,140	2,292	2,472	2,521	2,753	2,821	3,069	3,351	4,039	5,157	6,501	7,376	8,144	8,746	9,195

## CHAPTER 2 | Higher Education in Science and Engineering

Sex and field	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Psychology	326	360	370	441	434	445	446	517	554	744	1,271	896	1,090	1,496	1,795	2,050
Social sciences	1,874	1,780	1,922	2,031	2,087	2,308	2,375	2,552	2,797	3,295	3,886	5,605	6,286	6,648	6,951	7,145
Anthropology	21	30	28	35	26	40	26	33	44	50	61	67	127	115	126	151
Area and ethnic studies	56	44	63	33	40	40	36	53	59	52	88	66	63	100	131	148
Economics	116	114	90	113	141	158	178	154	165	220	233	209	240	284	263	325
Linguistics	0	0	0	0	0	3	0	0	0	0	1	0	0	1	12	2
Political science and public administration	251	204	225	271	286	372	367	361	386	437	475	811	1,061	1,186	1,308	1,357
Sociology	89	104	111	126	130	123	134	133	142	158	166	221	291	428	532	682
Other social sciences	1,341	1,284	1,405	1,453	1,464	1,572	1,634	1,818	2,001	2,378	2,862	4,231	4,504	4,534	4,579	4,480
Non-S&E	208,812	209,662	210,255	216,507	224,890	235,319	241,271	247,937	254,177	267,760	289,018	320,508	346,291	343,209	344,416	349,867
S&E technologies	42,251	40,951	38,395	40,095	40,027	38,269	37,651	39,063	41,208	42,897	45,746	52,795	58,228	54,566	51,978	51,343
Engineering technologies	34,511	33,581	32,084	33,146	31,393	27,632	25,295	25,788	27,183	28,505	29,864	33,301	35,697	32,699	30,353	30,401
Health technologies	6,995	6,591	5,668	6,232	7,712	9,620	11,129	11,810	12,493	12,947	14,208	17,536	20,374	19,602	19,248	18,328
Science technologies	691	683	589	645	682	714	717	824	838	882	1,143	1,265	1,387	1,492	1,479	1,599
Other S&E technologies	54	96	54	72	240	303	510	641	694	563	531	693	770	773	898	1,015
Female																
All fields	344,583	351,226	360,430	383,320	408,490	432,451	446,231	456,145	471,155	493,013	530,895	585,965	630,815	623,395	618,354	623,780
S&E	18,333	20,504	21,585	24,679	23,291	20,786	19,170	18,416	18,900	21,778	25,743	32,531	35,865	37,191	38,223	40,049
Engineering	249	316	298	373	596	372	321	328	314	327	357	437	489	542	590	695

## CHAPTER 2 | Higher Education in Science and Engineering

Sex and field	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Aerospace	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Chemical	5	2	2	1	188	1	2	1	0	2	4	7	2	8	9	13
Civil	20	19	17	14	17	13	12	20	6	14	7	16	23	26	26	12
Electrical	30	40	38	118	144	91	56	56	35	21	21	27	20	29	26	38
Industrial	15	17	6	11	6	6	9	9	7	7	10	8	8	8	2	8
Materials	1	3	1	4	2	2	3	1	1	0	3	1	0	1	3	1
Mechanical	8	7	9	7	4	2	3	6	9	19	15	15	13	20	18	35
Other	170	228	225	218	235	257	236	235	256	264	297	363	423	450	506	586
Science	18,084	20,188	21,287	24,306	22,695	20,414	18,849	18,088	18,586	21,451	25,386	32,094	35,376	36,649	37,633	39,354
Natural sciences	12,774	14,718	15,409	18,381	16,102	13,468	11,733	10,480	10,473	11,071	11,798	13,629	14,483	14,401	14,303	14,893
Agricultural sciences	791	787	764	774	709	649	740	674	635	687	795	774	942	923	999	1,055
Biological sciences	988	1,035	1,077	1,206	1,145	1,312	1,326	1,473	1,638	1,723	1,939	2,248	2,655	2,935	3,147	3,382
Earth, atmospheric, and ocean sciences	37	34	21	22	20	20	29	25	33	33	34	32	34	35	42	56
Atmospheric sciences	0	0	0	0	1	1	3	2	3	1	3	3	0	1	1	1
Earth sciences	16	12	11	19	13	12	16	19	21	17	24	21	25	27	36	43
Oceanography	21	22	10	3	6	7	10	4	9	15	7	8	9	7	5	12
Mathematics and computer sciences	10,240	12,275	12,902	15,836	13,538	10,832	8,958	7,467	7,364	7,737	8,110	9,180	9,293	8,788	8,279	8,346
Computer sciences	9,973	12,029	12,662	15,567	13,239	10,554	8,688	7,188	7,084	7,442	7,784	8,560	8,814	8,229	7,631	7,564
Mathematics and statistics	267	246	240	269	299	278	270	279	280	295	326	620	479	559	648	782

## CHAPTER 2 | Higher Education in Science and Engineering

Sex and field	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Physical sciences	718	587	645	543	690	655	680	841	803	891	920	1,395	1,559	1,720	1,836	2,054
Astronomy	0	0	1	1	0	0	0	1	0	1	0	1	2	1	2	0
Chemistry	175	84	93	130	154	148	145	204	204	225	190	237	257	312	320	385
Physics	77	60	68	59	59	64	26	33	33	39	59	66	66	88	127	179
Other physical sciences	466	443	483	353	477	443	509	603	566	626	671	1,091	1,234	1,319	1,387	1,490
Social and behavioral sciences	5,310	5,470	5,878	5,925	6,593	6,946	7,116	7,608	8,113	10,380	13,588	18,465	20,893	22,248	23,330	24,461
Psychology	1,128	1,193	1,334	1,344	1,453	1,497	1,498	1,696	1,858	3,205	5,311	2,970	3,611	4,622	5,734	6,686
Social sciences	4,182	4,277	4,544	4,581	5,140	5,449	5,618	5,912	6,255	7,175	8,277	15,495	17,282	17,626	17,596	17,775
Anthropology	31	50	55	41	69	80	88	84	109	99	130	164	210	211	258	290
Area and ethnic studies	194	255	251	88	58	66	78	95	104	118	120	150	126	154	210	217
Economics	94	95	131	109	127	140	138	127	146	141	154	148	162	200	171	250
Linguistics	0	0	0	0	0	3	1	4	1	1	2	0	1	2	18	6
Political science and public administration	782	709	701	888	1,116	1,194	1,382	1,427	1,360	1,394	1,577	3,781	4,738	5,363	5,603	5,478
Sociology	277	267	305	330	422	377	341	377	404	441	492	641	772	1,170	1,518	1,872
Other social sciences	2,804	2,901	3,101	3,125	3,348	3,589	3,590	3,798	4,131	4,981	5,802	10,611	11,273	10,526	9,818	9,662
Non-S&E	326,250	330,722	338,845	358,641	385,199	411,665	427,061	437,729	452,255	471,235	505,152	553,434	594,950	586,204	580,131	583,731
S&E technologies	41,402	41,104	38,282	42,038	47,916	54,252	59,121	62,835	64,975	68,275	78,730	95,841	107,403	102,007	96,988	92,755
Engineering technologies	5,959	6,151	5,817	6,454	5,627	4,856	4,415	4,309	4,460	4,738	4,689	4,921	4,912	4,776	4,285	4,363
Health technologies	34,964	34,422	32,019	35,121	41,785	48,812	54,098	57,781	59,748	62,787	73,229	90,041	101,423	96,137	91,531	87,185

CHAPTER 2 | Higher Education in Science and Engineering

Sex and field	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Science technologies	468	507	438	450	451	532	508	605	610	592	675	716	852	865	986	993
Other S&E technologies	11	24	8	13	53	52	100	140	157	158	137	163	216	229	186	214

**Note(s)**

Engineering technologies are more focused on applied skills than on fundamental science and mathematics. Data are based on degree-granting institutions eligible to participate in Title IV federal financial aid programs and do not match previously published data from *Science and Engineering Indicators 2008* and earlier years that were based on accredited higher education institutions.

**Source(s)**

National Center for Education Statistics, Integrated Postsecondary Education Data System (IPEDS), Completions Survey; National Science Foundation, National Center for Science and Engineering Statistics, Integrated Science and Engineering Resources Data System (WebCASPAR), <https://ncesdata.nsf.gov/webcaspar/>.  
*Science and Engineering Indicators 2018*

## CHAPTER 2 | Higher Education in Science and Engineering

APPENDIX TABLE 2-19

### Earned associate's degrees, by citizenship, field, race, and ethnicity: 2000–15

(Number)

Citizenship, field, race, and ethnicity	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
All citizenships, races, and ethnicities																
All fields	573,496	585,610	600,294	637,953	670,335	701,734	718,182	733,151	755,598	793,279	856,381	949,963	1,025,882	1,015,211	1,012,523	1,024,187
S&E	38,434	45,226	51,194	62,805	60,246	54,750	49,850	47,485	49,166	54,284	62,211	76,021	84,641	85,798	87,976	90,589
Engineering	1,794	1,898	1,781	2,278	2,843	2,557	2,291	2,272	2,403	2,329	2,665	2,994	3,538	3,871	4,409	5,004
Aerospace	1	0	0	0	0	0	2	0	0	0	2	0	3	1	0	3
Chemical	16	18	28	7	305	2	7	3	1	10	9	31	13	22	21	50
Civil	58	53	46	62	58	52	43	64	37	62	47	71	93	121	110	103
Electrical	280	309	182	672	910	691	531	459	422	242	236	199	209	202	319	346
Industrial	67	132	80	81	49	88	57	56	57	83	72	69	67	64	66	99
Materials	11	14	10	12	12	13	10	8	9	5	10	6	1	6	11	11
Mechanical	77	67	65	69	70	64	68	77	100	121	137	139	177	184	213	209
Other	1,284	1,305	1,370	1,375	1,439	1,647	1,573	1,605	1,777	1,806	2,152	2,479	2,975	3,271	3,669	4,183
Science	36,640	43,328	49,413	60,527	57,403	52,193	47,559	45,213	46,763	51,955	59,546	73,027	81,103	81,927	83,567	85,585
Natural sciences	29,130	35,718	41,243	52,130	48,289	42,494	37,622	34,536	35,299	37,536	40,801	48,061	52,834	51,535	51,491	51,929
Agricultural sciences	1,976	2,106	2,001	2,018	1,966	1,908	1,934	1,790	1,762	1,811	1,952	2,138	2,530	2,392	2,484	2,678
Biological sciences	1,484	1,536	1,577	1,786	1,753	1,979	2,028	2,224	2,379	2,546	2,881	3,440	4,003	4,340	4,689	5,071

## CHAPTER 2 | Higher Education in Science and Engineering

[illegible]

## CHAPTER 2 | Higher Education in Science and Engineering

Citizenship, field, race, and ethnicity	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Linguistics	0	0	0	0	0	6	1	4	1	1	3	0	1	3	30	8
Political science and public administration	1,033	913	926	1,159	1,402	1,566	1,749	1,788	1,746	1,831	2,052	4,592	5,799	6,549	6,911	6,835
Sociology	366	371	416	456	552	500	475	510	546	599	658	862	1,063	1,598	2,050	2,554
Other social sciences	4,145	4,185	4,506	4,578	4,812	5,161	5,224	5,616	6,132	7,359	8,664	14,842	15,777	15,060	14,397	14,142
Non-S&E	535,062	540,384	549,100	575,148	610,089	646,984	668,332	685,666	706,432	738,995	794,170	873,942	941,241	929,413	924,547	933,598
S&E technologies	83,653	82,055	76,677	82,133	87,943	92,521	96,772	101,898	106,183	111,172	124,476	148,636	165,631	156,573	148,966	144,098
Engineering technologies	40,470	39,732	37,901	39,600	37,020	32,488	29,710	30,097	31,643	33,243	34,553	38,222	40,609	37,475	34,638	34,764
Health technologies	41,959	41,013	37,687	41,353	49,497	58,432	65,227	69,591	72,241	75,734	87,437	107,577	121,797	115,739	110,779	105,513
Science technologies	1,159	1,190	1,027	1,095	1,133	1,246	1,225	1,429	1,448	1,474	1,818	1,981	2,239	2,357	2,465	2,592
Other S&E technologies	65	120	62	85	293	355	610	781	851	721	668	856	986	1,002	1,084	1,229
U.S. citizen or permanent resident																
All fields	563,380	574,008	588,000	624,467	655,767	687,613	704,750	719,324	741,153	778,055	840,221	933,331	1,008,751	998,339	995,410	1,006,203
S&E	37,585	44,071	49,778	61,190	58,625	53,398	48,751	46,590	48,212	53,128	60,911	74,500	83,039	84,211	86,261	88,653
Engineering	1,726	1,801	1,724	2,197	2,725	2,435	2,204	2,179	2,314	2,180	2,514	2,810	3,298	3,697	4,213	4,776
Aerospace	1	0	0	0	0	0	1	0	0	0	2	0	3	0	0	3
Chemical	14	17	26	7	302	2	5	2	1	6	7	22	12	19	18	43
Civil	54	53	44	56	57	52	39	63	34	55	41	65	84	110	105	102
Electrical	277	271	181	668	896	682	529	452	416	227	228	189	198	193	305	334
Industrial	66	130	78	80	49	85	55	53	57	83	72	69	67	64	66	98



## CHAPTER 2 | Higher Education in Science and Engineering

Citizenship, field, race, and ethnicity	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Materials	11	14	10	12	12	13	10	8	9	5	10	6	1	6	11	11
Mechanical	76	67	64	68	69	62	68	76	95	118	120	127	162	175	185	185
Other	1,227	1,249	1,321	1,306	1,340	1,539	1,497	1,525	1,702	1,686	2,034	2,332	2,771	3,130	3,523	4,000
Science	35,859	42,270	48,054	58,993	55,900	50,963	46,547	44,411	45,898	50,948	58,397	71,690	79,741	80,514	82,048	83,877
Natural sciences	28,500	34,841	40,055	50,791	47,015	41,475	36,791	33,910	34,627	36,761	39,955	47,075	51,861	50,566	50,410	50,726
Agricultural sciences	1,953	2,060	1,949	2,007	1,923	1,893	1,892	1,782	1,746	1,799	1,939	2,128	2,517	2,376	2,462	2,586
Biological sciences	1,457	1,501	1,547	1,737	1,696	1,921	1,964	2,163	2,296	2,474	2,773	3,348	3,910	4,226	4,577	4,979
Earth, atmospheric, and ocean sciences	81	78	57	52	39	45	65	65	64	98	96	93	101	109	135	152
Atmospheric sciences	0	1	0	0	2	2	7	9	5	4	16	9	9	4	6	3
Earth sciences	27	34	27	34	23	23	38	38	36	59	52	49	65	67	95	111
Oceanography	54	43	30	18	14	20	20	18	23	35	28	35	27	38	34	38
Mathematics and computer sciences	23,727	30,050	35,203	45,914	41,869	36,118	31,327	28,059	28,744	30,455	33,009	38,696	42,053	40,117	39,143	38,476
Computer sciences	23,085	29,396	34,553	45,225	41,114	35,371	30,628	27,261	27,934	29,567	32,019	37,126	40,610	38,384	37,098	35,874
Mathematics	642	654	650	689	755	747	699	798	810	888	990	1,570	1,443	1,733	2,045	2,602
Physical sciences	1,282	1,152	1,299	1,081	1,488	1,498	1,543	1,841	1,777	1,935	2,138	2,810	3,280	3,738	4,093	4,533
Astronomy	1	1	2	2	1	3	4	2	1	4	3	1	4	4	9	4
Chemistry	269	174	196	238	266	285	279	336	377	399	383	431	500	607	683	803
Physics	163	164	172	175	184	185	131	160	137	174	242	251	307	370	495	715
Other physical sciences	849	813	929	666	1,037	1,025	1,129	1,343	1,262	1,358	1,510	2,127	2,469	2,757	2,906	3,011

## CHAPTER 2 | Higher Education in Science and Engineering

Citizenship, field, race, and ethnicity	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Social and behavioral sciences	7,359	7,429	7,999	8,202	8,885	9,488	9,756	10,501	11,271	14,187	18,442	24,615	27,880	29,948	31,638	33,151
Psychology	1,432	1,528	1,668	1,742	1,843	1,904	1,922	2,192	2,382	3,897	6,501	3,810	4,664	6,056	7,449	8,621
Social sciences	5,927	5,901	6,331	6,460	7,042	7,584	7,834	8,309	8,889	10,290	11,941	20,805	23,216	23,892	24,189	24,530
Anthropology	49	78	82	76	93	119	111	113	150	148	187	228	335	324	384	434
Area and ethnic studies	234	278	299	115	95	104	110	148	161	164	196	205	185	249	331	361
Economics	192	182	201	191	230	266	287	262	279	326	338	312	344	431	382	510
History of science	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Linguistics	0	0	0	0	0	2	1	4	1	1	2	0	1	2	27	8
Political science and public administration	1,021	899	915	1,149	1,379	1,553	1,723	1,767	1,723	1,812	2,032	4,558	5,753	6,483	6,858	6,778
Sociology	362	361	410	450	531	481	460	491	528	592	649	850	1,047	1,580	2,037	2,536
Other social sciences	4,069	4,103	4,424	4,479	4,714	5,059	5,142	5,524	6,047	7,247	8,537	14,652	15,551	14,823	14,170	13,903
Non-S&E	525,795	529,937	538,222	563,277	597,142	634,215	655,999	672,734	692,941	724,927	779,310	858,831	925,712	914,128	909,149	917,550
S&E technologies	83,092	80,940	75,972	81,329	87,045	91,648	95,965	101,114	105,255	110,297	123,446	147,677	164,609	155,529	148,010	143,213
Engineering technologies	40,133	38,894	37,459	39,140	36,513	32,131	29,391	29,800	31,315	32,966	34,210	37,934	40,345	37,157	34,327	34,452
Health technologies	41,743	40,756	37,435	41,022	49,127	57,936	64,760	69,133	71,670	75,163	86,793	106,941	121,083	115,062	110,177	104,976
Science technologies	1,151	1,170	1,016	1,082	1,112	1,226	1,204	1,400	1,419	1,447	1,775	1,946	2,195	2,308	2,422	2,556
Other S&E technologies	65	120	62	85	293	355	610	781	851	721	668	856	986	1,002	1,084	1,229
Hispanic or Latino <sup>a</sup>																
All fields	57,971	61,364	62,072	67,476	72,626	78,555	80,417	84,462	89,899	96,387	110,056	123,212	148,604	156,071	166,346	181,156

## CHAPTER 2 | Higher Education in Science and Engineering

Citizenship, field, race, and ethnicity	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
S&E	4,361	5,105	5,582	6,994	6,910	6,615	6,006	6,118	6,376	7,157	8,412	9,845	12,369	14,526	16,963	19,046
Engineering	181	196	143	339	558	373	345	344	350	326	348	409	453	579	709	815
Aerospace	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chemical	3	0	2	0	89	0	2	0	0	1	0	3	1	5	4	2
Civil	5	2	6	2	5	2	6	19	9	25	6	11	21	30	51	42
Electrical	48	57	14	195	320	199	171	110	124	64	51	45	36	42	65	68
Industrial	7	33	11	8	3	0	9	8	5	1	1	3	9	6	11	25
Materials	0	0	1	0	0	0	0	1	0	0	1	1	0	0	2	1
Mechanical	21	19	23	18	17	14	17	27	20	29	28	35	32	32	30	36
Other	97	85	86	116	124	158	140	179	192	206	261	311	354	464	546	641
Science	4,180	4,909	5,439	6,655	6,352	6,242	5,661	5,774	6,026	6,831	8,064	9,436	11,916	13,947	16,254	18,231
Natural sciences	2,986	3,653	4,081	5,149	4,772	4,493	3,914	3,772	3,709	3,940	4,501	4,972	6,125	6,789	7,492	8,078
Agricultural sciences	77	109	86	68	54	43	58	59	47	44	63	67	91	108	115	158
Biological sciences	186	222	189	218	208	229	279	352	377	438	522	649	945	1,072	1,258	1,463
Earth, atmospheric, and ocean sciences	1	3	1	1	2	5	3	3	1	4	7	3	12	13	13	18
Atmospheric sciences	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Earth sciences	1	3	1	1	1	4	1	2	1	3	7	3	12	12	11	17
Oceanography	0	0	0	0	1	1	2	0	0	1	0	0	0	1	2	1
Mathematics and computer sciences	2,550	3,158	3,654	4,717	4,347	4,042	3,416	3,151	3,065	3,193	3,581	3,852	4,479	4,922	5,251	5,382

## CHAPTER 2 | Higher Education in Science and Engineering

Citizenship, field, race, and ethnicity	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Computer sciences	2,453	3,058	3,549	4,593	4,216	3,888	3,261	2,980	2,897	2,995	3,337	3,511	4,081	4,450	4,574	4,601
Mathematics	97	100	105	124	131	154	155	171	168	198	244	341	398	472	677	781
Physical sciences	172	161	151	145	161	174	158	207	219	261	328	401	598	674	855	1,057
Astronomy	1	0	0	2	0	0	0	0	0	1	3	0	0	1	3	2
Chemistry	42	27	24	42	37	48	40	56	62	61	60	74	117	140	181	208
Physics	76	70	68	59	50	61	30	34	31	45	92	75	102	127	169	242
Other physical sciences	53	64	59	42	74	65	88	117	126	154	173	252	379	406	502	605
Social and behavioral sciences	1,194	1,256	1,358	1,506	1,580	1,749	1,747	2,002	2,317	2,891	3,563	4,464	5,791	7,158	8,762	10,153
Psychology	193	222	260	298	338	384	366	447	492	678	942	944	1,364	1,930	2,648	3,379
Social sciences	1,001	1,034	1,098	1,208	1,242	1,365	1,381	1,555	1,825	2,213	2,621	3,520	4,427	5,228	6,114	6,774
Anthropology	8	11	13	16	17	14	11	15	29	24	29	49	93	95	108	131
Area and ethnic studies	17	7	15	24	12	20	18	28	29	31	39	41	45	60	84	78
Economics	50	43	55	50	58	65	60	58	55	84	85	82	102	132	142	172
History of science	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Linguistics	0	0	0	0	0	0	0	1	0	1	0	0	0	1	7	3
Political science and public administration	249	195	219	250	223	241	259	287	280	308	358	574	686	816	1,026	1,189
Sociology	63	79	92	109	124	123	123	138	167	160	207	270	389	616	947	1,267
Other social sciences	614	699	704	759	808	902	910	1,028	1,265	1,605	1,903	2,504	3,112	3,508	3,800	3,934
Non-S&E	53,610	56,259	56,490	60,482	65,716	71,940	74,411	78,344	83,523	89,230	101,644	113,367	136,235	141,545	149,383	162,110

## CHAPTER 2 | Higher Education in Science and Engineering

Citizenship, field, race, and ethnicity	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
S&E technologies	8,513	9,053	8,169	8,393	9,141	9,694	9,971	11,227	12,015	12,870	14,593	16,699	21,181	21,059	20,979	21,482
Engineering technologies	4,724	4,560	4,220	4,174	4,160	3,652	3,230	3,466	3,841	3,944	4,420	4,488	5,154	4,850	4,514	4,676
Health technologies	3,669	4,344	3,828	4,094	4,832	5,868	6,553	7,518	7,936	8,686	9,889	11,871	15,637	15,736	15,964	16,182
Science technologies	107	133	118	114	119	139	138	167	162	160	218	235	291	350	356	451
Other S&E technologies	13	16	3	11	30	35	50	76	76	80	66	105	99	123	145	173
Not Hispanic or Latino																
All fields	505,409	512,644	525,928	556,991	583,141	609,058	624,333	634,862	651,254	681,668	730,165	810,119	860,147	842,268	829,064	825,047
S&E	33,224	38,966	44,196	54,196	51,715	46,783	42,745	40,472	41,836	45,971	52,499	64,655	70,670	69,685	69,298	69,607
Engineering	1,545	1,605	1,581	1,858	2,167	2,062	1,859	1,835	1,964	1,854	2,166	2,401	2,845	3,118	3,504	3,961
Aerospace	1	0	0	0	0	0	1	0	0	0	2	0	3	0	0	3
Chemical	11	17	24	7	213	2	3	2	1	5	7	19	11	14	14	41
Civil	49	51	38	54	52	50	33	44	25	30	35	54	63	80	54	60
Electrical	229	214	167	473	576	483	358	342	292	163	177	144	162	151	240	266
Industrial	59	97	67	72	46	85	46	45	52	82	71	66	58	58	55	73
Materials	11	14	9	12	12	13	10	7	9	5	9	5	1	6	9	10
Mechanical	55	48	41	50	52	48	51	49	75	89	92	92	130	143	155	149
Other	1,130	1,164	1,235	1,190	1,216	1,381	1,357	1,346	1,510	1,480	1,773	2,021	2,417	2,666	2,977	3,359
Science	31,679	37,361	42,615	52,338	49,548	44,721	40,886	38,637	39,872	44,117	50,333	62,254	67,825	66,567	65,794	65,646
Natural sciences	25,514	31,188	35,974	45,642	42,243	36,982	32,877	30,138	30,918	32,821	35,454	42,103	45,736	43,777	42,918	42,648

## CHAPTER 2 | Higher Education in Science and Engineering

Citizenship, field, race, and ethnicity	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Agricultural sciences	1,876	1,951	1,863	1,939	1,869	1,850	1,834	1,723	1,699	1,755	1,876	2,061	2,426	2,268	2,347	2,428
Biological sciences	1,271	1,279	1,358	1,519	1,488	1,692	1,685	1,811	1,919	2,036	2,251	2,699	2,965	3,154	3,319	3,516
Earth, atmospheric, and ocean sciences	80	75	56	51	37	40	62	62	63	94	89	90	89	96	122	134
Atmospheric sciences	0	1	0	0	2	2	7	8	5	4	16	9	9	4	6	3
Earth sciences	26	31	26	33	22	19	37	36	35	56	45	46	53	55	84	94
Oceanography	54	43	30	18	13	19	18	18	23	34	28	35	27	37	32	37
Mathematics and computer sciences	21,177	26,892	31,549	41,197	37,522	32,076	27,911	24,908	25,679	27,262	29,428	34,844	37,574	35,195	33,892	33,094
Computer sciences	20,632	26,338	31,004	40,632	36,898	31,483	27,367	24,281	25,037	26,572	28,682	33,615	36,529	33,934	32,524	31,273
Mathematics	545	554	545	565	624	593	544	627	642	690	746	1,229	1,045	1,261	1,368	1,821
Physical sciences	1,110	991	1,148	936	1,327	1,324	1,385	1,634	1,558	1,674	1,810	2,409	2,682	3,064	3,238	3,476
Astronomy	0	1	2	0	1	3	4	2	1	3	0	1	4	3	6	2
Chemistry	227	147	172	196	229	237	239	280	315	338	323	357	383	467	502	595
Physics	87	94	104	116	134	124	101	126	106	129	150	176	205	243	326	473
Other physical sciences	796	749	870	624	963	960	1,041	1,226	1,136	1,204	1,337	1,875	2,090	2,351	2,404	2,406
Social and behavioral sciences	6,165	6,173	6,641	6,696	7,305	7,739	8,009	8,499	8,954	11,296	14,879	20,151	22,089	22,790	22,876	22,998
Psychology	1,239	1,306	1,408	1,444	1,505	1,520	1,556	1,745	1,890	3,219	5,559	2,866	3,300	4,126	4,801	5,242
Social sciences	4,926	4,867	5,233	5,252	5,800	6,219	6,453	6,754	7,064	8,077	9,320	17,285	18,789	18,664	18,075	17,756
Anthropology	41	67	69	60	76	105	100	98	121	124	158	179	242	229	276	303
Area and ethnic studies	217	271	284	91	83	84	92	120	132	133	157	164	140	189	247	283

## CHAPTER 2 | Higher Education in Science and Engineering

Citizenship, field, race, and ethnicity	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Economics	142	139	146	141	172	201	227	204	224	242	253	230	242	299	240	338
History of science	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Linguistics	0	0	0	0	0	2	1	3	1	0	2	0	1	1	20	5
Political science and public administration	772	704	696	899	1,156	1,312	1,464	1,480	1,443	1,504	1,674	3,984	5,067	5,667	5,832	5,589
Sociology	299	282	318	341	407	358	337	353	361	432	442	580	658	964	1,090	1,269
Other social sciences	3,455	3,404	3,720	3,720	3,906	4,157	4,232	4,496	4,782	5,642	6,634	12,148	12,439	11,315	10,370	9,969
Non-S&E	472,185	473,678	481,732	502,795	531,426	562,275	581,588	594,390	609,418	635,697	677,666	745,464	789,477	772,583	759,766	755,440
S&E technologies	74,579	71,887	67,803	72,936	77,904	81,954	85,994	89,887	93,240	97,427	108,853	130,978	143,428	134,470	127,031	121,731
Engineering technologies	35,409	34,334	33,239	34,966	32,353	28,479	26,161	26,334	27,474	29,022	29,790	33,446	35,191	32,307	29,813	29,776
Health technologies	38,074	36,412	33,607	36,928	44,295	52,068	58,207	61,615	63,734	66,477	76,904	95,070	105,446	99,326	94,213	88,794
Science technologies	1,044	1,037	898	968	993	1,087	1,066	1,233	1,257	1,287	1,557	1,711	1,904	1,958	2,066	2,105
Other S&E technologies	52	104	59	74	263	320	560	705	775	641	602	751	887	879	939	1,056
American Indian or Alaska Native																
All fields	6,282	6,392	6,565	7,134	7,692	8,001	8,068	8,076	8,256	8,235	9,589	9,451	9,898	9,930	9,780	9,517
S&E	608	605	703	811	825	839	801	851	870	835	909	1,051	1,046	1,096	1,117	1,077
Engineering	17	18	17	24	41	38	26	34	29	20	21	42	29	45	38	36
Aerospace	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chemical	0	0	0	0	9	0	0	0	0	0	0	0	0	0	1	1
Civil	2	1	1	1	4	2	0	0	1	2	0	0	0	2	3	0

## CHAPTER 2 | Higher Education in Science and Engineering

Citizenship, field, race, and ethnicity	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Electrical	0	2	2	5	7	11	2	4	4	1	0	1	1	0	1	2
Industrial	0	0	0	2	0	2	0	0	0	2	1	2	0	0	0	1
Materials	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
Mechanical	0	1	0	0	0	0	0	0	1	0	1	0	0	2	0	1
Other	15	14	14	16	21	23	24	30	23	15	19	39	28	40	33	30
Science	591	587	686	787	784	801	775	817	841	815	888	1,009	1,017	1,051	1,079	1,041
Natural sciences	384	417	444	546	524	504	498	446	474	459	531	509	543	582	601	537
Agricultural sciences	74	53	55	70	65	68	72	56	64	64	125	66	75	75	98	96
Biological sciences	39	33	43	27	47	44	65	55	59	52	54	46	66	79	69	64
Earth, atmospheric, and ocean sciences	0	0	0	1	0	0	0	1	1	2	0	0	3	2	5	6
Atmospheric sciences	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Earth sciences	0	0	0	0	0	0	0	1	0	2	0	0	3	1	5	6
Oceanography	0	0	0	1	0	0	0	0	1	0	0	0	0	1	0	0
Mathematics and computer sciences	258	314	329	431	388	365	335	305	313	304	315	350	358	376	380	313
Computer sciences	251	302	322	418	377	352	325	291	298	293	308	328	336	362	358	298
Mathematics	7	12	7	13	11	13	10	14	15	11	7	22	22	14	22	15
Physical sciences	13	17	17	17	24	27	26	29	37	37	37	47	41	50	49	58
Astronomy	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Chemistry	1	4	4	2	2	3	6	2	3	2	2	3	4	5	5	4



## CHAPTER 2 | Higher Education in Science and Engineering

Citizenship, field, race, and ethnicity	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Physics	0	2	0	3	0	2	1	5	3	2	0	2	2	2	3	4
Other physical sciences	12	11	13	12	22	21	19	22	31	33	35	42	35	43	41	50
Social and behavioral sciences	207	170	242	241	260	297	277	371	367	356	357	500	474	469	478	504
Psychology	38	34	32	31	36	56	41	73	67	71	95	81	88	85	103	124
Social sciences	169	136	210	210	224	241	236	298	300	285	262	419	386	384	375	380
Anthropology	1	2	0	1	0	2	3	3	1	3	3	5	7	4	3	5
Area and ethnic studies	32	23	30	48	42	30	52	67	75	78	75	86	69	71	84	85
Economics	2	1	3	2	1	1	0	2	0	1	2	2	6	1	1	3
History of science	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Linguistics	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Political science and public administration	21	5	10	22	35	34	37	48	43	40	36	74	70	87	69	78
Sociology	1	4	4	6	5	17	10	20	9	11	6	7	16	23	29	25
Other social sciences	112	101	163	131	141	157	134	158	172	152	140	245	218	198	189	184
Non-S&E	5,674	5,787	5,862	6,323	6,867	7,162	7,267	7,225	7,386	7,400	8,680	8,400	8,852	8,834	8,663	8,440
S&E technologies	790	734	684	799	940	952	1,003	1,001	1,077	1,162	1,154	1,288	1,432	1,472	1,337	1,302
Engineering technologies	367	299	295	366	415	330	313	289	315	355	340	399	377	424	363	388
Health technologies	414	424	385	423	516	610	681	695	741	786	799	867	1,031	1,022	955	886
Science technologies	9	9	4	10	6	7	6	10	13	13	5	14	17	18	14	13
Other S&E technologies	0	2	0	0	3	5	3	7	8	8	10	8	7	8	5	15

## CHAPTER 2 | Higher Education in Science and Engineering

Citizenship, field, race, and ethnicity	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Asian																
All fields	na	na	na	na	na	na	na	na	na	na	na	38,472	41,688	43,041	44,170	46,155
S&E	na	na	na	na	na	na	na	na	na	na	na	3,952	4,471	5,235	5,466	6,206
Engineering	na	na	na	na	na	na	na	na	na	na	na	199	272	291	357	405
Aerospace	na	na	na	na	na	na	na	na	na	na	na	0	0	0	0	0
Chemical	na	na	na	na	na	na	na	na	na	na	na	2	3	3	0	4
Civil	na	na	na	na	na	na	na	na	na	na	na	3	5	4	5	10
Electrical	na	na	na	na	na	na	na	na	na	na	na	11	19	16	29	29
Industrial	na	na	na	na	na	na	na	na	na	na	na	0	2	1	0	3
Materials	na	na	na	na	na	na	na	na	na	na	na	0	0	0	0	0
Mechanical	na	na	na	na	na	na	na	na	na	na	na	12	12	22	18	12
Other	na	na	na	na	na	na	na	na	na	na	na	171	231	245	305	347
Science	na	na	na	na	na	na	na	na	na	na	na	3,753	4,199	4,944	5,109	5,801
Natural sciences	na	na	na	na	na	na	na	na	na	na	na	2,457	2,735	3,078	3,209	3,607
Agricultural sciences	na	na	na	na	na	na	na	na	na	na	na	13	18	23	22	26
Biological sciences	na	na	na	na	na	na	na	na	na	na	na	405	471	499	522	542
Earth, atmospheric, and ocean sciences	na	na	na	na	na	na	na	na	na	na	na	4	6	1	1	5
Atmospheric sciences	na	na	na	na	na	na	na	na	na	na	na	0	0	0	0	0
Earth sciences	na	na	na	na	na	na	na	na	na	na	na	4	4	1	1	5

## CHAPTER 2 | Higher Education in Science and Engineering

Citizenship, field, race, and ethnicity	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Oceanography	na	na	na	na	na	na	na	na	na	na	na	0	2	0	0	0
Mathematics and computer sciences	na	na	na	na	na	na	na	na	na	na	na	1,662	1,779	2,048	2,087	2,335
Computer sciences	na	na	na	na	na	na	na	na	na	na	na	1,438	1,582	1,770	1,777	1,907
Mathematics	na	na	na	na	na	na	na	na	na	na	na	224	197	278	310	428
Physical sciences	na	na	na	na	na	na	na	na	na	na	na	373	461	507	577	699
Astronomy	na	na	na	na	na	na	na	na	na	na	na	0	0	1	1	0
Chemistry	na	na	na	na	na	na	na	na	na	na	na	104	131	132	159	170
Physics	na	na	na	na	na	na	na	na	na	na	na	21	44	59	88	127
Other physical sciences	na	na	na	na	na	na	na	na	na	na	na	248	286	315	329	402
Social and behavioral sciences	na	na	na	na	na	na	na	na	na	na	na	1,296	1,464	1,866	1,900	2,194
Psychology	na	na	na	na	na	na	na	na	na	na	na	174	243	364	480	562
Social sciences	na	na	na	na	na	na	na	na	na	na	na	1,122	1,221	1,502	1,420	1,632
Anthropology	na	na	na	na	na	na	na	na	na	na	na	15	16	19	22	24
Area and ethnic studies	na	na	na	na	na	na	na	na	na	na	na	3	10	10	13	10
Economics	na	na	na	na	na	na	na	na	na	na	na	39	49	55	36	76
History of science	na	na	na	na	na	na	na	na	na	na	na	0	0	0	0	0
Linguistics	na	na	na	na	na	na	na	na	na	na	na	0	0	1	4	2
Political science and public administration	na	na	na	na	na	na	na	na	na	na	na	78	83	137	122	166
Sociology	na	na	na	na	na	na	na	na	na	na	na	58	56	115	154	171

## CHAPTER 2 | Higher Education in Science and Engineering

Citizenship, field, race, and ethnicity	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Other social sciences	na	na	na	na	na	na	na	na	na	na	na	929	1,007	1,165	1,069	1,183
Non-S&E	na	na	na	na	na	na	na	na	na	na	na	34,520	37,217	37,806	38,704	39,949
S&E technologies	na	na	na	na	na	na	na	na	na	na	na	4,798	5,647	5,446	5,515	5,385
Engineering technologies	na	na	na	na	na	na	na	na	na	na	na	1,007	992	1,023	966	1,040
Health technologies	na	na	na	na	na	na	na	na	na	na	na	3,665	4,489	4,273	4,392	4,137
Science technologies	na	na	na	na	na	na	na	na	na	na	na	87	122	113	131	169
Other S&E technologies	na	na	na	na	na	na	na	na	na	na	na	39	44	37	26	39
Asian or Pacific Islander <sup>b</sup>																
All fields	27,313	27,919	30,322	31,597	31,908	32,498	33,800	35,623	36,754	38,619	41,472	na	na	na	na	na
S&E	2,649	2,907	3,381	4,075	3,694	3,129	2,769	2,715	2,877	3,314	3,706	na	na	na	na	na
Engineering	160	132	101	142	169	147	132	175	140	177	216	na	na	na	na	na
Aerospace	0	0	0	0	0	0	0	0	0	0	0	na	na	na	na	na
Chemical	0	0	2	1	8	0	0	0	0	0	0	na	na	na	na	na
Civil	3	4	5	6	2	1	1	2	2	5	6	na	na	na	na	na
Electrical	38	18	5	36	40	14	10	59	10	7	15	na	na	na	na	na
Industrial	0	2	0	0	1	2	1	3	1	3	5	na	na	na	na	na
Materials	0	0	0	0	0	0	0	0	0	0	0	na	na	na	na	na
Mechanical	2	0	0	2	0	1	3	3	3	6	7	na	na	na	na	na
Other	117	108	89	97	118	129	117	108	124	156	183	na	na	na	na	na

## CHAPTER 2 | Higher Education in Science and Engineering

Citizenship, field, race, and ethnicity	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Science	2,489	2,775	3,280	3,933	3,525	2,982	2,637	2,540	2,737	3,137	3,490	na	na	na	na	na
Natural sciences	2,010	2,342	2,802	3,432	2,955	2,359	2,002	1,822	1,935	2,176	2,308	na	na	na	na	na
Agricultural sciences	19	9	10	9	18	12	10	21	20	24	24	na	na	na	na	na
Biological sciences	109	94	93	143	148	204	224	257	319	337	340	na	na	na	na	na
Earth, atmospheric, and ocean sciences	1	0	0	1	0	0	1	0	0	6	1	na	na	na	na	na
Atmospheric sciences	0	0	0	0	0	0	0	0	0	0	0	na	na	na	na	na
Earth sciences	1	0	0	1	0	0	1	0	0	5	1	na	na	na	na	na
Oceanography	0	0	0	0	0	0	0	0	0	1	0	na	na	na	na	na
Mathematics and computer sciences	1,736	2,158	2,613	3,174	2,599	1,968	1,559	1,290	1,323	1,527	1,659	na	na	na	na	na
Computer sciences	1,646	2,052	2,522	3,072	2,499	1,871	1,474	1,212	1,205	1,397	1,521	na	na	na	na	na
Mathematics	90	106	91	102	100	97	85	78	118	130	138	na	na	na	na	na
Physical sciences	145	81	86	105	190	175	208	254	273	282	284	na	na	na	na	na
Astronomy	0	0	0	0	1	0	0	0	0	1	0	na	na	na	na	na
Chemistry	51	29	15	35	43	45	45	80	89	97	89	na	na	na	na	na
Physics	15	9	18	17	26	21	20	16	19	17	18	na	na	na	na	na
Other physical sciences	79	43	53	53	120	109	143	158	165	167	177	na	na	na	na	na
Social and behavioral sciences	479	433	478	501	570	623	635	718	802	961	1,182	na	na	na	na	na
Psychology	51	54	51	75	76	74	79	92	113	159	227	na	na	na	na	na
Social sciences	428	379	427	426	494	549	556	626	689	802	955	na	na	na	na	na

## CHAPTER 2 | Higher Education in Science and Engineering

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## CHAPTER 2 | Higher Education in Science and Engineering

Citizenship, field, race, and ethnicity	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Chemical	0	0	0	0	14	0	0	0	0	0	1	1	0	3	1	1
Civil	5	3	3	2	8	9	3	5	2	7	3	4	2	4	6	6
Electrical	27	30	32	121	161	146	97	79	96	32	16	23	17	17	44	52
Industrial	1	3	3	3	2	2	2	3	3	5	0	3	3	3	0	7
Materials	0	0	1	1	0	0	0	0	1	0	0	0	0	0	0	0
Mechanical	0	0	1	0	0	0	1	0	4	2	3	1	4	3	7	4
Other	98	81	94	90	104	131	112	103	121	123	142	151	210	214	250	252
Science	4,498	5,211	5,986	7,981	7,438	6,603	6,284	5,700	5,837	6,428	7,651	9,358	9,916	10,320	10,591	10,779
Natural sciences	3,497	4,263	4,990	6,899	6,272	5,384	4,956	4,367	4,507	4,667	5,221	6,017	6,208	6,529	6,564	6,632
Agricultural sciences	20	4	14	13	19	8	18	28	18	17	25	12	25	20	34	30
Biological sciences	139	131	138	145	135	142	185	207	172	183	243	272	327	363	376	431
Earth, atmospheric, and ocean sciences	0	0	1	1	0	1	4	0	2	0	1	2	0	1	2	2
Atmospheric sciences	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Earth sciences	0	0	0	1	0	1	1	0	2	0	1	2	0	1	2	2
Oceanography	0	0	1	0	0	0	3	0	0	0	0	0	0	0	0	0
Mathematics and computer sciences	3,253	4,048	4,760	6,677	6,043	5,154	4,652	4,032	4,214	4,351	4,826	5,369	5,463	5,723	5,730	5,767
Computer sciences	3,215	3,998	4,733	6,636	6,007	5,119	4,617	3,988	4,171	4,316	4,778	5,278	5,402	5,653	5,670	5,678
Mathematics	38	50	27	41	36	35	35	44	43	35	48	91	61	70	60	89
Physical sciences	85	80	77	63	75	79	97	100	101	116	126	362	393	422	422	402

## CHAPTER 2 | Higher Education in Science and Engineering

Citizenship, field, race, and ethnicity	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Astronomy	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chemistry	17	12	9	15	15	22	16	17	15	22	15	13	17	29	18	32
Physics	2	1	1	6	5	3	5	4	7	3	11	20	9	8	10	15
Other physical sciences	66	67	67	42	55	54	76	79	79	91	100	329	367	385	394	355
Social and behavioral sciences	1,001	948	996	1,082	1,166	1,219	1,328	1,333	1,330	1,761	2,430	3,341	3,708	3,791	4,027	4,147
Psychology	136	144	141	146	158	173	198	203	214	370	730	314	416	457	587	698
Social sciences	865	804	855	936	1,008	1,046	1,130	1,130	1,116	1,391	1,700	3,027	3,292	3,334	3,440	3,449
Anthropology	3	1	1	1	0	6	3	2	0	4	3	5	6	8	7	16
Area and ethnic studies	16	7	13	24	17	23	19	15	26	25	37	22	18	27	39	31
Economics	7	5	9	9	19	14	22	23	21	22	27	18	10	18	19	12
History of science	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Linguistics	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0
Political science and public administration	276	254	248	292	312	350	449	449	395	434	531	1,069	1,402	1,544	1,699	1,588
Sociology	55	66	73	77	100	76	67	67	64	90	79	108	143	176	176	236
Other social sciences	508	471	511	533	560	577	570	574	610	816	1,023	1,805	1,713	1,561	1,498	1,566
Non-S&E	53,779	56,330	58,625	63,853	69,203	74,934	78,028	80,054	83,010	87,843	97,687	109,612	121,106	117,206	116,168	120,070
S&E technologies	8,258	8,575	8,054	9,560	10,585	11,678	12,563	13,189	13,748	14,244	16,908	20,451	22,576	21,235	19,018	19,724
Engineering technologies	4,040	4,143	3,860	4,364	3,864	3,454	3,167	3,168	3,295	3,575	3,889	4,319	4,294	4,392	3,943	4,282
Health technologies	4,044	4,212	4,048	5,031	6,518	8,016	9,140	9,779	10,142	10,416	12,737	15,818	17,889	16,483	14,660	14,996



## CHAPTER 2 | Higher Education in Science and Engineering

Citizenship, field, race, and ethnicity	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Science technologies	147	163	119	134	136	128	151	142	160	175	217	222	247	249	266	276
Other S&E technologies	27	57	27	31	67	80	105	100	151	78	65	92	146	111	149	170
Native Hawaiian or Other Pacific Islander																
All fields	na	na	na	na	na	na	na	na	na	na	na	4,749	4,417	4,422	4,326	4,103
S&E	na	na	na	na	na	na	na	na	na	na	na	496	505	533	428	435
Engineering	na	na	na	na	na	na	na	na	na	na	na	21	23	20	21	16
Aerospace	na	na	na	na	na	na	na	na	na	na	na	0	0	0	0	0
Chemical	na	na	na	na	na	na	na	na	na	na	na	0	0	0	0	0
Civil	na	na	na	na	na	na	na	na	na	na	na	0	2	0	0	0
Electrical	na	na	na	na	na	na	na	na	na	na	na	2	2	2	3	3
Industrial	na	na	na	na	na	na	na	na	na	na	na	0	0	0	0	0
Materials	na	na	na	na	na	na	na	na	na	na	na	0	0	0	0	0
Mechanical	na	na	na	na	na	na	na	na	na	na	na	0	2	0	0	1
Other	na	na	na	na	na	na	na	na	na	na	na	19	17	18	18	12
Science	na	na	na	na	na	na	na	na	na	na	na	475	482	513	407	419
Natural sciences	na	na	na	na	na	na	na	na	na	na	na	236	254	268	251	239
Agricultural sciences	na	na	na	na	na	na	na	na	na	na	na	15	23	27	25	27
Biological sciences	na	na	na	na	na	na	na	na	na	na	na	52	25	31	29	34
Earth, atmospheric, and ocean sciences	na	na	na	na	na	na	na	na	na	na	na	0	0	0	0	1

## CHAPTER 2 | Higher Education in Science and Engineering

Citizenship, field, race, and ethnicity	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Atmospheric sciences	na	na	na	na	na	na	na	na	na	na	na	0	0	0	0	0
Earth sciences	na	na	na	na	na	na	na	na	na	na	na	0	0	0	0	1
Oceanography	na	na	na	na	na	na	na	na	na	na	na	0	0	0	0	0
Mathematics and computer sciences	na	na	na	na	na	na	na	na	na	na	na	148	194	193	177	159
Computer sciences	na	na	na	na	na	na	na	na	na	na	na	146	189	190	174	153
Mathematics	na	na	na	na	na	na	na	na	na	na	na	2	5	3	3	6
Physical sciences	na	na	na	na	na	na	na	na	na	na	na	21	12	17	20	18
Astronomy	na	na	na	na	na	na	na	na	na	na	na	0	0	0	0	0
Chemistry	na	na	na	na	na	na	na	na	na	na	na	1	3	0	3	3
Physics	na	na	na	na	na	na	na	na	na	na	na	0	0	0	0	4
Other physical sciences	na	na	na	na	na	na	na	na	na	na	na	20	9	17	17	11
Social and behavioral sciences	na	na	na	na	na	na	na	na	na	na	na	239	228	245	156	180
Psychology	na	na	na	na	na	na	na	na	na	na	na	18	19	31	23	20
Social sciences	na	na	na	na	na	na	na	na	na	na	na	221	209	214	133	160
Anthropology	na	na	na	na	na	na	na	na	na	na	na	1	2	1	0	2
Area and ethnic studies	na	na	na	na	na	na	na	na	na	na	na	1	3	11	17	15
Economics	na	na	na	na	na	na	na	na	na	na	na	0	0	0	1	3
History of science	na	na	na	na	na	na	na	na	na	na	na	0	0	0	0	0
Linguistics	na	na	na	na	na	na	na	na	na	na	na	0	0	0	1	0

## CHAPTER 2 | Higher Education in Science and Engineering

Citizenship, field, race, and ethnicity	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Political science and public administration	na	na	na	na	na	na	na	na	na	na	na	26	24	29	13	23
Sociology	na	na	na	na	na	na	na	na	na	na	na	6	10	10	11	7
Other social sciences	na	na	na	na	na	na	na	na	na	na	na	187	170	163	90	110
Non-S&E	na	na	na	na	na	na	na	na	na	na	na	4,253	3,912	3,889	3,898	3,668
S&E technologies	na	na	na	na	na	na	na	na	na	na	na	576	538	569	534	483
Engineering technologies	na	na	na	na	na	na	na	na	na	na	na	102	101	130	95	95
Health technologies	na	na	na	na	na	na	na	na	na	na	na	459	416	430	427	368
Science technologies	na	na	na	na	na	na	na	na	na	na	na	8	11	6	5	7
Other S&E technologies	na	na	na	na	na	na	na	na	na	na	na	7	10	3	7	13
White																
All fields	396,145	396,412	401,199	417,683	431,419	449,935	456,951	461,859	467,389	487,473	513,086	560,422	586,043	580,945	568,298	561,723
S&E	23,837	28,362	31,883	37,939	35,655	32,581	29,621	28,050	28,652	31,177	34,712	41,359	43,551	44,789	44,307	44,059
Engineering	1,177	1,278	1,265	1,387	1,569	1,488	1,354	1,316	1,453	1,384	1,621	1,797	2,068	2,266	2,507	2,862
Aerospace	1	0	0	0	0	0	1	0	0	0	2	0	2	0	0	1
Chemical	11	17	22	6	175	2	3	2	1	4	5	14	8	8	11	26
Civil	31	40	25	43	35	35	26	35	17	16	25	45	50	64	37	42
Electrical	157	159	123	288	337	287	196	180	168	115	133	94	100	106	142	161
Industrial	58	92	59	66	43	79	42	38	46	71	64	49	50	45	52	54
Materials	8	12	8	11	12	13	10	7	8	5	8	5	1	5	9	9

## CHAPTER 2 | Higher Education in Science and Engineering

Citizenship, field, race, and ethnicity	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Mechanical	52	46	40	48	50	43	47	45	60	79	77	69	96	99	118	110
Other	859	912	988	925	917	1,029	1,029	1,009	1,153	1,094	1,307	1,521	1,761	1,939	2,138	2,459
Science	22,660	27,084	30,618	36,552	34,086	31,093	28,267	26,734	27,199	29,793	33,091	39,562	41,483	42,523	41,800	41,197
Natural sciences	18,573	22,788	26,034	32,049	29,249	25,958	23,025	21,286	21,426	22,835	24,222	27,932	29,134	29,160	28,269	27,928
Agricultural sciences	1,741	1,840	1,725	1,795	1,695	1,716	1,686	1,556	1,557	1,571	1,618	1,838	2,160	1,995	2,051	2,113
Biological sciences	937	989	1,047	1,132	1,084	1,219	1,115	1,178	1,260	1,300	1,432	1,628	1,802	1,886	2,015	2,158
Earth, atmospheric, and ocean sciences	76	73	54	48	35	39	52	59	57	82	87	80	76	87	108	112
Atmospheric sciences	0	1	0	0	2	2	7	8	5	4	16	8	9	4	6	3
Earth sciences	24	30	25	31	21	18	32	33	30	47	43	37	42	49	71	74
Oceanography	52	42	29	17	12	19	13	18	22	31	28	35	25	34	31	35
Mathematics and computer sciences	15,020	19,133	22,317	28,386	25,519	22,032	19,213	17,415	17,537	18,801	19,880	23,039	23,588	23,468	22,263	21,615
Computer sciences	14,638	18,772	21,933	28,012	25,081	21,621	18,835	16,990	17,136	18,339	19,413	22,348	22,923	22,697	21,420	20,509
Mathematics	382	361	384	374	438	411	378	425	401	462	467	691	665	771	843	1,106
Physical sciences	799	753	891	688	916	952	959	1,078	1,015	1,081	1,205	1,347	1,508	1,724	1,832	1,930
Astronomy	0	1	2	0	0	2	4	1	1	2	0	1	4	1	4	2
Chemistry	144	98	133	128	153	158	158	156	184	170	183	200	187	245	260	328
Physics	65	72	77	80	89	92	66	86	67	90	100	112	125	146	189	271
Other physical sciences	590	582	679	480	674	700	731	835	763	819	922	1,034	1,192	1,332	1,379	1,329
Social and behavioral sciences	4,087	4,296	4,584	4,503	4,837	5,135	5,242	5,448	5,773	6,958	8,869	11,630	12,349	13,363	13,531	13,269

## CHAPTER 2 | Higher Education in Science and Engineering

Citizenship, field, race, and ethnicity	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Psychology	959	1,012	1,121	1,121	1,152	1,130	1,148	1,268	1,355	2,165	3,493	2,003	2,162	2,681	3,119	3,236
Social sciences	3,128	3,284	3,463	3,382	3,685	4,005	4,094	4,180	4,418	4,793	5,376	9,627	10,187	10,682	10,412	10,033
Anthropology	32	51	63	44	62	75	79	64	96	85	117	130	180	166	201	226
Area and ethnic studies	59	209	211	16	15	17	16	26	23	14	31	40	28	46	63	89
Economics	81	92	88	85	102	116	142	124	146	131	140	143	151	190	157	222
History of science	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Linguistics	0	0	0	0	0	1	0	0	1	0	2	0	1	0	8	3
Political science and public administration	371	353	338	497	650	761	812	813	862	836	881	2,041	2,357	3,144	3,295	3,133
Sociology	203	187	210	219	235	201	202	196	217	240	253	332	355	542	571	675
Other social sciences	2,382	2,392	2,553	2,521	2,621	2,834	2,843	2,957	3,073	3,487	3,952	6,941	7,115	6,594	6,117	5,685
Non-S&E	372,308	368,050	369,316	379,744	395,764	417,354	427,330	433,809	438,737	456,296	478,374	519,063	542,492	536,156	523,991	517,664
S&E technologies	59,987	56,812	52,956	55,621	58,958	62,313	64,337	66,943	69,002	71,362	77,730	90,822	96,799	92,913	87,297	84,261
Engineering technologies	27,820	26,801	25,386	25,909	24,352	22,157	20,433	20,659	21,323	22,249	22,511	24,791	24,366	23,623	21,869	21,591
Health technologies	31,311	29,155	26,810	28,905	33,666	39,102	42,702	44,838	46,215	47,679	53,579	64,190	70,394	67,199	63,276	60,426
Science technologies	833	814	728	766	780	858	829	938	933	960	1,175	1,288	1,405	1,435	1,497	1,492
Other S&E technologies	23	42	32	41	160	196	373	508	531	474	465	553	634	656	655	752
Two or more races <sup>c</sup>																
All fields	na	na	na	na	na	na	na	na	na	na	na	10,487	13,734	18,278	21,431	24,290
S&E	na	na	na	na	na	na	na	na	na	na	na	726	1,110	1,800	2,154	2,549

## CHAPTER 2 | Higher Education in Science and Engineering

Citizenship, field, race, and ethnicity	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Engineering	na	na	na	na	na	na	na	na	na	na	na	25	26	58	90	101
Aerospace	na	na	na	na	na	na	na	na	na	na	na	0	1	0	0	0
Chemical	na	na	na	na	na	na	na	na	na	na	na	0	0	0	1	4
Civil	na	na	na	na	na	na	na	na	na	na	na	1	1	2	2	0
Electrical	na	na	na	na	na	na	na	na	na	na	na	0	0	4	3	8
Industrial	na	na	na	na	na	na	na	na	na	na	na	0	0	0	1	2
Materials	na	na	na	na	na	na	na	na	na	na	na	0	0	0	0	0
Mechanical	na	na	na	na	na	na	na	na	na	na	na	4	6	6	5	3
Other	na	na	na	na	na	na	na	na	na	na	na	20	18	46	78	84
Science	na	na	na	na	na	na	na	na	na	na	na	701	1,084	1,742	2,064	2,448
Natural sciences	na	na	na	na	na	na	na	na	na	na	na	421	590	916	1,061	1,256
Agricultural sciences	na	na	na	na	na	na	na	na	na	na	na	21	26	34	40	48
Biological sciences	na	na	na	na	na	na	na	na	na	na	na	34	55	91	94	129
Earth, atmospheric, and ocean sciences	na	na	na	na	na	na	na	na	na	na	na	2	0	2	2	3
Atmospheric sciences	na	na	na	na	na	na	na	na	na	na	na	0	0	0	0	0
Earth sciences	na	na	na	na	na	na	na	na	na	na	na	2	0	2	1	1
Oceanography	na	na	na	na	na	na	na	na	na	na	na	0	0	0	1	2
Mathematics and computer sciences	na	na	na	na	na	na	na	na	na	na	na	321	442	677	790	904
Computer sciences	na	na	na	na	na	na	na	na	na	na	na	300	422	628	738	810

## CHAPTER 2 | Higher Education in Science and Engineering

Citizenship, field, race, and ethnicity	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Mathematics	na	na	na	na	na	na	na	na	na	na	na	21	20	49	52	94
Physical sciences	na	na	na	na	na	na	na	na	na	na	na	43	67	112	135	172
Astronomy	na	na	na	na	na	na	na	na	na	na	na	0	0	0	0	0
Chemistry	na	na	na	na	na	na	na	na	na	na	na	4	10	18	22	29
Physics	na	na	na	na	na	na	na	na	na	na	na	1	5	10	14	31
Other physical sciences	na	na	na	na	na	na	na	na	na	na	na	38	52	84	99	112
Social and behavioral sciences	na	na	na	na	na	na	na	na	na	na	na	280	494	826	1,003	1,192
Psychology	na	na	na	na	na	na	na	na	na	na	na	53	85	169	226	333
Social sciences	na	na	na	na	na	na	na	na	na	na	na	227	409	657	777	859
Anthropology	na	na	na	na	na	na	na	na	na	na	na	5	10	16	25	16
Area and ethnic studies	na	na	na	na	na	na	na	na	na	na	na	3	4	14	24	43
Economics	na	na	na	na	na	na	na	na	na	na	na	4	4	13	6	10
History of science	na	na	na	na	na	na	na	na	na	na	na	0	0	0	0	0
Linguistics	na	na	na	na	na	na	na	na	na	na	na	0	0	0	1	0
Political science and public administration	na	na	na	na	na	na	na	na	na	na	na	37	63	122	145	176
Sociology	na	na	na	na	na	na	na	na	na	na	na	15	24	39	77	96
Other social sciences	na	na	na	na	na	na	na	na	na	na	na	163	304	453	499	518
Non-S&E	na	na	na	na	na	na	na	na	na	na	na	9,761	12,624	16,478	19,277	21,741
S&E technologies	na	na	na	na	na	na	na	na	na	na	na	1,412	1,927	2,479	2,617	2,791

## CHAPTER 2 | Higher Education in Science and Engineering

Citizenship, field, race, and ethnicity	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Engineering technologies	na	na	na	na	na	na	na	na	na	na	na	329	384	643	698	712
Health technologies	na	na	na	na	na	na	na	na	na	na	na	1,053	1,493	1,752	1,783	1,980
Science technologies	na	na	na	na	na	na	na	na	na	na	na	17	30	64	78	63
Other S&E technologies	na	na	na	na	na	na	na	na	na	na	na	13	20	20	58	36
Other or unknown race or ethnicity																
All fields	17,261	20,263	23,097	28,526	35,192	36,799	40,987	43,360	49,781	52,901	60,515	67,385	73,109	57,882	53,992	48,088
S&E	1,501	1,764	2,109	3,173	3,814	3,343	3,055	2,966	3,373	4,048	5,356	7,530	9,835	5,668	4,927	4,180
Engineering	60	60	64	88	99	101	132	120	115	104	143	134	191	194	183	219
Aerospace	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Chemical	0	0	0	0	7	0	0	0	0	1	1	2	0	0	0	5
Civil	8	3	4	2	3	3	3	2	3	0	1	1	3	4	1	2
Electrical	7	5	5	23	31	25	53	20	14	8	13	13	23	6	18	11
Industrial	0	0	5	1	0	0	1	1	2	1	1	12	3	9	2	6
Materials	3	2	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Mechanical	1	1	0	0	2	4	0	1	7	2	4	6	10	11	7	18
Other	41	49	50	62	56	69	75	96	89	92	122	100	152	164	155	175
Science	1,441	1,704	2,045	3,085	3,715	3,242	2,923	2,846	3,258	3,944	5,213	7,396	9,644	5,474	4,744	3,961
Natural sciences	1,050	1,378	1,704	2,716	3,243	2,777	2,396	2,217	2,576	2,684	3,172	4,531	6,272	3,244	2,963	2,449
Agricultural sciences	22	45	59	52	72	46	48	62	40	79	84	96	99	94	77	88



## CHAPTER 2 | Higher Education in Science and Engineering

Citizenship, field, race, and ethnicity	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Biological sciences	47	32	37	72	74	83	96	114	109	164	182	262	219	205	214	158
Earth, atmospheric, and ocean sciences	3	2	1	0	2	0	5	2	3	4	0	2	4	3	4	5
Atmospheric sciences	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Earth sciences	1	1	1	0	1	0	3	2	3	2	0	1	4	1	4	5
Oceanography	2	1	0	0	1	0	2	0	0	2	0	0	0	2	0	0
Mathematics and computer sciences	910	1,239	1,530	2,529	2,973	2,557	2,152	1,866	2,292	2,279	2,748	3,955	5,750	2,710	2,465	2,001
Computer sciences	882	1,214	1,494	2,494	2,934	2,520	2,116	1,800	2,227	2,227	2,662	3,777	5,675	2,634	2,387	1,918
Mathematics	28	25	36	35	39	37	36	66	65	52	86	178	75	76	78	83
Physical sciences	68	60	77	63	122	91	95	173	132	158	158	216	200	232	203	197
Astronomy	0	0	0	0	0	0	0	1	0	0	0	0	0	1	1	0
Chemistry	14	4	11	16	16	9	14	25	24	47	34	32	31	38	35	29
Physics	5	10	8	10	14	6	9	15	10	17	21	20	20	18	22	21
Other physical sciences	49	46	58	37	92	76	72	132	98	94	103	164	149	175	145	147
Social and behavioral sciences	391	326	341	369	472	465	527	629	682	1,260	2,041	2,865	3,372	2,230	1,781	1,512
Psychology	55	62	63	71	83	87	90	109	141	454	1,014	223	287	339	263	269
Social sciences	336	264	278	298	389	378	437	520	541	806	1,027	2,642	3,085	1,891	1,518	1,243
Anthropology	4	8	5	10	12	13	14	17	18	20	28	18	21	15	18	14
Area and ethnic studies	107	26	28	0	8	3	2	6	6	6	8	9	8	10	7	10
Economics	11	9	10	16	23	23	22	20	19	28	35	24	22	22	20	12

## CHAPTER 2 | Higher Education in Science and Engineering

Citizenship, field, race, and ethnicity	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
History of science	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Linguistics	0	0	0	0	0	0	1	1	0	0	0	0	0	0	4	0
Political science and public administration	15	21	32	37	59	73	72	106	78	124	146	659	1,068	604	489	425
Sociology	16	13	19	21	41	33	30	24	38	37	64	54	54	59	72	59
Other social sciences	183	187	184	214	246	233	296	346	382	591	746	1,878	1,912	1,181	908	723
Non-S&E	15,760	18,499	20,988	25,353	31,378	33,456	37,932	40,394	46,408	48,853	55,159	59,855	63,274	52,214	49,065	43,908
S&E technologies	1,869	2,124	2,648	3,227	3,963	3,625	4,312	4,543	4,757	5,727	7,760	11,631	14,509	10,356	10,713	7,785
Engineering technologies	982	971	1,506	1,952	2,035	1,283	1,193	1,093	1,311	1,639	1,759	2,499	4,677	2,072	1,879	1,668
Health technologies	876	1,137	1,123	1,249	1,872	2,277	3,053	3,359	3,337	3,981	5,891	9,018	9,734	8,167	8,720	6,001
Science technologies	11	16	19	26	31	34	25	47	66	60	74	75	72	73	75	85
Other S&E technologies	0	0	0	0	25	31	41	44	43	47	36	39	26	44	39	31
Temporary visa holder																
All fields	10,116	11,602	12,294	13,486	14,568	14,121	13,432	13,827	14,445	15,224	16,160	16,632	17,131	16,872	17,113	17,984
S&E	849	1,155	1,416	1,615	1,621	1,352	1,099	895	954	1,156	1,300	1,521	1,602	1,587	1,715	1,936
Engineering	68	97	57	81	118	122	87	93	89	149	151	184	240	174	196	228
Aerospace	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0
Chemical	2	1	2	0	3	0	2	1	0	4	2	9	1	3	3	7
Civil	4	0	2	6	1	0	4	1	3	7	6	6	9	11	5	1
Electrical	3	38	1	4	14	9	2	7	6	15	8	10	11	9	14	12

## CHAPTER 2 | Higher Education in Science and Engineering

Citizenship, field, race, and ethnicity	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Industrial	1	2	2	1	0	3	2	3	0	0	0	0	0	0	0	1
Materials	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mechanical	1	0	1	1	1	2	0	1	5	3	17	12	15	9	28	24
Other	57	56	49	69	99	108	76	80	75	120	118	147	204	141	146	183
Science	781	1,058	1,359	1,534	1,503	1,230	1,012	802	865	1,007	1,149	1,337	1,362	1,413	1,519	1,708
Natural sciences	630	877	1,188	1,339	1,274	1,019	831	626	672	775	846	986	973	969	1,081	1,203
Agricultural sciences	23	46	52	11	43	15	42	8	16	12	13	10	13	16	22	92
Biological sciences	27	35	30	49	57	58	64	61	83	72	108	92	93	114	112	92
Earth, atmospheric, and ocean sciences	1	4	1	0	2	0	2	4	3	0	3	2	2	3	1	1
Atmospheric sciences	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0
Earth sciences	1	4	1	0	2	0	2	3	3	0	3	1	2	3	1	1
Oceanography	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mathematics and computer sciences	524	759	1,061	1,221	1,086	829	596	448	438	525	556	624	578	582	640	642
Computer sciences	491	717	1,025	1,175	1,039	769	542	419	393	483	495	549	492	513	545	547
Mathematics	33	42	36	46	47	60	54	29	45	42	61	75	86	69	95	95
Physical sciences	55	33	44	58	86	117	127	105	132	166	166	258	287	254	306	376
Astronomy	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1
Chemistry	32	9	5	13	13	19	19	18	10	23	21	28	33	19	21	25
Physics	8	3	5	16	9	11	12	4	14	10	6	9	11	8	21	23

## CHAPTER 2 | Higher Education in Science and Engineering

[illegible]

## CHAPTER 2 | Higher Education in Science and Engineering

na = not applicable; data were not collected for this detail.

<sup>a</sup> Beginning in 2008, the category includes Hispanic or one or more races.

<sup>b</sup> Pacific Islander includes Native Hawaiian or Other Pacific Islander.

<sup>c</sup> In 2011, the survey required institutions to begin reporting information on more than one race, along with information in the other racial and ethnic categories, but institutions were not required to update the race and ethnicity data of individuals who were already in the system. Therefore, the number reported for more than one race for the years after 2011 is likely to be an undercount.

**Note(s)**

Racial and ethnic breakouts include U.S. citizens and permanent residents only; temporary visa holder includes all racial and ethnic groups. Engineering technologies are focused more on applied skills than on fundamental science and mathematics. Data are based on degree-granting institutions eligible to participate in Title IV federal financial aid programs and do not match previously published data from *Science and Engineering Indicators 2008* and earlier years that were based on accredited higher education institutions.

**Source(s)**

National Center for Education Statistics, Integrated Postsecondary Education Data System (IPEDS), Completions Survey; National Science Foundation, National Center for Science and Engineering Statistics, Integrated Science and Engineering Resources Data System (WebCASPAR), <https://ncesdata.nsf.gov/webcaspar/>.

*Science and Engineering Indicators 2018*

## CHAPTER 2 | Higher Education in Science and Engineering

APPENDIX TABLE 2-20

### Degrees awarded to U.S. citizens and permanent residents, by sex, race, ethnicity, broad field category, and degree level: 2000 and 2015

(Number and percent)

Degree level and broad field category	2000					2015				
	All	Female	Male	Female (%)	Male (%)	All	Female	Male	Female (%)	Male (%)
Associate's level										
American Indian or Alaska Native										
All fields	6,282	4,131	2,151	65.8	34.2	9,517	6,109	3,408	64.2	35.8
S&E	608	386	222	63.5	36.5	1,077	591	486	54.9	45.1
Engineering	17	4	13	23.5	76.5	36	8	28	22.2	77.8
Natural sciences	384	220	164	57.3	42.7	537	216	321	40.2	59.8
Social and behavioral sciences	207	162	45	78.3	21.7	504	367	137	72.8	27.2
Non-S&E	5,674	3,745	1,929	66.0	34.0	8,440	5,518	2,922	65.4	34.6
Black or African American										
All fields	58,408	38,148	20,260	65.3	34.7	131,171	86,252	44,919	65.8	34.2
S&E	4,629	2,622	2,007	56.6	43.4	11,101	5,233	5,868	47.1	52.9
Engineering	131	25	106	19.1	80.9	322	33	289	10.2	89.8
Natural sciences	3,497	1,883	1,614	53.8	46.2	6,632	2,076	4,556	31.3	68.7
Social and behavioral sciences	1,001	714	287	71.3	28.7	4,147	3,124	1,023	75.3	24.7
Non-S&E	53,779	35,526	18,253	66.1	33.9	120,070	81,019	39,051	67.5	32.5

## CHAPTER 2 | Higher Education in Science and Engineering

Degree level and broad field category	2000					2015				
	All	Female	Male	Female (%)	Male (%)	All	Female	Male	Female (%)	Male (%)
Hispanic or Latino										
All fields	57,971	33,760	24,211	58.2	41.8	181,156	111,966	69,190	61.8	38.2
S&E	4,361	2,280	2,081	52.3	47.7	19,046	10,088	8,958	53.0	47.0
Engineering	181	30	151	16.6	83.4	815	132	683	16.2	83.8
Natural sciences	2,986	1,396	1,590	46.8	53.2	8,078	2,583	5,495	32.0	68.0
Social and behavioral sciences	1,194	854	340	71.5	28.5	10,153	7,373	2,780	72.6	27.4
Non-S&E	53,610	31,480	22,130	58.7	41.3	162,110	101,878	60,232	62.8	37.2
White										
All fields	396,145	237,369	158,776	59.9	40.1	561,723	337,452	224,271	60.1	39.9
S&E	23,837	10,680	13,157	44.8	55.2	44,059	17,310	26,749	39.3	60.7
Engineering	1,177	148	1,029	12.6	87.4	2,862	341	2,521	11.9	88.1
Natural sciences	18,573	7,644	10,929	41.2	58.8	27,928	7,262	20,666	26.0	74.0
Social and behavioral sciences	4,087	2,888	1,199	70.7	29.3	13,269	9,707	3,562	73.2	26.8
Non-S&E	372,308	226,689	145,619	60.9	39.1	517,664	320,142	197,522	61.8	38.2
Asian or Pacific Islander										
All fields	27,313	15,522	11,791	56.8	43.2	50,258	28,621	21,637	56.9	43.1
S&E	2,649	1,284	1,365	48.5	51.5	6,641	2,919	3,722	44.0	56.0
Engineering	160	23	137	14.4	85.6	421	86	335	20.4	79.6

## CHAPTER 2 | Higher Education in Science and Engineering

Degree level and broad field category	2000					2015				
	All	Female	Male	Female (%)	Male (%)	All	Female	Male	Female (%)	Male (%)
Natural sciences	2,010	939	1,071	46.7	53.3	3,846	1,290	2,556	33.5	66.5
Social and behavioral sciences	479	322	157	67.2	32.8	2,374	1,543	831	65.0	35.0
Non-S&E	24,664	14,238	10,426	57.7	42.3	43,617	25,702	17,915	58.9	41.1
Other or unknown race and ethnicity										
All fields	17,261	9,804	7,451	56.8	43.2	72,378	43,156	29,222	59.6	40.4
S&E	1,501	654	847	43.6	56.4	6,729	3,120	3,609	46.4	53.6
Engineering	60	8	52	13.3	86.7	320	49	271	15.3	84.7
Natural sciences	1050	376	674	35.8	64.2	3705	1050	2655	28.3	71.7
Social and behavioral sciences	391	270	121	69.1	30.9	2704	2021	683	74.7	25.3
Non-S&E	15760	9150	6610	58.1	41.9	65,649	40,036	25,613	61.0	39.0
Bachelor's level										
American Indian or Alaska Native										
All fields	8,414	5,077	3,337	60.3	39.7	9,697	5,841	3,856	60.2	39.8
S&E	2,607	1,443	1,164	55.4	44.6	2,972	1,620	1,352	54.5	45.5
Engineering	326	89	237	27.3	72.7	316	76	240	24.1	75.9
Natural sciences	917	462	455	50.4	49.6	1,111	512	599	46.1	53.9
Social and behavioral sciences	1,364	892	472	65.4	34.6	1,545	1,032	513	66.8	33.2
Non-S&E	5,807	3,634	2,173	62.6	37.4	6,725	4,221	2,504	62.8	37.2



## CHAPTER 2 | Higher Education in Science and Engineering

Degree level and broad field category	2000					2015				
	All	Female	Male	Female (%)	Male (%)	All	Female	Male	Female (%)	Male (%)
Black or African American										
All fields	104,341	68,679	35,662	65.8	34.2	182,778	117,189	65,589	64.1	35.9
S&E	32,993	20,975	12,018	63.6	36.4	53,649	32,845	20,804	61.2	38.8
Engineering	3,069	1,090	1,979	35.5	64.5	3,852	973	2,879	25.3	74.7
Natural sciences	10,796	6,464	4,332	59.9	40.1	17,286	8,920	8,366	51.6	48.4
Social and behavioral sciences	19,128	13,421	5,707	70.2	29.8	32,511	22,952	9,559	70.6	29.4
Non-S&E	71,348	47,704	23,644	66.9	33.1	129,129	84,344	44,785	65.3	34.7
Hispanic or Latino										
All fields	88,445	53,772	34,673	60.8	39.2	226,900	137,260	89,640	60.5	39.5
S&E	27,980	15,456	12,524	55.2	44.8	79,203	44,386	34,817	56.0	44.0
Engineering	4,075	988	3,087	24.2	75.8	9,960	2,209	7,751	22.2	77.8
Natural sciences	8,842	4,499	4,343	50.9	49.1	25,845	12,528	13,317	48.5	51.5
Social and behavioral sciences	15,063	9,969	5,094	66.2	33.8	43,398	29,649	13,749	68.3	31.7
Non-S&E	60,465	38,316	22,149	63.4	36.6	147,697	92,874	54,823	62.9	37.1
White										
All fields	896,511	508,407	388,104	56.7	43.3	1,150,065	646,445	503,620	56.2	43.8
S&E	270,341	133,114	137,227	49.2	50.8	373,795	176,865	196,930	47.3	52.7
Engineering	39,025	7,274	31,751	18.6	81.4	60,596	11,206	49,390	18.5	81.5

## CHAPTER 2 | Higher Education in Science and Engineering

Degree level and broad field category	2000					2015				
	All	Female	Male	Female (%)	Male (%)	All	Female	Male	Female (%)	Male (%)
Natural sciences	103,331	46,570	56,761	45.1	54.9	153,497	67,674	85,823	44.1	55.9
Social and behavioral sciences	127,985	79,270	48,715	61.9	38.1	159,702	97,985	61,717	61.4	38.6
Non-S&E	626,170	375,293	250,877	59.9	40.1	776,270	469,580	306,690	60.5	39.5
Asian or Pacific Islander										
All fields	75,384	40,766	34,618	54.1	45.9	127,809	69,573	58,236	54.4	45.6
S&E	35,556	16,982	18,574	47.8	52.2	60,703	29,098	31,605	47.9	52.1
Engineering	6,850	1,664	5,186	24.3	75.7	10,875	2,583	8,292	23.8	76.2
Natural sciences	16,342	7,647	8,695	46.8	53.2	29,885	14,199	15,686	47.5	52.5
Social and behavioral sciences	12,364	7,671	4,693	62.0	38.0	19,943	12,316	7,627	61.8	38.2
Non-S&E	39,828	23,784	16,044	59.7	40.3	67,106	40,475	26,631	60.3	39.7
Other or unknown race and ethnicity										
All fields	42,419	23,529	18,890	55.5	44.5	143,241	82,437	60,804	57.6	42.4
S&E	13,930	6,948	6,982	49.9	50.1	47,096	24,409	22,687	51.8	48.2
Engineering	1,610	296	1,314	18.4	81.6	5,752	1,241	4,511	21.6	78.4
Natural sciences	5,143	2,228	2,915	43.3	56.7	18,455	8,250	10,205	44.7	55.3
Social and behavioral sciences	7,177	4,424	2,753	61.6	38.4	22,889	14,918	7,971	65.2	34.8
Non-S&E	28,489	16,581	11,908	58.2	41.8	96,145	58,028	38,117	60.4	39.6
Master's level										

## CHAPTER 2 | Higher Education in Science and Engineering

Degree level and broad field category	2000					2015				
	All	Female	Male	Female (%)	Male (%)	All	Female	Male	Female (%)	Male (%)
American Indian or Alaska Native										
All fields	2,109	1,329	780	63.0	37.0	3,116	2,006	1,110	64.4	35.6
S&E	383	190	193	49.6	50.4	548	311	237	56.8	43.2
Engineering	64	16	48	25.0	75.0	59	18	41	30.5	69.5
Natural sciences	108	36	72	33.3	66.7	158	71	87	44.9	55.1
Social and behavioral sciences	211	138	73	65.4	34.6	331	222	109	67.1	32.9
Non-S&E	1,726	1,139	587	66.0	34.0	2,568	1,695	873	66.0	34.0
Black or African American										
All fields	33,589	23,173	10,416	69.0	31.0	79,680	55,842	23,838	70.1	29.9
S&E	5,563	3,320	2,243	59.7	40.3	13,239	8,415	4,824	63.6	36.4
Engineering	658	207	451	31.5	68.5	1,323	370	953	28.0	72.0
Natural sciences	1,179	588	591	49.9	50.1	3,337	1,538	1,799	46.1	53.9
Social and behavioral sciences	3,726	2,525	1,201	67.8	32.2	8,579	6,507	2,072	75.8	24.2
Non-S&E	28,026	19,853	8,173	70.8	29.2	66,441	47,427	19,014	71.4	28.6
Hispanic or Latino										
All fields	20,911	12,861	8,050	61.5	38.5	58,619	37,676	20,943	64.3	35.7
S&E	3,762	1,841	1,921	48.9	51.1	11,392	6,008	5,384	52.7	47.3
Engineering	852	201	651	23.6	76.4	2,290	555	1,735	24.2	75.8

## CHAPTER 2 | Higher Education in Science and Engineering

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## CHAPTER 2 | Higher Education in Science and Engineering

Degree level and broad field category	2000					2015				
	All	Female	Male	Female (%)	Male (%)	All	Female	Male	Female (%)	Male (%)
All fields	26,048	14,612	11,436	56.1	43.9	68,250	40,910	27,340	59.9	40.1
S&E	4,545	2,065	2,480	45.4	54.6	12,938	6,661	6,277	51.5	48.5
Engineering	940	192	748	20.4	79.6	2,308	536	1,772	23.2	76.8
Natural sciences	1,415	536	879	37.9	62.1	4,172	1,750	2,422	41.9	58.1
Social and behavioral sciences	2,190	1,337	853	61.1	38.9	6,458	4,375	2,083	67.7	32.3
Non-S&E	21,503	12,547	8,956	58.3	41.7	55,312	34,249	21,063	61.9	38.1
Doctoral level <sup>a</sup>										
American Indian or Alaska Native										
All fields	155	100	55	64.5	35.5	264	158	106	59.8	40.2
S&E	82	52	30	63.4	36.6	137	84	53	61.3	38.7
Engineering	5	2	3	40.0	60.0	12	4	8	33.3	66.7
Natural sciences	34	16	18	47.1	52.9	71	40	31	56.3	43.7
Social and behavioral sciences	43	34	9	79.1	20.9	54	40	14	74.1	25.9
Non-S&E	73	48	25	65.8	34.2	127	74	53	58.3	41.7
Black or African American										
All fields	2,147	1,314	833	61.2	38.8	5,050	3,472	1,578	68.8	31.2
S&E	821	462	359	56.3	43.7	1,855	1,237	618	66.7	33.3
Engineering	91	29	62	31.9	68.1	165	55	110	33.3	66.7

## CHAPTER 2 | Higher Education in Science and Engineering

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## CHAPTER 2 | Higher Education in Science and Engineering

Degree level and broad field category	2000					2015				
	All	Female	Male	Female (%)	Male (%)	All	Female	Male	Female (%)	Male (%)
All fields	2,297	1,013	1,284	44.1	55.9	3,740	2,072	1,668	55.4	44.6
S&E	1,714	704	1,010	41.1	58.9	2,703	1,415	1,288	52.3	47.7
Engineering	380	81	299	21.3	78.7	665	205	460	30.8	69.2
Natural sciences	979	412	567	42.1	57.9	1,546	872	674	56.4	43.6
Social and behavioral sciences	355	211	144	59.4	40.6	492	338	154	68.7	31.3
Non-S&E	583	309	274	53.0	47.0	1,037	657	380	63.4	36.6
Other or unknown race and ethnicity										
All fields	1,661	741	920	44.6	55.4	5,033	2,713	2,320	53.9	46.1
S&E	1,034	422	612	40.8	59.2	2,910	1,453	1,457	49.9	50.1
Engineering	146	28	118	19.2	80.8	469	121	348	25.8	74.2
Natural sciences	510	190	320	37.3	62.7	1,514	743	771	49.1	50.9
Social and behavioral sciences	378	204	174	54.0	46.0	927	589	338	63.5	36.5
Non-S&E	627	319	308	50.9	49.1	2,123	1,260	863	59.3	40.7

<sup>a</sup> At the doctoral level, medical sciences and other health sciences are included under natural sciences and consequently under S&E because at this level, these degrees are research degrees.

### Note(s)

To compare data over time, the race and ethnicity categories are the historic categories, not the most recent.

### Source(s)



## CHAPTER 2 | Higher Education in Science and Engineering

National Center for Education Statistics, Integrated Postsecondary Education Data System (IPEDS), Completions Survey; National Science Foundation, National Center for Science and Engineering Statistics, Integrated Science and Engineering Resources Data System (WebCASPAR), <https://ncesdata.nsf.gov/webcaspar/>.

*Science and Engineering Indicators 2018*



## CHAPTER 2 | Higher Education in Science and Engineering

### APPENDIX TABLE 2-21

#### Earned bachelor's degrees, by sex and field: 2000–15

(Number)

Sex and field	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Both sexes																
All fields	1,254,618	1,260,308	1,308,970	1,365,694	1,417,421	1,456,401	1,502,922	1,541,704	1,580,413	1,619,028	1,668,227	1,734,229	1,810,647	1,861,034	1,890,941	1,916,129
S&E	398,602	400,435	415,983	442,755	458,658	470,214	478,858	485,772	496,168	505,435	525,374	554,365	589,330	615,475	635,915	650,057
Engineering	59,487	59,214	60,605	63,789	64,680	66,152	68,227	68,274	69,908	70,600	74,399	78,099	83,263	87,812	93,950	99,906
Aerospace	1,267	1,498	1,747	2,017	2,318	2,384	2,753	2,828	2,934	3,037	3,207	3,342	3,545	3,490	3,565	3,871
Chemical	6,219	6,088	5,946	5,545	5,185	4,889	4,857	5,081	5,504	5,894	6,692	7,535	8,344	8,917	9,706	10,837
Civil	9,571	8,949	8,891	9,367	9,400	9,800	10,663	11,318	12,243	12,787	13,482	14,840	15,175	15,882	15,551	15,374
Electrical	17,675	18,359	18,957	20,757	21,374	21,459	19,933	18,547	17,357	16,184	16,290	16,485	17,380	18,412	19,991	21,357
Industrial	3,937	3,812	3,977	3,937	3,808	3,936	3,890	3,529	3,566	3,879	4,184	4,293	4,689	4,779	5,323	5,813
Materials	972	930	933	950	865	906	1,006	1,025	1,150	1,070	1,138	1,140	1,322	1,448	1,513	1,687
Mechanical	13,091	13,139	13,353	14,029	14,342	14,880	16,163	16,911	17,685	17,643	18,858	19,470	20,889	22,300	24,679	26,742
Other	6,755	6,439	6,801	7,187	7,388	7,898	8,962	9,035	9,469	10,106	10,548	10,994	11,919	12,584	13,622	14,225
Science	339,115	341,221	355,378	378,966	393,978	404,062	410,631	417,498	426,260	434,835	450,975	476,266	506,067	527,663	541,965	550,151
Natural sciences	150,962	152,623	158,975	170,068	173,633	173,460	173,966	176,275	177,601	181,914	190,158	202,517	219,025	233,032	245,624	257,665
Agricultural sciences	18,245	17,465	17,359	17,703	17,058	17,120	17,307	17,696	18,474	19,152	20,400	22,759	25,060	27,609	28,796	29,460
Biological sciences	64,887	62,010	61,675	63,517	64,750	67,972	72,972	79,348	82,398	85,574	89,615	93,654	99,900	104,703	109,520	115,124

## CHAPTER 2 | Higher Education in Science and Engineering

Sex and field	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Earth, atmospheric, and ocean sciences	4,019	3,968	3,984	3,949	3,903	3,959	3,987	4,077	4,314	4,542	4,802	5,299	5,865	6,291	6,730	7,155
Atmospheric sciences	490	456	525	562	572	677	651	745	736	721	691	678	735	749	751	734
Earth sciences	3,359	3,334	3,234	3,252	3,170	3,146	3,231	3,193	3,453	3,679	3,931	4,410	4,904	5,302	5,724	6,162
Oceanography	170	178	225	135	161	136	105	139	125	142	180	211	226	240	255	259
Mathematics and computer sciences	49,233	55,034	61,960	70,789	73,703	69,404	63,310	58,147	54,763	54,704	56,939	61,607	67,779	73,153	78,356	83,445
Computer sciences	37,519	43,597	49,706	57,926	59,968	54,588	48,000	42,596	38,922	38,496	40,107	43,586	47,960	51,586	56,130	60,309
Mathematics and statistics	11,714	11,437	12,254	12,863	13,735	14,816	15,310	15,551	15,841	16,208	16,832	18,021	19,819	21,567	22,226	23,136
Physical sciences	14,578	14,146	13,997	14,110	14,219	15,005	16,390	17,007	17,652	17,942	18,402	19,198	20,421	21,276	22,222	22,481
Astronomy	160	240	276	271	292	331	366	332	346	335	388	364	392	357	429	393
Chemistry	10,388	9,815	9,439	9,329	9,300	9,923	10,887	11,250	11,832	12,144	12,338	12,888	13,714	14,024	14,682	14,669
Physics	3,362	3,447	3,641	3,913	4,140	4,199	4,566	4,870	4,876	4,842	5,000	5,221	5,557	6,107	6,283	6,681
Other physical sciences	668	644	641	597	487	552	571	555	598	621	676	725	758	788	828	738
Social and behavioral sciences	188,153	188,598	196,403	208,898	220,345	230,602	236,665	241,223	248,659	252,921	260,817	273,749	287,042	294,631	296,341	292,486
Psychology	74,656	74,124	77,297	79,163	82,606	86,031	88,551	90,498	92,989	94,743	97,746	101,568	109,716	115,373	118,405	118,768
Social sciences	113,497	114,474	119,106	129,735	137,739	144,571	148,114	150,725	155,670	158,178	163,071	172,181	177,326	179,258	177,936	173,718
Anthropology	7,057	6,898	7,198	7,543	7,631	7,742	8,100	8,086	8,853	9,153	9,566	10,022	11,128	11,536	11,302	10,165
Area and ethnic studies	5,614	5,557	5,835	5,745	6,244	6,612	6,975	7,120	7,323	7,598	7,364	7,817	7,860	7,585	7,104	6,620
Economics	19,400	20,371	21,823	23,866	24,927	25,160	24,707	24,825	26,281	27,628	29,090	30,013	29,457	30,034	31,585	34,344

## CHAPTER 2 | Higher Education in Science and Engineering

Sex and field	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
History of science	92	101	103	103	140	117	113	114	103	100	110	138	122	119	133	131
Linguistics	716	757	847	914	1,047	1,053	1,201	1,340	1,505	1,478	1,682	1,808	2,109	2,184	2,225	2,275
Political science and public administration	36,384	36,650	38,565	43,796	47,509	51,540	53,589	54,598	55,889	55,319	57,649	59,752	60,760	60,244	59,260	56,814
Sociology	25,685	25,357	25,296	26,200	27,020	28,556	28,541	29,050	28,908	28,836	29,000	29,614	30,602	31,029	30,672	29,543
Other social sciences	18,549	18,783	19,439	21,568	23,221	23,791	24,888	25,592	26,808	28,066	28,610	33,017	35,288	36,527	35,655	33,826
Non-S&E	856,016	859,873	892,987	922,939	958,763	986,187	1,024,064	1,055,932	1,084,245	1,113,593	1,142,853	1,179,864	1,221,317	1,245,559	1,255,026	1,266,072
Engineering technologies	15,410	15,366	15,637	15,591	15,341	15,649	15,327	15,894	16,164	16,454	16,843	17,790	18,231	18,322	17,915	18,253
Male																
All fields	536,059	537,421	555,640	578,937	601,588	618,758	636,559	655,393	673,788	691,428	713,336	740,357	772,175	794,852	809,453	820,426
S&E	197,650	197,771	204,675	219,815	227,861	233,924	238,029	241,697	246,719	250,742	261,091	275,258	291,791	305,777	318,015	327,122
Engineering	47,281	47,302	47,923	50,809	51,417	52,949	54,889	55,621	56,987	57,850	60,706	63,441	67,282	70,878	75,324	79,849
Aerospace	1,029	1,194	1,435	1,633	1,905	1,980	2,252	2,376	2,493	2,600	2,744	2,903	3,082	3,011	3,077	3,356
Chemical	4,016	4,033	3,823	3,532	3,352	3,113	3,179	3,338	3,670	3,977	4,543	5,228	5,809	6,260	6,729	7,651
Civil	7,246	6,908	6,667	7,118	7,121	7,451	8,241	8,819	9,491	10,032	10,589	11,562	11,747	12,226	11,850	11,595
Electrical	15,325	15,817	16,240	17,839	18,331	18,614	17,346	16,438	15,450	14,578	14,550	14,744	15,457	16,345	17,660	18,816
Industrial	2,630	2,589	2,636	2,625	2,543	2,666	2,716	2,473	2,557	2,823	3,048	3,129	3,413	3,497	3,869	4,176
Materials	704	667	648	674	595	624	737	753	878	807	844	819	954	1,018	1,101	1,214
Mechanical	11,309	11,401	11,574	12,170	12,395	12,933	14,050	14,894	15,592	15,671	16,695	17,262	18,351	19,613	21,572	23,299

## CHAPTER 2 | Higher Education in Science and Engineering

Sex and field	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Other	5,022	4,693	4,900	5,218	5,175	5,568	6,368	6,530	6,856	7,362	7,693	7,794	8,469	8,908	9,466	9,742
Science	150,369	150,469	156,752	169,006	176,444	180,975	183,140	186,076	189,732	192,892	200,385	211,817	224,509	234,899	242,691	247,273
Natural sciences	80,832	82,030	85,578	92,543	95,462	95,606	94,589	95,924	96,002	97,915	102,530	109,549	118,519	126,982	134,324	140,610
Agricultural sciences	9,780	8,975	8,725	8,740	8,336	8,383	8,398	8,781	9,017	9,334	9,691	10,904	11,616	12,783	13,271	13,226
Biological sciences	26,936	24,972	24,030	24,023	24,319	25,698	27,917	31,347	33,136	34,477	36,737	37,860	40,683	42,732	44,811	46,554
Earth, atmospheric, and ocean sciences	2,413	2,346	2,282	2,298	2,256	2,299	2,341	2,399	2,559	2,774	2,913	3,219	3,570	3,891	4,134	4,454
Atmospheric sciences	376	324	374	386	369	436	432	483	473	486	455	461	472	500	493	469
Earth sciences	1,950	1,934	1,788	1,846	1,812	1,795	1,873	1,857	2,023	2,209	2,365	2,650	2,978	3,270	3,508	3,835
Oceanography	87	88	120	66	75	68	36	59	63	79	93	108	120	121	133	150
Mathematics and computer sciences	33,113	37,500	42,518	49,251	52,330	50,636	46,496	43,376	40,922	40,839	42,385	46,162	50,513	54,647	58,701	62,660
Computer sciences	26,997	31,549	36,016	42,258	44,902	42,429	38,061	34,652	32,038	31,602	32,801	35,886	39,230	42,377	45,986	49,446
Mathematics and statistics	6,116	5,951	6,502	6,993	7,428	8,207	8,435	8,724	8,884	9,237	9,584	10,276	11,283	12,270	12,715	13,214
Physical sciences	8,590	8,237	8,023	8,231	8,221	8,590	9,437	10,021	10,368	10,491	10,804	11,404	12,137	12,929	13,407	13,716
Astronomy	106	145	160	161	169	188	235	200	226	189	248	228	239	229	259	249
Chemistry	5,483	5,041	4,716	4,649	4,548	4,779	5,253	5,636	5,923	6,038	6,176	6,560	6,984	7,306	7,585	7,561
Physics	2,638	2,692	2,817	3,076	3,233	3,299	3,621	3,846	3,888	3,917	3,985	4,220	4,495	4,945	5,097	5,462
Other physical sciences	363	359	330	345	271	324	328	339	331	347	395	396	419	449	466	444
Social and behavioral sciences	69,537	68,439	71,174	76,463	80,982	85,369	88,551	90,152	93,730	94,977	97,855	102,268	105,990	107,917	108,367	106,663

## CHAPTER 2 | Higher Education in Science and Engineering

Sex and field	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Psychology	17,542	16,694	17,389	17,629	18,322	19,099	19,975	20,446	21,307	21,579	22,410	23,401	25,590	27,044	27,554	27,080
Social sciences	51,995	51,745	53,785	58,834	62,660	66,270	68,576	69,706	72,423	73,398	75,445	78,867	80,400	80,873	80,813	79,583
Anthropology	2,315	2,192	2,272	2,313	2,350	2,362	2,494	2,456	2,733	2,723	2,863	2,998	3,201	3,361	3,219	2,814
Area and ethnic studies	2,043	1,904	2,032	2,055	2,163	2,345	2,463	2,561	2,626	2,732	2,663	2,763	2,715	2,598	2,421	2,242
Economics	13,016	13,450	14,436	15,773	16,650	17,021	17,043	17,195	18,237	19,282	20,195	20,826	20,677	20,849	21,823	23,684
History of science	40	45	40	49	67	53	46	44	51	48	34	60	49	42	52	59
Linguistics	226	245	243	290	330	324	447	461	502	503	558	573	689	692	708	700
Political science and public administration	18,063	17,999	18,822	21,274	23,101	25,130	26,462	27,053	27,734	27,184	27,850	28,975	29,267	28,771	28,178	27,024
Sociology	7,657	7,437	7,299	7,558	7,718	8,430	8,548	8,698	8,787	8,707	8,858	8,988	9,433	9,507	9,598	9,154
Other social sciences	8,635	8,473	8,641	9,522	10,281	10,605	11,073	11,238	11,753	12,219	12,424	13,684	14,369	15,053	14,814	13,906
Non-S&E	338,409	339,650	350,965	359,122	373,727	384,834	398,530	413,696	427,069	440,686	452,245	465,099	480,384	489,075	491,438	493,304
Engineering technologies	13,448	13,286	13,480	13,276	13,195	13,425	13,274	13,989	14,160	14,487	14,788	15,590	16,062	16,089	15,757	15,858
Female																
All fields	718,559	722,887	753,330	786,757	815,833	837,643	866,363	886,311	906,625	927,600	954,891	993,872	1,038,472	1,066,182	1,081,488	1,095,703
S&E	200,952	202,664	211,308	222,940	230,797	236,290	240,829	244,075	249,449	254,693	264,283	279,107	297,539	309,698	317,900	322,935
Engineering	12,206	11,912	12,682	12,980	13,263	13,203	13,338	12,653	12,921	12,750	13,693	14,658	15,981	16,934	18,626	20,057
Aerospace	238	304	312	384	413	404	501	452	441	437	463	439	463	479	488	515
Chemical	2,203	2,055	2,123	2,013	1,833	1,776	1,678	1,743	1,834	1,917	2,149	2,307	2,535	2,657	2,977	3,186

## CHAPTER 2 | Higher Education in Science and Engineering

Sex and field	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Civil	2,325	2,041	2,224	2,249	2,279	2,349	2,422	2,499	2,752	2,755	2,893	3,278	3,428	3,656	3,701	3,779
Electrical	2,350	2,542	2,717	2,918	3,043	2,845	2,587	2,109	1,907	1,606	1,740	1,741	1,923	2,067	2,331	2,541
Industrial	1,307	1,223	1,341	1,312	1,265	1,270	1,174	1,056	1,009	1,056	1,136	1,164	1,276	1,282	1,454	1,637
Materials	268	263	285	276	270	282	269	272	272	263	294	321	368	430	412	473
Mechanical	1,782	1,738	1,779	1,859	1,947	1,947	2,113	2,017	2,093	1,972	2,163	2,208	2,538	2,687	3,107	3,443
Other	1,733	1,746	1,901	1,969	2,213	2,330	2,594	2,505	2,613	2,744	2,855	3,200	3,450	3,676	4,156	4,483
Science	188,746	190,752	198,626	209,960	217,534	223,087	227,491	231,422	236,528	241,943	250,590	264,449	281,558	292,764	299,274	302,878
Natural sciences	70,130	70,593	73,397	77,525	78,171	77,854	79,377	80,351	81,599	83,999	87,628	92,968	100,506	106,050	111,300	117,055
Agricultural sciences	8,465	8,490	8,634	8,963	8,722	8,737	8,909	8,915	9,457	9,818	10,709	11,855	13,444	14,826	15,525	16,234
Biological sciences	37,951	37,038	37,645	39,494	40,431	42,274	45,055	48,001	49,262	51,097	52,878	55,794	59,217	61,971	64,709	68,570
Earth, atmospheric, and ocean sciences	1,606	1,622	1,702	1,651	1,647	1,660	1,646	1,678	1,755	1,768	1,889	2,080	2,295	2,400	2,596	2,701
Atmospheric sciences	114	132	151	176	203	241	219	262	263	235	236	217	263	249	258	265
Earth sciences	1,409	1,400	1,446	1,406	1,358	1,351	1,358	1,336	1,430	1,470	1,566	1,760	1,926	2,032	2,216	2,327
Oceanography	83	90	105	69	86	68	69	80	62	63	87	103	106	119	122	109
Mathematics and computer sciences	16,120	17,534	19,442	21,538	21,373	18,768	16,814	14,771	13,841	13,865	14,554	15,445	17,266	18,506	19,655	20,785
Computer sciences	10,522	12,048	13,690	15,668	15,066	12,159	9,939	7,944	6,884	6,894	7,306	7,700	8,730	9,209	10,144	10,863
Mathematics and statistics	5,598	5,486	5,752	5,870	6,307	6,609	6,875	6,827	6,957	6,971	7,248	7,745	8,536	9,297	9,511	9,922
Physical sciences	5,988	5,909	5,974	5,879	5,998	6,415	6,953	6,986	7,284	7,451	7,598	7,794	8,284	8,347	8,815	8,765

## CHAPTER 2 | Higher Education in Science and Engineering

Sex and field	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Astronomy	54	95	116	110	123	143	131	132	120	146	140	136	153	128	170	144
Chemistry	4,905	4,774	4,723	4,680	4,752	5,144	5,634	5,614	5,909	6,106	6,162	6,328	6,730	6,718	7,097	7,108
Physics	724	755	824	837	907	900	945	1,024	988	925	1,015	1,001	1,062	1,162	1,186	1,219
Other physical sciences	305	285	311	252	216	228	243	216	267	274	281	329	339	339	362	294
Social and behavioral sciences	118,616	120,159	125,229	132,435	139,363	145,233	148,114	151,071	154,929	157,944	162,962	171,481	181,052	186,714	187,974	185,823
Psychology	57,114	57,430	59,908	61,534	64,284	66,932	68,576	70,052	71,682	73,164	75,336	78,167	84,126	88,329	90,851	91,688
Social sciences	61,502	62,729	65,321	70,901	75,079	78,301	79,538	81,019	83,247	84,780	87,626	93,314	96,926	98,385	97,123	94,135
Anthropology	4,742	4,706	4,926	5,230	5,281	5,380	5,606	5,630	6,120	6,430	6,703	7,024	7,927	8,175	8,083	7,351
Area and ethnic studies	3,571	3,653	3,803	3,690	4,081	4,267	4,512	4,559	4,697	4,866	4,701	5,054	5,145	4,987	4,683	4,378
Economics	6,384	6,921	7,387	8,093	8,277	8,139	7,664	7,630	8,044	8,346	8,895	9,187	8,780	9,185	9,762	10,660
History of science	52	56	63	54	73	64	67	70	52	52	76	78	73	77	81	72
Linguistics	490	512	604	624	717	729	754	879	1,003	975	1,124	1,235	1,420	1,492	1,517	1,575
Political science and public administration	18,321	18,651	19,743	22,522	24,408	26,410	27,127	27,545	28,155	28,135	29,799	30,777	31,493	31,473	31,082	29,790
Sociology	18,028	17,920	17,997	18,642	19,302	20,126	19,993	20,352	20,121	20,129	20,142	20,626	21,169	21,522	21,074	20,389
Other social sciences	9,914	10,310	10,798	12,046	12,940	13,186	13,815	14,354	15,055	15,847	16,186	19,333	20,919	21,474	20,841	19,920
Non-S&E	517,607	520,223	542,022	563,817	585,036	601,353	625,534	642,236	657,176	672,907	690,608	714,765	740,933	756,484	763,588	772,768
Engineering technologies	1,962	2,080	2,157	2,315	2,146	2,224	2,053	1,905	2,004	1,967	2,055	2,200	2,169	2,233	2,158	2,395

## CHAPTER 2 | Higher Education in Science and Engineering

### Note(s)

Engineering technologies are focused more on applied skills than on fundamental science and mathematics. Data are based on degree-granting institutions eligible to participate in Title IV federal financial aid programs and do not match previously published data from *Science and Engineering Indicators 2008* and earlier years that were based on accredited higher education institutions.

### Source(s)

National Center for Education Statistics, Integrated Postsecondary Education Data System (IPEDS), Completions Survey; National Science Foundation, National Center for Science and Engineering Statistics, Integrated Science and Engineering Resources Data System (WebCASPAR), <https://ncesdata.nsf.gov/webcaspar/>.

*Science and Engineering Indicators 2018*



## CHAPTER 2 | Higher Education in Science and Engineering

APPENDIX TABLE 2-22

### Earned bachelor's degrees, by citizenship, field, race, and ethnicity: 2000–15

(Number)

Citizenship, field, race, and ethnicity	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
All citizenships, races, and ethnicities																
All fields	1,254,618	1,260,308	1,308,970	1,365,694	1,417,421	1,456,401	1,502,922	1,541,704	1,580,413	1,619,028	1,668,227	1,734,229	1,810,647	1,861,034	1,890,941	1,916,129
S&E	398,602	400,435	415,983	442,755	458,658	470,214	478,858	485,772	496,168	505,435	525,374	554,365	589,330	615,475	635,915	650,057
Engineering	59,487	59,214	60,605	63,789	64,680	66,152	68,227	68,274	69,908	70,600	74,399	78,099	83,263	87,812	93,950	99,906
Aerospace	1,267	1,498	1,747	2,017	2,318	2,384	2,753	2,828	2,934	3,037	3,207	3,342	3,545	3,490	3,565	3,871
Chemical	6,219	6,088	5,946	5,545	5,185	4,889	4,857	5,081	5,504	5,894	6,692	7,535	8,344	8,917	9,706	10,837
Civil	9,571	8,949	8,891	9,367	9,400	9,800	10,663	11,318	12,243	12,787	13,482	14,840	15,175	15,882	15,551	15,374
Electrical	17,675	18,359	18,957	20,757	21,374	21,459	19,933	18,547	17,357	16,184	16,290	16,485	17,380	18,412	19,991	21,357
Industrial	3,937	3,812	3,977	3,937	3,808	3,936	3,890	3,529	3,566	3,879	4,184	4,293	4,689	4,779	5,323	5,813
Materials	972	930	933	950	865	906	1,006	1,025	1,150	1,070	1,138	1,140	1,322	1,448	1,513	1,687
Mechanical	13,091	13,139	13,353	14,029	14,342	14,880	16,163	16,911	17,685	17,643	18,858	19,470	20,889	22,300	24,679	26,742
Other	6,755	6,439	6,801	7,187	7,388	7,898	8,962	9,035	9,469	10,106	10,548	10,994	11,919	12,584	13,622	14,225
Science	339,115	341,221	355,378	378,966	393,978	404,062	410,631	417,498	426,260	434,835	450,975	476,266	506,067	527,663	541,965	550,151
Natural sciences	150,962	152,623	158,975	170,068	173,633	173,460	173,966	176,275	177,601	181,914	190,158	202,517	219,025	233,032	245,624	257,665
Agricultural sciences	18,245	17,465	17,359	17,703	17,058	17,120	17,307	17,696	18,474	19,152	20,400	22,759	25,060	27,609	28,796	29,460
Biological sciences	64,887	62,010	61,675	63,517	64,750	67,972	72,972	79,348	82,398	85,574	89,615	93,654	99,900	104,703	109,520	115,124

## CHAPTER 2 | Higher Education in Science and Engineering

Citizenship, field, race, and ethnicity	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Earth, atmospheric, and ocean sciences	4,019	3,968	3,984	3,949	3,903	3,959	3,987	4,077	4,314	4,542	4,802	5,299	5,865	6,291	6,730	7,155
Atmospheric sciences	490	456	525	562	572	677	651	745	736	721	691	678	735	749	751	734
Earth sciences	3,359	3,334	3,234	3,252	3,170	3,146	3,231	3,193	3,453	3,679	3,931	4,410	4,904	5,302	5,724	6,162
Oceanography	170	178	225	135	161	136	105	139	125	142	180	211	226	240	255	259
Mathematics and computer sciences	49,233	55,034	61,960	70,789	73,703	69,404	63,310	58,147	54,763	54,704	56,939	61,607	67,779	73,153	78,356	83,445
Computer sciences	37,519	43,597	49,706	57,926	59,968	54,588	48,000	42,596	38,922	38,496	40,107	43,586	47,960	51,586	56,130	60,309
Mathematics	11,714	11,437	12,254	12,863	13,735	14,816	15,310	15,551	15,841	16,208	16,832	18,021	19,819	21,567	22,226	23,136
Physical sciences	14,578	14,146	13,997	14,110	14,219	15,005	16,390	17,007	17,652	17,942	18,402	19,198	20,421	21,276	22,222	22,481
Astronomy	160	240	276	271	292	331	366	332	346	335	388	364	392	357	429	393
Chemistry	10,388	9,815	9,439	9,329	9,300	9,923	10,887	11,250	11,832	12,144	12,338	12,888	13,714	14,024	14,682	14,669
Physics	3,362	3,447	3,641	3,913	4,140	4,199	4,566	4,870	4,876	4,842	5,000	5,221	5,557	6,107	6,283	6,681
Other physical sciences	668	644	641	597	487	552	571	555	598	621	676	725	758	788	828	738
Social and behavioral sciences	188,153	188,598	196,403	208,898	220,345	230,602	236,665	241,223	248,659	252,921	260,817	273,749	287,042	294,631	296,341	292,486
Psychology	74,656	74,124	77,297	79,163	82,606	86,031	88,551	90,498	92,989	94,743	97,746	101,568	109,716	115,373	118,405	118,768
Social sciences	113,497	114,474	119,106	129,735	137,739	144,571	148,114	150,725	155,670	158,178	163,071	172,181	177,326	179,258	177,936	173,718
Anthropology	7,057	6,898	7,198	7,543	7,631	7,742	8,100	8,086	8,853	9,153	9,566	10,022	11,128	11,536	11,302	10,165
Area and ethnic studies	5,614	5,557	5,835	5,745	6,244	6,612	6,975	7,120	7,323	7,598	7,364	7,817	7,860	7,585	7,104	6,620
Economics	19,400	20,371	21,823	23,866	24,927	25,160	24,707	24,825	26,281	27,628	29,090	30,013	29,457	30,034	31,585	34,344

## CHAPTER 2 | Higher Education in Science and Engineering

Citizenship, field, race, and ethnicity	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
History of science	92	101	103	103	140	117	113	114	103	100	110	138	122	119	133	131
Linguistics	716	757	847	914	1,047	1,053	1,201	1,340	1,505	1,478	1,682	1,808	2,109	2,184	2,225	2,275
Political science and public administration	36,384	36,650	38,565	43,796	47,509	51,540	53,589	54,598	55,889	55,319	57,649	59,752	60,760	60,244	59,260	56,814
Sociology	25,685	25,357	25,296	26,200	27,020	28,556	28,541	29,050	28,908	28,836	29,000	29,614	30,602	31,029	30,672	29,543
Other social sciences	18,549	18,783	19,439	21,568	23,221	23,791	24,888	25,592	26,808	28,066	28,610	33,017	35,288	36,527	35,655	33,826
Non-S&E	856,016	859,873	892,987	922,939	958,763	986,187	1,024,064	1,055,932	1,084,245	1,113,593	1,142,853	1,179,864	1,221,317	1,245,559	1,255,026	1,266,072
Engineering technologies	15,410	15,366	15,637	15,591	15,341	15,649	15,327	15,894	16,164	16,454	16,843	17,790	18,231	18,322	17,915	18,253
U.S. citizen or permanent resident																
All fields	1,215,514	1,220,465	1,267,462	1,322,430	1,372,577	1,411,002	1,456,517	1,495,740	1,536,007	1,573,094	1,620,629	1,681,535	1,751,037	1,796,133	1,821,458	1,840,490
S&E	383,407	384,714	399,639	424,857	439,833	451,655	460,604	468,379	479,642	488,380	507,143	533,567	565,448	588,952	606,611	617,418
Engineering	54,955	54,795	56,339	59,512	60,130	61,412	63,516	63,885	65,728	66,529	69,897	72,848	76,932	81,065	86,394	91,351
Aerospace	1,146	1,350	1,625	1,857	2,144	2,213	2,606	2,653	2,783	2,859	2,990	3,097	3,278	3,217	3,269	3,599
Chemical	5,774	5,664	5,499	5,186	4,817	4,478	4,421	4,651	5,040	5,376	6,100	6,771	7,445	7,914	8,643	9,667
Civil	9,113	8,537	8,520	9,018	9,085	9,473	10,321	10,992	11,870	12,419	12,987	14,281	14,466	15,079	14,601	14,312
Electrical	15,839	16,517	17,089	18,703	19,098	19,138	17,757	16,668	15,768	14,759	14,871	14,786	15,381	16,396	17,830	18,847
Industrial	3,456	3,337	3,535	3,535	3,427	3,541	3,462	3,154	3,160	3,510	3,751	3,847	4,108	4,195	4,639	5,057
Materials	935	888	904	919	836	866	960	976	1,105	1,006	1,076	1,070	1,242	1,328	1,364	1,525
Mechanical	12,302	12,395	12,670	13,433	13,728	14,233	15,513	16,198	16,971	16,928	18,057	18,590	19,770	21,041	23,209	24,987

## CHAPTER 2 | Higher Education in Science and Engineering

Citizenship, field, race, and ethnicity	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Other	6,390	6,107	6,497	6,861	6,995	7,470	8,476	8,593	9,031	9,672	10,065	10,406	11,242	11,895	12,839	13,357
Science	328,452	329,919	343,300	365,345	379,703	390,243	397,088	404,494	413,914	421,851	437,246	460,719	488,516	507,887	520,217	526,067
Natural sciences	145,371	146,503	152,293	162,204	165,350	165,719	166,833	169,717	171,634	175,706	183,534	195,008	210,445	223,434	235,251	246,079
Agricultural sciences	17,987	17,217	17,097	17,433	16,807	16,846	17,041	17,414	18,246	18,909	20,111	22,417	24,686	27,094	28,227	28,856
Biological sciences	63,511	60,574	60,220	61,979	63,099	66,005	70,853	77,015	80,068	83,145	87,060	90,873	97,030	101,663	106,601	112,089
Earth, atmospheric, and ocean sciences	3,973	3,919	3,925	3,892	3,853	3,879	3,911	4,019	4,244	4,460	4,698	5,177	5,749	6,110	6,504	6,936
Atmospheric sciences	482	454	519	554	569	667	646	736	731	713	685	673	726	733	736	721
Earth sciences	3,326	3,288	3,185	3,204	3,125	3,081	3,166	3,146	3,389	3,605	3,835	4,293	4,800	5,140	5,517	5,956
Oceanography	165	177	221	134	159	131	99	137	124	142	178	211	223	237	251	259
Mathematics and computer sciences	45,854	51,203	57,597	65,313	67,963	64,652	59,402	55,004	52,197	52,046	54,064	58,223	63,524	68,379	72,834	76,942
Computer sciences	34,619	40,192	45,797	53,072	54,908	50,597	44,901	40,163	37,118	36,677	38,240	41,558	45,595	49,204	53,311	56,940
Mathematics	11,235	11,011	11,800	12,241	13,055	14,055	14,501	14,841	15,079	15,369	15,824	16,665	17,929	19,175	19,523	20,002
Physical sciences	14,046	13,590	13,454	13,587	13,628	14,337	15,626	16,265	16,879	17,146	17,601	18,318	19,456	20,188	21,085	21,256
Astronomy	156	227	260	256	282	311	353	319	330	322	375	348	384	345	401	377
Chemistry	10,044	9,480	9,097	9,003	8,950	9,526	10,421	10,799	11,364	11,615	11,791	12,315	13,115	13,331	13,937	13,907
Physics	3,202	3,267	3,475	3,745	3,951	3,999	4,323	4,647	4,647	4,633	4,793	4,966	5,231	5,758	5,952	6,267
Other physical sciences	644	616	622	583	445	501	529	500	538	576	642	689	726	754	795	705
Social and behavioral sciences	183,081	183,416	191,007	203,141	214,353	224,524	230,255	234,777	242,280	246,145	253,712	265,711	278,071	284,453	284,966	279,988

## CHAPTER 2 | Higher Education in Science and Engineering

Citizenship, field, race, and ethnicity	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Psychology	73,392	72,841	75,928	77,769	81,131	84,528	86,971	88,939	91,515	93,135	96,052	99,892	107,712	113,144	115,945	116,211
Social sciences	109,689	110,575	115,079	125,372	133,222	139,996	143,284	145,838	150,765	153,010	157,660	165,819	170,359	171,309	169,021	163,777
Anthropology	6,941	6,778	7,084	7,449	7,525	7,627	7,977	7,976	8,729	9,053	9,448	9,924	11,006	11,431	11,151	10,028
Area and ethnic studies	5,436	5,393	5,677	5,585	6,080	6,449	6,800	6,921	7,152	7,363	7,167	7,607	7,630	7,387	6,850	6,377
Economics	17,709	18,548	19,920	21,820	22,758	22,961	22,571	22,691	24,083	25,247	26,372	26,690	25,672	25,495	26,421	28,437
History of science	91	98	101	100	140	116	110	110	102	99	109	137	121	117	130	129
Linguistics	633	680	766	834	973	976	1,127	1,281	1,420	1,400	1,607	1,723	2,004	2,094	2,128	2,167
Political science and public administration	35,232	35,501	37,398	42,510	46,202	50,271	52,110	53,181	54,437	53,858	56,176	58,051	59,088	58,442	57,410	54,821
Sociology	25,386	25,099	25,001	25,851	26,693	28,227	28,151	28,652	28,543	28,480	28,633	29,243	30,163	30,544	30,125	28,959
Other social sciences	18,261	18,478	19,132	21,223	22,851	23,369	24,438	25,026	26,299	27,510	28,148	32,444	34,675	35,799	34,806	32,859
Non-S&E	832,107	835,751	867,823	897,573	932,744	959,347	995,913	1,027,361	1,056,365	1,084,714	1,113,486	1,147,968	1,185,589	1,207,181	1,214,847	1,223,072
Engineering technologies	14,967	14,823	15,171	15,132	14,825	15,161	14,949	15,515	15,793	16,009	16,415	17,340	17,715	17,676	17,252	17,368
Hispanic or Latino <sup>a</sup>																
All fields	88,445	90,232	95,492	101,030	106,388	111,616	118,057	124,787	131,695	137,746	147,205	159,936	176,699	194,919	211,710	226,900
S&E	27,980	28,361	29,935	32,533	33,748	35,662	37,049	38,546	40,877	43,018	46,336	51,421	58,146	65,726	73,179	79,203
Engineering	4,075	4,015	4,136	4,358	4,483	4,628	4,928	4,962	5,234	5,577	5,948	6,317	7,173	7,907	8,984	9,960
Aerospace	67	92	97	110	121	139	153	172	172	194	232	217	279	288	345	396
Chemical	380	341	353	320	313	333	345	326	375	405	446	478	606	638	714	814

## CHAPTER 2 | Higher Education in Science and Engineering

Citizenship, field, race, and ethnicity	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Civil	762	742	761	798	836	888	952	1,006	1,079	1,269	1,338	1,428	1,586	1,802	1,825	1,887
Electrical	1,283	1,301	1,411	1,428	1,564	1,535	1,563	1,521	1,467	1,484	1,404	1,548	1,710	1,790	2,150	2,303
Industrial	391	356	372	365	332	364	391	337	326	428	431	463	540	543	605	646
Materials	38	34	33	50	52	59	58	40	58	48	57	50	91	81	104	99
Mechanical	846	880	819	950	935	962	1,050	1,147	1,301	1,183	1,449	1,516	1,712	1,970	2,345	2,765
Other	308	269	290	337	330	348	416	413	456	566	591	617	649	795	896	1,050
Science	23,905	24,346	25,799	28,175	29,265	31,034	32,121	33,584	35,643	37,441	40,388	45,104	50,973	57,819	64,195	69,243
Natural sciences	8,842	9,202	9,476	10,767	10,736	10,968	11,099	11,312	12,153	12,720	13,659	15,231	17,536	20,142	23,072	25,845
Agricultural sciences	635	607	662	686	673	710	651	776	997	969	999	1,236	1,407	1,815	1,983	2,236
Biological sciences	4,446	4,547	4,367	4,840	4,611	4,819	5,084	5,453	5,995	6,384	7,124	7,761	8,891	10,081	11,542	13,171
Earth, atmospheric, and ocean sciences	125	157	136	119	131	151	143	135	192	221	246	265	323	390	495	539
Atmospheric sciences	9	15	10	10	13	20	20	18	30	42	31	29	36	33	56	46
Earth sciences	105	130	109	103	112	121	120	113	155	172	200	223	274	343	422	466
Oceanography	11	12	17	6	6	10	3	4	7	7	15	13	13	14	17	27
Mathematics and computer sciences	2,753	3,021	3,448	4,261	4,436	4,350	4,232	3,916	3,847	3,977	4,129	4,691	5,487	6,223	7,224	7,849
Computer sciences	2,154	2,396	2,776	3,590	3,758	3,529	3,351	2,970	2,923	2,999	3,124	3,539	4,210	4,719	5,469	5,912
Mathematics and statistics	599	625	672	671	678	821	881	946	924	978	1,005	1,152	1,277	1,504	1,755	1,937

## CHAPTER 2 | Higher Education in Science and Engineering

Citizenship, field, race, and ethnicity	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Physical sciences	883	870	863	861	885	938	989	1,032	1,122	1,169	1,161	1,278	1,428	1,633	1,828	2,050
Astronomy	7	16	10	12	23	17	12	18	30	21	33	26	21	31	36	38
Chemistry	719	669	666	669	651	704	739	748	830	879	841	940	1,052	1,104	1,273	1,416
Physics	125	151	156	164	187	183	206	246	229	235	258	276	314	426	446	528
Other physical sciences	32	34	31	16	24	34	32	20	33	34	29	36	41	72	73	68
Social and behavioral sciences	15,063	15,144	16,323	17,408	18,529	20,066	21,022	22,272	23,490	24,721	26,729	29,873	33,437	37,677	41,123	43,398
Psychology	6,127	6,178	6,695	6,828	7,285	7,708	8,236	8,506	8,885	9,615	10,412	11,667	13,353	15,389	17,580	18,799
Social sciences	8,936	8,966	9,628	10,580	11,244	12,358	12,786	13,766	14,605	15,106	16,317	18,206	20,084	22,288	23,543	24,599
Anthropology	462	465	494	533	568	578	607	636	723	775	873	1,056	1,200	1,394	1,503	1,548
Area and ethnic studies	659	648	688	717	756	827	926	971	972	1,007	1,021	1,185	1,261	1,294	1,305	1,229
Economics	976	1,030	1,068	1,188	1,290	1,352	1,423	1,510	1,540	1,616	1,836	1,835	2,047	2,205	2,396	2,821
History of science	3	5	7	4	7	6	5	5	2	3	5	13	8	7	9	12
Linguistics	42	45	39	48	71	68	80	101	120	121	141	165	216	254	288	312
Political science and public administration	2,973	2,925	3,135	3,586	3,872	4,583	4,531	5,105	5,382	5,496	5,768	6,422	6,889	7,607	7,935	8,068
Sociology	2,317	2,291	2,440	2,555	2,665	2,874	2,969	3,150	3,283	3,398	3,746	4,065	4,603	5,198	5,438	5,699
Other social sciences	1,504	1,557	1,757	1,949	2,015	2,070	2,245	2,288	2,583	2,690	2,927	3,465	3,860	4,329	4,669	4,910
Non-S&E	60,465	61,871	65,557	68,497	72,640	75,954	81,008	86,241	90,818	94,728	100,869	108,515	118,553	129,193	138,531	147,697
Engineering technologies	1,123	1,146	1,187	1,290	1,215	1,210	1,098	1,148	1,315	1,242	1,353	1,502	1,565	1,801	1,794	1,888

## CHAPTER 2 | Higher Education in Science and Engineering

Citizenship, field, race, and ethnicity	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Not Hispanic or Latino																
All fields	1,127,069	1,130,233	1,171,970	1,221,400	1,266,189	1,299,386	1,338,460	1,370,953	1,404,312	1,435,348	1,473,424	1,521,599	1,574,338	1,601,214	1,609,748	1,613,590
S&E	355,427	356,353	369,704	392,324	406,085	415,993	423,555	429,833	438,765	445,362	460,807	482,146	507,302	523,226	533,432	538,215
Engineering	50,880	50,780	52,203	55,154	55,647	56,784	58,588	58,923	60,494	60,952	63,949	66,531	69,759	73,158	77,410	81,391
Aerospace	1,079	1,258	1,528	1,747	2,023	2,074	2,453	2,481	2,611	2,665	2,758	2,880	2,999	2,929	2,924	3,203
Chemical	5,394	5,323	5,146	4,866	4,504	4,145	4,076	4,325	4,665	4,971	5,654	6,293	6,839	7,276	7,929	8,853
Civil	8,351	7,795	7,759	8,220	8,249	8,585	9,369	9,986	10,791	11,150	11,649	12,853	12,880	13,277	12,776	12,425
Electrical	14,556	15,216	15,678	17,275	17,534	17,603	16,194	15,147	14,301	13,275	13,467	13,238	13,671	14,606	15,680	16,544
Industrial	3,065	2,981	3,163	3,170	3,095	3,177	3,071	2,817	2,834	3,082	3,320	3,384	3,568	3,652	4,034	4,411
Materials	897	854	871	869	784	807	902	936	1,047	958	1,019	1,020	1,151	1,247	1,260	1,426
Mechanical	11,456	11,515	11,851	12,483	12,793	13,271	14,463	15,051	15,670	15,745	16,608	17,074	18,058	19,071	20,864	22,222
Other	6,082	5,838	6,207	6,524	6,665	7,122	8,060	8,180	8,575	9,106	9,474	9,789	10,593	11,100	11,943	12,307
Science	304,547	305,573	317,501	337,170	350,438	359,209	364,967	370,910	378,271	384,410	396,858	415,615	437,543	450,068	456,022	456,824
Natural sciences	136,529	137,301	142,817	151,437	154,614	154,751	155,734	158,405	159,481	162,986	169,875	179,777	192,909	203,292	212,179	220,234
Agricultural sciences	17,352	16,610	16,435	16,747	16,134	16,136	16,390	16,638	17,249	17,940	19,112	21,181	23,279	25,279	26,244	26,620
Biological sciences	59,065	56,027	55,853	57,139	58,488	61,186	65,769	71,562	74,073	76,761	79,936	83,112	88,139	91,582	95,059	98,918
Earth, atmospheric, and ocean sciences	3,848	3,762	3,789	3,773	3,722	3,728	3,768	3,884	4,052	4,239	4,452	4,912	5,426	5,720	6,009	6,397
Atmospheric sciences	473	439	509	544	556	647	626	718	701	671	654	644	690	700	680	675



## CHAPTER 2 | Higher Education in Science and Engineering

Citizenship, field, race, and ethnicity	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Earth sciences	3,221	3,158	3,076	3,101	3,013	2,960	3,046	3,033	3,234	3,433	3,635	4,070	4,526	4,797	5,095	5,490
Oceanography	154	165	204	128	153	121	96	133	117	135	163	198	210	223	234	232
Mathematics and computer sciences	43,101	48,182	54,149	61,052	63,527	60,302	55,170	51,088	48,350	48,069	49,935	53,532	58,037	62,156	65,610	69,093
Computer sciences	32,465	37,796	43,021	49,482	51,150	47,068	41,550	37,193	34,195	33,678	35,116	38,019	41,385	44,485	47,842	51,028
Mathematics and statistics	10,636	10,386	11,128	11,570	12,377	13,234	13,620	13,895	14,155	14,391	14,819	15,513	16,652	17,671	17,768	18,065
Physical sciences	13,163	12,720	12,591	12,726	12,743	13,399	14,637	15,233	15,757	15,977	16,440	17,040	18,028	18,555	19,257	19,206
Astronomy	149	211	250	244	259	294	341	301	300	301	342	322	363	314	365	339
Chemistry	9,325	8,811	8,431	8,334	8,299	8,822	9,682	10,051	10,534	10,736	10,950	11,375	12,063	12,227	12,664	12,491
Physics	3,077	3,116	3,319	3,581	3,764	3,816	4,117	4,401	4,418	4,398	4,535	4,690	4,917	5,332	5,506	5,739
Other physical sciences	612	582	591	567	421	467	497	480	505	542	613	653	685	682	722	637
Social and behavioral sciences	168,018	168,272	174,684	185,733	195,824	204,458	209,233	212,505	218,790	221,424	226,983	235,838	244,634	246,776	243,843	236,590
Psychology	67,265	66,663	69,233	70,941	73,846	76,820	78,735	80,433	82,630	83,520	85,640	88,225	94,359	97,755	98,365	97,412
Social sciences	100,753	101,609	105,451	114,792	121,978	127,638	130,498	132,072	136,160	137,904	141,343	147,613	150,275	149,021	145,478	139,178
Anthropology	6,479	6,313	6,590	6,916	6,957	7,049	7,370	7,340	8,006	8,278	8,575	8,868	9,806	10,037	9,648	8,480
Area and ethnic studies	4,777	4,745	4,989	4,868	5,324	5,622	5,874	5,950	6,180	6,356	6,146	6,422	6,369	6,093	5,545	5,148
Economics	16,733	17,518	18,852	20,632	21,468	21,609	21,148	21,181	22,543	23,631	24,536	24,855	23,625	23,290	24,025	25,616
History of science	88	93	94	96	133	110	105	105	100	96	104	124	113	110	121	117
Linguistics	591	635	727	786	902	908	1,047	1,180	1,300	1,279	1,466	1,558	1,788	1,840	1,840	1,855

## CHAPTER 2 | Higher Education in Science and Engineering

Citizenship, field, race, and ethnicity	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Political science and public administration	32,259	32,576	34,263	38,924	42,330	45,688	47,579	48,076	49,055	48,362	50,408	51,629	52,199	50,835	49,475	46,753
Sociology	23,069	22,808	22,561	23,296	24,028	25,353	25,182	25,502	25,260	25,082	24,887	25,178	25,560	25,346	24,687	23,260
Other social sciences	16,757	16,921	17,375	19,274	20,836	21,299	22,193	22,738	23,716	24,820	25,221	28,979	30,815	31,470	30,137	27,949
Non-S&E	771,642	773,880	802,266	829,076	860,104	883,393	914,905	941,120	965,547	989,986	1,012,617	1,039,453	1,067,036	1,077,988	1,076,316	1,075,375
Engineering technologies	13,844	13,677	13,984	13,842	13,610	13,951	13,851	14,367	14,478	14,767	15,062	15,838	16,150	15,875	15,458	15,480
American Indian or Alaska Native																
All fields	8,414	8,683	8,744	9,314	10,021	9,704	10,281	10,751	10,768	11,407	11,485	11,126	10,743	10,768	10,211	9,697
S&E	2,607	2,800	2,649	2,909	3,264	3,209	3,341	3,319	3,392	3,564	3,624	3,445	3,411	3,446	3,192	2,972
Engineering	326	256	308	320	333	349	353	305	344	347	366	322	309	356	320	316
Aerospace	7	8	17	10	23	16	14	9	16	19	20	16	17	10	11	12
Chemical	42	31	33	34	29	30	27	25	36	30	37	29	31	34	31	40
Civil	83	65	67	67	64	73	73	75	63	75	77	89	61	81	72	46
Electrical	81	56	70	99	88	84	69	61	81	72	76	55	56	69	62	49
Industrial	23	17	21	12	15	27	17	14	23	18	21	10	16	20	16	19
Materials	5	4	6	3	6	5	8	5	7	5	1	3	5	1	1	2
Mechanical	52	51	61	58	73	72	91	71	81	88	87	84	78	82	70	97
Other	33	24	33	37	35	42	54	45	37	40	47	36	45	59	57	51
Science	2,281	2,544	2,341	2,589	2,931	2,860	2,988	3,014	3,048	3,217	3,258	3,123	3,102	3,090	2,872	2,656

## CHAPTER 2 | Higher Education in Science and Engineering

Citizenship, field, race, and ethnicity	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Natural sciences	917	1,080	967	1,002	1,216	1,145	1,141	1,151	1,109	1,231	1,201	1,171	1,212	1,233	1,177	1,111
Agricultural sciences	190	215	158	163	188	161	186	165	172	207	175	182	213	225	193	206
Biological sciences	379	431	410	378	417	499	479	531	508	577	550	546	576	528	493	435
Earth, atmospheric, and ocean sciences	43	35	26	24	31	25	36	26	28	29	44	31	47	33	43	44
Atmospheric sciences	4	5	1	4	1	1	1	4	2	4	4	2	3	5	3	5
Earth sciences	35	29	23	18	30	23	35	21	26	24	39	29	44	26	39	36
Oceanography	4	1	2	2	0	1	0	1	0	1	1	0	0	2	1	3
Mathematics and computer sciences	240	326	290	343	504	357	338	312	294	284	324	310	289	344	339	349
Computer sciences	172	275	233	278	445	281	274	249	221	213	248	226	231	267	278	281
Mathematics and statistics	68	51	57	65	59	76	64	63	73	71	76	84	58	77	61	68
Physical sciences	65	73	83	94	76	103	102	117	107	134	108	102	87	103	109	77
Astronomy	2	2	2	4	1	3	1	1	1	2	3	1	3	5	0	0
Chemistry	49	47	57	71	50	65	73	90	80	94	66	68	59	69	79	64
Physics	12	19	21	17	20	33	24	22	22	32	35	31	23	25	27	10
Other physical sciences	2	5	3	2	5	2	4	4	4	6	4	2	2	4	3	3

## CHAPTER 2 | Higher Education in Science and Engineering

Citizenship, field, race, and ethnicity	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Social and behavioral sciences	1,364	1,464	1,374	1,587	1,715	1,715	1,847	1,863	1,939	1,986	2,057	1,952	1,890	1,857	1,695	1,545
Psychology	518	561	542	545	597	555	597	612	637	632	748	651	711	672	660	601
Social sciences	846	903	832	1,042	1,118	1,160	1,250	1,251	1,302	1,354	1,309	1,301	1,179	1,185	1,035	944
Anthropology	89	93	85	111	103	98	114	116	106	134	107	102	103	107	72	71
Area and ethnic studies	80	106	121	128	145	134	127	170	166	176	157	186	167	203	173	162
Economics	71	68	65	95	108	95	104	103	104	128	112	114	87	99	75	84
History of science	1	0	0	0	0	0	0	0	1	1	0	0	1	0	1	0
Linguistics	10	2	2	9	4	12	7	11	9	12	10	16	7	12	7	12
Political science and public administration	230	234	241	288	354	345	397	368	404	375	416	387	332	334	301	260
Sociology	220	225	184	244	228	259	271	249	268	299	267	228	228	211	202	165
Other social sciences	145	175	134	167	176	217	230	234	244	229	240	268	254	219	204	190
Non-S&E	5,807	5,883	6,095	6,405	6,757	6,495	6,940	7,432	7,376	7,843	7,861	7,681	7,332	7,322	7,019	6,725
Engineering technologies	110	129	102	126	195	96	132	138	112	142	132	152	145	163	149	155
Asian																
All fields	na	na	na	na	na	na	na	na	na	na	na	109,009	113,716	117,932	120,037	122,822
S&E	na	na	na	na	na	na	na	na	na	na	na	51,139	53,254	56,080	57,374	59,092
Engineering	na	na	na	na	na	na	na	na	na	na	na	8,658	9,081	9,947	10,078	10,734

## CHAPTER 2 | Higher Education in Science and Engineering

Citizenship, field, race, and ethnicity	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Aerospace	na	na	na	na	na	na	na	na	na	na	na	325	343	389	334	395
Chemical	na	na	na	na	na	na	na	na	na	na	na	898	1,040	1,125	1,133	1,344
Civil	na	na	na	na	na	na	na	na	na	na	na	1,227	1,214	1,344	1,218	1,223
Electrical	na	na	na	na	na	na	na	na	na	na	na	2,449	2,488	2,772	2,899	3,110
Industrial	na	na	na	na	na	na	na	na	na	na	na	390	390	420	419	455
Materials	na	na	na	na	na	na	na	na	na	na	na	145	157	202	183	224
Mechanical	na	na	na	na	na	na	na	na	na	na	na	1,566	1,686	1,876	1,946	2,079
Other	na	na	na	na	na	na	na	na	na	na	na	1,658	1,763	1,819	1,946	1,904
Science	na	na	na	na	na	na	na	na	na	na	na	42,481	44,173	46,133	47,296	48,358
Natural sciences	na	na	na	na	na	na	na	na	na	na	na	22,949	24,616	26,165	27,624	29,244
Agricultural sciences	na	na	na	na	na	na	na	na	na	na	na	898	1,039	1,115	1,123	1,156
Biological sciences	na	na	na	na	na	na	na	na	na	na	na	14,496	15,403	15,791	16,125	16,658
Earth, atmospheric, and ocean sciences	na	na	na	na	na	na	na	na	na	na	na	148	185	210	213	247
Atmospheric sciences	na	na	na	na	na	na	na	na	na	na	na	11	19	13	16	22
Earth sciences	na	na	na	na	na	na	na	na	na	na	na	129	150	188	180	213
Oceanography	na	na	na	na	na	na	na	na	na	na	na	8	16	9	17	12
Mathematics and computer sciences	na	na	na	na	na	na	na	na	na	na	na	5,244	5,664	6,619	7,564	8,670

## CHAPTER 2 | Higher Education in Science and Engineering

Citizenship, field, race, and ethnicity	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Computer sciences	na	na	na	na	na	na	na	na	na	na	na	3,439	3,819	4,520	5,364	6,326
Mathematics and statistics	na	na	na	na	na	na	na	na	na	na	na	1,805	1,845	2,099	2,200	2,344
Physical sciences	na	na	na	na	na	na	na	na	na	na	na	2,163	2,325	2,430	2,599	2,513
Astronomy	na	na	na	na	na	na	na	na	na	na	na	20	33	32	38	27
Chemistry	na	na	na	na	na	na	na	na	na	na	na	1,769	1,856	1,931	2,099	1,980
Physics	na	na	na	na	na	na	na	na	na	na	na	339	377	425	402	462
Other physical sciences	na	na	na	na	na	na	na	na	na	na	na	35	59	42	60	44
Social and behavioral sciences	na	na	na	na	na	na	na	na	na	na	na	19,532	19,557	19,968	19,672	19,114
Psychology	na	na	na	na	na	na	na	na	na	na	na	6,207	6,673	6,973	7,099	6,940
Social sciences	na	na	na	na	na	na	na	na	na	na	na	13,325	12,884	12,995	12,573	12,174
Anthropology	na	na	na	na	na	na	na	na	na	na	na	657	678	737	714	620
Area and ethnic studies	na	na	na	na	na	na	na	na	na	na	na	809	883	819	714	638
Economics	na	na	na	na	na	na	na	na	na	na	na	4,424	4,151	4,112	4,161	4,248
History of science	na	na	na	na	na	na	na	na	na	na	na	13	13	13	15	9
Linguistics	na	na	na	na	na	na	na	na	na	na	na	193	219	213	223	236
Political science and public administration	na	na	na	na	na	na	na	na	na	na	na	3,690	3,532	3,576	3,317	3,154

## CHAPTER 2 | Higher Education in Science and Engineering

Citizenship, field, race, and ethnicity	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Sociology	na	na	na	na	na	na	na	na	na	na	na	1,808	1,750	1,801	1,753	1,686
Other social sciences	na	na	na	na	na	na	na	na	na	na	na	1,731	1,658	1,724	1,676	1,583
Non-S&E	na	na	na	na	na	na	na	na	na	na	na	57,870	60,462	61,852	62,663	63,730
Engineering technologies	na	na	na	na	na	na	na	na	na	na	na	664	622	649	663	665
Asian or Pacific Islander <sup>b</sup>																
All fields	75,384	75,741	79,482	83,498	86,743	91,482	96,315	99,011	102,301	105,246	109,022	na	na	na	na	na
S&E	35,556	36,468	37,518	39,944	41,403	43,312	44,475	45,516	47,323	48,348	50,367	na	na	na	na	na
Engineering	6,850	7,025	7,120	7,413	7,628	8,211	8,551	8,466	8,343	8,266	8,405	na	na	na	na	na
Aerospace	98	103	128	145	186	184	223	250	278	294	309	na	na	na	na	na
Chemical	788	702	636	563	527	486	558	652	690	739	888	na	na	na	na	na
Civil	642	521	482	500	493	585	770	908	985	1,111	1,083	na	na	na	na	na
Electrical	3,143	3,522	3,773	3,967	4,086	4,293	3,840	3,353	2,994	2,561	2,415	na	na	na	na	na
Industrial	332	319	356	386	376	352	362	333	315	360	343	na	na	na	na	na
Materials	91	88	85	91	95	101	166	153	140	137	157	na	na	na	na	na
Mechanical	1,002	998	892	939	928	1,082	1,249	1,413	1,491	1,489	1,543	na	na	na	na	na
Other	754	772	768	822	937	1,128	1,383	1,404	1,450	1,575	1,667	na	na	na	na	na
Science	28,706	29,443	30,398	32,531	33,775	35,101	35,924	37,050	38,980	40,082	41,962	na	na	na	na	na
Natural sciences	16,342	16,633	17,196	18,499	18,433	18,455	18,459	19,106	20,231	20,957	22,078	na	na	na	na	na
Agricultural sciences	454	399	411	459	415	448	542	606	632	731	831	na	na	na	na	na

## CHAPTER 2 | Higher Education in Science and Engineering

Citizenship, field, race, and ethnicity	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Biological sciences	8,025	7,493	7,209	7,398	7,792	8,835	10,088	11,572	12,866	13,578	14,327	na	na	na	na	na
Earth, atmospheric, and ocean sciences	97	86	85	73	85	86	92	106	121	143	158	na	na	na	na	na
Atmospheric sciences	14	14	8	9	11	15	12	17	13	14	15	na	na	na	na	na
Earth sciences	77	64	65	58	65	69	75	82	104	119	133	na	na	na	na	na
Oceanography	6	8	12	6	9	2	5	7	4	10	10	na	na	na	na	na
Mathematics and computer sciences	6,304	7,311	8,274	9,426	8,912	7,770	6,119	5,020	4,645	4,459	4,645	na	na	na	na	na
Computer sciences	5,415	6,395	7,273	8,273	7,668	6,351	4,672	3,581	3,133	2,894	3,015	na	na	na	na	na
Mathematics and statistics	889	916	1,001	1,153	1,244	1,419	1,447	1,439	1,512	1,565	1,630	na	na	na	na	na
Physical sciences	1,462	1,344	1,217	1,143	1,229	1,316	1,618	1,802	1,967	2,046	2,117	na	na	na	na	na
Astronomy	9	12	24	16	18	21	37	16	21	27	36	na	na	na	na	na
Chemistry	1,208	1,126	978	893	960	1,024	1,267	1,420	1,596	1,671	1,726	na	na	na	na	na
Physics	218	184	184	204	223	236	281	327	307	306	310	na	na	na	na	na
Other physical sciences	27	22	31	30	28	35	33	39	43	42	45	na	na	na	na	na
Social and behavioral sciences	12,364	12,810	13,202	14,032	15,342	16,646	17,465	17,944	18,749	19,125	19,884	na	na	na	na	na
Psychology	4,188	4,150	4,241	4,064	4,350	4,797	5,305	5,615	5,931	6,042	6,231	na	na	na	na	na



## CHAPTER 2 | Higher Education in Science and Engineering

Citizenship, field, race, and ethnicity	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Social sciences	8,176	8,660	8,961	9,968	10,992	11,849	12,160	12,329	12,818	13,083	13,653	na	na	na	na	na
Anthropology	340	332	377	396	398	424	496	534	581	599	678	na	na	na	na	na
Area and ethnic studies	737	714	686	671	758	875	879	899	880	932	895	na	na	na	na	na
Economics	2,774	3,082	3,235	3,708	4,007	4,003	3,913	3,874	3,976	4,218	4,645	na	na	na	na	na
History of science	12	15	20	16	14	11	9	8	11	13	8	na	na	na	na	na
Linguistics	72	69	73	83	105	112	112	136	156	152	187	na	na	na	na	na
Political science and public administration	2,073	2,228	2,325	2,648	2,903	3,267	3,488	3,539	3,653	3,551	3,640	na	na	na	na	na
Sociology	1,324	1,300	1,325	1,372	1,596	1,853	1,907	1,908	1,994	1,950	1,992	na	na	na	na	na
Other social sciences	844	920	920	1,074	1,211	1,304	1,356	1,431	1,567	1,668	1,608	na	na	na	na	na
Non-S&E	39,828	39,273	41,964	43,554	45,340	48,170	51,840	53,495	54,978	56,898	58,655	na	na	na	na	na
Engineering technologies	770	731	769	703	680	754	661	669	657	594	622	na	na	na	na	na
Black or African American																
All fields	104,341	106,966	111,330	117,902	123,636	127,978	133,743	137,566	142,576	145,988	152,404	161,005	172,868	179,517	180,812	182,778
S&E	32,993	33,386	34,899	36,961	38,737	39,846	40,108	40,401	41,263	41,822	43,428	46,341	49,683	52,165	52,647	53,649
Engineering	3,069	2,892	2,982	3,092	3,227	3,206	3,209	3,164	3,101	3,096	3,082	3,097	3,218	3,505	3,599	3,852
Aerospace	40	39	43	65	70	71	85	72	84	90	101	88	73	91	82	113
Chemical	383	373	346	317	303	273	231	244	256	256	255	288	337	359	390	401
Civil	403	329	317	292	320	342	324	403	420	441	483	510	513	542	534	575

## CHAPTER 2 | Higher Education in Science and Engineering

Citizenship, field, race, and ethnicity	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Electrical	1,055	1,089	1,103	1,301	1,408	1,331	1,277	1,207	1,135	1,120	1,035	980	996	1,147	1,147	1,154
Industrial	256	238	256	275	251	297	273	252	229	230	262	245	258	236	255	273
Materials	24	27	32	22	22	19	28	22	31	30	27	29	36	33	39	41
Mechanical	594	515	561	471	504	537	569	570	560	539	550	585	610	694	668	793
Other	314	282	324	349	349	336	422	394	386	390	369	372	395	403	484	502
Science	29,924	30,494	31,917	33,869	35,510	36,640	36,899	37,237	38,162	38,726	40,346	43,244	46,465	48,660	49,048	49,797
Natural sciences	10,796	11,359	12,066	13,191	13,554	13,199	13,071	12,880	12,540	12,694	13,114	13,721	15,012	16,143	16,472	17,286
Agricultural sciences	450	428	454	452	450	444	485	481	557	510	595	575	704	744	852	856
Biological sciences	4,738	4,693	4,632	4,878	5,039	5,052	5,366	5,857	6,003	6,253	6,434	6,677	7,073	7,494	7,663	8,250
Earth, atmospheric, and ocean sciences	51	56	62	60	65	68	58	79	89	88	97	105	119	134	143	166
Atmospheric sciences	10	2	10	12	20	8	14	15	21	20	23	23	18	21	19	14
Earth sciences	40	52	42	43	43	54	43	61	65	65	71	76	95	106	116	143
Oceanography	1	2	10	5	2	6	1	3	3	3	3	6	6	7	8	9
Mathematics and computer sciences	4,467	5,186	5,900	6,873	7,042	6,670	6,122	5,420	4,807	4,710	4,900	5,239	5,811	6,512	6,494	6,762
Computer sciences	3,563	4,378	5,057	6,083	6,259	5,815	5,275	4,588	4,011	3,868	4,066	4,418	4,847	5,497	5,472	5,746
Mathematics and statistics	904	808	843	790	783	855	847	832	796	842	834	821	964	1,015	1,022	1,016
Physical sciences	1,090	996	1,018	928	958	965	1,040	1,043	1,084	1,133	1,088	1,125	1,305	1,259	1,320	1,252

## CHAPTER 2 | Higher Education in Science and Engineering

Citizenship, field, race, and ethnicity	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Astronomy	1	2	3	1	3	4	9	3	6	5	7	5	3	5	3	10
Chemistry	888	827	796	744	756	760	827	852	910	935	893	918	1,101	1,044	1,068	1,009
Physics	152	133	182	147	166	166	171	163	144	149	143	149	142	148	195	172
Other physical sciences	49	34	37	36	33	35	33	25	24	44	45	53	59	62	54	61
Social and behavioral sciences	19,128	19,135	19,851	20,678	21,956	23,441	23,828	24,357	25,622	26,032	27,232	29,523	31,453	32,517	32,576	32,511
Psychology	7,572	7,561	7,748	8,014	8,485	9,141	9,097	9,729	10,271	10,541	11,066	11,643	12,709	13,413	13,617	14,022
Social sciences	11,556	11,574	12,103	12,664	13,471	14,300	14,731	14,628	15,351	15,491	16,166	17,880	18,744	19,104	18,959	18,489
Anthropology	268	242	253	258	338	320	337	358	408	435	447	495	500	506	515	467
Area and ethnic studies	738	691	784	749	805	905	1,011	926	1,012	992	927	1,211	1,076	917	963	925
Economics	1,044	1,089	1,221	1,326	1,409	1,377	1,379	1,289	1,380	1,346	1,441	1,414	1,380	1,437	1,428	1,648
History of science	6	6	4	6	8	5	4	12	7	8	9	7	20	9	8	11
Linguistics	14	24	25	17	32	33	44	44	57	50	44	60	84	80	85	69
Political science and public administration	3,601	3,556	3,737	4,059	4,452	4,866	5,099	4,955	5,119	5,188	5,536	5,844	6,340	6,664	6,600	6,369
Sociology	4,097	4,200	4,167	4,214	4,220	4,539	4,627	4,721	4,842	4,761	4,879	5,271	5,457	5,448	5,482	5,336
Other social sciences	1,788	1,766	1,912	2,035	2,207	2,255	2,230	2,323	2,526	2,711	2,883	3,578	3,887	4,043	3,878	3,664
Non-S&E	71,348	73,580	76,431	80,941	84,899	88,132	93,635	97,165	101,313	104,166	108,976	114,664	123,185	127,352	128,165	129,129
Engineering technologies	1,466	1,427	1,467	1,557	1,592	1,599	1,574	1,463	1,467	1,442	1,531	1,650	1,851	1,962	1,924	1,870

## CHAPTER 2 | Higher Education in Science and Engineering

Citizenship, field, race, and ethnicity	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Native Hawaiian or Other Pacific Islander																
All fields	na	na	na	na	na	na	na	na	na	na	na	4,205	4,545	4,958	5,139	4,987
S&E	na	na	na	na	na	na	na	na	na	na	na	1,240	1,485	1,549	1,568	1,611
Engineering	na	na	na	na	na	na	na	na	na	na	na	117	162	187	183	141
Aerospace	na	na	na	na	na	na	na	na	na	na	na	3	5	5	6	4
Chemical	na	na	na	na	na	na	na	na	na	na	na	5	9	9	9	11
Civil	na	na	na	na	na	na	na	na	na	na	na	36	55	45	40	32
Electrical	na	na	na	na	na	na	na	na	na	na	na	29	34	49	34	35
Industrial	na	na	na	na	na	na	na	na	na	na	na	0	5	12	8	5
Materials	na	na	na	na	na	na	na	na	na	na	na	2	3	3	3	1
Mechanical	na	na	na	na	na	na	na	na	na	na	na	29	34	40	53	33
Other	na	na	na	na	na	na	na	na	na	na	na	13	17	24	30	20
Science	na	na	na	na	na	na	na	na	na	na	na	1,123	1,323	1,362	1,385	1,470
Natural sciences	na	na	na	na	na	na	na	na	na	na	na	440	528	567	604	641
Agricultural sciences	na	na	na	na	na	na	na	na	na	na	na	38	48	63	76	89
Biological sciences	na	na	na	na	na	na	na	na	na	na	na	220	261	250	269	291
Earth, atmospheric, and ocean sciences	na	na	na	na	na	na	na	na	na	na	na	8	8	13	10	9
Atmospheric sciences	na	na	na	na	na	na	na	na	na	na	na	0	1	2	1	2

## CHAPTER 2 | Higher Education in Science and Engineering

Citizenship, field, race, and ethnicity	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Earth sciences	na	na	na	na	na	na	na	na	na	na	na	8	7	10	8	6
Oceanography	na	na	na	na	na	na	na	na	na	na	na	0	0	1	1	1
Mathematics and computer sciences	na	na	na	na	na	na	na	na	na	na	na	138	183	197	213	215
Computer sciences	na	na	na	na	na	na	na	na	na	na	na	101	145	159	179	180
Mathematics and statistics	na	na	na	na	na	na	na	na	na	na	na	37	38	38	34	35
Physical sciences	na	na	na	na	na	na	na	na	na	na	na	36	28	44	36	37
Astronomy	na	na	na	na	na	na	na	na	na	na	na	0	0	0	0	0
Chemistry	na	na	na	na	na	na	na	na	na	na	na	27	21	29	23	26
Physics	na	na	na	na	na	na	na	na	na	na	na	8	5	14	5	9
Other physical sciences	na	na	na	na	na	na	na	na	na	na	na	1	2	1	8	2
Social and behavioral sciences	na	na	na	na	na	na	na	na	na	na	na	683	795	795	781	829
Psychology	na	na	na	na	na	na	na	na	na	na	na	206	238	272	275	297
Social sciences	na	na	na	na	na	na	na	na	na	na	na	477	557	523	506	532
Anthropology	na	na	na	na	na	na	na	na	na	na	na	25	33	24	39	30
Area and ethnic studies	na	na	na	na	na	na	na	na	na	na	na	38	43	44	40	41
Economics	na	na	na	na	na	na	na	na	na	na	na	65	53	48	46	57

## CHAPTER 2 | Higher Education in Science and Engineering

Citizenship, field, race, and ethnicity	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
History of science	na	na	na	na	na	na	na	na	na	na	na	0	0	0	0	1
Linguistics	na	na	na	na	na	na	na	na	na	na	na	3	3	4	5	8
Political science and public administration	na	na	na	na	na	na	na	na	na	na	na	158	188	165	182	162
Sociology	na	na	na	na	na	na	na	na	na	na	na	99	109	95	94	115
Other social sciences	na	na	na	na	na	na	na	na	na	na	na	89	128	143	100	118
Non-S&E	na	na	na	na	na	na	na	na	na	na	na	2,965	3,060	3,409	3,571	3,376
Engineering technologies	na	na	na	na	na	na	na	na	na	na	na	19	26	34	39	50
White																
All fields	896,511	890,089	914,692	943,779	967,924	987,957	1,011,497	1,032,791	1,051,236	1,069,016	1,082,145	1,102,792	1,132,689	1,150,239	1,154,363	1,150,065
S&E	270,341	267,866	276,403	290,875	297,708	303,321	308,888	312,763	316,982	320,081	326,643	338,461	354,629	365,827	372,882	373,795
Engineering	39,025	38,723	39,693	41,820	41,838	42,191	43,526	43,980	45,383	45,647	47,977	49,401	52,352	54,344	57,811	60,596
Aerospace	899	1,058	1,279	1,447	1,629	1,723	2,005	2,017	2,088	2,113	2,155	2,257	2,379	2,254	2,297	2,484
Chemical	4,062	4,061	3,976	3,746	3,483	3,203	3,086	3,210	3,453	3,706	4,169	4,699	5,009	5,346	5,817	6,507
Civil	6,984	6,615	6,624	7,032	7,012	7,196	7,768	8,130	8,750	8,871	9,243	9,982	10,263	10,378	10,060	9,692
Electrical	9,717	9,875	9,968	10,971	10,939	10,868	10,026	9,620	9,207	8,588	8,904	8,635	9,114	9,525	10,274	10,884
Industrial	2,385	2,323	2,429	2,388	2,353	2,353	2,312	2,107	2,148	2,346	2,501	2,482	2,692	2,773	3,097	3,377
Materials	741	708	712	701	614	633	671	711	802	710	778	776	846	944	940	1,060
Mechanical	9,450	9,520	9,852	10,501	10,730	10,933	11,833	12,266	12,692	12,753	13,420	13,568	14,426	15,113	16,664	17,626

## CHAPTER 2 | Higher Education in Science and Engineering

Citizenship, field, race, and ethnicity	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Other	4,787	4,563	4,853	5,034	5,078	5,282	5,825	5,919	6,243	6,560	6,807	7,002	7,623	8,011	8,662	8,966
Science	231,316	229,143	236,710	249,055	255,870	261,130	265,362	268,783	271,599	274,434	278,666	289,060	302,277	311,483	315,071	313,199
Natural sciences	103,331	102,252	105,511	110,194	110,989	111,642	112,658	114,851	114,545	116,594	120,168	126,538	135,222	142,658	148,787	153,497
Agricultural sciences	15,655	14,948	14,728	14,935	14,368	14,353	14,388	14,523	15,004	15,476	16,291	17,967	19,635	21,392	22,145	22,454
Biological sciences	43,903	41,261	41,212	41,893	42,443	43,759	46,495	49,771	50,367	51,756	53,192	55,171	58,374	60,732	63,320	65,376
Earth, atmospheric, and ocean sciences	3,536	3,436	3,450	3,442	3,338	3,366	3,360	3,474	3,565	3,718	3,879	4,256	4,713	4,970	5,211	5,492
Atmospheric sciences	437	395	467	493	508	597	575	662	639	610	586	575	620	619	608	593
Earth sciences	2,959	2,888	2,806	2,837	2,691	2,663	2,703	2,692	2,822	2,996	3,149	3,509	3,917	4,161	4,417	4,704
Oceanography	140	153	177	112	139	106	82	120	104	112	144	172	176	190	186	195
Mathematics and computer sciences	30,141	32,808	36,434	39,998	41,024	39,886	37,400	35,764	34,064	33,934	34,875	36,921	39,642	42,230	44,344	46,298
Computer sciences	21,759	24,649	27,696	31,040	31,400	29,742	26,948	25,033	23,189	23,021	23,702	25,293	27,067	29,031	31,206	33,112
Mathematics and statistics	8,382	8,159	8,738	8,958	9,624	10,144	10,452	10,731	10,875	10,913	11,173	11,628	12,575	13,199	13,138	13,186
Physical sciences	10,096	9,799	9,687	9,926	9,816	10,278	11,015	11,319	11,545	11,710	11,931	12,223	12,858	13,334	13,767	13,877
Astronomy	131	185	204	212	220	234	269	248	251	233	260	272	291	249	291	275
Chemistry	6,900	6,500	6,260	6,280	6,149	6,586	7,023	7,135	7,322	7,463	7,560	7,821	8,181	8,287	8,489	8,510
Physics	2,543	2,617	2,736	2,963	3,115	3,092	3,333	3,545	3,572	3,599	3,636	3,734	3,917	4,285	4,438	4,612

## CHAPTER 2 | Higher Education in Science and Engineering

Citizenship, field, race, and ethnicity	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Other physical sciences	522	497	487	471	332	366	390	391	400	415	475	396	469	513	549	480
Social and behavioral sciences	127,985	126,891	131,199	138,861	144,881	149,488	152,704	153,932	157,054	157,840	158,498	162,522	167,055	168,825	166,284	159,702
Psychology	52,400	51,545	53,318	54,711	56,576	58,089	59,416	59,761	60,763	60,729	60,764	62,207	65,837	68,542	68,565	66,908
Social sciences	75,585	75,346	77,881	84,150	88,305	91,399	93,288	94,171	96,291	97,111	97,734	100,315	101,218	100,283	97,719	92,794
Anthropology	5,378	5,222	5,380	5,593	5,498	5,586	5,784	5,652	6,134	6,388	6,488	6,658	7,428	7,662	7,307	6,426
Area and ethnic studies	2,940	2,937	3,069	2,948	3,180	3,240	3,374	3,456	3,611	3,687	3,571	3,512	3,431	3,386	3,041	2,792
Economics	12,102	12,414	13,371	14,299	14,656	14,720	14,427	14,496	15,501	16,205	16,386	16,466	15,758	15,600	16,295	17,324
History of science	58	57	60	68	100	86	83	73	69	61	69	93	68	74	89	87
Linguistics	439	499	571	598	652	637	771	858	955	909	1,033	1,107	1,270	1,327	1,312	1,286
Political science and public administration	24,931	24,961	26,150	29,565	31,756	33,891	35,058	35,634	35,932	35,254	35,946	36,325	35,991	34,702	33,911	31,940
Sociology	16,561	16,099	15,817	16,283	16,677	17,231	16,963	16,985	16,556	16,413	15,802	15,676	15,866	15,667	15,031	13,762
Other social sciences	13,176	13,157	13,463	14,796	15,786	16,008	16,828	17,017	17,533	18,194	18,439	20,478	21,406	21,865	20,733	19,177
Non-S&E	626,170	622,223	638,289	652,904	670,216	684,636	702,609	720,028	734,254	748,935	755,502	764,331	778,060	784,412	781,481	776,270
Engineering technologies	10,916	10,760	10,925	10,744	10,453	10,634	10,605	11,209	11,260	11,560	11,739	12,153	12,194	11,900	11,386	11,365
Two or more races <sup>c</sup>																
All fields	na	na	na	na	na	na	na	na	na	na	na	19,451	25,473	32,310	43,043	51,507
S&E	na	na	na	na	na	na	na	na	na	na	na	7,168	9,610	12,149	16,956	20,135



## CHAPTER 2 | Higher Education in Science and Engineering

Citizenship, field, race, and ethnicity	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Engineering	na	na	na	na	na	na	na	na	na	na	na	888	1,125	1,422	2,116	2,707
Aerospace	na	na	na	na	na	na	na	na	na	na	na	31	57	73	93	117
Chemical	na	na	na	na	na	na	na	na	na	na	na	98	100	110	192	272
Civil	na	na	na	na	na	na	na	na	na	na	na	164	177	258	312	396
Electrical	na	na	na	na	na	na	na	na	na	na	na	187	215	292	465	556
Industrial	na	na	na	na	na	na	na	na	na	na	na	49	60	50	90	135
Materials	na	na	na	na	na	na	na	na	na	na	na	10	28	26	40	54
Mechanical	na	na	na	na	na	na	na	na	na	na	na	197	284	358	545	724
Other	na	na	na	na	na	na	na	na	na	na	na	152	204	255	379	453
Science	na	na	na	na	na	na	na	na	na	na	na	6,280	8,485	10,727	14,840	17,428
Natural sciences	na	na	na	na	na	na	na	na	na	na	na	2,390	3,274	4,292	6,270	7,750
Agricultural sciences	na	na	na	na	na	na	na	na	na	na	na	226	378	541	722	830
Biological sciences	na	na	na	na	na	na	na	na	na	na	na	1,142	1,593	2,047	3,030	3,878
Earth, atmospheric, and ocean sciences	na	na	na	na	na	na	na	na	na	na	na	65	102	116	162	199
Atmospheric sciences	na	na	na	na	na	na	na	na	na	na	na	2	6	13	15	19
Earth sciences	na	na	na	na	na	na	na	na	na	na	na	58	88	97	131	169
Oceanography	na	na	na	na	na	na	na	na	na	na	na	5	8	6	16	11

## CHAPTER 2 | Higher Education in Science and Engineering

Citizenship, field, race, and ethnicity	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Mathematics and computer sciences	na	na	na	na	na	na	na	na	na	na	na	706	892	1,206	1,745	2,173
Computer sciences	na	na	na	na	na	na	na	na	na	na	na	496	655	864	1,238	1,569
Mathematics and statistics	na	na	na	na	na	na	na	na	na	na	na	210	237	342	507	604
Physical sciences	na	na	na	na	na	na	na	na	na	na	na	251	309	382	611	670
Astronomy	na	na	na	na	na	na	na	na	na	na	na	8	6	10	18	15
Chemistry	na	na	na	na	na	na	na	na	na	na	na	152	208	250	397	422
Physics	na	na	na	na	na	na	na	na	na	na	na	82	86	109	178	217
Other physical sciences	na	na	na	na	na	na	na	na	na	na	na	9	9	13	18	16
Social and behavioral sciences	na	na	na	na	na	na	na	na	na	na	na	3,890	5,211	6,435	8,570	9,678
Psychology	na	na	na	na	na	na	na	na	na	na	na	1,488	1,919	2,412	3,319	3,817
Social sciences	na	na	na	na	na	na	na	na	na	na	na	2,402	3,292	4,023	5,251	5,861
Anthropology	na	na	na	na	na	na	na	na	na	na	na	192	291	360	497	460
Area and ethnic studies	na	na	na	na	na	na	na	na	na	na	na	216	244	312	340	343
Economics	na	na	na	na	na	na	na	na	na	na	na	356	435	504	691	917
History of science	na	na	na	na	na	na	na	na	na	na	na	4	5	4	4	5
Linguistics	na	na	na	na	na	na	na	na	na	na	na	40	52	61	102	118

## CHAPTER 2 | Higher Education in Science and Engineering

Citizenship, field, race, and ethnicity	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Political science and public administration	na	na	na	na	na	na	na	na	na	na	na	772	1,131	1,312	1,670	1,848
Sociology	na	na	na	na	na	na	na	na	na	na	na	443	576	733	943	1,049
Other social sciences	na	na	na	na	na	na	na	na	na	na	na	379	558	737	1,004	1,121
Non-S&E	na	na	na	na	na	na	na	na	na	na	na	12,283	15,863	20,161	26,087	31,372
Engineering technologies	na	na	na	na	na	na	na	na	na	na	na	145	191	216	298	442
Other or unknown race and ethnicity																
All fields	42,419	48,754	57,722	66,907	77,865	82,265	86,624	90,834	97,431	103,691	118,368	114,011	114,304	105,490	96,143	91,734
S&E	13,930	15,833	18,235	21,635	24,973	26,305	26,743	27,834	29,805	31,547	36,745	34,352	35,230	32,010	28,813	26,961
Engineering	1,610	1,884	2,100	2,509	2,621	2,827	2,949	3,008	3,323	3,596	4,119	4,048	3,512	3,397	3,303	3,045
Aerospace	35	50	61	80	115	80	126	133	145	149	173	160	125	107	101	78
Chemical	119	156	155	206	162	153	174	194	230	240	305	276	313	293	357	278
Civil	239	265	269	329	360	389	434	470	573	652	763	845	597	629	540	461
Electrical	560	674	764	937	1,013	1,027	982	906	884	934	1,037	903	768	752	799	756
Industrial	69	84	101	109	100	148	107	111	119	128	193	208	147	141	149	147
Materials	36	27	36	52	47	49	29	45	67	76	56	55	76	38	54	44
Mechanical	358	431	485	514	558	647	721	731	846	876	1,008	1,045	940	908	918	870
Other	194	197	229	282	266	334	376	418	459	541	584	556	546	529	385	411
Science	12,320	13,949	16,135	19,126	22,352	23,478	23,794	24,826	26,482	27,951	32,626	30,304	31,718	28,613	25,510	23,916

## CHAPTER 2 | Higher Education in Science and Engineering

Citizenship, field, race, and ethnicity	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Natural sciences	5,143	5,977	7,077	8,551	10,422	10,310	10,405	10,417	11,056	11,510	13,314	12,568	13,045	12,234	11,245	10,705
Agricultural sciences	603	620	684	738	713	730	789	863	884	1,016	1,220	1,295	1,262	1,199	1,133	1,029
Biological sciences	2,020	2,149	2,390	2,592	2,797	3,041	3,341	3,831	4,329	4,597	5,433	4,860	4,859	4,740	4,159	4,030
Earth, atmospheric, and ocean sciences	121	149	166	174	203	183	222	199	249	261	274	299	252	244	227	240
Atmospheric sciences	8	23	23	26	16	26	24	20	26	23	26	31	23	27	18	20
Earth sciences	110	125	140	145	184	151	190	177	217	229	243	261	225	209	204	219
Oceanography	3	1	3	3	3	6	8	2	6	9	5	7	4	8	5	1
Mathematics and computer sciences	1,949	2,551	3,251	4,412	6,045	5,619	5,191	4,572	4,540	4,682	5,191	4,974	5,556	5,048	4,911	4,626
Computer sciences	1,556	2,099	2,762	3,808	5,378	4,879	4,381	3,742	3,641	3,682	4,085	4,046	4,621	4,147	4,105	3,814
Mathematics and statistics	393	452	489	604	667	740	810	830	899	1,000	1,106	928	935	901	806	812
Physical sciences	450	508	586	635	664	737	862	952	1,054	954	1,196	1,140	1,116	1,003	815	780
Astronomy	6	10	17	11	17	32	25	33	21	34	36	16	27	13	15	12
Chemistry	280	311	340	346	384	387	492	554	626	573	705	620	637	617	509	480
Physics	152	163	196	250	240	289	308	344	373	312	411	347	367	326	261	257
Other physical sciences	12	24	33	28	23	29	37	21	34	35	44	157	85	47	30	31

## CHAPTER 2 | Higher Education in Science and Engineering

Citizenship, field, race, and ethnicity	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Social and behavioral sciences	7,177	7,972	9,058	10,575	11,930	13,168	13,389	14,409	15,426	16,441	19,312	17,736	18,673	16,379	14,265	13,211
Psychology	2,587	2,846	3,384	3,607	3,838	4,238	4,320	4,716	5,028	5,576	6,831	5,823	6,272	5,471	4,830	4,827
Social sciences	4,590	5,126	5,674	6,968	8,092	8,930	9,069	9,693	10,398	10,865	12,481	11,913	12,401	10,908	9,435	8,384
Anthropology	404	424	495	558	620	621	639	680	777	722	855	739	773	641	504	406
Area and ethnic studies	282	297	329	372	436	468	483	499	511	569	596	450	525	412	274	247
Economics	742	865	960	1,204	1,288	1,414	1,325	1,419	1,582	1,734	1,952	2,016	1,761	1,490	1,329	1,338
History of science	11	15	10	6	11	8	9	12	12	13	18	7	6	10	4	4
Linguistics	56	41	56	79	109	114	113	131	123	156	192	139	153	143	106	126
Political science and public administration	1,424	1,597	1,810	2,364	2,865	3,319	3,537	3,580	3,947	3,994	4,870	4,453	4,685	4,082	3,494	3,020
Sociology	867	984	1,068	1,183	1,307	1,471	1,414	1,639	1,600	1,659	1,947	1,653	1,574	1,391	1,182	1,147
Other social sciences	804	903	946	1,202	1,456	1,515	1,549	1,733	1,846	2,018	2,051	2,456	2,924	2,739	2,542	2,096
Non-S&E	28,489	32,921	39,487	45,272	52,892	55,960	59,881	63,000	67,626	72,144	81,623	79,659	79,074	73,480	67,330	64,773
Engineering technologies	582	630	721	712	690	868	879	888	982	1,029	1,038	1,055	1,121	951	999	933
Temporary visa holder																
All fields	39,104	39,843	41,508	43,264	44,844	45,399	46,405	45,964	44,406	45,934	47,598	52,694	59,610	64,901	69,483	75,639
S&E	15,195	15,721	16,344	17,898	18,825	18,559	18,254	17,393	16,526	17,055	18,231	20,798	23,882	26,523	29,304	32,639
Engineering	4,532	4,419	4,266	4,277	4,550	4,740	4,711	4,389	4,180	4,071	4,502	5,251	6,331	6,747	7,556	8,555

## CHAPTER 2 | Higher Education in Science and Engineering

Citizenship, field, race, and ethnicity	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Aerospace	121	148	122	160	174	171	147	175	151	178	217	245	267	273	296	272
Chemical	445	424	447	359	368	411	436	430	464	518	592	764	899	1,003	1,063	1,170
Civil	458	412	371	349	315	327	342	326	373	368	495	559	709	803	950	1,062
Electrical	1,836	1,842	1,868	2,054	2,276	2,321	2,176	1,879	1,589	1,425	1,419	1,699	1,999	2,016	2,161	2,510
Industrial	481	475	442	402	381	395	428	375	406	369	433	446	581	584	684	756
Materials	37	42	29	31	29	40	46	49	45	64	62	70	80	120	149	162
Mechanical	789	744	683	596	614	647	650	713	714	715	801	880	1,119	1,259	1,470	1,755
Other	365	332	304	326	393	428	486	442	438	434	483	588	677	689	783	868
Science	10,663	11,302	12,078	13,621	14,275	13,819	13,543	13,004	12,346	12,984	13,729	15,547	17,551	19,776	21,748	24,084
Natural sciences	5,591	6,120	6,682	7,864	8,283	7,741	7,133	6,558	5,967	6,208	6,624	7,509	8,580	9,598	10,373	11,586
Agricultural sciences	258	248	262	270	251	274	266	282	228	243	289	342	374	515	569	604
Biological sciences	1,376	1,436	1,455	1,538	1,651	1,967	2,119	2,333	2,330	2,429	2,555	2,781	2,870	3,040	2,919	3,035
Earth, atmospheric, and ocean sciences	46	49	59	57	50	80	76	58	70	82	104	122	116	181	226	219
Atmospheric sciences	8	2	6	8	3	10	5	9	5	8	6	5	9	16	15	13
Earth sciences	33	46	49	48	45	65	65	47	64	74	96	117	104	162	207	206
Oceanography	5	1	4	1	2	5	6	2	1	0	2	0	3	3	4	0
Mathematics and computer sciences	3,379	3,831	4,363	5,476	5,740	4,752	3,908	3,143	2,566	2,658	2,875	3,384	4,255	4,774	5,522	6,503
Computer sciences	2,900	3,405	3,909	4,854	5,060	3,991	3,099	2,433	1,804	1,819	1,867	2,028	2,365	2,382	2,819	3,369

## CHAPTER 2 | Higher Education in Science and Engineering

Citizenship, field, race, and ethnicity	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Mathematics and statistics	479	426	454	622	680	761	809	710	762	839	1,008	1,356	1,890	2,392	2,703	3,134
Physical sciences	532	556	543	523	591	668	764	742	773	796	801	880	965	1,088	1,137	1,225
Astronomy	4	13	16	15	10	20	13	13	16	13	13	16	8	12	28	16
Chemistry	344	335	342	326	350	397	466	451	468	529	547	573	599	693	745	762
Physics	160	180	166	168	189	200	243	223	229	209	207	255	326	349	331	414
Other physical sciences	24	28	19	14	42	51	42	55	60	45	34	36	32	34	33	33
Social and behavioral sciences	5,072	5,182	5,396	5,757	5,992	6,078	6,410	6,446	6,379	6,776	7,105	8,038	8,971	10,178	11,375	12,498
Psychology	1,264	1,283	1,369	1,394	1,475	1,503	1,580	1,559	1,474	1,608	1,694	1,676	2,004	2,229	2,460	2,557
Social sciences	3,808	3,899	4,027	4,363	4,517	4,575	4,830	4,887	4,905	5,168	5,411	6,362	6,967	7,949	8,915	9,941
Anthropology	116	120	114	94	106	115	123	110	124	100	118	98	122	105	151	137
Area and ethnic studies	178	164	158	160	164	163	175	199	171	235	197	210	230	198	254	243
Economics	1,691	1,823	1,903	2,046	2,169	2,199	2,136	2,134	2,198	2,381	2,718	3,323	3,785	4,539	5,164	5,907
History of science	1	3	2	3	0	1	3	4	1	1	1	1	1	2	3	2
Linguistics	83	77	81	80	74	77	74	59	85	78	75	85	105	90	97	108
Political science and public administration	1,152	1,149	1,167	1,286	1,307	1,269	1,479	1,417	1,452	1,461	1,473	1,701	1,672	1,802	1,850	1,993
Sociology	299	258	295	349	327	329	390	398	365	356	367	371	439	485	547	584
Other social sciences	288	305	307	345	370	422	450	566	509	556	462	573	613	728	849	967
Non-S&E	23,909	24,122	25,164	25,366	26,019	26,840	28,151	28,571	27,880	28,879	29,367	31,896	35,728	38,378	40,179	43,000

## CHAPTER 2 | Higher Education in Science and Engineering

Citizenship, field, race, and ethnicity	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Engineering technologies	443	543	466	459	516	488	378	379	371	445	428	450	516	646	663	885

na = not applicable; data were not collected for this detail.

<sup>a</sup> Beginning in 2008, the category includes Hispanic or one or more races.

<sup>b</sup> Pacific Islander includes Native Hawaiian or Other Pacific Islander.

<sup>c</sup> In 2011, the survey required institutions to begin reporting information on more than one race, along with information in the other racial and ethnic categories, but institutions were not required to update the race and ethnicity data of individuals who were already in the system. Therefore, the number reported for more than one race for the years after 2011 is likely to be an undercount.

### Note(s)

Racial and ethnic breakouts include U.S. citizens and permanent residents only; temporary visa holder includes all racial and ethnic groups. Engineering technologies are focused more on applied skills than on fundamental science and mathematics. Data are based on degree-granting institutions eligible to participate in Title IV federal financial aid programs and do not match previously published data from *Science and Engineering Indicators 2008* and earlier years that were based on accredited higher education institutions.

### Source(s)

National Center for Education Statistics, Integrated Postsecondary Education Data System (IPEDS), Completions Survey; National Science Foundation, National Center for Science and Engineering Statistics, Integrated Science and Engineering Resources Data System (WebCASPAR), <https://ncesdata.nsf.gov/webcaspar/>.

*Science and Engineering Indicators 2018*



## CHAPTER 2 | Higher Education in Science and Engineering

APPENDIX TABLE 2-23

### S&E graduate enrollment, by field: 2000–15

(Number)

Field	2000	2001	2002	2003	2004	2005	2006	2007 <sup>a</sup>	2008	2009	2010	2011	2012	2013	2014 <sup>b</sup>	2015
S&E	493,311	509,607	540,404	567,121	574,463	582,226	597,643	604,815	613,591	611,629	611,841	608,171	609,760	615,706	648,525	667,939
Engineering	104,112	109,493	119,668	127,377	123,566	120,565	123,041	127,075	131,951	137,873	142,446	143,390	146,022	150,873	162,671	167,789
Aerospace	3,407	3,451	3,685	4,048	4,089	4,170	4,482	4,616	4,902	5,266	5,540	5,691	5,069	5,181	5,116	5,345
Chemical	7,056	6,913	7,414	7,516	7,452	7,173	7,261	7,584	7,892	8,188	8,668	8,828	9,222	9,698	9,870	10,008
Civil	16,451	16,665	17,713	18,890	18,561	18,114	17,802	16,071	16,931	18,638	19,559	19,596	19,922	20,110	20,789	20,978
Electrical	33,611	36,100	39,948	41,763	38,995	37,450	38,265	40,588	41,164	41,218	41,336	41,580	42,347	45,562	51,909	52,940
Industrial	12,119	12,940	14,033	14,313	13,852	13,650	13,829	14,474	15,692	15,825	15,205	14,494	14,469	14,363	14,845	16,284
Materials	4,377	4,721	4,992	5,131	5,059	5,160	5,268	5,314	5,539	5,863	6,274	6,649	6,985	7,144	7,518	7,741
Mechanical	15,235	15,852	17,139	18,393	17,852	17,373	17,919	18,347	19,585	21,243	22,509	21,883	23,088	24,087	25,651	27,314
Other	11,856	12,851	14,744	17,323	17,706	17,475	18,215	20,081	20,246	21,632	23,355	24,669	24,920	24,728	26,973	27,179
Science	389,199	400,114	420,736	439,744	450,897	461,661	474,602	477,740	481,640	473,756	469,395	464,781	463,738	464,833	485,854	500,150
Natural sciences	255,406	263,978	279,369	292,453	299,439	304,952	314,602	310,489	313,706	303,195	298,812	292,097	295,414	297,561	324,083	339,566
Agricultural sciences	12,023	12,235	12,698	13,197	13,445	13,123	13,016	13,528	14,153	15,200	15,656	16,129	16,234	16,429	17,505	18,610
Biological sciences <sup>c</sup>	56,282	57,639	61,088	64,701	66,565	68,479	69,941	73,516	74,678	75,660	77,726	79,540	80,994	81,444	83,413	85,098
Earth, atmospheric, and ocean sciences	13,941	13,841	14,240	14,620	15,131	14,836	14,920	14,100	14,389	14,839	15,655	15,820	16,069	15,816	15,710	15,447
Atmospheric sciences	963	924	1,036	1,150	1,086	1,146	1,079	1,178	1,400	1,355	1,455	1,513	1,546	1,534	1,466	1,387

## CHAPTER 2 | Higher Education in Science and Engineering

Field	2000	2001	2002	2003	2004	2005	2006	2007 <sup>a</sup>	2008	2009	2010	2011	2012	2013	2014 <sup>b</sup>	2015
Earth sciences	6,596	6,544	6,712	6,889	7,358	7,212	7,177	7,020	7,089	7,539	8,251	8,361	8,659	8,754	8,821	8,876
Oceanography	2,668	2,585	2,618	2,695	2,801	2,760	2,770	2,615	2,634	2,633	2,556	2,680	2,642	2,682	2,666	2,574
Other geosciences	3,714	3,788	3,874	3,886	3,886	3,718	3,894	3,287	3,266	3,312	3,393	3,266	3,222	2,846	2,757	2,610
Mathematics and computer sciences	63,000	68,847	73,432	73,161	69,947	68,188	68,468	69,221	70,953	73,387	74,682	75,035	76,364	81,143	102,420	112,636
Computer sciences	47,350	52,196	55,269	53,696	50,016	47,978	47,653	48,246	49,553	51,161	51,546	51,234	51,789	56,339	76,546	86,192
Mathematics and statistics	15,650	16,651	18,163	19,465	19,931	20,210	20,815	20,975	21,400	22,226	23,136	23,801	24,575	24,804	25,874	26,444
Medical and other health sciences	79,775	80,378	85,570	92,476	98,590	103,951	111,356	103,300	102,214	85,960	76,120	65,879	65,825	62,710	64,703	67,389
Medical sciences	22,815	24,012	26,841	29,440	29,762	31,223	33,437	31,876	32,311	32,508	33,862	34,348	34,555	34,332	35,323	36,978
Other health sciences <sup>d</sup>	56,960	56,366	58,729	63,036	68,828	72,728	77,919	71,424	69,903	53,452	42,258	31,531	31,270	28,378	29,380	30,411
Physical sciences	30,385	31,038	32,341	34,298	35,761	36,375	36,901	36,824	37,319	38,149	38,973	39,694	39,928	40,019	40,332	40,386
Astronomy	888	916	990	1,080	1,119	1,191	1,211	1,232	1,275	1,409	1,331	1,345	1,278	1,250	1,241	1,273
Chemistry	18,105	18,366	19,045	20,049	20,776	21,101	21,351	21,298	21,574	22,094	22,436	22,802	23,117	22,949	22,936	22,840
Physics	10,841	11,248	11,701	12,555	13,298	13,472	13,722	13,816	13,862	14,060	14,507	14,829	14,940	15,239	15,564	15,609
Other physical sciences	551	508	605	614	568	611	617	478	608	586	699	718	593	581	591	664
Social and behavioral sciences	133,793	136,136	141,367	147,291	151,458	156,709	160,000	162,767	162,375	164,004	162,639	166,147	162,286	161,380	154,575	152,446
Psychology <sup>d</sup>	50,466	50,454	51,152	52,162	54,126	57,282	57,653	59,617	58,991	56,184	53,419	54,486	54,117	54,102	48,833	49,740
Social sciences	83,327	85,682	90,215	95,129	97,332	99,427	102,347	103,150	103,384	107,820	109,220	111,661	108,169	107,278	105,742	102,706
Anthropology	7,626	7,491	7,481	7,789	7,826	7,750	8,150	8,129	8,333	8,359	8,528	8,406	8,247	8,172	7,955	7,625
Economics	12,827	13,569	14,196	14,634	14,513	13,932	14,290	14,586	15,103	16,215	16,497	17,015	17,004	16,735	16,535	16,355

## CHAPTER 2 | Higher Education in Science and Engineering

Field	2000	2001	2002	2003	2004	2005	2006	2007 <sup>a</sup>	2008	2009	2010	2011	2012	2013	2014 <sup>b</sup>	2015
History of science	532	571	663	737	994	965	968	1,054	1,177	1,006	705	597	508	391	371	379
Linguistics	2,674	2,744	2,875	3,028	2,941	3,187	3,074	2,879	3,095	3,170	3,132	3,219	3,256	3,509	3,489	3,370
Political science and public administration	31,131	31,805	34,934	36,880	39,023	40,780	41,784	41,349	40,871	43,919	45,045	49,660	48,855	48,411	47,370	45,781
Sociology	9,397	9,620	9,665	9,900	9,713	9,866	9,872	10,324	10,655	10,307	10,212	9,959	9,157	9,188	8,834	8,479
Other social sciences	19,140	19,882	20,401	22,161	22,322	22,947	24,209	24,829	24,150	24,844	25,101	22,805	21,142	20,872	21,188	20,717
Multidisciplinary and interdisciplinary studies	ne	ne	ne	ne	ne	ne	ne	4,484	5,559	6,557	7,944	6,537	6,038	5,892	7,196	8,138

ne = not eligible; data were not collected for this field before 2007.

<sup>a</sup> In 2007, eligible fields were reclassified, newly eligible fields were added, and the survey was redesigned to improve coverage and coding of eligible units. Because of methodological changes, counts should be used with caution for trend analysis. For more details, see appendix A in <https://www.nsf.gov/statistics/nsf10307/>.

<sup>b</sup> In 2014, the survey frame was updated following a comprehensive frame evaluation study. The study identified potentially eligible but not previously surveyed U.S. academic institutions with master's- or doctorate-granting programs in science, engineering, or health. For more details on the impact of the frame update, see <https://www.nsf.gov/statistics/2016/nsf16314/>.

<sup>c</sup> Starting in 2007, includes neuroscience, which may have been reported under other fields in prior years.

<sup>d</sup> Beginning with 2008, more rigorous follow-up was done in recent years with institutions regarding the exclusion of practitioner-oriented graduate degree programs in psychology and in other health sciences (a subfield of health). This change may affect interpretation of trends in these fields.

### Note(s)

S&E includes health fields (medical sciences and other health sciences) and excludes newly eligible fields (architecture, communication, and family and consumer sciences and human sciences) added starting in 2007. Therefore, the S&E numbers in this table differ from the data used in National Science Foundation, National Center for Science and Engineering Statistics, Survey of Graduate Students and Postdoctorates in Science and Engineering (annual series), and elsewhere. The survey changes in 2007 and 2014 may affect interpretation of trends.

### Source(s)

National Science Foundation, National Center for Science and Engineering Statistics, special tabulations (2016), 2015 Survey of Graduate Students and Postdoctorates in Science and Engineering (GSS).

*Science and Engineering Indicators 2018*

## CHAPTER 2 | Higher Education in Science and Engineering

APPENDIX TABLE 2-24

### First-time full-time S&E graduate students, by citizenship and field: 2000–15

(Number)

Citizenship and field	2000	2001	2002	2003	2004	2005	2006	2007 <sup>a</sup>	2008	2009	2010	2011	2012	2013	2014 <sup>b</sup>	2015
All citizenships																
S&E	94,340	98,112	104,184	107,715	106,544	110,219	116,482	118,893	126,165	129,731	131,394	132,441	133,962	139,550	150,261	157,868
Engineering	22,191	23,306	24,607	24,429	22,025	22,373	25,876	26,732	28,613	30,230	31,540	32,355	33,703	36,805	41,156	41,474
Aerospace	775	767	712	845	834	804	943	962	1,116	1,176	1,196	1,239	991	1,138	1,238	1,261
Chemical	1,595	1,541	1,616	1,600	1,392	1,293	1,429	1,566	1,713	1,910	2,047	2,039	2,216	2,433	2,408	2,527
Civil	3,840	3,820	4,107	4,363	4,175	4,057	4,198	3,662	4,073	4,878	5,079	5,003	5,119	5,127	5,411	5,162
Electrical	7,195	7,882	8,221	7,834	6,633	6,987	8,668	8,920	9,042	8,831	9,237	9,790	10,439	12,387	14,097	13,593
Industrial	2,005	2,216	2,238	2,029	1,724	1,674	2,148	2,626	3,015	2,908	2,783	2,837	2,767	3,047	3,710	4,269
Materials	1,005	975	1,044	958	926	992	1,043	1,086	1,170	1,302	1,431	1,561	1,609	1,571	1,630	1,761
Mechanical	3,269	3,583	3,709	3,476	3,129	3,225	3,734	3,937	4,297	4,814	5,055	4,832	5,344	5,843	6,428	6,794
Other	2,507	2,522	2,960	3,324	3,212	3,341	3,713	3,973	4,187	4,411	4,712	5,054	5,218	5,259	6,234	6,107
Science	72,149	74,806	79,577	83,286	84,519	87,846	90,606	91,390	96,412	98,089	98,095	98,702	98,885	101,505	107,414	114,359
Natural sciences	49,626	51,215	54,124	55,791	56,655	58,228	60,076	60,985	64,066	63,707	64,457	64,614	65,362	68,397	75,653	81,489
Agricultural sciences	2,335	2,338	2,320	2,424	2,316	2,260	2,206	2,356	2,597	2,994	3,121	3,053	3,040	3,128	3,364	3,637
Biological sciences <sup>c</sup>	10,955	11,608	12,127	12,719	12,796	12,918	13,055	14,022	14,832	15,838	16,543	17,327	17,919	17,336	18,021	19,474
Earth, atmospheric, and ocean sciences	2,649	2,794	3,085	3,104	2,926	2,758	2,795	2,749	2,904	3,153	3,445	3,408	3,451	3,382	3,441	3,321

## CHAPTER 2 | Higher Education in Science and Engineering

Citizenship and field	2000	2001	2002	2003	2004	2005	2006	2007 <sup>a</sup>	2008	2009	2010	2011	2012	2013	2014 <sup>b</sup>	2015
Atmospheric sciences	222	205	213	268	228	228	207	243	263	250	279	266	300	291	302	281
Earth sciences	1,230	1,383	1,437	1,412	1,336	1,308	1,348	1,405	1,429	1,682	1,887	1,839	1,868	1,940	1,983	1,937
Oceanography	479	511	533	567	534	463	457	402	466	517	502	520	481	476	499	540
Other geosciences	718	695	902	857	828	759	783	699	746	704	777	783	802	675	657	563
Mathematics and computer sciences	11,850	12,763	12,955	12,319	12,035	12,454	13,325	13,688	15,025	15,445	15,776	16,589	17,426	21,408	27,044	29,619
Computer sciences	8,431	9,077	9,037	8,134	7,783	8,258	8,983	9,256	10,434	10,557	10,583	10,995	11,688	15,397	20,658	22,911
Mathematics and statistics	3,419	3,686	3,918	4,185	4,252	4,196	4,342	4,432	4,591	4,888	5,193	5,594	5,738	6,011	6,386	6,708
Medical and other health sciences	16,008	15,701	17,357	18,384	19,979	21,181	22,069	21,459	21,816	19,001	17,995	16,475	15,911	15,601	16,436	17,629
Medical sciences	5,127	5,361	5,780	6,034	6,525	6,644	7,096	6,870	7,753	7,714	7,962	8,014	7,800	8,022	8,415	9,079
Other health sciences <sup>d</sup>	10,881	10,340	11,577	12,350	13,454	14,537	14,973	14,589	14,063	11,287	10,033	8,461	8,111	7,579	8,021	8,550
Physical sciences	5,829	6,011	6,280	6,841	6,603	6,657	6,626	6,711	6,892	7,276	7,577	7,762	7,615	7,542	7,347	7,809
Astronomy	183	193	194	225	210	190	204	207	225	250	234	267	235	210	206	238
Chemistry	3,482	3,651	3,746	3,983	3,862	3,904	3,900	3,938	4,161	4,331	4,557	4,585	4,487	4,429	4,261	4,480
Physics	2,101	2,102	2,231	2,543	2,442	2,458	2,409	2,523	2,406	2,571	2,663	2,766	2,783	2,761	2,734	2,938
Other physical sciences	63	65	109	90	89	105	113	43	100	124	123	144	110	142	146	153
Social and behavioral sciences	22,523	23,591	25,453	27,495	27,864	29,618	30,530	30,405	32,346	34,382	33,638	34,088	33,523	33,108	31,761	32,870
Psychology <sup>d</sup>	7,545	7,691	8,420	8,858	9,478	10,358	10,224	10,476	11,082	10,980	10,231	10,218	10,455	10,467	9,839	10,669
Social sciences	14,978	15,900	17,033	18,637	18,386	19,260	20,306	19,929	21,264	23,402	23,407	23,870	23,068	22,641	21,922	22,201
Anthropology	1,157	1,119	1,177	1,279	1,187	1,243	1,314	1,310	1,444	1,452	1,454	1,407	1,459	1,436	1,401	1,279

## CHAPTER 2 | Higher Education in Science and Engineering

Citizenship and field	2000	2001	2002	2003	2004	2005	2006	2007 <sup>a</sup>	2008	2009	2010	2011	2012	2013	2014 <sup>b</sup>	2015
Economics	2,963	3,058	3,418	3,457	3,209	3,281	3,450	3,670	3,836	4,465	4,436	4,573	4,520	4,345	4,436	4,458
History of science	78	72	97	107	107	138	121	151	205	119	94	85	78	53	64	66
Linguistics	454	495	466	588	570	633	577	535	557	632	645	680	709	707	691	665
Political science and public administration	5,142	5,562	6,241	6,950	7,333	7,807	8,319	7,627	8,152	9,736	9,637	10,618	10,277	10,152	9,553	9,810
Sociology	1,464	1,591	1,690	1,722	1,537	1,672	1,504	1,730	1,888	1,761	1,729	1,783	1,597	1,567	1,596	1,553
Other social sciences	3,720	4,003	3,944	4,534	4,443	4,486	5,021	4,906	5,182	5,237	5,412	4,724	4,428	4,381	4,181	4,370
Multidisciplinary and interdisciplinary studies	NA	NA	NA	NA	NA	NA	NA	771	1,140	1,412	1,759	1,384	1,374	1,240	1,691	2,035
U.S. citizen or permanent resident																
S&E	61,021	62,396	70,346	76,478	77,169	79,531	81,142	81,033	84,230	88,183	89,174	86,686	84,860	83,542	83,698	87,677
Engineering	8,603	8,668	10,749	12,263	11,188	10,905	11,747	11,053	11,767	13,749	14,638	13,896	13,158	13,116	13,103	12,925
Aerospace	374	348	396	536	537	508	616	592	707	753	810	801	621	685	716	705
Chemical	651	616	760	852	733	624	684	695	711	927	1,002	910	934	995	936	1,026
Civil	2,009	1,989	2,250	2,595	2,591	2,492	2,650	2,188	2,335	3,017	3,124	2,905	2,697	2,471	2,355	2,068
Electrical	1,901	1,985	2,679	3,127	2,458	2,430	2,305	2,129	2,223	2,295	2,416	2,346	2,119	2,137	2,063	2,097
Industrial	596	590	781	832	755	690	933	901	1,030	1,121	1,042	995	805	886	877	826
Materials	413	410	502	479	454	482	545	514	534	592	721	684	725	706	683	729
Mechanical	1,231	1,373	1,681	1,843	1,684	1,668	1,889	1,854	1,959	2,477	2,664	2,360	2,394	2,415	2,488	2,415
Other	1,428	1,357	1,700	1,999	1,976	2,011	2,125	2,180	2,268	2,567	2,859	2,895	2,863	2,821	2,985	3,059
Science	52,418	53,728	59,597	64,215	65,981	68,626	69,395	69,396	71,604	73,303	73,151	71,714	70,648	69,497	69,457	73,470

## CHAPTER 2 | Higher Education in Science and Engineering

Citizenship and field	2000	2001	2002	2003	2004	2005	2006	2007 <sup>a</sup>	2008	2009	2010	2011	2012	2013	2014 <sup>b</sup>	2015
Natural sciences	34,659	34,988	39,006	41,645	42,752	43,728	44,112	44,138	45,010	44,896	45,485	44,122	44,052	43,285	44,812	47,866
Agricultural sciences	1,916	1,845	1,856	1,971	1,870	1,828	1,764	1,848	1,996	2,359	2,513	2,357	2,345	2,394	2,572	2,795
Biological sciences <sup>c</sup>	8,355	8,768	9,261	9,763	9,808	9,925	9,946	10,687	11,129	12,159	12,890	13,380	14,101	13,654	14,248	15,425
Earth, atmospheric, and ocean sciences	2,082	2,210	2,548	2,573	2,468	2,270	2,289	2,271	2,306	2,533	2,804	2,712	2,728	2,640	2,637	2,589
Atmospheric sciences	147	140	157	220	186	172	170	195	209	199	223	209	228	214	221	211
Earth sciences	986	1,091	1,179	1,129	1,102	1,073	1,068	1,139	1,119	1,323	1,511	1,415	1,442	1,505	1,498	1,519
Oceanography	374	426	447	485	476	376	380	345	382	424	407	435	394	389	420	467
Other geosciences	575	553	765	739	704	649	671	592	596	587	663	653	664	532	498	392
Mathematics and computer sciences	4,263	4,651	5,845	6,418	6,264	6,193	5,904	5,595	5,872	6,467	6,594	6,402	6,172	6,225	6,469	6,917
Computer sciences	2,414	2,621	3,534	3,891	3,632	3,632	3,382	3,034	3,324	3,659	3,582	3,339	3,279	3,303	3,682	4,126
Mathematics and statistics	1,849	2,030	2,311	2,527	2,632	2,561	2,522	2,561	2,548	2,808	3,012	3,063	2,893	2,922	2,787	2,791
Medical and other health sciences	14,720	14,189	15,721	16,829	18,316	19,374	20,164	19,648	19,719	16,954	16,105	14,643	14,113	13,723	14,439	15,533
Medical sciences	4,248	4,302	4,640	4,982	5,372	5,455	5,836	5,614	6,285	6,186	6,554	6,554	6,352	6,524	6,879	7,435
Other health sciences <sup>d</sup>	10,472	9,887	11,081	11,847	12,944	13,919	14,328	14,034	13,434	10,768	9,551	8,089	7,761	7,199	7,560	8,098
Physical sciences	3,323	3,325	3,775	4,091	4,026	4,138	4,045	4,089	3,988	4,424	4,579	4,628	4,593	4,649	4,447	4,607
Astronomy	123	135	137	150	145	144	142	136	146	191	169	178	174	161	156	168
Chemistry	2,151	2,125	2,292	2,438	2,391	2,461	2,405	2,434	2,453	2,683	2,777	2,765	2,786	2,772	2,663	2,725
Physics	1,009	1,025	1,270	1,442	1,416	1,439	1,406	1,487	1,315	1,455	1,547	1,580	1,558	1,625	1,536	1,620
Other physical sciences	40	40	76	61	74	94	92	32	74	95	86	105	75	91	92	94

## CHAPTER 2 | Higher Education in Science and Engineering

Citizenship and field	2000	2001	2002	2003	2004	2005	2006	2007 <sup>a</sup>	2008	2009	2010	2011	2012	2013	2014 <sup>b</sup>	2015
Social and behavioral sciences	17,759	18,740	20,591	22,570	23,229	24,898	25,283	25,258	26,594	28,407	27,666	27,592	26,596	26,212	24,645	25,604
Psychology <sup>d</sup>	7,060	7,167	7,902	8,285	8,944	9,800	9,645	9,861	10,407	10,347	9,570	9,535	9,750	9,784	9,128	9,884
Social sciences	10,699	11,573	12,689	14,285	14,285	15,098	15,638	15,397	16,187	18,060	18,096	18,057	16,846	16,428	15,517	15,720
Anthropology	996	985	1,028	1,142	1,068	1,131	1,170	1,149	1,280	1,325	1,295	1,252	1,300	1,284	1,224	1,107
Economics	1,207	1,275	1,559	1,694	1,589	1,594	1,634	1,731	1,756	2,213	2,164	2,098	1,915	1,757	1,707	1,752
History of science	65	62	90	95	97	115	109	140	183	106	78	69	62	47	47	50
Linguistics	257	294	305	405	381	440	417	370	361	419	441	468	470	462	448	420
Political science and public administration	3,870	4,291	4,949	5,561	5,974	6,475	6,670	6,206	6,584	7,926	7,898	8,616	8,075	7,995	7,353	7,520
Sociology	1,205	1,311	1,440	1,501	1,357	1,474	1,339	1,513	1,689	1,531	1,508	1,559	1,367	1,318	1,355	1,316
Other social sciences	3,099	3,355	3,318	3,887	3,819	3,869	4,299	4,288	4,334	4,540	4,712	3,995	3,657	3,565	3,383	3,555
Multidisciplinary and interdisciplinary studies	NA	NA	NA	NA	NA	NA	NA	584	859	1,131	1,385	1,076	1,054	929	1,138	1,282
Temporary visa holder																
S&E	33,319	35,716	33,838	31,237	29,375	30,688	35,340	37,860	41,935	41,548	42,220	45,755	49,102	56,008	66,563	70,191
Engineering	13,588	14,638	13,858	12,166	10,837	11,468	14,129	15,679	16,846	16,481	16,902	18,459	20,545	23,689	28,053	28,549
Aerospace	401	419	316	309	297	296	327	370	409	423	386	438	370	453	522	556
Chemical	944	925	856	748	659	669	745	871	1,002	983	1,045	1,129	1,282	1,438	1,472	1,501
Civil	1,831	1,831	1,857	1,768	1,584	1,565	1,548	1,474	1,738	1,861	1,955	2,098	2,422	2,656	3,056	3,094
Electrical	5,294	5,897	5,542	4,707	4,175	4,557	6,363	6,791	6,819	6,536	6,821	7,444	8,320	10,250	12,034	11,496
Industrial	1,409	1,626	1,457	1,197	969	984	1,215	1,725	1,985	1,787	1,741	1,842	1,962	2,161	2,833	3,443



## CHAPTER 2 | Higher Education in Science and Engineering

Citizenship and field	2000	2001	2002	2003	2004	2005	2006	2007 <sup>a</sup>	2008	2009	2010	2011	2012	2013	2014 <sup>b</sup>	2015
Materials	592	565	542	479	472	510	498	572	636	710	710	877	884	865	947	1,032
Mechanical	2,038	2,210	2,028	1,633	1,445	1,557	1,845	2,083	2,338	2,337	2,391	2,472	2,950	3,428	3,940	4,379
Other	1,079	1,165	1,260	1,325	1,236	1,330	1,588	1,793	1,919	1,844	1,853	2,159	2,355	2,438	3,249	3,048
Science	19,731	21,078	19,980	19,071	18,538	19,220	21,211	22,194	24,808	24,786	24,944	26,988	28,237	32,008	37,957	40,889
Natural sciences	14,967	16,227	15,118	14,146	13,903	14,500	15,964	16,847	19,056	18,811	18,972	20,492	21,310	25,112	30,841	33,623
Agricultural sciences	419	493	464	453	446	432	442	508	601	635	608	696	695	734	792	842
Biological sciences <sup>c</sup>	2,600	2,840	2,866	2,956	2,988	2,993	3,109	3,335	3,703	3,679	3,653	3,947	3,818	3,682	3,773	4,049
Earth, atmospheric, and ocean sciences	567	584	537	531	458	488	506	478	598	620	641	696	723	742	804	732
Atmospheric sciences	75	65	56	48	42	56	37	48	54	51	56	57	72	77	81	70
Earth sciences	244	292	258	283	234	235	280	266	310	359	376	424	426	435	485	418
Oceanography	105	85	86	82	58	87	77	57	84	93	95	85	87	87	79	73
Other geosciences	143	142	137	118	124	110	112	107	150	117	114	130	138	143	159	171
Mathematics and computer sciences	7,587	8,112	7,110	5,901	5,771	6,261	7,421	8,093	9,153	8,978	9,182	10,187	11,254	15,183	20,575	22,702
Computer sciences	6,017	6,456	5,503	4,243	4,151	4,626	5,601	6,222	7,110	6,898	7,001	7,656	8,409	12,094	16,976	18,785
Mathematics and statistics	1,570	1,656	1,607	1,658	1,620	1,635	1,820	1,871	2,043	2,080	2,181	2,531	2,845	3,089	3,599	3,917
Medical and other health sciences	1,288	1,512	1,636	1,555	1,663	1,807	1,905	1,811	2,097	2,047	1,890	1,832	1,798	1,878	1,997	2,096
Medical sciences	879	1,059	1,140	1,052	1,153	1,189	1,260	1,256	1,468	1,528	1,408	1,460	1,448	1,498	1,536	1,644
Other health sciences <sup>d</sup>	409	453	496	503	510	618	645	555	629	519	482	372	350	380	461	452
Physical sciences	2,506	2,686	2,505	2,750	2,577	2,519	2,581	2,622	2,904	2,852	2,998	3,134	3,022	2,893	2,900	3,202

## CHAPTER 2 | Higher Education in Science and Engineering

Citizenship and field	2000	2001	2002	2003	2004	2005	2006	2007 <sup>a</sup>	2008	2009	2010	2011	2012	2013	2014 <sup>b</sup>	2015
Astronomy	60	58	57	75	65	46	62	71	79	59	65	89	61	49	50	70
Chemistry	1,331	1,526	1,454	1,545	1,471	1,443	1,495	1,504	1,708	1,648	1,780	1,820	1,701	1,657	1,598	1,755
Physics	1,092	1,077	961	1,101	1,026	1,019	1,003	1,036	1,091	1,116	1,116	1,186	1,225	1,136	1,198	1,318
Other physical sciences	23	25	33	29	15	11	21	11	26	29	37	39	35	51	54	59
Social and behavioral sciences	4,764	4,851	4,862	4,925	4,635	4,720	5,247	5,147	5,752	5,975	5,972	6,496	6,927	6,896	7,116	7,266
Psychology <sup>d</sup>	485	524	518	573	534	558	579	615	675	633	661	683	705	683	711	785
Social sciences	4,279	4,327	4,344	4,352	4,101	4,162	4,668	4,532	5,077	5,342	5,311	5,813	6,222	6,213	6,405	6,481
Anthropology	161	134	149	137	119	112	144	161	164	127	159	155	159	152	177	172
Economics	1,756	1,783	1,859	1,763	1,620	1,687	1,816	1,939	2,080	2,252	2,272	2,475	2,605	2,588	2,729	2,706
History of science	13	10	7	12	10	23	12	11	22	13	16	16	16	6	17	16
Linguistics	197	201	161	183	189	193	160	165	196	213	204	212	239	245	243	245
Political science and public administration	1,272	1,271	1,292	1,389	1,359	1,332	1,649	1,421	1,568	1,810	1,739	2,002	2,202	2,157	2,200	2,290
Sociology	259	280	250	221	180	198	165	217	199	230	221	224	230	249	241	237
Other social sciences	621	648	626	647	624	617	722	618	848	697	700	729	771	816	798	815
Multidisciplinary and interdisciplinary studies	ne	ne	ne	ne	ne	ne	ne	187	281	281	374	308	320	311	553	753

NA = not available; ne = not eligible; data were not collected for this field before 2007.

<sup>a</sup> In 2007, eligible fields were reclassified, newly eligible fields were added, and the survey was redesigned to improve coverage and coding of eligible units. Because of methodological changes, counts should be used with caution for trend analysis. For more details, see appendix A in <https://www.nsf.gov/statistics/nsf10307/>.

<sup>b</sup> In 2014, the survey frame was updated following a comprehensive frame evaluation study. The study identified potentially eligible but not previously surveyed U.S. academic institutions with master's- or doctorate-granting programs in science, engineering, or health. For more details on the impact of the frame update, see <https://www.nsf.gov/statistics/2016/nsf16314/>.

CHAPTER 2 | Higher Education in Science and Engineering

<sup>c</sup> Starting in 2007, includes neuroscience, which may have been reported under other fields in prior years.

<sup>d</sup> Beginning with 2008, more rigorous follow-up was done in recent years with institutions regarding the exclusion of practitioner-oriented graduate degree programs in psychology and in other health sciences (a subfield of health). This change may affect interpretation of trends in these fields.

**Note(s)**

S&E includes health fields (medical sciences and other health sciences) and excludes newly eligible fields (architecture, communication, and family and consumer sciences and human sciences) added starting in 2007. Therefore, the S&E numbers in this table differ from the data used in National Science Foundation National Science Foundation, National Center for Science and Engineering Statistics, Survey of Graduate Students and Postdoctorates in Science and Engineering (annual series), and elsewhere. The survey changes in 2007 and 2014 may affect interpretation of trends.

**Source(s)**

National Science Foundation, National Center for Science and Engineering Statistics, special tabulations (2016), 2015 Survey of Graduate Students and Postdoctorates in Science and Engineering.

*Science and Engineering Indicators 2018*

## CHAPTER 2 | Higher Education in Science and Engineering

### APPENDIX TABLE 2-25

#### S&E graduate enrollment, by citizenship and field: 2000–15

(Number)

Citizenship and field	2000	2001	2002	2003	2004	2005	2006	2007 <sup>a</sup>	2008	2009	2010	2011	2012	2013	2014 <sup>b</sup>	2015
All citizenships																
S&E	493,311	509,607	540,404	567,121	574,463	582,226	597,643	604,815	613,591	611,629	611,841	608,171	609,760	615,706	648,525	667,939
Engineering	104,112	109,493	119,668	127,377	123,566	120,565	123,041	127,075	131,951	137,873	142,446	143,390	146,022	150,873	162,671	167,789
Aerospace	3,407	3,451	3,685	4,048	4,089	4,170	4,482	4,616	4,902	5,266	5,540	5,691	5,069	5,181	5,116	5,345
Chemical	7,056	6,913	7,414	7,516	7,452	7,173	7,261	7,584	7,892	8,188	8,668	8,828	9,222	9,698	9,870	10,008
Civil	16,451	16,665	17,713	18,890	18,561	18,114	17,802	16,071	16,931	18,638	19,559	19,596	19,922	20,110	20,789	20,978
Electrical	33,611	36,100	39,948	41,763	38,995	37,450	38,265	40,588	41,164	41,218	41,336	41,580	42,347	45,562	51,909	52,940
Industrial	12,119	12,940	14,033	14,313	13,852	13,650	13,829	14,474	15,692	15,825	15,205	14,494	14,469	14,363	14,845	16,284
Materials	4,377	4,721	4,992	5,131	5,059	5,160	5,268	5,314	5,539	5,863	6,274	6,649	6,985	7,144	7,518	7,741
Mechanical	15,235	15,852	17,139	18,393	17,852	17,373	17,919	18,347	19,585	21,243	22,509	21,883	23,088	24,087	25,651	27,314
Other	11,856	12,851	14,744	17,323	17,706	17,475	18,215	20,081	20,246	21,632	23,355	24,669	24,920	24,728	26,973	27,179
Science	389,199	400,114	420,736	439,744	450,897	461,661	474,602	477,740	481,640	473,756	469,395	464,781	463,738	464,833	485,854	500,150
Natural sciences	255,406	263,978	279,369	292,453	299,439	304,952	314,602	310,489	313,706	303,195	298,812	292,097	295,414	297,561	324,083	339,566
Agricultural sciences	12,023	12,235	12,698	13,197	13,445	13,123	13,016	13,528	14,153	15,200	15,656	16,129	16,234	16,429	17,505	18,610
Biological sciences <sup>c</sup>	56,282	57,639	61,088	64,701	66,565	68,479	69,941	73,516	74,678	75,660	77,726	79,540	80,994	81,444	83,413	85,098
Earth, atmospheric, and ocean sciences	13,941	13,841	14,240	14,620	15,131	14,836	14,920	14,100	14,389	14,839	15,655	15,820	16,069	15,816	15,710	15,447

## CHAPTER 2 | Higher Education in Science and Engineering

Citizenship and field	2000	2001	2002	2003	2004	2005	2006	2007 <sup>a</sup>	2008	2009	2010	2011	2012	2013	2014 <sup>b</sup>	2015
Atmospheric sciences	963	924	1,036	1,150	1,086	1,146	1,079	1,178	1,400	1,355	1,455	1,513	1,546	1,534	1,466	1,387
Earth sciences	6,596	6,544	6,712	6,889	7,358	7,212	7,177	7,020	7,089	7,539	8,251	8,361	8,659	8,754	8,821	8,876
Oceanography	2,668	2,585	2,618	2,695	2,801	2,760	2,770	2,615	2,634	2,633	2,556	2,680	2,642	2,682	2,666	2,574
Other geosciences	3,714	3,788	3,874	3,886	3,886	3,718	3,894	3,287	3,266	3,312	3,393	3,266	3,222	2,846	2,757	2,610
Mathematics and computer sciences	63,000	68,847	73,432	73,161	69,947	68,188	68,468	69,221	70,953	73,387	74,682	75,035	76,364	81,143	102,420	112,636
Computer sciences	47,350	52,196	55,269	53,696	50,016	47,978	47,653	48,246	49,553	51,161	51,546	51,234	51,789	56,339	76,546	86,192
Mathematics and statistics	15,650	16,651	18,163	19,465	19,931	20,210	20,815	20,975	21,400	22,226	23,136	23,801	24,575	24,804	25,874	26,444
Medical and other health sciences	79,775	80,378	85,570	92,476	98,590	103,951	111,356	103,300	102,214	85,960	76,120	65,879	65,825	62,710	64,703	67,389
Medical sciences	22,815	24,012	26,841	29,440	29,762	31,223	33,437	31,876	32,311	32,508	33,862	34,348	34,555	34,332	35,323	36,978
Other health sciences <sup>d</sup>	56,960	56,366	58,729	63,036	68,828	72,728	77,919	71,424	69,903	53,452	42,258	31,531	31,270	28,378	29,380	30,411
Physical sciences	30,385	31,038	32,341	34,298	35,761	36,375	36,901	36,824	37,319	38,149	38,973	39,694	39,928	40,019	40,332	40,386
Astronomy	888	916	990	1,080	1,119	1,191	1,211	1,232	1,275	1,409	1,331	1,345	1,278	1,250	1,241	1,273
Chemistry	18,105	18,366	19,045	20,049	20,776	21,101	21,351	21,298	21,574	22,094	22,436	22,802	23,117	22,949	22,936	22,840
Physics	10,841	11,248	11,701	12,555	13,298	13,472	13,722	13,816	13,862	14,060	14,507	14,829	14,940	15,239	15,564	15,609
Other physical sciences	551	508	605	614	568	611	617	478	608	586	699	718	593	581	591	664
Social and behavioral sciences	133,793	136,136	141,367	147,291	151,458	156,709	160,000	162,767	162,375	164,004	162,639	166,147	162,286	161,380	154,575	152,446
Psychology <sup>d</sup>	50,466	50,454	51,152	52,162	54,126	57,282	57,653	59,617	58,991	56,184	53,419	54,486	54,117	54,102	48,833	49,740
Social sciences	83,327	85,682	90,215	95,129	97,332	99,427	102,347	103,150	103,384	107,820	109,220	111,661	108,169	107,278	105,742	102,706
Anthropology	7,626	7,491	7,481	7,789	7,826	7,750	8,150	8,129	8,333	8,359	8,528	8,406	8,247	8,172	7,955	7,625

## CHAPTER 2 | Higher Education in Science and Engineering

Citizenship and field	2000	2001	2002	2003	2004	2005	2006	2007 <sup>a</sup>	2008	2009	2010	2011	2012	2013	2014 <sup>b</sup>	2015
Economics	12,827	13,569	14,196	14,634	14,513	13,932	14,290	14,586	15,103	16,215	16,497	17,015	17,004	16,735	16,535	16,355
History of science	532	571	663	737	994	965	968	1,054	1,177	1,006	705	597	508	391	371	379
Linguistics	2,674	2,744	2,875	3,028	2,941	3,187	3,074	2,879	3,095	3,170	3,132	3,219	3,256	3,509	3,489	3,370
Political science and public administration	31,131	31,805	34,934	36,880	39,023	40,780	41,784	41,349	40,871	43,919	45,045	49,660	48,855	48,411	47,370	45,781
Sociology	9,397	9,620	9,665	9,900	9,713	9,866	9,872	10,324	10,655	10,307	10,212	9,959	9,157	9,188	8,834	8,479
Other social sciences	19,140	19,882	20,401	22,161	22,322	22,947	24,209	24,829	24,150	24,844	25,101	22,805	21,142	20,872	21,188	20,717
Multidisciplinary and interdisciplinary studies	ne	ne	ne	ne	ne	ne	ne	4,484	5,559	6,557	7,944	6,537	6,038	5,892	7,196	8,138
U.S. citizens and permanent residents																
S&E	364,894	368,737	387,416	412,105	423,218	434,730	446,625	447,903	448,347	442,779	440,839	434,718	429,197	422,078	424,585	427,756
Engineering	56,651	56,890	61,277	67,310	66,379	66,551	67,698	67,592	69,411	73,031	76,747	76,970	75,669	74,201	72,852	72,522
Aerospace	1,894	1,805	1,999	2,361	2,401	2,528	2,998	3,090	3,311	3,605	3,893	4,045	3,614	3,629	3,389	3,418
Chemical	3,711	3,398	3,686	3,736	3,753	3,675	3,685	3,744	3,821	4,022	4,272	4,402	4,473	4,630	4,725	4,604
Civil	10,306	10,072	10,553	11,458	11,436	11,415	11,421	9,972	10,477	11,750	12,482	12,221	11,984	11,448	10,929	10,465
Electrical	15,315	15,534	16,579	18,118	16,878	16,662	16,166	16,024	16,042	15,936	16,109	15,985	15,301	14,892	14,454	14,346
Industrial	7,574	7,588	8,290	8,820	8,763	9,071	9,249	9,090	9,464	9,511	9,028	8,552	8,233	8,006	7,372	7,361
Materials	2,265	2,385	2,482	2,546	2,501	2,518	2,690	2,719	2,796	2,949	3,197	3,315	3,425	3,504	3,633	3,745
Mechanical	8,052	8,141	8,562	9,602	9,724	9,719	10,205	10,481	11,075	11,893	12,986	12,635	12,859	12,791	12,696	12,679
Other	7,534	7,967	9,126	10,669	10,923	10,963	11,284	12,472	12,425	13,365	14,780	15,815	15,780	15,301	15,654	15,904
Science	308,243	311,847	326,139	344,795	356,839	368,179	378,927	380,311	378,936	369,748	364,092	357,748	353,528	347,877	351,733	355,234

## CHAPTER 2 | Higher Education in Science and Engineering

Citizenship and field	2000	2001	2002	2003	2004	2005	2006	2007 <sup>a</sup>	2008	2009	2010	2011	2012	2013	2014 <sup>b</sup>	2015
Natural sciences	193,036	195,250	205,691	218,875	226,950	232,603	240,588	235,170	234,181	222,537	217,406	209,614	210,464	206,530	216,627	222,115
Agricultural sciences	9,612	9,722	10,085	10,601	10,750	10,464	10,341	10,631	11,047	11,938	12,416	12,702	12,676	12,773	13,604	14,466
Biological sciences <sup>c</sup>	44,521	45,196	47,253	49,865	50,734	52,012	53,034	56,558	56,746	57,904	59,829	61,374	62,592	63,118	65,088	66,741
Earth, atmospheric, and ocean sciences	11,249	11,059	11,463	11,837	12,337	12,058	12,153	11,488	11,612	12,082	12,729	12,730	12,863	12,589	12,392	12,025
Atmospheric sciences	659	639	721	861	813	849	821	891	1,080	1,056	1,133	1,180	1,199	1,191	1,074	1,012
Earth sciences	5,294	5,189	5,333	5,456	5,906	5,785	5,749	5,633	5,686	6,036	6,607	6,588	6,781	6,860	6,887	6,814
Oceanography	2,142	2,071	2,152	2,206	2,304	2,270	2,267	2,184	2,164	2,170	2,122	2,211	2,204	2,220	2,222	2,168
Other geosciences	3,154	3,160	3,257	3,314	3,314	3,154	3,316	2,780	2,682	2,820	2,867	2,751	2,679	2,318	2,209	2,031
Mathematics and computer sciences	34,681	36,309	39,342	41,477	40,785	40,177	39,894	38,873	38,551	40,236	40,691	40,307	39,702	38,553	44,070	45,052
Computer sciences	25,088	26,142	28,203	29,420	28,261	27,409	26,675	25,441	25,316	26,325	26,170	25,656	24,962	24,191	29,630	31,027
Mathematics and statistics	9,593	10,167	11,139	12,057	12,524	12,768	13,219	13,432	13,235	13,911	14,521	14,651	14,740	14,362	14,440	14,025
Medical and other health sciences	74,243	74,129	78,297	84,924	91,196	96,217	103,022	95,203	93,669	77,306	68,089	58,363	58,354	55,071	56,797	59,322
Medical sciences	19,090	19,784	21,773	24,212	24,789	26,163	27,936	26,297	26,354	26,218	27,976	28,482	28,764	28,401	29,216	30,747
Other health sciences <sup>d</sup>	55,153	54,345	56,524	60,712	66,407	70,054	75,086	68,906	67,315	51,088	40,113	29,881	29,590	26,670	27,581	28,575
Physical sciences	18,730	18,835	19,251	20,171	21,148	21,675	22,144	22,417	22,556	23,071	23,652	24,138	24,277	24,426	24,676	24,509
Astronomy	617	633	687	747	749	828	845	851	873	969	932	939	934	920	915	921
Chemistry	11,883	11,797	11,792	12,168	12,637	12,833	13,050	13,201	13,155	13,515	13,766	14,057	14,263	14,266	14,348	14,251
Physics	5,757	5,991	6,259	6,744	7,270	7,473	7,722	7,918	7,988	8,078	8,460	8,656	8,639	8,832	9,020	8,934
Other physical sciences	473	414	513	512	492	541	527	447	540	509	494	486	441	408	393	403

## CHAPTER 2 | Higher Education in Science and Engineering

Citizenship and field	2000	2001	2002	2003	2004	2005	2006	2007 <sup>a</sup>	2008	2009	2010	2011	2012	2013	2014 <sup>b</sup>	2015
Social and behavioral sciences	115,207	116,597	120,448	125,920	129,889	135,576	138,339	141,353	140,102	141,683	139,979	142,639	138,117	136,612	129,561	127,277
Psychology <sup>d</sup>	48,203	47,933	48,295	49,055	50,932	54,228	54,802	56,574	55,912	53,246	50,332	51,398	51,016	51,042	45,868	46,631
Social sciences	67,004	68,664	72,153	76,865	78,957	81,348	83,537	84,779	84,190	88,437	89,647	91,241	87,101	85,570	83,693	80,646
Anthropology	6,797	6,722	6,634	6,967	6,966	6,892	7,225	7,155	7,352	7,410	7,538	7,424	7,283	7,182	6,952	6,608
Economics	6,006	6,233	6,530	6,920	6,938	6,590	6,810	7,068	7,331	8,194	8,307	8,502	8,055	7,639	7,289	7,043
History of science	463	501	595	668	925	886	881	978	1,081	913	630	511	425	319	294	299
Linguistics	1,714	1,782	1,893	2,065	1,936	2,257	2,124	2,028	2,150	2,229	2,182	2,232	2,235	2,409	2,404	2,321
Political science and public administration	26,972	27,582	30,280	32,003	34,054	35,895	36,477	36,263	35,621	38,328	39,520	43,561	42,556	42,018	40,705	39,135
Sociology	8,065	8,228	8,275	8,485	8,356	8,481	8,493	9,046	9,371	9,073	8,983	8,751	7,936	7,925	7,596	7,269
Other social sciences	16,987	17,616	17,946	19,757	19,782	20,347	21,527	22,241	21,284	22,290	22,487	20,260	18,611	18,078	18,453	17,971
Multidisciplinary and interdisciplinary studies	ne	ne	ne	ne	ne	ne	ne	3,788	4,653	5,528	6,707	5,495	4,947	4,735	5,545	5,842
Temporary visa holders																
S&E	128,417	140,870	152,988	155,016	151,245	147,496	151,018	156,912	165,244	168,850	171,002	173,453	180,563	193,628	223,940	240,183
Engineering	47,461	52,603	58,391	60,067	57,187	54,014	55,343	59,483	62,540	64,842	65,699	66,420	70,353	76,672	89,819	95,267
Aerospace	1,513	1,646	1,686	1,687	1,688	1,642	1,484	1,526	1,591	1,661	1,647	1,646	1,455	1,552	1,727	1,927
Chemical	3,345	3,515	3,728	3,780	3,699	3,498	3,576	3,840	4,071	4,166	4,396	4,426	4,749	5,068	5,145	5,404
Civil	6,145	6,593	7,160	7,432	7,125	6,699	6,381	6,099	6,454	6,888	7,077	7,375	7,938	8,662	9,860	10,513
Electrical	18,296	20,566	23,369	23,645	22,117	20,788	22,099	24,564	25,122	25,282	25,227	25,595	27,046	30,670	37,455	38,594
Industrial	4,545	5,352	5,743	5,493	5,089	4,579	4,580	5,384	6,228	6,314	6,177	5,942	6,236	6,357	7,473	8,923



## CHAPTER 2 | Higher Education in Science and Engineering

Citizenship and field	2000	2001	2002	2003	2004	2005	2006	2007 <sup>a</sup>	2008	2009	2010	2011	2012	2013	2014 <sup>b</sup>	2015
Materials	2,112	2,336	2,510	2,585	2,558	2,642	2,578	2,595	2,743	2,914	3,077	3,334	3,560	3,640	3,885	3,996
Mechanical	7,183	7,711	8,577	8,791	8,128	7,654	7,714	7,866	8,510	9,350	9,523	9,248	10,229	11,296	12,955	14,635
Other	4,322	4,884	5,618	6,654	6,783	6,512	6,931	7,609	7,821	8,267	8,575	8,854	9,140	9,427	11,319	11,275
Science	80,956	88,267	94,597	94,949	94,058	93,482	95,675	97,429	102,704	104,008	105,303	107,033	110,210	116,956	134,121	144,916
Natural sciences	62,370	68,728	73,678	73,578	72,489	72,349	74,014	75,319	79,525	80,658	81,406	82,483	84,950	91,031	107,456	117,451
Agricultural sciences	2,411	2,513	2,613	2,596	2,695	2,659	2,675	2,897	3,106	3,262	3,240	3,427	3,558	3,656	3,901	4,144
Biological sciences <sup>c</sup>	11,761	12,443	13,835	14,836	15,831	16,467	16,907	16,958	17,932	17,756	17,897	18,166	18,402	18,326	18,325	18,357
Earth, atmospheric, and ocean sciences	2,692	2,782	2,777	2,783	2,794	2,778	2,767	2,612	2,777	2,757	2,926	3,090	3,206	3,227	3,318	3,422
Atmospheric sciences	304	285	315	289	273	297	258	287	320	299	322	333	347	343	392	375
Earth sciences	1,302	1,355	1,379	1,433	1,452	1,427	1,428	1,387	1,403	1,503	1,644	1,773	1,878	1,894	1,934	2,062
Oceanography	526	514	466	489	497	490	503	431	470	463	434	469	438	462	444	406
Other geosciences	560	628	617	572	572	564	578	507	584	492	526	515	543	528	548	579
Mathematics and computer sciences	28,319	32,538	34,090	31,684	29,162	28,011	28,574	30,348	32,402	33,151	33,991	34,728	36,662	42,590	58,350	67,584
Computer sciences	22,262	26,054	27,066	24,276	21,755	20,569	20,978	22,805	24,237	24,836	25,376	25,578	26,827	32,148	46,916	55,165
Mathematics and statistics	6,057	6,484	7,024	7,408	7,407	7,442	7,596	7,543	8,165	8,315	8,615	9,150	9,835	10,442	11,434	12,419
Medical and other health sciences	5,532	6,249	7,273	7,552	7,394	7,734	8,334	8,097	8,545	8,654	8,031	7,516	7,471	7,639	7,906	8,067
Medical sciences	3,725	4,228	5,068	5,228	4,973	5,060	5,501	5,579	5,957	6,290	5,886	5,866	5,791	5,931	6,107	6,231
Other health sciences <sup>d</sup>	1,807	2,021	2,205	2,324	2,421	2,674	2,833	2,518	2,588	2,364	2,145	1,650	1,680	1,708	1,799	1,836
Physical sciences	11,655	12,203	13,090	14,127	14,613	14,700	14,757	14,407	14,763	15,078	15,321	15,556	15,651	15,593	15,656	15,877

## CHAPTER 2 | Higher Education in Science and Engineering

Citizenship and field	2000	2001	2002	2003	2004	2005	2006	2007 <sup>a</sup>	2008	2009	2010	2011	2012	2013	2014 <sup>b</sup>	2015
Astronomy	271	283	303	333	370	363	366	381	402	440	399	406	344	330	326	352
Chemistry	6,222	6,569	7,253	7,881	8,139	8,268	8,301	8,097	8,419	8,579	8,670	8,745	8,854	8,683	8,588	8,589
Physics	5,084	5,257	5,442	5,811	6,028	5,999	6,000	5,898	5,874	5,982	6,047	6,173	6,301	6,407	6,544	6,675
Other physical sciences	78	94	92	102	76	70	90	31	68	77	205	232	152	173	198	261
Social and behavioral sciences	18,586	19,539	20,919	21,371	21,569	21,133	21,661	21,414	22,273	22,321	22,660	23,508	24,169	24,768	25,014	25,169
Psychology <sup>d</sup>	2,263	2,521	2,857	3,107	3,194	3,054	2,851	3,043	3,079	2,938	3,087	3,088	3,101	3,060	2,965	3,109
Social sciences	16,323	17,018	18,062	18,264	18,375	18,079	18,810	18,371	19,194	19,383	19,573	20,420	21,068	21,708	22,049	22,060
Anthropology	829	769	847	822	860	858	925	974	981	949	990	982	964	990	1,003	1,017
Economics	6,821	7,336	7,666	7,714	7,575	7,342	7,480	7,518	7,772	8,021	8,190	8,513	8,949	9,096	9,246	9,312
History of science	69	70	68	69	69	79	87	76	96	93	75	86	83	72	77	80
Linguistics	960	962	982	963	1,005	930	950	851	945	941	950	987	1,021	1,100	1,085	1,049
Political science and public administration	4,159	4,223	4,654	4,877	4,969	4,885	5,307	5,086	5,250	5,591	5,525	6,099	6,299	6,393	6,665	6,646
Sociology	1,332	1,392	1,390	1,415	1,357	1,385	1,379	1,278	1,284	1,234	1,229	1,208	1,221	1,263	1,238	1,210
Other social sciences	2,153	2,266	2,455	2,404	2,540	2,600	2,682	2,588	2,866	2,554	2,614	2,545	2,531	2,794	2,735	2,746
Multidisciplinary and interdisciplinary studies	ne	ne	ne	ne	ne	ne	ne	696	906	1,029	1,237	1,042	1,091	1,157	1,651	2,296

ne = not eligible; data were not collected for this field before 2007.

<sup>a</sup> In 2007, eligible fields were reclassified, newly eligible fields were added, and the survey was redesigned to improve coverage and coding of eligible units. Because of methodological changes, counts should be used with caution for trend analysis. For more details, see appendix A in <https://www.nsf.gov/statistics/nsf10307/>.

<sup>b</sup> In 2014, the survey frame was updated following a comprehensive frame evaluation study. The study identified potentially eligible but not previously surveyed U.S. academic institutions with master's- or doctorate-granting programs in science, engineering, or health. For more details on the impact of the frame update, see <https://www.nsf.gov/statistics/2016/nsf16314/>.

CHAPTER 2 | Higher Education in Science and Engineering

<sup>c</sup> Starting in 2007, includes neuroscience, which may have been reported under other fields in prior years.

<sup>d</sup> Beginning with 2008, more rigorous follow-up was done in recent years with institutions regarding the exclusion of practitioner-oriented graduate degree programs in psychology and in other health sciences (a subfield of health). This change may affect interpretation of trends in these fields.

**Note(s)**

S&E includes health fields (medical sciences and other health sciences) and excludes newly eligible fields (architecture, communication, and family and consumer sciences and human sciences) added starting in 2007. Therefore, the S&E numbers in this table differ from the data used in National Science Foundation, National Center for Science and Engineering Statistics, Survey of Graduate Students and Postdoctorates in Science and Engineering (annual series), and elsewhere. The survey changes in 2007 and 2014 may affect interpretation of trends.

**Source(s)**

National Science Foundation, National Center for Science and Engineering Statistics, special tabulations (2016), 2015 Survey of Graduate Students and Postdoctorates in Science and Engineering.

*Science and Engineering Indicators 2018*

## CHAPTER 2 | Higher Education in Science and Engineering

APPENDIX TABLE 2-26

### International graduate student enrollment in U.S. universities, by field and selected places of origin: 2016 and 2017

(Number)

Place of origin	All fields	S&E									Non-S&E
		Total	Agricultural sciences	Biological sciences	Computer sciences	Engineering	Mathematics	Physical sciences	Psychology	Social sciences	
2016											
All locations	389,310	244,040	3,970	15,700	70,630	96,330	15,780	18,210	3,360	20,070	145,270
India	117,540	95,950	470	3,280	47,430	39,470	1,380	2,310	310	1,300	21,590
China	123,290	76,400	1,330	5,500	13,110	30,840	10,230	7,500	810	7,080	46,890
Iran	9,270	7,680	110	220	970	5,020	220	790	40	330	1,590
South Korea	17,880	6,740	110	590	630	2,450	470	570	280	1,640	11,140
Saudi Arabia	12,510	5,810	110	720	1,480	1,930	410	560	110	500	6,700
Taiwan	8,780	4,370	70	530	750	1,840	240	540	100	300	4,410
Bangladesh	4,480	3,560	60	230	650	1,810	110	430	10	280	920
Nepal	4,880	3,410	220	430	930	800	90	700	30	210	1,470
Canada	9,330	2,650	60	440	160	620	180	320	360	520	6,680
Nigeria	4,810	2,190	110	200	440	810	80	190	30	340	2,620
Turkey	3,470	2,070	20	180	230	810	110	150	70	510	1,400
Mexico	3,400	1,570	90	190	90	490	90	170	40	410	1,830
Sri Lanka	1,610	1,370	40	130	90	220	180	660	10	50	240

## CHAPTER 2 | Higher Education in Science and Engineering

Place of origin	All fields	S&E									Non-S&E
		Total	Agricultural sciences	Biological sciences	Computer sciences	Engineering	Mathematics	Physical sciences	Psychology	Social sciences	
Pakistan	2,240	1,340	20	60	370	530	40	90	20	220	900
Vietnam	3,130	1,330	10	100	310	370	170	160	20	190	1,800
Colombia	2,510	1,220	80	160	80	400	80	140	30	260	1,290
Brazil	3,490	1,210	150	170	90	290	50	110	50	300	2,280
France	2,370	1,050	20	70	90	530	80	70	20	180	1,330
Germany	2,270	1,010	30	140	70	190	80	140	50	330	1,260
Japan	2,660	990	20	90	80	200	30	90	60	420	1,670
Other locations	49,380	22,130	870	2,300	2,620	6,740	1,480	2,520	900	4,690	27,260
2017											
All locations	367,920	229,310	3,920	15,530	61,460	88,960	18,110	18,140	3,340	19,850	138,610
China	124,990	79,580	1,210	5,490	14,680	30,840	11,910	7,430	860	7,160	45,410
India	96,760	77,500	460	3,000	36,200	32,110	1,800	2,280	320	1,330	19,260
Iran	9,150	7,640	110	240	1,010	4,910	200	800	60	320	1,510
South Korea	17,050	6,650	120	590	650	2,360	470	600	260	1,600	10,410
Saudi Arabia	10,850	5,200	90	700	1,270	1,750	350	500	110	430	5,640
Taiwan	8,810	4,580	70	470	930	1,870	310	520	110	300	4,230
Bangladesh	4,620	3,810	70	260	670	1,930	120	490	10	260	810

## CHAPTER 2 | Higher Education in Science and Engineering

Place of origin	All fields	S&E									Non-S&E
		Total	Agricultural sciences	Biological sciences	Computer sciences	Engineering	Mathematics	Physical sciences	Psychology	Social sciences	
Nepal	4,820	3,430	220	460	850	840	100	730	20	210	1,390
Canada	8,970	2,640	70	410	210	610	170	310	360	500	6,330
Nigeria	5,340	2,420	120	230	530	880	110	200	30	320	2,920
Turkey	3,550	2,080	20	190	260	820	90	150	80	470	1,470
Mexico	3,230	1,550	90	190	90	470	80	190	40	420	1,690
Vietnam	3,300	1,520	10	120	390	390	200	180	40	200	1,780
Sri Lanka	1,700	1,470	30	140	100	260	180	690	10	60	240
Pakistan	2,320	1,420	20	70	390	530	60	110	20	230	900
Brazil	3,810	1,360	160	180	110	370	50	110	50	330	2,460
Colombia	2,480	1,190	80	150	80	370	80	130	30	260	1,300
France	2,250	1,060	20	70	100	530	90	70	20	170	1,190
Germany	2,170	970	30	120	80	180	70	130	50	310	1,200
Japan	2,590	990	20	100	80	210	30	80	50	410	1,600
Other locations	49,150	22,290	920	2,360	2,790	6,740	1,610	2,450	840	4,580	26,870

Note(s)

## CHAPTER 2 | Higher Education in Science and Engineering

Data include active foreign national students on F-1 visas and exclude those on optional practical training. Graduate student enrollment includes master's and doctoral degrees. Numbers are rounded to the nearest 10. Places of origin are ordered by total number of S&E students. Detail may not add to total because of rounding. Physical sciences include earth, atmospheric, and ocean sciences. Data include students who are in the SEVIS database between 16 April and 15 November of each year.

### Source(s)

U.S. Department of Homeland Security, U.S. Immigration and Customs Enforcement, special tabulations (2017), Student and Exchange Visitor Information System (SEVIS) database.

*Science and Engineering Indicators 2018*

## CHAPTER 2 | Higher Education in Science and Engineering

APPENDIX TABLE 2-27

### Earned master's degrees, by sex and field: 2000–15

(Number)

Sex and field	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Both sexes																
All fields	460,142	471,329	485,535	516,098	562,862	578,964	599,365	610,469	631,711	665,473	698,528	736,455	757,387	756,975	759,796	763,980
S&E	96,230	99,528	99,650	108,355	119,296	120,870	120,999	120,278	126,404	134,517	139,926	150,653	161,371	166,397	171,228	180,955
Engineering	25,738	26,436	26,180	29,472	33,922	33,899	32,263	30,936	33,177	36,510	37,614	41,282	43,150	43,388	45,362	49,207
Aerospace	560	611	682	702	870	935	936	912	1,036	1,075	1,098	1,306	1,408	1,266	1,311	1,318
Chemical	1,352	1,368	1,267	1,364	1,506	1,506	1,432	1,230	1,230	1,285	1,430	1,741	1,911	1,932	2,092	2,278
Civil	4,140	4,010	3,945	4,188	4,445	4,631	4,493	4,184	4,327	4,570	4,962	5,915	6,405	6,486	6,691	6,573
Electrical	8,341	8,596	8,246	10,038	12,220	11,613	10,456	10,093	11,232	12,698	12,105	12,545	12,642	12,473	13,112	15,763
Industrial	3,048	3,375	3,375	3,842	4,247	3,937	3,558	3,505	3,659	4,313	4,866	5,083	5,346	5,327	5,605	5,631
Materials	759	706	624	717	800	790	765	787	768	836	815	894	990	1,099	1,170	1,164
Mechanical	3,378	3,471	3,516	3,802	4,555	4,739	4,542	4,365	4,556	4,689	4,890	5,938	5,977	5,991	6,285	6,954
Other	4,160	4,299	4,525	4,819	5,279	5,748	6,081	5,860	6,369	7,044	7,448	7,860	8,471	8,814	9,096	9,526
Science	70,492	73,092	73,470	78,883	85,374	86,971	88,736	89,342	93,227	98,007	102,312	109,371	118,221	123,009	125,866	131,748
Natural sciences	33,326	35,471	35,780	39,300	41,970	41,078	40,808	40,144	41,914	43,397	45,331	48,346	52,583	55,873	58,908	66,939
Agricultural sciences	3,858	3,752	4,019	3,955	4,221	4,171	4,100	4,126	4,120	4,349	4,684	5,148	5,843	5,757	5,916	5,792
Biological sciences	6,329	6,487	6,341	6,883	7,644	8,120	8,718	8,794	9,565	9,921	10,668	11,214	12,313	13,048	13,731	14,370



## CHAPTER 2 | Higher Education in Science and Engineering

Sex and field	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Earth, atmospheric, and ocean sciences	1,345	1,363	1,406	1,491	1,570	1,637	1,684	1,632	1,552	1,579	1,677	1,789	2,043	2,080	2,197	2,212
Atmospheric sciences	156	140	141	167	179	212	206	193	199	225	227	221	240	233	263	253
Earth sciences	1,104	1,121	1,151	1,203	1,248	1,314	1,350	1,312	1,222	1,224	1,301	1,429	1,650	1,705	1,782	1,812
Oceanography	85	102	114	121	143	111	128	127	131	130	149	139	153	142	152	147
Mathematics and computer sciences	18,281	20,132	20,389	23,311	24,505	23,086	22,028	21,349	22,303	23,447	23,979	25,722	27,675	30,179	32,419	39,821
Computer sciences	14,986	16,852	16,965	19,590	20,208	18,489	17,138	16,314	17,151	17,988	18,021	19,519	21,001	22,833	24,635	31,552
Mathematics and statistics	3,295	3,280	3,424	3,721	4,297	4,597	4,890	5,035	5,152	5,459	5,958	6,203	6,674	7,346	7,784	8,269
Physical sciences	3,513	3,737	3,625	3,660	4,030	4,064	4,278	4,243	4,374	4,101	4,323	4,473	4,709	4,809	4,645	4,744
Astronomy	102	93	112	123	150	159	146	152	166	139	149	185	127	170	160	156
Chemistry	1,909	2,009	1,867	1,830	2,056	1,912	2,097	2,144	2,236	2,131	2,175	2,324	2,493	2,478	2,431	2,491
Physics	1,244	1,376	1,353	1,453	1,637	1,794	1,853	1,792	1,799	1,657	1,810	1,771	1,879	1,984	1,876	1,934
Other physical sciences	258	259	293	254	187	199	182	155	173	174	189	193	210	177	178	163
Social and behavioral sciences	37,166	37,621	37,690	39,583	43,404	45,893	47,928	49,198	51,313	54,610	56,981	61,025	65,638	67,136	66,958	64,809
Psychology	13,806	14,449	14,204	14,885	15,700	16,478	17,302	18,594	18,836	20,744	21,032	22,363	24,215	25,140	25,332	24,029
Social sciences	23,360	23,172	23,486	24,698	27,704	29,415	30,626	30,604	32,477	33,866	35,949	38,662	41,423	41,996	41,626	40,780
Anthropology	950	1,092	1,017	1,043	1,098	1,107	1,156	1,214	1,145	1,248	1,233	1,243	1,279	1,195	1,316	1,258
Area and ethnic studies	1,511	1,511	1,473	1,427	1,616	1,662	2,017	1,641	1,722	1,672	1,700	1,880	1,857	1,874	1,791	1,858
Economics	2,515	2,492	2,651	2,951	3,201	3,504	3,330	3,351	3,576	3,651	3,732	4,173	4,331	4,287	4,541	4,432
History of science	24	26	35	25	25	29	41	28	47	33	25	44	37	33	28	26

## CHAPTER 2 | Higher Education in Science and Engineering

Sex and field	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Linguistics	553	552	520	525	574	611	621	583	610	720	679	711	789	782	728	779
Political science and public administration	13,038	12,937	13,200	14,135	15,780	17,421	18,073	18,525	19,933	20,575	22,083	24,128	26,085	26,762	26,321	25,786
Sociology	2,036	1,901	1,957	1,929	2,031	1,518	1,577	1,575	1,571	1,601	1,453	1,640	1,810	1,652	1,661	1,481
Other social sciences	2,733	2,661	2,633	2,663	3,379	3,563	3,811	3,687	3,873	4,366	5,044	4,843	5,235	5,411	5,240	5,160
Non-S&E	363,912	371,801	385,885	407,743	443,566	458,094	478,366	490,191	505,307	530,956	558,602	585,802	596,016	590,578	588,568	583,025
Male																
All fields	192,821	195,277	200,199	212,513	230,786	234,829	239,418	239,892	248,971	263,478	277,170	293,301	302,401	303,230	304,556	308,283
S&E	54,560	55,884	55,939	61,183	67,215	67,244	66,249	65,353	68,810	73,489	76,266	82,451	87,810	90,046	92,457	99,282
Engineering	20,396	20,819	20,617	23,301	26,774	26,287	24,784	23,957	25,540	28,271	29,212	31,943	33,254	33,091	34,374	36,925
Aerospace	484	521	557	596	721	771	781	742	864	906	941	1,110	1,217	1,076	1,104	1,140
Chemical	1,008	1,016	932	1,021	1,089	1,081	1,046	854	877	887	995	1,235	1,316	1,319	1,475	1,603
Civil	3,065	2,951	2,883	3,041	3,234	3,309	3,147	2,969	3,091	3,214	3,553	4,266	4,551	4,503	4,695	4,607
Electrical	6,781	6,921	6,685	8,136	9,822	9,133	8,243	8,079	8,882	10,198	9,695	10,064	10,128	9,992	10,268	12,018
Industrial	2,400	2,591	2,583	2,999	3,341	3,018	2,640	2,628	2,734	3,247	3,685	3,738	3,907	3,926	4,094	4,070
Materials	558	534	456	536	601	586	565	578	549	594	590	650	669	764	822	818
Mechanical	2,923	3,023	3,048	3,343	3,992	4,140	3,909	3,782	3,896	3,990	4,197	5,150	5,226	5,160	5,325	5,879
Other	3,177	3,262	3,473	3,629	3,974	4,249	4,453	4,325	4,647	5,235	5,556	5,730	6,240	6,351	6,591	6,790
Science	34,164	35,065	35,322	37,882	40,441	40,957	41,465	41,396	43,270	45,218	47,054	50,508	54,556	56,955	58,083	62,357
Natural sciences	19,765	20,934	21,097	23,356	24,768	24,417	24,457	23,946	24,982	25,944	26,952	28,688	31,243	33,487	34,832	39,765

## CHAPTER 2 | Higher Education in Science and Engineering

Sex and field	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Agricultural sciences	2,039	1,915	2,022	1,896	1,965	1,951	1,947	1,859	1,872	2,031	2,237	2,399	2,690	2,584	2,622	2,564
Biological sciences	2,816	2,732	2,668	2,864	3,160	3,233	3,612	3,541	3,954	4,146	4,485	4,782	5,235	5,625	5,913	6,044
Earth, atmospheric, and ocean sciences	832	799	834	879	869	927	923	891	847	848	888	994	1,170	1,178	1,281	1,257
Atmospheric sciences	119	100	95	112	112	143	135	124	126	134	133	135	147	142	152	163
Earth sciences	670	649	678	702	682	737	738	713	663	658	686	797	956	961	1,063	1,031
Oceanography	43	50	61	65	75	47	50	54	58	56	69	62	67	75	66	63
Mathematics and computer sciences	11,780	13,052	13,274	15,375	16,257	15,766	15,323	14,975	15,500	16,332	16,640	17,697	19,128	20,989	22,087	26,834
Computer sciences	9,983	11,161	11,325	13,335	13,910	13,180	12,520	12,038	12,555	13,119	13,058	14,011	15,161	16,570	17,547	21,945
Mathematics and statistics	1,797	1,891	1,949	2,040	2,347	2,586	2,803	2,937	2,945	3,213	3,582	3,686	3,967	4,419	4,540	4,889
Physical sciences	2,298	2,436	2,299	2,342	2,517	2,540	2,652	2,680	2,809	2,587	2,702	2,816	3,020	3,111	2,929	3,066
Astronomy	77	57	85	81	97	97	80	93	104	82	94	115	77	94	94	94
Chemistry	1,086	1,184	1,015	1,001	1,106	973	1,073	1,139	1,201	1,134	1,120	1,243	1,361	1,348	1,309	1,382
Physics	1,000	1,090	1,067	1,140	1,224	1,372	1,414	1,375	1,421	1,286	1,400	1,367	1,470	1,583	1,437	1,498
Other physical sciences	135	105	132	120	90	98	85	73	83	85	88	91	112	86	89	92
Social and behavioral sciences	14,399	14,131	14,225	14,526	15,673	16,540	17,008	17,450	18,288	19,274	20,102	21,820	23,313	23,468	23,251	22,592
Psychology	3,443	3,510	3,426	3,478	3,465	3,560	3,665	3,915	3,920	4,382	4,386	4,719	5,062	5,288	5,327	5,103
Social sciences	10,956	10,621	10,799	11,048	12,208	12,980	13,343	13,535	14,368	14,892	15,716	17,101	18,251	18,180	17,924	17,489
Anthropology	363	403	375	388	377	370	395	375	379	410	394	394	419	376	416	411
Area and ethnic studies	643	619	608	554	656	687	794	644	662	622	679	746	728	724	654	709

## CHAPTER 2 | Higher Education in Science and Engineering

Sex and field	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Economics	1,563	1,519	1,601	1,790	1,949	2,113	2,011	2,045	2,192	2,145	2,240	2,445	2,596	2,514	2,689	2,633
History of science	18	16	18	15	11	17	30	10	24	17	16	30	19	19	9	11
Linguistics	146	172	160	145	164	178	171	175	212	217	202	229	281	290	287	255
Political science and public administration	6,317	6,094	6,213	6,399	6,947	7,614	7,850	8,209	8,694	8,979	9,550	10,580	11,178	11,356	11,115	10,850
Sociology	649	643	642	633	673	485	467	485	512	536	476	567	633	545	537	495
Other social sciences	1,257	1,155	1,182	1,124	1,431	1,516	1,625	1,592	1,693	1,966	2,159	2,110	2,397	2,356	2,217	2,125
Non-S&E	138,261	139,393	144,260	151,330	163,571	167,585	173,169	174,539	180,161	189,989	200,904	210,850	214,591	213,184	212,099	209,001
Female																
All fields	267,321	276,052	285,336	303,585	332,076	344,135	359,947	370,577	382,740	401,995	421,358	443,154	454,986	453,745	455,240	455,697
S&E	41,670	43,644	43,711	47,172	52,081	53,626	54,750	54,925	57,594	61,028	63,660	68,202	73,561	76,351	78,771	81,673
Engineering	5,342	5,617	5,563	6,171	7,148	7,612	7,479	6,979	7,637	8,239	8,402	9,339	9,896	10,297	10,988	12,282
Aerospace	76	90	125	106	149	164	155	170	172	169	157	196	191	190	207	178
Chemical	344	352	335	343	417	425	386	376	353	398	435	506	595	613	617	675
Civil	1,075	1,059	1,062	1,147	1,211	1,322	1,346	1,215	1,236	1,356	1,409	1,649	1,854	1,983	1,996	1,966
Electrical	1,560	1,675	1,561	1,902	2,398	2,480	2,213	2,014	2,350	2,500	2,410	2,481	2,514	2,481	2,844	3,745
Industrial	648	784	792	843	906	919	918	877	925	1,066	1,181	1,345	1,439	1,401	1,511	1,561
Materials	201	172	168	181	199	204	200	209	219	242	225	244	321	335	348	346
Mechanical	455	448	468	459	563	599	633	583	660	699	693	788	751	831	960	1,075
Other	983	1,037	1,052	1,190	1,305	1,499	1,628	1,535	1,722	1,809	1,892	2,130	2,231	2,463	2,505	2,736

## CHAPTER 2 | Higher Education in Science and Engineering

Sex and field	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Science	36,328	38,027	38,148	41,001	44,933	46,014	47,271	47,946	49,957	52,789	55,258	58,863	63,665	66,054	67,783	69,391
Natural sciences	13,561	14,537	14,683	15,944	17,202	16,661	16,351	16,198	16,932	17,453	18,379	19,658	21,340	22,386	24,076	27,174
Agricultural sciences	1,819	1,837	1,997	2,059	2,256	2,220	2,153	2,267	2,248	2,318	2,447	2,749	3,153	3,173	3,294	3,228
Biological sciences	3,513	3,755	3,673	4,019	4,484	4,887	5,106	5,253	5,611	5,775	6,183	6,432	7,078	7,423	7,818	8,326
Earth, atmospheric, and ocean sciences	513	564	572	612	701	710	761	741	705	731	789	795	873	902	916	955
Atmospheric sciences	37	40	46	55	67	69	71	69	73	91	94	86	93	91	111	90
Earth sciences	434	472	473	501	566	577	612	599	559	566	615	632	694	744	719	781
Oceanography	42	52	53	56	68	64	78	73	73	74	80	77	86	67	86	84
Mathematics and computer sciences	6,501	7,080	7,115	7,936	8,248	7,320	6,705	6,374	6,803	7,115	7,339	8,025	8,547	9,190	10,332	12,987
Computer sciences	5,003	5,691	5,640	6,255	6,298	5,309	4,618	4,276	4,596	4,869	4,963	5,508	5,840	6,263	7,088	9,607
Mathematics and statistics	1,498	1,389	1,475	1,681	1,950	2,011	2,087	2,098	2,207	2,246	2,376	2,517	2,707	2,927	3,244	3,380
Physical sciences	1,215	1,301	1,326	1,318	1,513	1,524	1,626	1,563	1,565	1,514	1,621	1,657	1,689	1,698	1,716	1,678
Astronomy	25	36	27	42	53	62	66	59	62	57	55	70	50	76	66	62
Chemistry	823	825	852	829	950	939	1,024	1,005	1,035	997	1,055	1,081	1,132	1,130	1,122	1,109
Physics	244	286	286	313	413	422	439	417	378	371	410	404	409	401	439	436
Other physical sciences	123	154	161	134	97	101	97	82	90	89	101	102	98	91	89	71
Social and behavioral sciences	22,767	23,490	23,465	25,057	27,731	29,353	30,920	31,748	33,025	35,336	36,879	39,205	42,325	43,668	43,707	42,217
Psychology	10,363	10,939	10,778	11,407	12,235	12,918	13,637	14,679	14,916	16,362	16,646	17,644	19,153	19,852	20,005	18,926
Social sciences	12,404	12,551	12,687	13,650	15,496	16,435	17,283	17,069	18,109	18,974	20,233	21,561	23,172	23,816	23,702	23,291

## CHAPTER 2 | Higher Education in Science and Engineering

Sex and field	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Anthropology	587	689	642	655	721	737	761	839	766	838	839	849	860	819	900	847
Area and ethnic studies	868	892	865	873	960	975	1223	997	1,060	1050	1,021	1,134	1,129	1,150	1,137	1,149
Economics	952	973	1050	1161	1,252	1,391	1,319	1,306	1,384	1,506	1,492	1,728	1,735	1,773	1,852	1,799
History of science	6	10	17	10	14	12	11	18	23	16	9	14	18	14	19	15
Linguistics	407	380	360	380	410	433	450	408	398	503	477	482	508	492	441	524
Political science and public administration	6,721	6,843	6,987	7,736	8,833	9,807	10,223	10,316	11,239	11,596	12,533	13,548	14,907	15,406	15,206	14,936
Sociology	1,387	1,258	1,315	1,296	1,358	1,033	1,110	1,090	1,059	1,065	977	1,073	1177	1,107	1,124	986
Other social sciences	1,476	1,506	1,451	1,539	1,948	2,047	2,186	2,095	2,180	2,400	2,885	2,733	2,838	3,055	3,023	3,035
Non-S&E	225,651	232,408	241,625	256,413	279,995	290,509	305,197	315,652	325,146	340,967	357,698	374,952	381,425	377,394	376,469	374,024

### Note(s)

Data are based on degree-granting institutions eligible to participate in Title IV federal financial aid programs and do not match previously published data from *Science and Engineering Indicators 2008* and earlier years that were based on accredited higher education institutions.

### Source(s)

National Center for Education Statistics, Integrated Postsecondary Education Data System (IPEDS), Completions Survey; National Science Foundation, National Center for Science and Engineering Statistics, Integrated Science and Engineering Resources Data System (WebCASPAR), <https://ncesdata.nsf.gov/webcaspar/>.

*Science and Engineering Indicators 2018*

## CHAPTER 2 | Higher Education in Science and Engineering

APPENDIX TABLE 2-28

### Earned master's degrees, by citizenship, field, race, and ethnicity: 2000–15

(Number)

Citizenship, field, race, and ethnicity	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
All citizenships, races, and ethnicities																
All fields	460,142	471,329	485,535	516,098	562,862	578,964	599,365	610,469	631,711	665,473	698,528	736,455	757,387	756,975	759,796	763,980
S&E	96,230	99,528	99,650	108,355	119,296	120,870	120,999	120,278	126,404	134,517	139,926	150,653	161,371	166,397	171,228	180,955
Engineering	25,738	26,436	26,180	29,472	33,922	33,899	32,263	30,936	33,177	36,510	37,614	41,282	43,150	43,388	45,362	49,207
Aerospace	560	611	682	702	870	935	936	912	1,036	1,075	1,098	1,306	1,408	1,266	1,311	1,318
Chemical	1,352	1,368	1,267	1,364	1,506	1,506	1,432	1,230	1,230	1,285	1,430	1,741	1,911	1,932	2,092	2,278
Civil	4,140	4,010	3,945	4,188	4,445	4,631	4,493	4,184	4,327	4,570	4,962	5,915	6,405	6,486	6,691	6,573
Electrical	8,341	8,596	8,246	10,038	12,220	11,613	10,456	10,093	11,232	12,698	12,105	12,545	12,642	12,473	13,112	15,763
Industrial	3,048	3,375	3,375	3,842	4,247	3,937	3,558	3,505	3,659	4,313	4,866	5,083	5,346	5,327	5,605	5,631
Materials	759	706	624	717	800	790	765	787	768	836	815	894	990	1,099	1,170	1,164
Mechanical	3,378	3,471	3,516	3,802	4,555	4,739	4,542	4,365	4,556	4,689	4,890	5,938	5,977	5,991	6,285	6,954
Other	4,160	4,299	4,525	4,819	5,279	5,748	6,081	5,860	6,369	7,044	7,448	7,860	8,471	8,814	9,096	9,526
Science	70,492	73,092	73,470	78,883	85,374	86,971	88,736	89,342	93,227	98,007	102,312	109,371	118,221	123,009	125,866	131,748
Natural sciences	33,326	35,471	35,780	39,300	41,970	41,078	40,808	40,144	41,914	43,397	45,331	48,346	52,583	55,873	58,908	66,939
Agricultural sciences	3,858	3,752	4,019	3,955	4,221	4,171	4,100	4,126	4,120	4,349	4,684	5,148	5,843	5,757	5,916	5,792
Biological sciences	6,329	6,487	6,341	6,883	7,644	8,120	8,718	8,794	9,565	9,921	10,668	11,214	12,313	13,048	13,731	14,370

## CHAPTER 2 | Higher Education in Science and Engineering

Citizenship, field, race, and ethnicity	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Earth, atmospheric, and ocean sciences	1,345	1,363	1,406	1,491	1,570	1,637	1,684	1,632	1,552	1,579	1,677	1,789	2,043	2,080	2,197	2,212
Atmospheric sciences	156	140	141	167	179	212	206	193	199	225	227	221	240	233	263	253
Earth sciences	1,104	1,121	1,151	1,203	1,248	1,314	1,350	1,312	1,222	1,224	1,301	1,429	1,650	1,705	1,782	1,812
Oceanography	85	102	114	121	143	111	128	127	131	130	149	139	153	142	152	147
Mathematics and computer sciences	18,281	20,132	20,389	23,311	24,505	23,086	22,028	21,349	22,303	23,447	23,979	25,722	27,675	30,179	32,419	39,821
Computer sciences	14,986	16,852	16,965	19,590	20,208	18,489	17,138	16,314	17,151	17,988	18,021	19,519	21,001	22,833	24,635	31,552
Mathematics and statistics	3,295	3,280	3,424	3,721	4,297	4,597	4,890	5,035	5,152	5,459	5,958	6,203	6,674	7,346	7,784	8,269
Physical sciences	3,513	3,737	3,625	3,660	4,030	4,064	4,278	4,243	4,374	4,101	4,323	4,473	4,709	4,809	4,645	4,744
Astronomy	102	93	112	123	150	159	146	152	166	139	149	185	127	170	160	156
Chemistry	1,909	2,009	1,867	1,830	2,056	1,912	2,097	2,144	2,236	2,131	2,175	2,324	2,493	2,478	2,431	2,491
Physics	1,244	1,376	1,353	1,453	1,637	1,794	1,853	1,792	1,799	1,657	1,810	1,771	1,879	1,984	1,876	1,934
Other physical sciences	258	259	293	254	187	199	182	155	173	174	189	193	210	177	178	163
Social and behavioral sciences	37,166	37,621	37,690	39,583	43,404	45,893	47,928	49,198	51,313	54,610	56,981	61,025	65,638	67,136	66,958	64,809
Psychology	13,806	14,449	14,204	14,885	15,700	16,478	17,302	18,594	18,836	20,744	21,032	22,363	24,215	25,140	25,332	24,029
Social sciences	23,360	23,172	23,486	24,698	27,704	29,415	30,626	30,604	32,477	33,866	35,949	38,662	41,423	41,996	41,626	40,780
Anthropology	950	1,092	1,017	1,043	1,098	1,107	1,156	1,214	1,145	1,248	1,233	1,243	1,279	1,195	1,316	1,258
Area and ethnic studies	1,511	1,511	1,473	1,427	1,616	1,662	2,017	1,641	1,722	1,672	1,700	1,880	1,857	1,874	1,791	1,858
Economics	2,515	2,492	2,651	2,951	3,201	3,504	3,330	3,351	3,576	3,651	3,732	4,173	4,331	4,287	4,541	4,432
History of science	24	26	35	25	25	29	41	28	47	33	25	44	37	33	28	26



## CHAPTER 2 | Higher Education in Science and Engineering

Citizenship, field, race, and ethnicity	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Linguistics	553	552	520	525	574	611	621	583	610	720	679	711	789	782	728	779
Political science and public administration	13,038	12,937	13,200	14,135	15,780	17,421	18,073	18,525	19,933	20,575	22,083	24,128	26,085	26,762	26,321	25,786
Sociology	2,036	1,901	1,957	1,929	2,031	1,518	1,577	1,575	1,571	1,601	1,453	1,640	1,810	1,652	1,661	1,481
Other social sciences	2,733	2,661	2,633	2,663	3,379	3,563	3,811	3,687	3,873	4,366	5,044	4,843	5,235	5,411	5,240	5,160
Non-S&E	363,912	371,801	385,885	407,743	443,566	458,094	478,366	490,191	505,307	530,956	558,602	585,802	596,016	590,578	588,568	583,025
U.S. citizen or permanent resident																
All fields	404,158	409,897	421,846	444,498	487,965	505,724	527,585	542,133	558,844	585,823	617,074	650,538	668,242	662,486	655,968	646,832
S&E	71,415	72,085	72,074	75,952	83,835	87,402	90,157	91,595	94,318	98,503	103,552	111,438	120,426	123,136	123,884	122,231
Engineering	15,914	15,434	15,380	16,125	18,282	19,034	18,972	19,276	19,749	20,940	21,685	23,895	25,567	25,469	25,471	24,747
Aerospace	339	360	395	417	579	645	683	731	798	839	833	974	1,079	979	991	983
Chemical	721	726	662	656	704	739	734	691	609	626	720	830	916	875	949	1,015
Civil	3,048	2,777	2,591	2,684	2,782	3,080	3,070	2,968	3,054	3,233	3,527	4,296	4,657	4,658	4,583	4,077
Electrical	4,232	3,924	4,004	4,362	5,303	5,214	4,970	5,068	5,211	5,545	5,089	5,155	5,089	4,937	4,838	4,656
Industrial	1,872	1,966	1,945	2,077	2,271	2,178	2,102	2,165	2,077	2,264	2,715	2,839	3,114	3,129	3,188	2,896
Materials	483	406	380	378	417	451	431	456	432	452	460	488	536	578	575	559
Mechanical	2,212	2,221	2,213	2,214	2,630	2,827	2,818	2,841	2,981	2,895	3,133	3,728	3,830	3,802	3,825	3,950
Other	3,007	3,054	3,190	3,337	3,596	3,900	4,164	4,356	4,587	5,086	5,208	5,585	6,346	6,511	6,522	6,611
Science	55,501	56,651	56,694	59,827	65,553	68,368	71,185	72,319	74,569	77,563	81,867	87,543	94,859	97,667	98,413	97,484
Natural sciences	22,990	23,725	24,102	25,722	27,903	28,378	28,828	28,599	28,967	28,982	30,893	32,941	35,832	37,862	39,137	40,387

## CHAPTER 2 | Higher Education in Science and Engineering

Citizenship, field, race, and ethnicity	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Agricultural sciences	3,342	3,281	3,540	3,440	3,575	3,575	3,539	3,587	3,556	3,773	4,102	4,514	5,161	5,018	5,114	4,999
Biological sciences	5,579	5,614	5,536	5,882	6,530	6,910	7,430	7,468	8,100	8,211	8,878	9,313	10,265	11,003	11,586	12,043
Earth, atmospheric, and ocean sciences	1,150	1,191	1,207	1,285	1,312	1,390	1,431	1,416	1,348	1,345	1,436	1,563	1,727	1,763	1,854	1,864
Atmospheric sciences	118	116	113	128	135	166	161	158	173	203	184	200	201	201	219	204
Earth sciences	962	987	1,001	1,046	1,058	1,132	1,162	1,156	1,061	1,039	1,126	1,242	1,390	1,434	1,502	1,530
Oceanography	70	88	93	111	119	92	108	102	114	103	126	121	136	128	133	130
Mathematics and computer sciences	10,546	11,141	11,382	12,632	13,824	13,795	13,573	13,293	13,014	12,886	13,546	14,551	15,588	16,845	17,501	18,376
Computer sciences	8,362	9,091	9,252	10,423	11,312	10,975	10,489	10,027	9,746	9,641	10,066	10,786	11,636	12,725	13,409	14,199
Mathematics and statistics	2,184	2,050	2,130	2,209	2,512	2,820	3,084	3,266	3,268	3,245	3,480	3,765	3,952	4,120	4,092	4,177
Physical sciences	2,373	2,498	2,437	2,483	2,662	2,708	2,855	2,835	2,949	2,767	2,931	3,000	3,091	3,233	3,082	3,105
Astronomy	80	65	77	94	102	122	117	114	128	114	117	134	104	137	119	122
Chemistry	1,310	1,388	1,261	1,297	1,384	1,289	1,396	1,432	1,524	1,436	1,465	1,532	1,627	1,604	1,555	1,615
Physics	761	808	829	851	1,010	1,121	1,175	1,148	1,138	1,064	1,184	1,159	1,191	1,357	1,267	1,244
Other physical sciences	222	237	270	241	166	176	167	141	159	153	165	175	169	135	141	124
Social and behavioral sciences	32,511	32,926	32,592	34,105	37,650	39,990	42,357	43,720	45,602	48,581	50,974	54,602	59,027	59,805	59,276	57,097
Psychology	13,336	13,981	13,719	14,201	15,081	15,827	16,672	17,931	18,182	20,115	20,348	21,649	23,425	24,212	24,491	23,209
Social sciences	19,175	18,945	18,873	19,904	22,569	24,163	25,685	25,789	27,420	28,466	30,626	32,953	35,602	35,593	34,785	33,888
Anthropology	864	1,004	918	960	993	1,034	1,064	1,109	1,053	1,136	1,127	1,158	1,184	1,089	1,215	1,149
Area and ethnic studies	1,282	1,283	1,249	1,201	1,363	1,426	1,756	1,439	1,469	1,423	1,435	1,619	1,604	1,582	1,480	1,564

## CHAPTER 2 | Higher Education in Science and Engineering

Citizenship, field, race, and ethnicity	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Economics	1,209	1,172	1,191	1,337	1,493	1,774	1,778	1,827	1,954	1,992	2,067	2,325	2,459	2,194	2,188	2,093
History of science	22	21	33	18	22	23	32	26	39	28	22	39	32	26	21	22
Linguistics	380	394	351	353	398	422	450	404	442	547	505	536	597	594	549	537
Political science and public administration	11,114	10,954	11,053	11,913	13,415	14,926	15,735	16,235	17,477	17,950	19,550	21,338	23,304	23,655	23,044	22,509
Sociology	1,845	1,744	1,766	1,744	1,832	1,349	1,409	1,411	1,432	1,440	1,300	1,476	1,638	1,481	1,492	1,318
Other social sciences	2,459	2,373	2,312	2,378	3,053	3,209	3,461	3,338	3,554	3,950	4,620	4,462	4,784	4,972	4,796	4,696
Non-S&E	332,743	337,812	349,772	368,546	404,130	418,322	437,428	450,538	464,526	487,320	513,522	539,100	547,816	539,350	532,084	524,601
Hispanic or Latino <sup>a</sup>																
All fields	20,911	22,450	23,356	25,517	29,905	32,435	34,081	36,456	37,354	40,395	43,037	46,594	50,173	52,804	56,007	58,619
S&E	3,762	4,113	4,106	4,384	5,111	5,380	5,681	6,041	6,216	6,634	7,379	8,411	9,459	10,161	10,893	11,392
Engineering	852	835	853	862	1,130	1,145	1,094	1,220	1,243	1,317	1,447	1,709	1,984	2,075	2,209	2,290
Aerospace	13	11	19	13	21	38	26	38	32	34	45	61	68	81	78	88
Chemical	39	40	45	39	40	41	49	43	42	46	37	53	58	62	65	96
Civil	180	167	187	152	163	208	185	199	208	217	268	318	405	425	467	445
Electrical	211	172	179	238	340	274	281	294	294	290	269	373	363	334	380	391
Industrial	172	191	205	162	229	239	212	238	256	283	318	327	406	394	445	397
Materials	15	21	15	6	16	26	17	21	22	16	24	34	35	51	45	44
Mechanical	99	93	87	116	157	151	153	171	160	183	201	222	277	295	305	334
Other	123	140	116	136	164	168	171	216	229	248	285	321	372	433	424	495

## CHAPTER 2 | Higher Education in Science and Engineering

Citizenship, field, race, and ethnicity	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Science	2,910	3,278	3,253	3,522	3,981	4,235	4,587	4,821	4,973	5,317	5,932	6,702	7,475	8,086	8,684	9,102
Natural sciences	935	1,124	1,050	1,252	1,392	1,362	1,459	1,451	1,490	1,528	1,777	1,975	2,258	2,422	2,667	2,920
Agricultural sciences	133	123	175	132	171	185	196	176	157	206	227	264	302	295	305	314
Biological sciences	268	310	267	268	330	362	373	418	466	461	519	581	677	754	872	916
Earth, atmospheric, and ocean sciences	30	28	35	28	36	47	51	42	57	41	53	81	83	80	97	104
Atmospheric sciences	2	0	1	2	2	3	2	5	11	6	2	9	9	8	15	12
Earth sciences	26	25	31	24	32	43	47	33	43	32	44	66	72	68	77	86
Oceanography	2	3	3	2	2	1	2	4	3	3	7	6	2	4	5	6
Mathematics and computer sciences	408	544	437	680	728	628	671	670	654	655	817	875	1,042	1,106	1,196	1,354
Computer sciences	308	472	355	572	615	498	506	491	473	497	651	659	809	815	921	1,056
Mathematics and statistics	100	72	82	108	113	130	165	179	181	158	166	216	233	291	275	298
Physical sciences	96	119	136	144	127	140	168	145	156	165	161	174	154	187	197	232
Astronomy	2	1	2	2	3	2	6	3	6	4	3	6	4	5	5	5
Chemistry	56	74	72	90	70	84	107	79	90	89	96	107	82	99	116	123
Physics	34	37	56	41	44	49	54	60	53	67	56	54	65	77	71	100
Other physical sciences	4	7	6	11	10	5	1	3	7	5	6	7	3	6	5	4
Social and behavioral sciences	1,975	2,154	2,203	2,270	2,589	2,873	3,128	3,370	3,483	3,789	4,155	4,727	5,217	5,664	6,017	6,182
Psychology	842	946	962	974	1,102	1,222	1,331	1,466	1,543	1,670	1,812	2,051	2,161	2,547	2,566	2,664
Social sciences	1,133	1,208	1,241	1,296	1,487	1,651	1,797	1,904	1,940	2,119	2,343	2,676	3,056	3,117	3,451	3,518

## CHAPTER 2 | Higher Education in Science and Engineering

Citizenship, field, race, and ethnicity	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Anthropology	37	45	59	48	58	62	60	67	59	83	80	89	81	108	85	98
Area and ethnic studies	97	111	109	119	116	132	174	144	184	164	188	187	225	215	250	248
Economics	67	53	57	79	80	111	100	86	81	92	90	152	161	160	146	164
History of science	0	1	0	1	0	0	0	1	1	1	1	1	3	2	1	2
Linguistics	18	27	19	23	26	26	42	37	33	43	31	42	58	56	59	50
Political science and public administration	702	736	743	802	909	1,026	1,070	1,248	1,252	1,343	1,541	1,706	1,964	2,019	2,308	2,305
Sociology	110	116	140	117	139	111	126	112	105	140	112	166	201	177	209	192
Other social sciences	102	119	114	107	159	183	225	209	225	253	300	333	363	380	393	459
Non-S&E	17,149	18,337	19,250	21,133	24,794	27,055	28,400	30,415	31,138	33,761	35,658	38,183	40,714	42,643	45,114	47,227
Not Hispanic or Latino																
All fields	383,247	387,447	398,490	418,981	458,060	473,289	493,504	505,677	521,490	545,428	574,037	603,944	618,069	609,682	599,961	588,213
S&E	67,653	67,972	67,968	71,568	78,724	82,022	84,476	85,554	88,102	91,869	96,173	103,027	110,967	112,975	112,991	110,839
Engineering	15,062	14,599	14,527	15,263	17,152	17,889	17,878	18,056	18,506	19,623	20,238	22,186	23,583	23,394	23,262	22,457
Aerospace	326	349	376	404	558	607	657	693	766	805	788	913	1,011	898	913	895
Chemical	682	686	617	617	664	698	685	648	567	580	683	777	858	813	884	919
Civil	2,868	2,610	2,404	2,532	2,619	2,872	2,885	2,769	2,846	3,016	3,259	3,978	4,252	4,233	4,116	3,632
Electrical	4,021	3,752	3,825	4,124	4,963	4,940	4,689	4,774	4,917	5,255	4,820	4,782	4,726	4,603	4,458	4,265
Industrial	1,700	1,775	1,740	1,915	2,042	1,939	1,890	1,927	1,821	1,981	2,397	2,512	2,708	2,735	2,743	2,499

## CHAPTER 2 | Higher Education in Science and Engineering

Citizenship, field, race, and ethnicity	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Materials	468	385	365	372	401	425	414	435	410	436	436	454	501	527	530	515
Mechanical	2,113	2,128	2,126	2,098	2,473	2,676	2,665	2,670	2,821	2,712	2,932	3,506	3,553	3,507	3,520	3,616
Other	2,884	2,914	3,074	3,201	3,432	3,732	3,993	4,140	4,358	4,838	4,923	5,264	5,974	6,078	6,098	6,116
Science	52,591	53,373	53,441	56,305	61,572	64,133	66,598	67,498	69,596	72,246	75,935	80,841	87,384	89,581	89,729	88,382
Natural sciences	22,055	22,601	23,052	24,470	26,511	27,016	27,369	27,148	27,477	27,454	29,116	30,966	33,574	35,440	36,470	37,467
Agricultural sciences	3,209	3,158	3,365	3,308	3,404	3,390	3,343	3,411	3,399	3,567	3,875	4,250	4,859	4,723	4,809	4,685
Biological sciences	5,311	5,304	5,269	5,614	6,200	6,548	7,057	7,050	7,634	7,750	8,359	8,732	9,588	10,249	10,714	11,127
Earth, atmospheric, and ocean sciences	1,120	1,163	1,172	1,257	1,276	1,343	1,380	1,374	1,291	1,304	1,383	1,482	1,644	1,683	1,757	1,760
Atmospheric sciences	116	116	112	126	133	163	159	153	162	197	182	191	192	193	204	192
Earth sciences	936	962	970	1,022	1,026	1,089	1,115	1,123	1,018	1,007	1,082	1,176	1,318	1,366	1,425	1,444
Oceanography	68	85	90	109	117	91	106	98	111	100	119	115	134	124	128	124
Mathematics and computer sciences	10,138	10,597	10,945	11,952	13,096	13,167	12,902	12,623	12,360	12,231	12,729	13,676	14,546	15,739	16,305	17,022
Computer sciences	8,054	8,619	8,897	9,851	10,697	10,477	9,983	9,536	9,273	9,144	9,415	10,127	10,827	11,910	12,488	13,143
Mathematics and statistics	2,084	1,978	2,048	2,101	2,399	2,690	2,919	3,087	3,087	3,087	3,314	3,549	3,719	3,829	3,817	3,879
Physical sciences	2,277	2,379	2,301	2,339	2,535	2,568	2,687	2,690	2,793	2,602	2,770	2,826	2,937	3,046	2,885	2,873
Astronomy	78	64	75	92	99	120	111	111	122	110	114	128	100	132	114	117
Chemistry	1,254	1,314	1,189	1,207	1,314	1,205	1,289	1,353	1,434	1,347	1,369	1,425	1,545	1,505	1,439	1,492
Physics	727	771	773	810	966	1,072	1,121	1,088	1,085	997	1,128	1,105	1,126	1,280	1,196	1,144
Other physical sciences	218	230	264	230	156	171	166	138	152	148	159	168	166	129	136	120

## CHAPTER 2 | Higher Education in Science and Engineering

Citizenship, field, race, and ethnicity	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Social and behavioral sciences	30,536	30,772	30,389	31,835	35,061	37,117	39,229	40,350	42,119	44,792	46,819	49,875	53,810	54,141	53,259	50,915
Psychology	12,494	13,035	12,757	13,227	13,979	14,605	15,341	16,465	16,639	18,445	18,536	19,598	21,264	21,665	21,925	20,545
Social sciences	18,042	17,737	17,632	18,608	21,082	22,512	23,888	23,885	25,480	26,347	28,283	30,277	32,546	32,476	31,334	30,370
Anthropology	827	959	859	912	935	972	1,004	1,042	994	1,053	1,047	1,069	1,103	981	1,130	1,051
Area and ethnic studies	1,185	1,172	1,140	1,082	1,247	1,294	1,582	1,295	1,285	1,259	1,247	1,432	1,379	1,367	1,230	1,316
Economics	1,142	1,119	1,134	1,258	1,413	1,663	1,678	1,741	1,873	1,900	1,977	2,173	2,298	2,034	2,042	1,929
History of science	22	20	33	17	22	23	32	25	38	27	21	38	29	24	20	20
Linguistics	362	367	332	330	372	396	408	367	409	504	474	494	539	538	490	487
Political science and public administration	10,412	10,218	10,310	11,111	12,506	13,900	14,665	14,987	16,225	16,607	18,009	19,632	21,340	21,636	20,736	20,204
Sociology	1,735	1,628	1,626	1,627	1,693	1,238	1,283	1,299	1,327	1,300	1,188	1,310	1,437	1,304	1,283	1,126
Other social sciences	2,357	2,254	2,198	2,271	2,894	3,026	3,236	3,129	3,329	3,697	4,320	4,129	4,421	4,592	4,403	4,237
Non-S&E	315,594	319,475	330,522	347,413	379,336	391,267	409,028	420,123	433,388	453,559	477,864	500,917	507,102	496,707	486,970	477,374
American Indian or Alaska Native																
All fields	2,109	2,293	2,410	2,574	2,857	2,969	3,142	3,178	3,324	3,310	3,464	3,507	3,275	3,350	3,188	3,116
S&E	383	476	421	457	540	501	568	552	553	560	629	584	603	597	589	548
Engineering	64	60	56	69	85	82	87	73	86	89	87	78	92	79	55	59
Aerospace	0	2	4	2	6	2	8	5	1	7	9	3	1	6	3	3
Chemical	3	4	2	2	0	4	2	7	3	3	3	2	2	1	0	3

## CHAPTER 2 | Higher Education in Science and Engineering

Citizenship, field, race, and ethnicity	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Civil	14	10	11	13	16	13	17	15	13	18	12	16	17	14	12	9
Electrical	14	10	13	18	10	20	17	5	28	18	22	10	15	11	6	8
Industrial	8	15	8	8	19	18	9	13	14	13	12	15	20	13	10	11
Materials	4	1	2	1	1	1	1	0	2	0	2	0	3	3	0	2
Mechanical	7	7	6	9	21	6	11	12	10	9	12	13	13	10	8	5
Other	14	11	10	16	12	18	22	16	15	21	15	19	21	21	16	18
Science	319	416	365	388	455	419	481	479	467	471	542	506	511	518	534	489
Natural sciences	108	147	119	126	136	134	168	141	162	137	160	161	173	160	146	158
Agricultural sciences	23	18	25	24	23	27	35	34	31	26	35	34	34	36	20	40
Biological sciences	26	29	34	31	33	29	46	32	55	38	52	40	48	39	49	43
Earth, atmospheric, and ocean sciences	9	11	4	9	7	11	4	9	7	10	8	13	17	15	4	6
Atmospheric sciences	0	0	0	0	0	1	0	1	0	0	0	2	0	2	0	0
Earth sciences	9	8	4	9	7	10	4	8	7	10	7	10	16	12	3	6
Oceanography	0	3	0	0	0	0	0	0	0	0	1	1	1	1	1	0
Mathematics and computer sciences	41	80	41	50	65	56	69	54	55	44	56	62	63	54	61	62
Computer sciences	32	71	33	42	58	47	58	40	44	36	45	48	52	45	56	53
Mathematics and statistics	9	9	8	8	7	9	11	14	11	8	11	14	11	9	5	9
Physical sciences	9	9	15	12	8	11	14	12	14	19	9	12	11	16	12	7
Astronomy	0	0	0	1	0	1	0	0	0	1	1	2	0	1	0	0



## CHAPTER 2 | Higher Education in Science and Engineering

Citizenship, field, race, and ethnicity	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Chemistry	5	7	11	5	3	6	9	8	8	9	5	5	6	10	7	4
Physics	3	2	4	5	5	3	3	3	5	8	3	3	4	5	4	3
Other physical sciences	1	0	0	1	0	1	2	1	1	1	0	2	1	0	1	0
Social and behavioral sciences	211	269	246	262	319	285	313	338	305	334	382	345	338	358	388	331
Psychology	69	107	97	109	112	118	118	114	104	116	123	116	113	140	154	119
Social sciences	142	162	149	153	207	167	195	224	201	218	259	229	225	218	234	212
Anthropology	14	17	12	11	19	14	21	25	16	16	19	14	14	12	13	5
Area and ethnic studies	16	20	20	33	27	27	28	25	32	25	28	23	29	28	22	36
Economics	3	7	10	6	6	10	3	12	8	9	12	8	4	8	4	2
History of science	0	1	1	0	0	0	0	0	0	0	0	0	0	0	2	1
Linguistics	1	1	4	1	2	6	2	2	2	4	16	7	5	6	6	2
Political science and public administration	62	70	74	78	118	90	107	134	117	135	136	137	134	134	161	142
Sociology	30	28	17	17	17	7	10	9	12	8	11	8	15	7	6	7
Other social sciences	16	18	11	7	18	13	24	17	14	21	37	32	24	23	20	17
Non-S&E	1,726	1,817	1,989	2,117	2,317	2,468	2,574	2,626	2,771	2,750	2,835	2,923	2,672	2,753	2,599	2,568
Asian																
All fields	na	na	na	na	na	na	na	na	na	na	na	37,473	38,490	38,950	38,800	39,188
S&E	na	na	na	na	na	na	na	na	na	na	na	10,347	10,538	10,992	10,785	10,976

## CHAPTER 2 | Higher Education in Science and Engineering

Citizenship, field, race, and ethnicity	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Engineering	na	na	na	na	na	na	na	na	na	na	na	3,942	3,792	3,867	3,574	3,469
Aerospace	na	na	na	na	na	na	na	na	na	na	na	109	126	111	110	98
Chemical	na	na	na	na	na	na	na	na	na	na	na	153	164	153	171	174
Civil	na	na	na	na	na	na	na	na	na	na	na	481	511	501	478	406
Electrical	na	na	na	na	na	na	na	na	na	na	na	1,430	1,264	1,326	1,089	1,083
Industrial	na	na	na	na	na	na	na	na	na	na	na	362	330	376	325	290
Materials	na	na	na	na	na	na	na	na	na	na	na	73	67	102	98	94
Mechanical	na	na	na	na	na	na	na	na	na	na	na	466	428	433	432	475
Other	na	na	na	na	na	na	na	na	na	na	na	868	902	865	871	849
Science	na	na	na	na	na	na	na	na	na	na	na	6,405	6,746	7,125	7,211	7,507
Natural sciences	na	na	na	na	na	na	na	na	na	na	na	3,912	3,991	4,390	4,553	4,941
Agricultural sciences	na	na	na	na	na	na	na	na	na	na	na	199	218	184	185	166
Biological sciences	na	na	na	na	na	na	na	na	na	na	na	1,244	1,416	1,554	1,623	1,723
Earth, atmospheric, and ocean sciences	na	na	na	na	na	na	na	na	na	na	na	37	39	41	42	53
Atmospheric sciences	na	na	na	na	na	na	na	na	na	na	na	6	5	5	4	5
Earth sciences	na	na	na	na	na	na	na	na	na	na	na	27	34	27	34	45
Oceanography	na	na	na	na	na	na	na	na	na	na	na	4	0	9	4	3
Mathematics and computer sciences	na	na	na	na	na	na	na	na	na	na	na	2,128	2,065	2,297	2,425	2,727
Computer sciences	na	na	na	na	na	na	na	na	na	na	na	1,618	1,566	1,738	1,881	2,174

## CHAPTER 2 | Higher Education in Science and Engineering

Citizenship, field, race, and ethnicity	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Mathematics and statistics	na	na	na	na	na	na	na	na	na	na	na	510	499	559	544	553
Physical sciences	na	na	na	na	na	na	na	na	na	na	na	304	253	314	278	272
Astronomy	na	na	na	na	na	na	na	na	na	na	na	8	6	14	9	10
Chemistry	na	na	na	na	na	na	na	na	na	na	na	206	171	202	195	183
Physics	na	na	na	na	na	na	na	na	na	na	na	80	72	93	71	73
Other physical sciences	na	na	na	na	na	na	na	na	na	na	na	10	4	5	3	6
Social and behavioral sciences	na	na	na	na	na	na	na	na	na	na	na	2,493	2,755	2,735	2,658	2,566
Psychology	na	na	na	na	na	na	na	na	na	na	na	753	879	908	885	833
Social sciences	na	na	na	na	na	na	na	na	na	na	na	1,740	1,876	1,827	1,773	1,733
Anthropology	na	na	na	na	na	na	na	na	na	na	na	43	38	27	38	39
Area and ethnic studies	na	na	na	na	na	na	na	na	na	na	na	100	100	108	96	88
Economics	na	na	na	na	na	na	na	na	na	na	na	219	272	230	211	231
History of science	na	na	na	na	na	na	na	na	na	na	na	1	2	1	2	2
Linguistics	na	na	na	na	na	na	na	na	na	na	na	38	41	44	45	27
Political science and public administration	na	na	na	na	na	na	na	na	na	na	na	1,077	1,135	1,140	1,138	1,104
Sociology	na	na	na	na	na	na	na	na	na	na	na	86	84	81	58	61
Other social sciences	na	na	na	na	na	na	na	na	na	na	na	176	204	196	185	181
Non-S&E	na	na	na	na	na	na	na	na	na	na	na	27,126	27,952	27,958	28,015	28,212

## CHAPTER 2 | Higher Education in Science and Engineering

Citizenship, field, race, and ethnicity	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Asian or Pacific Islander <sup>b</sup>																
All fields	21,720	22,309	23,134	24,616	27,526	29,378	30,362	32,056	32,942	35,086	37,307	na	na	na	na	na
S&E	7,032	7,056	6,839	7,601	8,642	8,891	8,731	9,088	9,177	9,664	9,959	na	na	na	na	na
Engineering	2,380	2,399	2,190	2,431	3,016	3,094	3,186	3,355	3,494	3,929	3,736	na	na	na	na	na
Aerospace	26	37	29	39	51	55	64	74	74	82	87	na	na	na	na	na
Chemical	114	120	96	96	135	106	110	103	93	101	115	na	na	na	na	na
Civil	283	220	203	240	254	298	277	306	298	309	354	na	na	na	na	na
Electrical	1,062	1,014	915	1,047	1,435	1,381	1,333	1,444	1,548	1,958	1,580	na	na	na	na	na
Industrial	192	210	189	273	284	332	319	313	301	272	301	na	na	na	na	na
Materials	54	55	43	52	53	64	63	65	65	68	70	na	na	na	na	na
Mechanical	265	358	315	262	347	324	360	343	370	359	385	na	na	na	na	na
Other	384	385	400	422	457	534	660	707	745	780	844	na	na	na	na	na
Science	4,652	4,657	4,649	5,170	5,626	5,797	5,545	5,733	5,683	5,735	6,223	na	na	na	na	na
Natural sciences	3,199	3,164	3,165	3,530	3,760	3,748	3,406	3,526	3,396	3,365	3,675	na	na	na	na	na
Agricultural sciences	94	97	126	99	111	111	84	128	102	137	165	na	na	na	na	na
Biological sciences	595	540	537	646	762	795	820	883	977	1,037	1,245	na	na	na	na	na
Earth, atmospheric, and ocean sciences	22	28	37	28	39	31	30	25	38	24	45	na	na	na	na	na
Atmospheric sciences	4	5	7	4	5	4	5	5	5	3	3	na	na	na	na	na
Earth sciences	17	17	25	18	28	26	23	16	27	17	37	na	na	na	na	na

## CHAPTER 2 | Higher Education in Science and Engineering

Citizenship, field, race, and ethnicity	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Oceanography	1	6	5	6	6	1	2	4	6	4	5	na	na	na	na	na
Mathematics and computer sciences	2,248	2,279	2,252	2,526	2,652	2,568	2,252	2,211	2,043	1,908	1,929	na	na	na	na	na
Computer sciences	2,068	2,074	2,038	2,305	2,377	2,244	1,856	1,754	1,627	1,477	1,470	na	na	na	na	na
Mathematics and statistics	180	205	214	221	275	324	396	457	416	431	459	na	na	na	na	na
Physical sciences	240	220	213	231	196	243	220	279	236	259	291	na	na	na	na	na
Astronomy	5	5	4	7	6	7	2	4	2	12	7	na	na	na	na	na
Chemistry	172	153	125	157	128	154	137	177	154	178	186	na	na	na	na	na
Physics	53	56	66	57	60	74	78	94	78	66	93	na	na	na	na	na
Other physical sciences	10	6	18	10	2	8	3	4	2	3	5	na	na	na	na	na
Social and behavioral sciences	1,453	1,493	1,484	1,640	1,866	2,049	2,139	2,207	2,287	2,370	2,548	na	na	na	na	na
Psychology	473	503	530	531	593	597	651	733	724	765	781	na	na	na	na	na
Social sciences	980	990	954	1,109	1,273	1,452	1,488	1,474	1,563	1,605	1,767	na	na	na	na	na
Anthropology	39	39	34	42	43	44	39	51	46	59	53	na	na	na	na	na
Area and ethnic studies	78	101	90	97	93	111	126	110	113	117	126	na	na	na	na	na
Economics	132	113	119	156	157	185	207	191	211	221	194	na	na	na	na	na
History of science	0	0	2	2	3	1	1	1	1	1	1	na	na	na	na	na
Linguistics	42	43	26	32	37	41	43	32	35	38	36	na	na	na	na	na
Political science and public administration	516	534	512	601	717	855	862	880	952	942	1,106	na	na	na	na	na

## CHAPTER 2 | Higher Education in Science and Engineering

Citizenship, field, race, and ethnicity	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Sociology	66	70	86	95	106	78	71	62	67	67	56	na	na	na	na	na
Other social sciences	107	90	85	84	117	137	139	147	138	160	195	na	na	na	na	na
Non-S&E	14,688	15,253	16,295	17,015	18,884	20,487	21,631	22,968	23,765	25,422	27,348	na	na	na	na	na
Black or African American																
All fields	33,589	35,426	36,936	40,090	45,183	49,109	52,844	55,624	57,473	61,713	66,817	71,393	75,732	79,618	80,576	79,680
S&E	5,563	6,174	6,230	6,919	7,511	7,764	8,011	8,371	8,908	9,339	10,292	10,961	12,069	13,112	13,280	13,239
Engineering	658	699	735	823	853	869	883	926	977	971	1,098	1,180	1,244	1,255	1,228	1,323
Aerospace	7	10	14	7	11	19	22	26	25	19	30	25	18	22	29	18
Chemical	34	34	31	43	31	56	37	39	46	31	46	42	48	66	50	62
Civil	93	102	101	96	76	100	88	106	118	106	137	152	169	177	161	148
Electrical	183	188	189	226	238	230	226	251	260	246	235	291	254	251	235	258
Industrial	90	119	141	158	170	152	171	152	155	166	214	232	230	233	239	256
Materials	15	9	19	14	21	19	12	9	15	25	16	14	19	17	21	21
Mechanical	91	89	71	78	85	81	86	85	101	86	89	104	116	100	104	115
Other	145	148	169	201	221	212	241	258	257	292	331	320	390	389	389	445
Science	4,905	5,475	5,495	6,096	6,658	6,895	7,128	7,445	7,931	8,368	9,194	9,781	10,825	11,857	12,052	11,916
Natural sciences	1,179	1,382	1,374	1,606	1,678	1,602	1,691	1,753	1,878	1,826	2,052	2,322	2,651	3,108	3,140	3,337
Agricultural sciences	84	96	88	103	102	85	96	113	98	124	132	180	166	187	190	189
Biological sciences	223	313	288	298	385	377	406	438	500	474	512	599	673	752	785	847

## CHAPTER 2 | Higher Education in Science and Engineering

Citizenship, field, race, and ethnicity	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Earth, atmospheric, and ocean sciences	7	21	18	18	22	17	30	23	29	26	18	29	38	45	39	45
Atmospheric sciences	0	4	2	2	3	3	7	3	4	6	4	4	4	6	6	4
Earth sciences	6	15	15	13	16	13	21	18	22	18	13	25	33	37	33	40
Oceanography	1	2	1	3	3	1	2	2	3	2	1	0	1	2	0	1
Mathematics and computer sciences	748	822	859	1,075	1,049	1,022	1,007	1,056	1,106	1,059	1,265	1,376	1,600	1,983	1,994	2,117
Computer sciences	650	709	746	977	934	887	853	898	950	919	1,111	1,212	1,420	1,776	1,801	1,913
Mathematics and statistics	98	113	113	98	115	135	154	158	156	140	154	164	180	207	193	204
Physical sciences	117	130	121	112	120	101	152	123	145	143	125	138	174	141	132	139
Astronomy	0	0	2	1	1	2	3	0	0	4	0	0	2	1	3	1
Chemistry	65	82	74	76	87	55	93	74	110	97	90	93	129	84	102	97
Physics	44	41	37	32	27	39	51	43	30	36	30	40	34	49	22	34
Other physical sciences	8	7	8	3	5	5	5	6	5	6	5	5	9	7	5	7
Social and behavioral sciences	3,726	4,093	4,121	4,490	4,980	5,293	5,437	5,692	6,053	6,542	7,142	7,459	8,174	8,749	8,912	8,579
Psychology	1,347	1,601	1,643	1,829	1,942	2,142	1,996	2,253	2,411	2,724	2,640	2,856	3,137	3,179	3,313	3,089
Social sciences	2,379	2,492	2,478	2,661	3,038	3,151	3,441	3,439	3,642	3,818	4,502	4,603	5,037	5,570	5,599	5,490
Anthropology	33	37	32	33	31	30	32	41	43	30	33	30	42	32	31	28
Area and ethnic studies	91	86	108	121	127	135	136	142	156	152	145	184	157	142	142	149
Economics	71	66	76	67	70	96	100	101	120	111	117	121	120	149	124	134
History of science	0	1	2	0	0	0	1	2	2	1	2	0	0	1	2	1

## CHAPTER 2 | Higher Education in Science and Engineering

Citizenship, field, race, and ethnicity	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Linguistics	4	14	5	7	3	9	13	14	7	16	15	18	17	16	18	21
Political science and public administration	1,585	1,754	1,718	1,861	2,057	2,243	2,451	2,490	2,668	2,825	3,296	3,507	3,949	4,319	4,312	4,239
Sociology	344	294	285	274	301	205	201	190	201	202	205	198	203	220	250	197
Other social sciences	251	240	252	298	449	433	507	459	445	481	689	545	549	691	720	721
Non-S&E	28,026	29,252	30,706	33,171	37,672	41,345	44,833	47,253	48,565	52,374	56,525	60,432	63,663	66,506	67,296	66,441
Native Hawaiian or Other Pacific Islander <sup>b</sup>																
All fields	na	na	na	na	na	na	na	na	na	na	na	1,272	1,521	1,687	1,755	1,519
S&E	na	na	na	na	na	na	na	na	na	na	na	230	238	255	273	269
Engineering	na	na	na	na	na	na	na	na	na	na	na	19	37	34	35	35
Aerospace	na	na	na	na	na	na	na	na	na	na	na	0	2	1	1	0
Chemical	na	na	na	na	na	na	na	na	na	na	na	0	2	1	1	0
Civil	na	na	na	na	na	na	na	na	na	na	na	4	8	9	4	7
Electrical	na	na	na	na	na	na	na	na	na	na	na	5	2	7	5	9
Industrial	na	na	na	na	na	na	na	na	na	na	na	0	8	2	9	2
Materials	na	na	na	na	na	na	na	na	na	na	na	1	0	3	0	0
Mechanical	na	na	na	na	na	na	na	na	na	na	na	2	4	5	0	5
Other	na	na	na	na	na	na	na	na	na	na	na	7	11	6	15	12
Science	na	na	na	na	na	na	na	na	na	na	na	211	201	221	238	234



## CHAPTER 2 | Higher Education in Science and Engineering

Citizenship, field, race, and ethnicity	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Natural sciences	na	na	na	na	na	na	na	na	na	na	na	68	61	70	70	78
Agricultural sciences	na	na	na	na	na	na	na	na	na	na	na	4	7	15	7	12
Biological sciences	na	na	na	na	na	na	na	na	na	na	na	23	26	22	20	20
Earth, atmospheric, and ocean sciences	na	na	na	na	na	na	na	na	na	na	na	4	0	1	2	2
Atmospheric sciences	na	na	na	na	na	na	na	na	na	na	na	1	0	0	0	0
Earth sciences	na	na	na	na	na	na	na	na	na	na	na	3	0	1	2	2
Oceanography	na	na	na	na	na	na	na	na	na	na	na	0	0	0	0	0
Mathematics and computer sciences	na	na	na	na	na	na	na	na	na	na	na	33	23	25	38	42
Computer sciences	na	na	na	na	na	na	na	na	na	na	na	28	17	24	35	38
Mathematics and statistics	na	na	na	na	na	na	na	na	na	na	na	5	6	1	3	4
Physical sciences	na	na	na	na	na	na	na	na	na	na	na	4	5	7	3	2
Astronomy	na	na	na	na	na	na	na	na	na	na	na	0	0	0	0	0
Chemistry	na	na	na	na	na	na	na	na	na	na	na	2	3	4	2	1
Physics	na	na	na	na	na	na	na	na	na	na	na	1	2	3	1	1
Other physical sciences	na	na	na	na	na	na	na	na	na	na	na	1	0	0	0	0
Social and behavioral sciences	na	na	na	na	na	na	na	na	na	na	na	143	140	151	168	156
Psychology	na	na	na	na	na	na	na	na	na	na	na	43	56	59	72	60
Social sciences	na	na	na	na	na	na	na	na	na	na	na	100	84	92	96	96
Anthropology	na	na	na	na	na	na	na	na	na	na	na	1	5	1	0	1

## CHAPTER 2 | Higher Education in Science and Engineering

Citizenship, field, race, and ethnicity	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Area and ethnic studies	na	na	na	na	na	na	na	na	na	na	na	7	13	9	10	5
Economics	na	na	na	na	na	na	na	na	na	na	na	2	2	4	5	0
History of science	na	na	na	na	na	na	na	na	na	na	na	0	0	0	0	0
Linguistics	na	na	na	na	na	na	na	na	na	na	na	0	0	1	1	0
Political science and public administration	na	na	na	na	na	na	na	na	na	na	na	79	55	70	64	74
Sociology	na	na	na	na	na	na	na	na	na	na	na	0	1	1	3	0
Other social sciences	na	na	na	na	na	na	na	na	na	na	na	11	8	6	13	16
Non-S&E	na	na	na	na	na	na	na	na	na	na	na	1,042	1,283	1,432	1,482	1,250
White																
All fields	299,781	296,202	299,441	309,126	330,212	342,100	352,593	355,075	362,206	374,920	389,668	410,814	418,925	413,610	405,699	396,460
S&E	50,130	48,920	48,583	50,191	54,729	56,535	58,127	58,408	59,126	60,774	62,633	67,712	73,302	73,856	74,278	72,869
Engineering	11,020	10,391	10,337	10,615	11,763	12,198	12,084	11,949	12,077	12,428	12,919	14,579	16,004	15,556	15,591	15,263
Aerospace	284	277	310	327	444	490	506	534	601	650	600	699	805	694	708	711
Chemical	501	487	435	431	455	452	481	435	369	388	445	505	561	524	595	590
Civil	2,337	2,128	1,930	1,994	2,089	2,245	2,277	2,126	2,196	2,252	2,399	2,993	3,183	3,046	3,014	2,748
Electrical	2,474	2,216	2,287	2,401	2,815	2,785	2,609	2,580	2,546	2,446	2,396	2,513	2,690	2,513	2,425	2,435
Industrial	1,238	1,266	1,247	1,298	1,364	1,226	1,207	1,218	1,168	1,255	1,517	1,541	1,787	1,766	1,806	1,702
Materials	373	293	282	280	304	314	305	328	288	309	304	326	363	364	379	354

## CHAPTER 2 | Higher Education in Science and Engineering

Citizenship, field, race, and ethnicity	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Mechanical	1,630	1,557	1,583	1,605	1,840	2,042	1,968	1,997	2,073	2,011	2,157	2,624	2,699	2,628	2,595	2,636
Other	2,183	2,167	2,263	2,279	2,452	2,644	2,731	2,731	2,836	3,117	3,101	3,378	3,916	4,021	4,069	4,087
Science	39,110	38,529	38,246	39,576	42,966	44,337	46,043	46,459	47,049	48,346	49,714	53,133	57,298	58,300	58,687	57,606
Natural sciences	16,154	15,989	16,270	16,947	18,313	18,794	19,270	18,851	18,767	18,622	19,462	20,666	22,714	23,581	24,339	24,781
Agricultural sciences	2,864	2,782	2,951	2,898	2,953	2,930	2,880	2,886	2,953	3,023	3,177	3,484	4,043	3,887	3,987	3,860
Biological sciences	4,183	4,124	4,088	4,291	4,617	4,876	5,248	5,073	5,242	5,299	5,594	5,838	6,438	6,828	7,126	7,309
Earth, atmospheric, and ocean sciences	1,036	1,043	1,065	1,125	1,144	1,197	1,217	1,232	1,114	1,148	1,181	1,278	1,411	1,444	1,519	1,512
Atmospheric sciences	111	99	98	117	120	149	141	140	148	177	164	170	172	169	179	166
Earth sciences	861	876	890	914	921	963	982	1,006	869	884	910	1,011	1,118	1,174	1,227	1,239
Oceanography	64	68	77	94	103	85	94	86	97	87	107	97	121	101	113	107
Mathematics and computer sciences	6,296	6,166	6,383	6,808	7,576	7,800	7,830	7,650	7,368	7,258	7,505	8,005	8,591	9,158	9,524	9,953
Computer sciences	4,641	4,651	4,828	5,185	5,781	5,818	5,715	5,463	5,176	5,080	5,183	5,553	5,987	6,525	6,797	7,223
Mathematics and statistics	1,655	1,515	1,555	1,623	1,795	1,982	2,115	2,187	2,192	2,178	2,322	2,452	2,604	2,633	2,727	2,730
Physical sciences	1,775	1,874	1,783	1,825	2,023	1,991	2,095	2,010	2,090	1,894	2,005	2,061	2,231	2,264	2,183	2,147
Astronomy	65	47	59	67	76	98	97	91	106	80	93	98	82	101	90	95
Chemistry	930	992	877	905	1,012	886	963	977	1,032	941	926	964	1,110	1,061	997	1,058
Physics	585	627	613	642	790	851	883	820	838	754	855	868	901	995	990	903
Other physical sciences	195	208	234	211	145	156	152	122	114	119	131	131	138	107	106	91
Social and behavioral sciences	22,956	22,540	21,976	22,629	24,653	25,543	26,773	27,608	28,282	29,724	30,252	32,467	34,584	34,719	34,348	32,825

## CHAPTER 2 | Higher Education in Science and Engineering

Citizenship, field, race, and ethnicity	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Psychology	9,721	9,885	9,452	9,694	10,175	10,410	11,048	11,646	11,561	12,581	12,484	13,227	14,025	14,542	14,848	13,955
Social sciences	13,235	12,655	12,524	12,935	14,478	15,133	15,725	15,962	16,721	17,143	17,768	19,240	20,559	20,177	19,500	18,870
Anthropology	686	800	705	743	770	779	786	811	778	843	819	825	863	772	881	857
Area and ethnic studies	890	792	763	691	838	809	938	825	813	786	797	942	937	920	797	864
Economics	839	840	827	828	927	1,097	1,077	1,161	1,173	1,271	1,203	1,469	1,542	1,374	1,418	1,307
History of science	20	18	23	13	17	20	29	20	34	25	17	34	24	17	12	15
Linguistics	295	284	270	258	290	300	298	282	311	383	351	368	414	390	362	378
Political science and public administration	7,429	7,013	7,066	7,518	8,361	9,107	9,406	9,723	10,272	10,319	10,854	11,809	12,648	12,631	12,170	11,833
Sociology	1,254	1,178	1,183	1,177	1,202	858	906	912	915	894	796	863	977	876	847	743
Other social sciences	1,822	1,730	1,687	1,707	2,073	2,163	2,285	2,228	2,425	2,622	2,931	2,930	3,154	3,197	3,013	2,873
Non-S&E	249,651	247,282	250,858	258,935	275,483	285,565	294,466	296,667	303,080	314,146	327,035	343,102	345,623	339,754	331,421	323,591
Two or more races <sup>c</sup>																
All fields	na	na	na	na	na	na	na	na	na	na	na	5,970	8,723	10,720	12,229	13,375
S&E	na	na	na	na	na	na	na	na	na	na	na	1,335	2,072	2,545	2,913	3,105
Engineering	na	na	na	na	na	na	na	na	na	na	na	296	391	492	568	585
Aerospace	na	na	na	na	na	na	na	na	na	na	na	15	20	23	23	30
Chemical	na	na	na	na	na	na	na	na	na	na	na	15	18	13	14	30
Civil	na	na	na	na	na	na	na	na	na	na	na	50	87	104	116	95

## CHAPTER 2 | Higher Education in Science and Engineering

Citizenship, field, race, and ethnicity	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Electrical	na	na	na	na	na	na	na	na	na	na	na	62	64	85	103	95
Industrial	na	na	na	na	na	na	na	na	na	na	na	43	39	56	59	53
Materials	na	na	na	na	na	na	na	na	na	na	na	5	12	15	16	18
Mechanical	na	na	na	na	na	na	na	na	na	na	na	36	50	72	98	89
Other	na	na	na	na	na	na	na	na	na	na	na	70	101	124	139	175
Science	na	na	na	na	na	na	na	na	na	na	na	1,039	1,681	2,053	2,345	2,520
Natural sciences	na	na	na	na	na	na	na	na	na	na	na	341	559	810	902	1,025
Agricultural sciences	na	na	na	na	na	na	na	na	na	na	na	48	71	95	109	128
Biological sciences	na	na	na	na	na	na	na	na	na	na	na	110	167	283	326	332
Earth, atmospheric, and ocean sciences	na	na	na	na	na	na	na	na	na	na	na	9	25	42	53	33
Atmospheric sciences	na	na	na	na	na	na	na	na	na	na	na	0	2	3	3	5
Earth sciences	na	na	na	na	na	na	na	na	na	na	na	9	22	38	45	27
Oceanography	na	na	na	na	na	na	na	na	na	na	na	0	1	1	5	1
Mathematics and computer sciences	na	na	na	na	na	na	na	na	na	na	na	141	242	308	358	446
Computer sciences	na	na	na	na	na	na	na	na	na	na	na	107	179	229	290	345
Mathematics and statistics	na	na	na	na	na	na	na	na	na	na	na	34	63	79	68	101
Physical sciences	na	na	na	na	na	na	na	na	na	na	na	33	54	82	56	86
Astronomy	na	na	na	na	na	na	na	na	na	na	na	3	1	2	2	4
Chemistry	na	na	na	na	na	na	na	na	na	na	na	17	26	36	31	50

## CHAPTER 2 | Higher Education in Science and Engineering

Citizenship, field, race, and ethnicity	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Physics	na	na	na	na	na	na	na	na	na	na	na	9	23	41	21	29
Other physical sciences	na	na	na	na	na	na	na	na	na	na	na	4	4	3	2	3
Social and behavioral sciences	na	na	na	na	na	na	na	na	na	na	na	698	1,122	1,243	1,443	1,495
Psychology	na	na	na	na	na	na	na	na	na	na	na	241	407	480	500	541
Social sciences	na	na	na	na	na	na	na	na	na	na	na	457	715	763	943	954
Anthropology	na	na	na	na	na	na	na	na	na	na	na	17	31	36	55	44
Area and ethnic studies	na	na	na	na	na	na	na	na	na	na	na	35	49	59	60	66
Economics	na	na	na	na	na	na	na	na	na	na	na	41	50	55	45	47
History of science	na	na	na	na	na	na	na	na	na	na	na	0	1	1	1	0
Linguistics	na	na	na	na	na	na	na	na	na	na	na	5	17	17	16	19
Political science and public administration	na	na	na	na	na	na	na	na	na	na	na	267	416	463	579	603
Sociology	na	na	na	na	na	na	na	na	na	na	na	27	43	46	56	53
Other social sciences	na	na	na	na	na	na	na	na	na	na	na	65	108	86	131	122
Non-S&E	na	na	na	na	na	na	na	na	na	na	na	4,635	6,651	8,175	9,316	10,270
Other or unknown race and ethnicity																
All fields	26,048	31,217	36,569	42,575	52,282	49,733	54,563	59,744	65,545	70,399	76,781	73,515	71,403	61,747	57,714	54,875
S&E	4,545	5,346	5,895	6,400	7,302	8,331	9,039	9,135	10,338	11,532	12,660	11,858	12,145	11,618	10,873	9,833
Engineering	940	1,050	1,209	1,325	1,435	1,646	1,638	1,753	1,872	2,206	2,398	2,092	2,023	2,111	2,211	1,723

## CHAPTER 2 | Higher Education in Science and Engineering

Citizenship, field, race, and ethnicity	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Aerospace	9	23	19	29	46	41	57	54	65	47	62	62	39	41	39	35
Chemical	30	41	53	45	43	80	55	64	56	57	74	60	63	55	53	60
Civil	141	150	159	189	184	216	226	216	221	331	357	282	277	382	331	219
Electrical	288	324	421	432	465	524	504	494	535	587	587	471	437	410	595	377
Industrial	172	165	155	178	205	211	184	231	183	275	353	319	294	289	295	185
Materials	22	27	19	25	22	27	33	33	40	34	44	35	37	23	16	26
Mechanical	120	117	151	144	180	223	240	233	267	247	289	261	243	259	283	291
Other	158	203	232	283	290	324	339	428	505	628	632	602	633	652	599	530
Science	3,605	4,296	4,686	5,075	5,867	6,685	7,401	7,382	8,466	9,326	10,262	9,766	10,122	9,507	8,662	8,110
Natural sciences	1,415	1,919	2,124	2,261	2,624	2,738	2,834	2,877	3,274	3,504	3,767	3,496	3,425	3,321	3,320	3,147
Agricultural sciences	144	165	175	184	215	237	248	250	215	257	366	301	320	319	311	290
Biological sciences	284	298	322	348	403	471	537	624	860	902	956	878	820	771	785	853
Earth, atmospheric, and ocean sciences	46	60	48	77	64	87	99	85	103	96	131	112	114	95	98	109
Atmospheric sciences	1	8	5	3	5	6	6	4	5	11	11	8	9	8	12	12
Earth sciences	43	46	36	68	54	77	85	75	93	78	115	91	95	77	81	85
Oceanography	2	6	7	6	5	4	8	6	5	7	5	13	10	10	5	12
Mathematics and computer sciences	805	1,250	1,410	1,493	1,754	1,721	1,744	1,652	1,788	1,962	1,974	1,931	1,962	1,914	1,905	1,675
Computer sciences	663	1,114	1,252	1,342	1,547	1,481	1,501	1,381	1,476	1,632	1,606	1,561	1,606	1,573	1,628	1,397
Mathematics and statistics	142	136	158	151	207	240	243	271	312	330	368	370	356	341	277	278

## CHAPTER 2 | Higher Education in Science and Engineering

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## CHAPTER 2 | Higher Education in Science and Engineering

Citizenship, field, race, and ethnicity	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
All fields	55,984	61,432	63,689	71,600	74,897	73,240	71,780	68,336	72,867	79,650	81,454	85,917	89,145	94,489	103,828	117,148
S&E	24,815	27,443	27,576	32,403	35,461	33,468	30,842	28,683	32,086	36,014	36,374	39,215	40,945	43,261	47,344	58,724
Engineering	9,824	11,002	10,800	13,347	15,640	14,865	13,291	11,660	13,428	15,570	15,929	17,387	17,583	17,919	19,891	24,460
Aerospace	221	251	287	285	291	290	253	181	238	236	265	332	329	287	320	335
Chemical	631	642	605	708	802	767	698	539	621	659	710	911	995	1,057	1,143	1,263
Civil	1,092	1,233	1,354	1,504	1,663	1,551	1,423	1,216	1,273	1,337	1,435	1,619	1,748	1,828	2,108	2,496
Electrical	4,109	4,672	4,242	5,676	6,917	6,399	5,486	5,025	6,021	7,153	7,016	7,390	7,553	7,536	8,274	11,107
Industrial	1,176	1,409	1,430	1,765	1,976	1,759	1,456	1,340	1,582	2,049	2,151	2,244	2,232	2,198	2,417	2,735
Materials	276	300	244	339	383	339	334	331	336	384	355	406	454	521	595	605
Mechanical	1,166	1,250	1,303	1,588	1,925	1,912	1,724	1,524	1,575	1,794	1,757	2,210	2,147	2,189	2,460	3,004
Other	1,153	1,245	1,335	1,482	1,683	1,848	1,917	1,504	1,782	1,958	2,240	2,275	2,125	2,303	2,574	2,915
Science	14,991	16,441	16,776	19,056	19,821	18,603	17,551	17,023	18,658	20,444	20,445	21,828	23,362	25,342	27,453	34,264
Natural sciences	10,336	11,746	11,678	13,578	14,067	12,700	11,980	11,545	12,947	14,415	14,438	15,405	16,751	18,011	19,771	26,552
Agricultural sciences	516	471	479	515	646	596	561	539	564	576	582	634	682	739	802	793
Biological sciences	750	873	805	1,001	1,114	1,210	1,288	1,326	1,465	1,710	1,790	1,901	2,048	2,045	2,145	2,327
Earth, atmospheric, and ocean sciences	195	172	199	206	258	247	253	216	204	234	241	226	316	317	343	348
Atmospheric sciences	38	24	28	39	44	46	45	35	26	22	43	21	39	32	44	49
Earth sciences	142	134	150	157	190	182	188	156	161	185	175	187	260	271	280	282
Oceanography	15	14	21	10	24	19	20	25	17	27	23	18	17	14	19	17

## CHAPTER 2 | Higher Education in Science and Engineering

Citizenship, field, race, and ethnicity	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Mathematics and computer sciences	7,735	8,991	9,007	10,679	10,681	9,291	8,455	8,056	9,289	10,561	10,433	11,171	12,087	13,334	14,918	21,445
Computer sciences	6,624	7,761	7,713	9,167	8,896	7,514	6,649	6,287	7,405	8,347	7,955	8,733	9,365	10,108	11,226	17,353
Mathematics and statistics	1,111	1,230	1,294	1,512	1,785	1,777	1,806	1,769	1,884	2,214	2,478	2,438	2,722	3,226	3,692	4,092
Physical sciences	1,140	1,239	1,188	1,177	1,368	1,356	1,423	1,408	1,425	1,334	1,392	1,473	1,618	1,576	1,563	1,639
Astronomy	22	28	35	29	48	37	29	38	38	25	32	51	23	33	41	34
Chemistry	599	621	606	533	672	623	701	712	712	695	710	792	866	874	876	876
Physics	483	568	524	602	627	673	678	644	661	593	626	612	688	627	609	690
Other physical sciences	36	22	23	13	21	23	15	14	14	21	24	18	41	42	37	39
Social and behavioral sciences	4,655	4,695	5,098	5,478	5,754	5,903	5,571	5,478	5,711	6,029	6,007	6,423	6,611	7,331	7,682	7,712
Psychology	470	468	485	684	619	651	630	663	654	629	684	714	790	928	841	820
Social sciences	4,185	4,227	4,613	4,794	5,135	5,252	4,941	4,815	5,057	5,400	5,323	5,709	5,821	6,403	6,841	6,892
Anthropology	86	88	99	83	105	73	92	105	92	112	106	85	95	106	101	109
Area and ethnic studies	229	228	224	226	253	236	261	202	253	249	265	261	253	292	311	294
Economics	1,306	1,320	1,460	1,614	1,708	1,730	1,552	1,524	1,622	1,659	1,665	1,848	1,872	2,093	2,353	2,339
History of science	2	5	2	7	3	6	9	2	8	5	3	5	5	7	7	4
Linguistics	173	158	169	172	176	189	171	179	168	173	174	175	192	188	179	242
Political science and public administration	1,924	1,983	2,147	2,222	2,365	2,495	2,338	2,290	2,456	2,625	2,533	2,790	2,781	3,107	3,277	3,277
Sociology	191	157	191	185	199	169	168	164	139	161	153	164	172	171	169	163
Other social sciences	274	288	321	285	326	354	350	349	319	416	424	381	451	439	444	464

## CHAPTER 2 | Higher Education in Science and Engineering

Citizenship, field, race, and ethnicity	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Non-S&E	31,169	33,989	36,113	39,197	39,436	39,772	40,938	39,653	40,781	43,636	45,080	46,702	48,200	51,228	56,484	58,424

na = not applicable; data were not collected for this detail.

<sup>a</sup> Beginning in 2008, the category includes Hispanic or one or more races.

<sup>b</sup> Pacific Islander includes Native Hawaiian or Other Pacific Islander.

<sup>c</sup> In 2011, the survey required institutions to begin reporting information on more than one race, along with information in the other racial and ethnic categories, but institutions were not required to update the race and ethnicity data of individuals who were already in the system. Therefore, the number reported for more than one race for the years after 2011 is likely to be an undercount.

### Note(s)

Racial and ethnic breakouts include U.S. citizens and permanent residents only; temporary visa holder includes all racial and ethnic groups. Data are based on degree-granting institutions eligible to participate in Title IV federal financial aid programs and do not match previously published data from *Science and Engineering Indicators 2008* and earlier years that were based on accredited higher education institutions.

### Source(s)

National Center for Education Statistics, Integrated Postsecondary Education Data System (IPEDS), Completions Survey; National Science Foundation, National Center for Science and Engineering Statistics, Integrated Science and Engineering Resources Data System (WebCASPAR), <https://ncesdata.nsf.gov/webcaspar/>.

*Science and Engineering Indicators 2018*

## CHAPTER 2 | Higher Education in Science and Engineering

APPENDIX TABLE 2-29

### Earned doctoral degrees, by citizenship, field, and sex: 2000–15

(Number)

Citizenship, field, and sex	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
All citizenships																
Both sexes																
All fields	44,947	45,068	44,311	46,177	48,560	52,855	56,309	60,887	61,716	61,730	57,405	59,847	62,071	64,887	67,591	69,115
S&E	27,862	28,096	27,588	28,746	30,979	34,468	37,541	40,980	41,480	41,111	36,711	38,470	39,828	41,563	43,995	44,521
Engineering	5,384	5,561	5,196	5,282	5,931	6,548	7,402	8,066	8,110	7,915	7,812	8,478	8,873	9,489	10,135	10,406
Aerospace	203	202	193	178	190	205	209	234	232	257	228	237	275	310	336	310
Chemical	665	680	693	608	708	872	911	915	950	886	929	951	969	1,001	1,169	1,197
Civil	628	647	669	685	736	830	864	935	909	902	851	894	922	1,036	1,154	1,230
Electrical	1,515	1,527	1,361	1,402	1,634	1,782	2,124	2,380	2,279	2,090	2,169	2,352	2,475	2,469	2,642	2,651
Industrial	218	262	275	258	280	286	302	364	346	333	290	319	348	389	400	354
Materials	454	454	381	457	494	514	611	663	665	661	653	651	715	757	734	810
Mechanical	821	906	813	786	835	963	1,139	1,138	1,149	1,186	1,022	1,172	1,277	1,384	1,454	1,586
Other	880	883	811	908	1,054	1,096	1,242	1,437	1,580	1,600	1,670	1,902	1,892	2,143	2,246	2,268
Science	22,478	22,535	22,392	23,464	25,048	27,920	30,139	32,914	33,370	33,196	28,899	29,992	30,955	32,074	33,860	34,115
Natural sciences	14,296	14,084	14,385	15,340	16,773	19,329	21,563	24,052	24,466	24,649	20,809	21,313	22,115	22,808	24,098	24,165
Agricultural sciences	984	934	969	1,060	1,016	1,004	1,037	1,068	1,080	1,143	982	1,053	1,144	1,218	1,228	1,381

## CHAPTER 2 | Higher Education in Science and Engineering

Citizenship, field, and sex	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Biological sciences	4,992	4,750	4,596	5,212	5,491	5,925	6,138	6,703	7,319	7,429	7,571	7,596	7,817	7,825	8,207	7,890
Earth, atmospheric, and ocean sciences	579	542	562	544	540	572	600	727	683	724	713	687	737	794	861	827
Atmospheric sciences	87	70	68	78	77	96	95	87	106	110	100	120	125	137	126	146
Earth sciences	393	380	404	368	369	379	430	513	469	503	496	467	497	530	606	575
Oceanography	99	92	90	98	94	97	75	127	108	111	117	100	115	127	129	106
Mathematics and computer sciences	1,858	1,769	1,677	1,825	1,975	2,301	2,713	2,953	3,058	3,110	3,155	3,152	3,360	3,633	3,799	3,753
Computer sciences	777	768	750	816	910	1,121	1,416	1,597	1,696	1,574	1,561	1,562	1,690	1,809	1,935	1,951
Mathematics and statistics	1,081	1,001	927	1,009	1,065	1,180	1,297	1,356	1,362	1,536	1,594	1,590	1,670	1,824	1,864	1,802
Medical and other health sciences	2,439	2,643	3,334	3,321	4,406	5,907	7,089	8,392	8,121	7,827	4,062	4,265	4,468	4,635	5,056	5,343
Medical sciences	893	864	882	850	1,010	1,144	1,252	1,293	1,320	1,254	1,506	1,497	1,688	1,867	2,148	2,433
Other health sciences	1,546	1,779	2,452	2,471	3,396	4,763	5,837	7,099	6,801	6,573	2,556	2,768	2,780	2,768	2,908	2,910
Physical sciences	3,444	3,446	3,247	3,378	3,345	3,620	3,986	4,209	4,205	4,416	4,326	4,560	4,589	4,703	4,947	4,971
Astronomy	101	103	70	101	101	115	114	128	163	143	160	166	170	174	179	153
Chemistry	2,090	2,134	2,037	2,158	2,105	2,226	2,502	2,606	2,495	2,652	2,564	2,685	2,630	2,730	2,921	2,906
Physics	1,208	1,169	1,096	1,089	1,119	1,254	1,341	1,442	1,507	1,580	1,570	1,670	1,752	1,740	1,768	1,840
Other physical sciences	45	40	44	30	20	25	29	33	40	41	32	39	37	59	79	72
Social and behavioral sciences	8,182	8,451	8,007	8,124	8,275	8,591	8,576	8,862	8,904	8,547	8,090	8,679	8,840	9,266	9,762	9,950
Psychology	4,200	4,538	4,185	4,258	4,389	4,681	4,484	4,696	4,600	4,046	3,606	3,952	3,868	4,280	4,574	4,533
Social sciences	3,982	3,913	3,822	3,866	3,886	3,910	4,092	4,166	4,304	4,501	4,484	4,727	4,972	4,986	5,188	5,417

## CHAPTER 2 | Higher Education in Science and Engineering

Citizenship, field, and sex	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Anthropology	471	428	508	487	537	459	480	519	491	527	534	596	585	595	606	577
Area and ethnic studies	212	216	209	176	204	184	220	226	246	226	237	257	274	272	316	309
Economics	1,001	1,016	961	967	978	1,111	1,057	1,107	1,172	1,172	1,120	1,152	1,271	1,227	1,212	1,283
History of science	23	21	20	27	20	28	34	27	34	19	31	27	24	29	41	31
Linguistics	202	193	152	201	194	172	216	219	215	240	203	235	249	237	240	266
Political science and public administration	1,019	1,047	992	1,055	1,001	1,049	1,098	1,093	1,104	1,244	1,312	1,314	1,402	1,507	1,537	1,622
Sociology	602	550	547	598	564	534	574	573	594	635	612	671	635	626	692	733
Other social sciences	452	442	433	355	388	373	413	402	448	438	435	475	532	493	544	596
Non-S&E	17,085	16,972	16,723	17,431	17,581	18,387	18,768	19,907	20,236	20,619	20,694	21,377	22,243	23,324	23,596	24,594
Male																
All fields	25,064	24,781	23,760	24,398	25,359	27,039	28,702	30,336	30,601	30,505	29,008	30,334	31,304	32,739	33,760	34,455
S&E	17,024	16,873	16,164	16,569	17,532	18,970	20,254	21,653	21,995	21,743	20,361	21,377	22,101	23,021	24,072	24,371
Engineering	4,549	4,640	4,300	4,373	4,884	5,326	5,918	6,381	6,362	6,203	5,997	6,580	6,867	7,312	7,824	7,980
Aerospace	179	179	174	154	170	178	184	204	208	224	188	207	235	261	283	263
Chemical	529	518	527	459	530	667	667	682	701	649	660	671	676	703	841	836
Civil	513	520	541	549	576	630	667	685	677	688	605	655	681	738	840	859
Electrical	1,328	1,330	1,213	1,230	1,418	1,530	1,826	2,004	1,891	1,752	1,787	1,965	2,051	2,105	2,229	2,261
Industrial	175	209	200	188	228	221	220	260	249	247	218	219	244	276	278	233
Materials	371	363	307	359	403	392	456	494	509	489	487	495	543	555	537	593

## CHAPTER 2 | Higher Education in Science and Engineering

Citizenship, field, and sex	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Mechanical	732	816	715	698	736	847	988	991	989	1,026	897	1,010	1,083	1,172	1,237	1,363
Other	722	705	623	736	823	861	910	1,061	1,138	1,128	1,155	1,358	1,354	1,502	1,579	1,572
Science	12,475	12,233	11,864	12,196	12,648	13,644	14,336	15,272	15,633	15,540	14,364	14,797	15,234	15,709	16,248	16,391
Natural sciences	8,833	8,553	8,398	8,748	9,119	10,142	10,889	11,860	12,133	12,070	10,936	11,305	11,625	12,003	12,512	12,487
Agricultural sciences	663	601	637	672	640	642	612	630	635	637	527	562	604	648	635	716
Biological sciences	2,790	2,655	2,557	2,826	2,948	3,014	3,125	3,419	3,612	3,535	3,564	3,609	3,665	3,658	3,832	3,711
Earth, atmospheric, and ocean sciences	413	386	385	376	360	375	382	441	439	436	424	420	418	429	487	468
Atmospheric sciences	70	55	47	57	54	67	62	54	85	77	66	84	76	79	85	91
Earth sciences	273	270	284	264	245	256	282	318	295	308	292	281	282	298	345	326
Oceanography	70	61	54	55	61	52	38	69	59	51	66	55	60	52	57	51
Mathematics and computer sciences	1,453	1,351	1,238	1,382	1,473	1,749	2,022	2,219	2,262	2,283	2,343	2,387	2,528	2,751	2,857	2,811
Computer sciences	646	632	579	648	709	907	1,109	1,269	1,323	1,223	1,225	1,251	1,329	1,458	1,532	1,512
Mathematics and statistics	807	719	659	734	764	842	913	950	939	1,060	1,118	1,136	1,199	1,293	1,325	1,299
Medical and other health sciences	930	1,027	1,223	1,046	1,266	1,734	1,931	2,224	2,214	2,148	1,123	1,185	1,265	1,330	1,328	1,457
Medical sciences	419	393	431	393	419	466	500	510	531	479	534	547	603	646	681	699
Other health sciences	511	634	792	653	847	1,268	1,431	1,714	1,683	1,669	589	638	662	684	647	758
Physical sciences	2,584	2,533	2,358	2,446	2,432	2,628	2,817	2,927	2,971	3,031	2,955	3,142	3,145	3,187	3,373	3,324
Astronomy	76	83	56	73	69	77	74	85	124	89	99	109	113	111	117	101
Chemistry	1,426	1,415	1,346	1,451	1,411	1,456	1,609	1,642	1,594	1,628	1,570	1,638	1,602	1,628	1,771	1,700

## CHAPTER 2 | Higher Education in Science and Engineering

Citizenship, field, and sex	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Physics	1,050	1,002	926	899	940	1,072	1,107	1,177	1,227	1,287	1,265	1,368	1,402	1,405	1,437	1,473
Other physical sciences	32	33	30	23	12	23	27	23	26	27	21	27	28	43	48	50
Social and behavioral sciences	3,642	3,680	3,466	3,448	3,529	3,502	3,447	3,412	3,500	3,470	3,428	3,492	3,609	3,706	3,736	3,904
Psychology	1,370	1,440	1,348	1,327	1,356	1,348	1,236	1,282	1,289	1,134	1,069	1,089	1,059	1,162	1,213	1,190
Social sciences	2,272	2,240	2,118	2,121	2,173	2,154	2,211	2,130	2,211	2,336	2,359	2,403	2,550	2,544	2,523	2,714
Anthropology	205	181	209	190	244	198	208	199	190	212	220	238	211	206	228	224
Area and ethnic studies	106	86	107	67	97	81	98	95	103	88	106	116	113	130	129	125
Economics	733	724	690	687	689	772	733	749	764	753	740	746	850	791	797	817
History of science	16	18	16	13	11	17	17	13	17	12	17	19	17	11	23	15
Linguistics	86	84	63	79	78	60	85	89	95	88	88	93	116	97	94	117
Political science and public administration	636	683	573	646	620	609	642	577	584	698	724	716	750	808	757	856
Sociology	248	229	215	245	226	205	206	211	234	255	234	252	233	259	257	292
Other social sciences	242	235	245	194	208	212	222	197	224	230	230	223	260	242	238	268
Non-S&E	8,040	7,908	7,596	7,829	7,827	8,069	8,448	8,683	8,606	8,762	8,647	8,957	9,203	9,718	9,688	10,084
Female																
All fields	19,883	20,287	20,551	21,779	23,201	25,816	27,607	30,551	31,115	31,225	28,397	29,513	30,767	32,148	33,831	34,660
S&E	10,838	11,223	11,424	12,177	13,447	15,498	17,287	19,327	19,485	19,368	16,350	17,093	17,727	18,542	19,923	20,150
Engineering	835	921	896	909	1,047	1,222	1,484	1,685	1,748	1,712	1,815	1,898	2,006	2,177	2,311	2,426
Aerospace	24	23	19	24	20	27	25	30	24	33	40	30	40	49	53	47



## CHAPTER 2 | Higher Education in Science and Engineering

Citizenship, field, and sex	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Chemical	136	162	166	149	178	205	244	233	249	237	269	280	293	298	328	361
Civil	115	127	128	136	160	200	197	250	232	214	246	239	241	298	314	371
Electrical	187	197	148	172	216	252	298	376	388	338	382	387	424	364	413	390
Industrial	43	53	75	70	52	65	82	104	97	86	72	100	104	113	122	121
Materials	83	91	74	98	91	122	155	169	156	172	166	156	172	202	197	217
Mechanical	89	90	98	88	99	116	151	147	160	160	125	162	194	212	217	223
Other	158	178	188	172	231	235	332	376	442	472	515	544	538	641	667	696
Science	10,003	10,302	10,528	11,268	12,400	14,276	15,803	17,642	17,737	17,656	14,535	15,195	15,721	16,365	17,612	17,724
Natural sciences	5,463	5,531	5,987	6,592	7,654	9,187	10,674	12,192	12,333	12,579	9,873	10,008	10,490	10,805	11,586	11,678
Agricultural sciences	321	333	332	388	376	362	425	438	445	506	455	491	540	570	593	665
Biological sciences	2,202	2,095	2,039	2,386	2,543	2,911	3,013	3,284	3,707	3,894	4,007	3,987	4,152	4,167	4,375	4,179
Earth, atmospheric, and ocean sciences	166	156	177	168	180	197	218	286	244	288	289	267	319	365	374	359
Atmospheric sciences	17	15	21	21	23	29	33	33	21	33	34	36	49	58	41	55
Earth sciences	120	110	120	104	124	123	148	195	174	195	204	186	215	232	261	249
Oceanography	29	31	36	43	33	45	37	58	49	60	51	45	55	75	72	55
Mathematics and computer sciences	405	418	439	443	502	552	691	734	796	827	812	765	832	882	942	942
Computer sciences	131	136	171	168	201	214	307	328	373	351	336	311	361	351	403	439
Mathematics and statistics	274	282	268	275	301	338	384	406	423	476	476	454	471	531	539	503
Medical and other health sciences	1,509	1,616	2,111	2,275	3,140	4,173	5,158	6,168	5,907	5,679	2,939	3,080	3,203	3,305	3,728	3,886

## CHAPTER 2 | Higher Education in Science and Engineering

Citizenship, field, and sex	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Medical sciences	474	471	451	457	591	678	752	783	789	775	972	950	1,085	1,221	1,467	1,734
Other health sciences	1,035	1,145	1,660	1,818	2,549	3,495	4,406	5,385	5,118	4,904	1,967	2,130	2,118	2,084	2,261	2,152
Physical sciences	860	913	889	932	913	992	1,169	1,282	1,234	1,385	1,371	1,418	1,444	1,516	1,574	1,647
Astronomy	25	20	14	28	32	38	40	43	39	54	61	57	57	63	62	52
Chemistry	664	719	691	707	694	770	893	964	901	1,024	994	1,047	1,028	1,102	1,150	1,206
Physics	158	167	170	190	179	182	234	265	280	293	305	302	350	335	331	367
Other physical sciences	13	7	14	7	8	2	2	10	14	14	11	12	9	16	31	22
Social and behavioral sciences	4,540	4,771	4,541	4,676	4,746	5,089	5,129	5,450	5,404	5,077	4,662	5,187	5,231	5,560	6,026	6,046
Psychology	2,830	3,098	2,837	2,931	3,033	3,333	3,248	3,414	3,311	2,912	2,537	2,863	2,809	3,118	3,361	3,343
Social sciences	1,710	1,673	1,704	1,745	1,713	1,756	1,881	2,036	2,093	2,165	2,125	2,324	2,422	2,442	2,665	2,703
Anthropology	266	247	299	297	293	261	272	320	301	315	314	358	374	389	378	353
Area and ethnic studies	106	130	102	109	107	103	122	131	143	138	131	141	161	142	187	184
Economics	268	292	271	280	289	339	324	358	408	419	380	406	421	436	415	466
History of science	7	3	4	14	9	11	17	14	17	7	14	8	7	18	18	16
Linguistics	116	109	89	122	116	112	131	130	120	152	115	142	133	140	146	149
Political science and public administration	383	364	419	409	381	440	456	516	520	546	588	598	652	699	780	766
Sociology	354	321	332	353	338	329	368	362	360	380	378	419	402	367	435	441
Other social sciences	210	207	188	161	180	161	191	205	224	208	205	252	272	251	306	328
Non-S&E	9,045	9,064	9,127	9,602	9,754	10,318	10,320	11,224	11,630	11,857	12,047	12,420	13,040	13,606	13,908	14,510

## CHAPTER 2 | Higher Education in Science and Engineering

Citizenship, field, and sex	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
U.S. citizen or permanent resident																
Both sexes																
All fields	34,113	34,105	33,382	34,551	35,807	38,512	40,334	43,888	44,509	45,019	41,759	43,514	45,203	47,233	49,267	50,859
S&E	19,401	19,382	19,110	19,731	21,136	23,113	24,816	27,283	27,594	27,753	24,106	25,296	26,057	27,209	28,785	29,338
Engineering	2,656	2,562	2,261	2,237	2,347	2,452	2,714	2,994	3,180	3,374	3,507	3,713	3,926	4,123	4,451	4,620
Aerospace	125	101	77	72	73	91	80	108	103	137	122	130	163	169	208	194
Chemical	364	357	354	295	340	360	423	373	417	437	469	440	442	428	520	564
Civil	319	300	273	283	257	296	296	359	330	348	347	353	366	410	465	535
Electrical	641	587	506	478	531	567	560	645	704	711	757	815	847	813	822	855
Industrial	104	109	115	93	119	107	117	129	125	112	116	124	124	133	136	111
Materials	240	217	172	198	205	191	242	286	284	281	316	283	363	348	348	374
Mechanical	384	414	335	336	307	338	388	376	406	472	425	505	556	614	643	683
Other	479	477	429	482	515	502	608	718	811	876	955	1,063	1,065	1,208	1,309	1,304
Science	16,745	16,820	16,849	17,494	18,789	20,661	22,102	24,289	24,414	24,379	20,599	21,583	22,131	23,086	24,334	24,718
Natural sciences	9,779	9,682	10,048	10,765	11,872	13,661	15,139	17,116	17,248	17,699	14,237	14,614	15,075	15,546	16,333	16,579
Agricultural sciences	553	544	549	626	601	611	640	643	668	715	639	660	694	770	755	888
Biological sciences	3,724	3,579	3,443	3,901	4,118	4,330	4,377	4,713	5,091	5,310	5,447	5,513	5,705	5,710	5,957	5,720
Earth, atmospheric, and ocean sciences	409	362	368	376	356	360	389	481	436	477	481	472	498	540	583	566
Atmospheric sciences	57	40	43	46	45	54	45	48	58	68	50	83	75	91	85	99

## CHAPTER 2 | Higher Education in Science and Engineering

Citizenship, field, and sex	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Earth sciences	280	258	266	259	245	244	296	347	302	333	350	312	339	363	395	391
Oceanography	72	64	59	71	66	62	48	86	76	76	81	77	84	86	103	76
Mathematics and computer sciences	990	920	848	926	963	1,040	1,134	1,325	1,338	1,518	1,645	1,621	1,671	1,761	1,823	1,764
Computer sciences	402	395	410	413	455	500	551	680	667	730	782	772	819	849	875	864
Mathematics and statistics	588	525	438	513	508	540	583	645	671	788	863	849	852	912	948	900
Medical and other health sciences	1,955	2,121	2,796	2,876	3,865	5,284	6,416	7,688	7,408	7,193	3,536	3,696	3,798	3,991	4,392	4,667
Medical sciences	615	582	568	577	655	735	816	862	910	848	1,142	1,108	1,220	1,393	1,656	1,945
Other health sciences	1,340	1,539	2,228	2,299	3,210	4,549	5,600	6,826	6,498	6,345	2,394	2,588	2,578	2,598	2,736	2,722
Physical sciences	2,148	2,156	2,044	2,060	1,969	2,036	2,183	2,266	2,307	2,486	2,489	2,652	2,709	2,774	2,823	2,974
Astronomy	76	78	53	79	75	73	73	89	117	98	119	108	124	120	131	118
Chemistry	1,336	1,383	1,355	1,374	1,321	1,366	1,461	1,464	1,414	1,586	1,542	1,592	1,584	1,653	1,703	1,787
Physics	708	677	604	591	562	585	635	696	754	781	808	928	985	970	951	1,028
Other physical sciences	28	18	32	16	11	12	14	17	22	21	20	24	16	31	38	41
Social and behavioral sciences	6,966	7,138	6,801	6,729	6,917	7,000	6,963	7,173	7,166	6,680	6,362	6,969	7,056	7,540	8,001	8,139
Psychology	4,042	4,381	4,042	4,059	4,191	4,452	4,230	4,450	4,359	3,770	3,334	3,694	3,617	4,017	4,320	4,261
Social sciences	2,924	2,757	2,759	2,670	2,726	2,548	2,733	2,723	2,807	2,910	3,028	3,275	3,439	3,523	3,681	3,878
Anthropology	409	356	430	420	466	392	425	433	416	431	444	505	490	508	507	489
Area and ethnic studies	180	180	180	149	168	154	187	202	190	178	191	214	220	240	265	263
Economics	474	422	419	377	396	368	371	369	438	408	459	456	538	535	500	566

## CHAPTER 2 | Higher Education in Science and Engineering

Citizenship, field, and sex	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
History of science	18	20	16	24	14	21	28	16	29	12	25	24	17	24	29	19
Linguistics	105	100	84	102	105	95	114	123	114	145	118	146	139	131	139	155
Political science and public administration	856	859	821	827	809	806	827	811	822	919	967	1,013	1,086	1,181	1,234	1,284
Sociology	510	473	474	492	460	436	466	459	477	499	504	555	536	517	580	623
Other social sciences	372	347	335	279	308	276	315	310	321	318	320	362	413	387	427	479
Non-S&E	14,712	14,723	14,272	14,820	14,671	15,399	15,518	16,605	16,915	17,266	17,653	18,218	19,146	20,024	20,482	21,521
Male																
All fields	17,408	17,061	16,263	16,501	16,767	17,391	18,294	19,321	19,603	19,881	19,176	20,016	20,622	21,586	22,143	22,954
S&E	10,712	10,457	10,024	10,097	10,487	10,925	11,496	12,285	12,595	12,787	11,980	12,545	12,919	13,460	13,972	14,320
Engineering	2,160	2,079	1,810	1,807	1,854	1,941	2,108	2,317	2,376	2,518	2,601	2,793	2,925	3,104	3,349	3,456
Aerospace	108	85	67	63	64	81	69	92	90	119	102	115	139	142	172	164
Chemical	275	271	267	225	245	277	306	279	287	311	329	299	307	302	380	402
Civil	248	224	206	204	178	200	211	268	219	240	234	238	244	271	300	353
Electrical	557	524	449	418	457	477	497	555	595	597	638	685	689	708	704	743
Industrial	81	77	76	66	90	79	73	88	79	74	81	87	75	90	93	77
Materials	186	170	128	155	169	141	176	212	217	194	224	217	275	247	256	276
Mechanical	330	372	298	297	258	296	329	319	339	391	363	421	463	505	548	562
Other	375	356	319	379	393	390	447	504	550	592	630	731	733	839	896	879
Science	8,552	8,378	8,214	8,290	8,633	8,984	9,388	9,968	10,219	10,269	9,379	9,752	9,994	10,356	10,623	10,864

## CHAPTER 2 | Higher Education in Science and Engineering

Citizenship, field, and sex	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Natural sciences	5,693	5,554	5,508	5,683	5,912	6,466	6,879	7,485	7,661	7,813	6,895	7,184	7,358	7,557	7,803	7,946
Agricultural sciences	359	334	344	388	367	376	381	365	394	365	318	343	364	400	390	449
Biological sciences	2,021	1,963	1,893	2,068	2,189	2,185	2,237	2,386	2,531	2,485	2,517	2,597	2,609	2,641	2,767	2,687
Earth, atmospheric, and ocean sciences	289	243	233	249	226	234	241	276	268	286	282	282	274	284	306	314
Atmospheric sciences	46	34	32	32	32	42	32	30	50	52	32	61	52	55	58	70
Earth sciences	195	171	168	181	152	161	185	204	180	201	207	181	180	195	203	209
Oceanography	48	38	33	36	42	31	24	42	38	33	43	40	42	34	45	35
Mathematics and computer sciences	752	691	617	687	700	785	853	987	967	1,122	1,223	1,243	1,283	1,338	1,382	1,348
Computer sciences	329	311	308	323	345	397	421	535	514	569	605	624	655	668	688	675
Mathematics and statistics	423	380	309	364	355	388	432	452	453	553	618	619	628	670	694	673
Medical and other health sciences	687	766	955	830	1,016	1,460	1,639	1,918	1,886	1,878	878	927	976	1,036	1,041	1,143
Medical sciences	261	239	245	241	235	269	286	281	292	280	351	344	373	424	453	457
Other health sciences	426	527	710	589	781	1,191	1,353	1,637	1,594	1,598	527	583	603	612	588	686
Physical sciences	1,585	1,557	1,466	1,461	1,414	1,426	1,528	1,553	1,615	1,677	1,677	1,792	1,852	1,858	1,917	2,005
Astronomy	56	62	43	58	50	45	47	58	87	57	69	68	82	75	86	76
Chemistry	885	905	892	911	889	871	943	912	898	966	932	941	953	973	1,023	1,065
Physics	626	576	510	480	469	499	526	573	615	637	662	765	805	788	786	837
Other physical sciences	18	14	21	12	6	11	12	10	15	17	14	18	12	22	22	27
Social and behavioral sciences	2,859	2,824	2,706	2,607	2,721	2,518	2,509	2,483	2,558	2,456	2,484	2,568	2,636	2,799	2,820	2,918

## CHAPTER 2 | Higher Education in Science and Engineering

Citizenship, field, and sex	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Psychology	1,296	1,369	1,293	1,255	1,293	1,274	1,147	1,215	1,217	1,040	980	1,016	994	1,078	1,129	1,106
Social sciences	1,563	1,455	1,413	1,352	1,428	1,244	1,362	1,268	1,341	1,416	1,504	1,552	1,642	1,721	1,691	1,812
Anthropology	167	144	175	160	218	157	180	166	157	164	177	196	160	177	175	181
Area and ethnic studies	81	69	92	56	80	65	81	88	81	67	87	93	90	112	109	101
Economics	336	275	288	260	274	231	251	251	283	274	302	300	360	367	343	369
History of science	13	17	13	11	8	11	14	6	13	9	14	16	13	11	14	9
Linguistics	46	41	31	43	38	33	45	49	52	51	50	61	62	52	58	72
Political science and public administration	523	543	456	488	481	446	472	409	418	487	520	537	567	610	605	641
Sociology	206	186	185	190	165	153	162	164	177	201	186	194	196	215	209	235
Other social sciences	191	180	173	144	164	148	157	135	160	163	168	155	194	177	178	204
Non-S&E	6,696	6,604	6,239	6,404	6,280	6,466	6,798	7,036	7,008	7,094	7,196	7,471	7,703	8,126	8,171	8,634
Female																
All fields	16,705	17,044	17,119	18,050	19,040	21,121	22,040	24,567	24,906	25,138	22,583	23,498	24,581	25,647	27,124	27,905
S&E	8,689	8,925	9,086	9,634	10,649	12,188	13,320	14,998	14,999	14,966	12,126	12,751	13,138	13,749	14,813	15,018
Engineering	496	483	451	430	493	511	606	677	804	856	906	920	1,001	1,019	1,102	1,164
Aerospace	17	16	10	9	9	10	11	16	13	18	20	15	24	27	36	30
Chemical	89	86	87	70	95	83	117	94	130	126	140	141	135	126	140	162
Civil	71	76	67	79	79	96	85	91	111	108	113	115	122	139	165	182
Electrical	84	63	57	60	74	90	63	90	109	114	119	130	158	105	118	112

## CHAPTER 2 | Higher Education in Science and Engineering

Citizenship, field, and sex	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Industrial	23	32	39	27	29	28	44	41	46	38	35	37	49	43	43	34
Materials	54	47	44	43	36	50	66	74	67	87	92	66	88	101	92	98
Mechanical	54	42	37	39	49	42	59	57	67	81	62	84	93	109	95	121
Other	104	121	110	103	122	112	161	214	261	284	325	332	332	369	413	425
Science	8,193	8,442	8,635	9,204	10,156	11,677	12,714	14,321	14,195	14,110	11,220	11,831	12,137	12,730	13,711	13,854
Natural sciences	4,086	4,128	4,540	5,082	5,960	7,195	8,260	9,631	9,587	9,886	7,342	7,430	7,717	7,989	8,530	8,633
Agricultural sciences	194	210	205	238	234	235	259	278	274	350	321	317	330	370	365	439
Biological sciences	1,703	1,616	1,550	1,833	1,929	2,145	2,140	2,327	2,560	2,825	2,930	2,916	3,096	3,069	3,190	3,033
Earth, atmospheric, and ocean sciences	120	119	135	127	130	126	148	205	168	191	199	190	224	256	277	252
Atmospheric sciences	11	6	11	14	13	12	13	18	8	16	18	22	23	36	27	29
Earth sciences	85	87	98	78	93	83	111	143	122	132	143	131	159	168	192	182
Oceanography	24	26	26	35	24	31	24	44	38	43	38	37	42	52	58	41
Mathematics and computer sciences	238	229	231	239	263	255	281	338	371	396	422	378	388	423	441	416
Computer sciences	73	84	102	90	110	103	130	145	153	161	177	148	164	181	187	189
Mathematics and statistics	165	145	129	149	153	152	151	193	218	235	245	230	224	242	254	227
Medical and other health sciences	1,268	1,355	1,841	2,046	2,849	3,824	4,777	5,770	5,522	5,315	2,658	2,769	2,822	2,955	3,351	3,524
Medical sciences	354	343	323	336	420	466	530	581	618	568	791	764	847	969	1,203	1,488
Other health sciences	914	1,012	1,518	1,710	2,429	3,358	4,247	5,189	4,904	4,747	1,867	2,005	1,975	1,986	2,148	2,036
Physical sciences	563	599	578	599	555	610	655	713	692	809	812	860	857	916	906	969



## CHAPTER 2 | Higher Education in Science and Engineering

Citizenship, field, and sex	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Astronomy	20	16	10	21	25	28	26	31	30	41	50	40	42	45	45	42
Chemistry	451	478	463	463	432	495	518	552	516	620	610	651	631	680	680	722
Physics	82	101	94	111	93	86	109	123	139	144	146	163	180	182	165	191
Other physical sciences	10	4	11	4	5	1	2	7	7	4	6	6	4	9	16	14
Social and behavioral sciences	4,107	4,314	4,095	4,122	4,196	4,482	4,454	4,690	4,608	4,224	3,878	4,401	4,420	4,741	5,181	5,221
Psychology	2,746	3,012	2,749	2,804	2,898	3,178	3,083	3,235	3,142	2,730	2,354	2,678	2,623	2,939	3,191	3,155
Social sciences	1,361	1,302	1,346	1,318	1,298	1,304	1,371	1,455	1,466	1,494	1,524	1,723	1,797	1,802	1,990	2,066
Anthropology	242	212	255	260	248	235	245	267	259	267	267	309	330	331	332	308
Area and ethnic studies	99	111	88	93	88	89	106	114	109	111	104	121	130	128	156	162
Economics	138	147	131	117	122	137	120	118	155	134	157	156	178	168	157	197
History of science	5	3	3	13	6	10	14	10	16	3	11	8	4	13	15	10
Linguistics	59	59	53	59	67	62	69	74	62	94	68	85	77	79	81	83
Political science and public administration	333	316	365	339	328	360	355	402	404	432	447	476	519	571	629	643
Sociology	304	287	289	302	295	283	304	295	300	298	318	361	340	302	371	388
Other social sciences	181	167	162	135	144	128	158	175	161	155	152	207	219	210	249	275
Non-S&E	8,016	8,119	8,033	8,416	8,391	8,933	8,720	9,569	9,907	10,172	10,457	10,747	11,443	11,898	12,311	12,887

Note(s)

CHAPTER 2 | Higher Education in Science and Engineering

Data in this table differ from doctoral degree data in other tables and figures in this report that are based on the National Science Foundation (NSF) Survey of Earned Doctorates and that refer to research doctorates only. The greatest differences are in psychology, education, and medical and other life sciences. Before 2008, the National Center for Education Statistics (NCES) used two doctoral degree categories (doctor's and first-professional). Data in this table for those years include only the doctor's category. In 2008 and 2009, NCES allowed optional reporting in three new doctoral degree categories (doctor's — research/ scholarship, doctor's — professional practice, and doctor's — other) in addition to the doctor's category. For those 2 years, data in this table include only doctorates reported in the doctor's category plus those reported in doctor's — research/ scholarship. In 2010, NCES required institutions to use only the three new doctoral degree categories, and data in this table for 2010 and later include only doctorates reported in the category doctor's — research/scholarship. This change primarily affects data for other health sciences.

Source(s)

NCES, Integrated Postsecondary Education Data System (IPEDS), Completions Survey; NSF, National Center for Science and Engineering Statistics, Integrated Science and Engineering Resources Data System (WebCASPAR), <https://ncesdata.nsf.gov/webcaspar/>.

*Science and Engineering Indicators 2018*

## CHAPTER 2 | Higher Education in Science and Engineering

APPENDIX TABLE 2-30

### Median number of years from S&E doctorate recipients' entry to graduate school to receipt of doctorate, by field: 1985–2015

(Median number of years)

Year	All S&E	Agricultural sciences	Biological sciences	Computer sciences	Earth, atmospheric, and ocean sciences	Engineering	Mathematics	Medical and other health sciences	Physical sciences	Psychology	Social sciences
1985	7.2	7.2	6.7	7.4	7.4	6.7	6.7	9.7	6.0	7.9	9.1
1986	7.2	7.7	6.7	7.6	7.7	6.7	6.6	10.0	6.0	8.2	9.2
1987	7.2	7.5	6.9	7.7	7.9	6.7	6.9	9.9	5.9	8.2	9.3
1988	7.2	7.7	6.9	7.7	8.2	6.7	6.9	10.7	6.0	8.3	9.4
1989	7.2	8.0	6.9	7.7	7.7	6.7	6.7	10.7	6.1	8.2	9.1
1990	7.6	8.1	7.2	7.2	7.7	6.7	6.9	11.2	6.2	8.5	9.3
1991	7.5	8.3	6.9	7.7	8.0	6.9	6.9	11.2	6.2	8.2	9.4
1992	7.7	8.3	7.2	7.7	8.2	7.2	7.4	11.7	6.4	8.4	9.2
1993	7.7	8.2	7.2	7.9	8.7	7.2	7.2	11.7	6.7	8.2	9.4
1994	7.7	8.2	7.2	8.1	8.9	7.2	7.2	11.7	6.7	7.9	9.3
1995	7.7	8.5	7.2	8.1	8.9	7.3	7.2	11.2	6.7	7.9	9.3
1996	7.7	8.7	7.2	8.2	9.2	7.2	7.1	11.7	6.7	7.7	8.9
1997	7.7	8.7	7.0	8.3	8.7	7.2	7.2	11.7	6.3	7.7	8.9
1998	7.3	8.7	6.7	8.2	8.4	7.2	6.7	11.7	6.2	7.3	8.7
1999	7.2	8.2	6.7	8.2	8.2	7.2	6.7	10.7	6.2	7.2	8.7
2000	7.5	8.7	6.9	8.2	8.3	7.2	6.9	11.2	6.2	7.2	8.7

## CHAPTER 2 | Higher Education in Science and Engineering

Year	All S&E	Agricultural sciences	Biological sciences	Computer sciences	Earth, atmospheric, and ocean sciences	Engineering	Mathematics	Medical and other health sciences	Physical sciences	Psychology	Social sciences
2001	7.2	8.7	6.7	7.9	8.2	7.1	6.8	10.7	6.2	7.2	8.9
2002	7.5	8.7	6.7	8.1	8.2	7.2	6.7	11.1	6.2	7.7	8.9
2003	7.6	8.2	6.7	8.2	8.0	7.3	6.9	10.3	6.2	7.2	9.2
2004	7.2	7.9	6.7	7.8	7.7	7.2	6.7	9.5	6.3	7.1	8.7
2005	7.3	7.9	6.7	7.7	7.8	7.3	6.8	9.7	6.3	7.3	9.0
2006	7.2	8.0	6.7	7.8	7.7	7.0	6.7	9.7	6.3	7.0	8.7
2007	7.0	7.7	6.7	7.4	7.4	6.7	6.7	9.6	6.3	7.0	8.7
2008	7.0	7.9	6.5	7.3	7.3	6.7	6.7	9.3	6.3	6.9	8.7
2009	7.0	8.0	6.7	7.6	7.3	6.9	6.7	9.7	6.2	6.9	8.5
2010	7.0	7.8	6.6	7.6	7.3	6.9	6.3	9.0	6.3	6.9	8.7
2011	7.0	8.0	6.7	7.7	7.7	6.8	6.2	9.3	6.3	6.9	8.7
2012	7.0	7.9	6.7	7.4	7.3	6.7	6.3	8.9	6.3	6.9	8.7
2013	6.9	7.7	6.7	7.6	7.0	6.7	6.3	9.0	6.2	6.9	8.7
2014	6.9	7.6	6.4	7.4	7.3	6.5	6.3	9.0	6.1	7.0	8.7
2015	6.8	7.3	6.3	7.6	6.9	6.7	6.0	9.0	6.0	7.0	8.3

### Note(s)

Includes only doctorate recipients who reported year of entry to first graduate school or program.

### Source(s)



## CHAPTER 2 | Higher Education in Science and Engineering

National Science Foundation, National Center for Science and Engineering Statistics, special tabulations (2016), 2015 Survey of Earned Doctorates (SED).

*Science and Engineering Indicators 2018*

## CHAPTER 2 | Higher Education in Science and Engineering

APPENDIX TABLE 2-31

### Median number of years from S&E doctorate recipients' entry to graduate school to receipt of doctorate, by sex, citizenship, ethnicity, race, and broad field of study: 2015

(Median number of years and number of recipients)

Field	Total <sup>a</sup>	Sex		Temporary visa holder	U.S. citizens and permanent residents									Unknown citizenship
					Total	Hispanic or Latino	Not Hispanic or Latino						Ethnicity not reported	
		American Indian or Alaska Native	Asian				Black or African American	White	More than one race	Other race or race not reported				
All fields (median years)	7.3	7.2	7.7	7.3	7.4	7.7	9.7	7.3	9.7	7.3	7.2	7.8	7.0	7.0
S&E	6.8	6.7	6.9	7.1	6.7	6.9	8.3	6.9	8.3	6.7	6.7	7.0	6.3	6.6
Agricultural sciences	7.3	7.3	7.3	7.7	7.3	8.7	s	7.3	8.5	7.0	8.3	s	8.5	9.6
Biological sciences	6.3	6.7	6.3	7.0	6.3	6.3	6.7	6.7	6.7	6.2	6.3	5.8	6.0	5.7
Computer sciences	7.6	7.4	8.0	7.3	7.9	9.4	0.0	8.8	10.0	7.7	8.2	7.7	8.0	6.2
Earth, atmospheric, and ocean sciences	6.9	7.0	6.9	7.3	6.7	6.8	s	7.7	7.0	6.7	6.7	s	9.1	10.9
Engineering	6.7	6.7	6.3	6.9	6.2	6.2	7.3	6.7	7.0	6.0	6.0	5.6	5.3	6.6
Mathematics	6.0	6.1	6.0	6.3	6.0	6.5	0.0	7.0	7.7	5.9	5.5	8.0	6.0	5.7
Medical and other health sciences	9.0	7.7	9.7	7.3	9.7	10.9	s	7.9	11.0	9.7	8.2	s	9.7	7.9
Physical sciences	6.0	6.0	5.9	6.7	5.7	6.0	5.7	6.0	6.3	5.7	5.9	4.7	5.0	5.9
Psychology	7.0	7.0	7.0	7.9	7.0	7.0	7.2	6.7	8.3	6.8	7.0	6.9	7.3	7.7
Social sciences	8.3	8.2	8.7	8.3	8.5	9.0	11.4	9.0	10.0	8.2	7.7	10.3	10.0	8.0

## CHAPTER 2 | Higher Education in Science and Engineering

Field	Total <sup>a</sup>	Sex		Temporary visa holder	U.S. citizens and permanent residents									Unknown citizenship
					Total	Hispanic or Latino	Not Hispanic or Latino						Ethnicity not reported	
		Male	Female				American Indian or Alaska Native	Asian	Black or African American	White	More than one race	Other race or race not reported		
Non-S&E	10.0	9.7	10.1	9.0	10.2	10.2	12.4	10.6	12.0	10.0	9.7	10.0	11.0	8.0
All fields (number)	49,402	26,690	22,712	15,394	33,737	2,329	120	3,014	2,182	24,768	900	220	204	271
S&E	37,495	21,675	15,820	13,452	23,844	1,604	68	2,449	1,290	17,455	669	161	148	199
Agricultural sciences	1,219	635	584	492	721	49	s	44	26	570	18	s	6	6
Biological sciences	7,838	3,690	4,148	2,137	5,670	442	11	691	194	4,093	181	32	26	31
Computer sciences	1,791	1,428	363	1,041	735	34	0	106	27	533	18	7	10	15
Earth, atmospheric, and ocean sciences	892	521	371	275	612	34	s	22	11	519	16	s	6	5
Engineering	8,974	6,903	2,071	4,878	4,048	282	7	645	159	2,797	108	30	20	48
Mathematics	1,651	1,184	467	788	854	38	0	92	25	657	17	10	15	9
Medical and other health sciences	2,401	761	1,640	490	1,898	122	s	169	219	1,312	41	s	14	13
Physical sciences	4,412	3,023	1,389	1,705	2,685	131	7	245	86	2,117	72	13	14	22
Psychology	3,128	904	2,224	244	2,865	218	10	179	227	2,129	80	10	12	19
Social sciences	5,189	2,626	2,563	1,402	3,756	254	22	256	316	2,728	118	37	25	31
Non-S&E	11,907	5,015	6,892	1,942	9,893	725	52	565	892	7,313	231	59	56	72



CHAPTER 2 | Higher Education in Science and Engineering

s = suppressed for reasons of confidentiality and/or reliability.  
<sup>a</sup> Total includes doctorate recipients for whom sex was not reported.

**Note(s)**  
Includes only doctorate recipients who reported year of entry to first graduate school or program. Reporting categories for ethnicity and race were expanded in 2013; comparisons with data before 2013 should be made with caution. Percentages may not add to total because of rounding.

**Source(s)**  
National Science Foundation, National Center for Science and Engineering Statistics, special tabulations (2016), 2015 Survey of Earned Doctorates (SED).  
*Science and Engineering Indicators 2018*



## CHAPTER 2 | Higher Education in Science and Engineering

APPENDIX TABLE 2-32

### Earned doctoral degrees, by citizenship, field, race, and ethnicity: 2000–15

(Number)

Citizenship, field, race, and ethnicity	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
All citizenships, races, and ethnicities																
All fields	44,947	45,068	44,311	46,177	48,560	52,855	56,309	60,887	61,716	61,730	57,405	59,847	62,071	64,887	67,591	69,115
S&E	27,862	28,096	27,588	28,746	30,979	34,468	37,541	40,980	41,480	41,111	36,711	38,470	39,828	41,563	43,995	44,521
Engineering	5,384	5,561	5,196	5,282	5,931	6,548	7,402	8,066	8,110	7,915	7,812	8,478	8,873	9,489	10,135	10,406
Aerospace	203	202	193	178	190	205	209	234	232	257	228	237	275	310	336	310
Chemical	665	680	693	608	708	872	911	915	950	886	929	951	969	1,001	1,169	1,197
Civil	628	647	669	685	736	830	864	935	909	902	851	894	922	1,036	1,154	1,230
Electrical	1,515	1,527	1,361	1,402	1,634	1,782	2,124	2,380	2,279	2,090	2,169	2,352	2,475	2,469	2,642	2,651
Industrial	218	262	275	258	280	286	302	364	346	333	290	319	348	389	400	354
Materials	454	454	381	457	494	514	611	663	665	661	653	651	715	757	734	810
Mechanical	821	906	813	786	835	963	1,139	1,138	1,149	1,186	1,022	1,172	1,277	1,384	1,454	1,586
Other	880	883	811	908	1,054	1,096	1,242	1,437	1,580	1,600	1,670	1,902	1,892	2,143	2,246	2,268
Science	22,478	22,535	22,392	23,464	25,048	27,920	30,139	32,914	33,370	33,196	28,899	29,992	30,955	32,074	33,860	34,115
Natural sciences	14,296	14,084	14,385	15,340	16,773	19,329	21,563	24,052	24,466	24,649	20,809	21,313	22,115	22,808	24,098	24,165
Agricultural sciences	984	934	969	1,060	1,016	1,004	1,037	1,068	1,080	1,143	982	1,053	1,144	1,218	1,228	1,381
Biological sciences	4,992	4,750	4,596	5,212	5,491	5,925	6,138	6,703	7,319	7,429	7,571	7,596	7,817	7,825	8,207	7,890

## CHAPTER 2 | Higher Education in Science and Engineering

Citizenship, field, race, and ethnicity	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Earth, atmospheric, and ocean sciences	579	542	562	544	540	572	600	727	683	724	713	687	737	794	861	827
Atmospheric sciences	87	70	68	78	77	96	95	87	106	110	100	120	125	137	126	146
Earth sciences	393	380	404	368	369	379	430	513	469	503	496	467	497	530	606	575
Oceanography	99	92	90	98	94	97	75	127	108	111	117	100	115	127	129	106
Mathematics and computer sciences	1,858	1,769	1,677	1,825	1,975	2,301	2,713	2,953	3,058	3,110	3,155	3,152	3,360	3,633	3,799	3,753
Computer sciences	777	768	750	816	910	1,121	1,416	1,597	1,696	1,574	1,561	1,562	1,690	1,809	1,935	1,951
Mathematics and statistics	1,081	1,001	927	1,009	1,065	1,180	1,297	1,356	1,362	1,536	1,594	1,590	1,670	1,824	1,864	1,802
Medical and other health sciences	2,439	2,643	3,334	3,321	4,406	5,907	7,089	8,392	8,121	7,827	4,062	4,265	4,468	4,635	5,056	5,343
Medical sciences	893	864	882	850	1,010	1,144	1,252	1,293	1,320	1,254	1,506	1,497	1,688	1,867	2,148	2,433
Other health sciences	1,546	1,779	2,452	2,471	3,396	4,763	5,837	7,099	6,801	6,573	2,556	2,768	2,780	2,768	2,908	2,910
Physical sciences	3,444	3,446	3,247	3,378	3,345	3,620	3,986	4,209	4,205	4,416	4,326	4,560	4,589	4,703	4,947	4,971
Astronomy	101	103	70	101	101	115	114	128	163	143	160	166	170	174	179	153
Chemistry	2,090	2,134	2,037	2,158	2,105	2,226	2,502	2,606	2,495	2,652	2,564	2,685	2,630	2,730	2,921	2,906
Physics	1,208	1,169	1,096	1,089	1,119	1,254	1,341	1,442	1,507	1,580	1,570	1,670	1,752	1,740	1,768	1,840
Other physical sciences	45	40	44	30	20	25	29	33	40	41	32	39	37	59	79	72
Social and behavioral sciences	8,182	8,451	8,007	8,124	8,275	8,591	8,576	8,862	8,904	8,547	8,090	8,679	8,840	9,266	9,762	9,950
Psychology	4,200	4,538	4,185	4,258	4,389	4,681	4,484	4,696	4,600	4,046	3,606	3,952	3,868	4,280	4,574	4,533
Social sciences	3,982	3,913	3,822	3,866	3,886	3,910	4,092	4,166	4,304	4,501	4,484	4,727	4,972	4,986	5,188	5,417
Anthropology	471	428	508	487	537	459	480	519	491	527	534	596	585	595	606	577

## CHAPTER 2 | Higher Education in Science and Engineering

Citizenship, field, race, and ethnicity	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Area and ethnic studies	212	216	209	176	204	184	220	226	246	226	237	257	274	272	316	309
Economics	1,001	1,016	961	967	978	1,111	1,057	1,107	1,172	1,172	1,120	1,152	1,271	1,227	1,212	1,283
History of science	23	21	20	27	20	28	34	27	34	19	31	27	24	29	41	31
Linguistics	202	193	152	201	194	172	216	219	215	240	203	235	249	237	240	266
Political science and public administration	1,019	1,047	992	1,055	1,001	1,049	1,098	1,093	1,104	1,244	1,312	1,314	1,402	1,507	1,537	1,622
Sociology	602	550	547	598	564	534	574	573	594	635	612	671	635	626	692	733
Other social sciences	452	442	433	355	388	373	413	402	448	438	435	475	532	493	544	596
Non-S&E	17,085	16,972	16,723	17,431	17,581	18,387	18,768	19,907	20,236	20,619	20,694	21,377	22,243	23,324	23,596	24,594
U.S. citizen or permanent resident																
All fields	34,113	34,105	33,382	34,551	35,807	38,512	40,334	43,888	44,509	45,019	41,759	43,514	45,203	47,233	49,267	50,859
S&E	19,401	19,382	19,110	19,731	21,136	23,113	24,816	27,283	27,594	27,753	24,106	25,296	26,057	27,209	28,785	29,338
Engineering	2,656	2,562	2,261	2,237	2,347	2,452	2,714	2,994	3,180	3,374	3,507	3,713	3,926	4,123	4,451	4,620
Aerospace	125	101	77	72	73	91	80	108	103	137	122	130	163	169	208	194
Chemical	364	357	354	295	340	360	423	373	417	437	469	440	442	428	520	564
Civil	319	300	273	283	257	296	296	359	330	348	347	353	366	410	465	535
Electrical	641	587	506	478	531	567	560	645	704	711	757	815	847	813	822	855
Industrial	104	109	115	93	119	107	117	129	125	112	116	124	124	133	136	111
Materials	240	217	172	198	205	191	242	286	284	281	316	283	363	348	348	374
Mechanical	384	414	335	336	307	338	388	376	406	472	425	505	556	614	643	683

## CHAPTER 2 | Higher Education in Science and Engineering

Citizenship, field, race, and ethnicity	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Other	479	477	429	482	515	502	608	718	811	876	955	1,063	1,065	1,208	1,309	1,304
Science	16,745	16,820	16,849	17,494	18,789	20,661	22,102	24,289	24,414	24,379	20,599	21,583	22,131	23,086	24,334	24,718
Natural sciences	9,779	9,682	10,048	10,765	11,872	13,661	15,139	17,116	17,248	17,699	14,237	14,614	15,075	15,546	16,333	16,579
Agricultural sciences	553	544	549	626	601	611	640	643	668	715	639	660	694	770	755	888
Biological sciences	3,724	3,579	3,443	3,901	4,118	4,330	4,377	4,713	5,091	5,310	5,447	5,513	5,705	5,710	5,957	5,720
Earth, atmospheric, and ocean sciences	409	362	368	376	356	360	389	481	436	477	481	472	498	540	583	566
Atmospheric sciences	57	40	43	46	45	54	45	48	58	68	50	83	75	91	85	99
Earth sciences	280	258	266	259	245	244	296	347	302	333	350	312	339	363	395	391
Oceanography	72	64	59	71	66	62	48	86	76	76	81	77	84	86	103	76
Mathematics and computer sciences	990	920	848	926	963	1,040	1,134	1,325	1,338	1,518	1,645	1,621	1,671	1,761	1,823	1,764
Computer sciences	402	395	410	413	455	500	551	680	667	730	782	772	819	849	875	864
Mathematics and statistics	588	525	438	513	508	540	583	645	671	788	863	849	852	912	948	900
Medical and other health sciences	1,955	2,121	2,796	2,876	3,865	5,284	6,416	7,688	7,408	7,193	3,536	3,696	3,798	3,991	4,392	4,667
Medical sciences	615	582	568	577	655	735	816	862	910	848	1,142	1,108	1,220	1,393	1,656	1,945
Other health sciences	1,340	1,539	2,228	2,299	3,210	4,549	5,600	6,826	6,498	6,345	2,394	2,588	2,578	2,598	2,736	2,722
Physical sciences	2,148	2,156	2,044	2,060	1,969	2,036	2,183	2,266	2,307	2,486	2,489	2,652	2,709	2,774	2,823	2,974
Astronomy	76	78	53	79	75	73	73	89	117	98	119	108	124	120	131	118
Chemistry	1,336	1,383	1,355	1,374	1,321	1,366	1,461	1,464	1,414	1,586	1,542	1,592	1,584	1,653	1,703	1,787
Physics	708	677	604	591	562	585	635	696	754	781	808	928	985	970	951	1,028

## CHAPTER 2 | Higher Education in Science and Engineering

Citizenship, field, race, and ethnicity	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Other physical sciences	28	18	32	16	11	12	14	17	22	21	20	24	16	31	38	41
Social and behavioral sciences	6,966	7,138	6,801	6,729	6,917	7,000	6,963	7,173	7,166	6,680	6,362	6,969	7,056	7,540	8,001	8,139
Psychology	4,042	4,381	4,042	4,059	4,191	4,452	4,230	4,450	4,359	3,770	3,334	3,694	3,617	4,017	4,320	4,261
Social sciences	2,924	2,757	2,759	2,670	2,726	2,548	2,733	2,723	2,807	2,910	3,028	3,275	3,439	3,523	3,681	3,878
Anthropology	409	356	430	420	466	392	425	433	416	431	444	505	490	508	507	489
Area and ethnic studies	180	180	180	149	168	154	187	202	190	178	191	214	220	240	265	263
Economics	474	422	419	377	396	368	371	369	438	408	459	456	538	535	500	566
History of science	18	20	16	24	14	21	28	16	29	12	25	24	17	24	29	19
Linguistics	105	100	84	102	105	95	114	123	114	145	118	146	139	131	139	155
Political science and public administration	856	859	821	827	809	806	827	811	822	919	967	1,013	1,086	1,181	1,234	1,284
Sociology	510	473	474	492	460	436	466	459	477	499	504	555	536	517	580	623
Other social sciences	372	347	335	279	308	276	315	310	321	318	320	362	413	387	427	479
Non-S&E	14,712	14,723	14,272	14,820	14,671	15,399	15,518	16,605	16,915	17,266	17,653	18,218	19,146	20,024	20,482	21,521
Hispanic or Latino <sup>a</sup>																
All fields	1,382	1,594	1,503	1,609	1,739	1,914	1,980	2,138	2,410	2,419	2,294	2,457	2,703	2,938	3,239	3,554
S&E	775	905	840	878	1,057	1,121	1,190	1,301	1,499	1,335	1,312	1,397	1,482	1,641	1,828	2,019
Engineering	86	88	88	106	101	98	105	138	130	153	196	182	191	202	247	286
Aerospace	2	7	3	4	3	4	0	7	3	8	7	8	9	11	16	8
Chemical	18	8	17	13	9	20	20	16	20	22	33	23	30	17	28	31

## CHAPTER 2 | Higher Education in Science and Engineering

Citizenship, field, race, and ethnicity	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Civil	11	14	6	14	21	13	16	25	14	21	26	18	27	24	28	40
Electrical	17	17	26	22	19	14	11	33	27	27	42	41	36	34	41	54
Industrial	3	4	9	2	2	4	12	12	9	6	11	10	5	10	12	11
Materials	7	10	5	9	6	13	12	9	7	10	19	9	14	16	26	26
Mechanical	10	16	11	15	13	14	12	13	17	28	23	31	28	34	34	35
Other	18	12	11	27	28	16	22	23	33	31	35	42	42	56	62	81
Science	689	817	752	772	956	1,023	1,085	1,163	1,369	1,182	1,116	1,215	1,291	1,439	1,581	1,733
Natural sciences	319	386	342	382	468	503	573	619	803	727	674	692	740	820	874	1,014
Agricultural sciences	13	21	20	16	17	14	36	15	18	21	33	45	41	45	49	47
Biological sciences	149	155	139	171	186	216	212	226	274	282	326	324	329	393	379	425
Earth, atmospheric, and ocean sciences	9	10	4	8	10	11	12	18	17	14	16	14	18	24	21	31
Atmospheric sciences	1	0	1	1	0	1	2	2	2	0	0	1	2	2	3	2
Earth sciences	6	6	1	3	10	9	10	12	13	12	13	11	11	19	13	25
Oceanography	2	4	2	4	0	1	0	4	2	2	3	2	5	3	5	4
Mathematics and computer sciences	25	29	28	28	41	38	33	38	45	58	48	48	65	74	66	77
Computer sciences	13	12	19	11	18	17	6	17	16	23	17	19	26	40	31	42
Mathematics and statistics	12	17	9	17	23	21	27	21	29	35	31	29	39	34	35	35
Medical and other health sciences	56	90	82	94	141	148	187	230	337	237	143	138	155	151	208	280
Medical sciences	16	28	22	29	31	30	34	51	84	38	63	67	64	79	100	150

## CHAPTER 2 | Higher Education in Science and Engineering

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## CHAPTER 2 | Higher Education in Science and Engineering

Citizenship, field, race, and ethnicity	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
All fields	32,731	32,511	31,879	32,942	34,068	36,598	38,354	41,750	42,099	42,600	39,465	41,057	42,500	44,295	46,028	47,305
S&E	18,626	18,477	18,270	18,853	20,079	21,992	23,626	25,982	26,095	26,418	22,794	23,899	24,575	25,568	26,957	27,319
Engineering	2,570	2,474	2,173	2,131	2,246	2,354	2,609	2,856	3,050	3,221	3,311	3,531	3,735	3,921	4,204	4,334
Aerospace	123	94	74	68	70	87	80	101	100	129	115	122	154	158	192	186
Chemical	346	349	337	282	331	340	403	357	397	415	436	417	412	411	492	533
Civil	308	286	267	269	236	283	280	334	316	327	321	335	339	386	437	495
Electrical	624	570	480	456	512	553	549	612	677	684	715	774	811	779	781	801
Industrial	101	105	106	91	117	103	105	117	116	106	105	114	119	123	124	100
Materials	233	207	167	189	199	178	230	277	277	271	297	274	349	332	322	348
Mechanical	374	398	324	321	294	324	376	363	389	444	402	474	528	580	609	648
Other	461	465	418	455	487	486	586	695	778	845	920	1,021	1,023	1,152	1,247	1,223
Science	16,056	16,003	16,097	16,722	17,833	19,638	21,017	23,126	23,045	23,197	19,483	20,368	20,840	21,647	22,753	22,985
Natural sciences	9,460	9,296	9,706	10,383	11,404	13,158	14,566	16,497	16,445	16,972	13,563	13,922	14,335	14,726	15,459	15,565
Agricultural sciences	540	523	529	610	584	597	604	628	650	694	606	615	653	725	706	841
Biological sciences	3,575	3,424	3,304	3,730	3,932	4,114	4,165	4,487	4,817	5,028	5,121	5,189	5,376	5,317	5,578	5,295
Earth, atmospheric, and ocean sciences	400	352	364	368	346	349	377	463	419	463	465	458	480	516	562	535
Atmospheric sciences	56	40	42	45	45	53	43	46	56	68	50	82	73	89	82	97
Earth sciences	274	252	265	256	235	235	286	335	289	321	337	301	328	344	382	366
Oceanography	70	60	57	67	66	61	48	82	74	74	78	75	79	83	98	72



## CHAPTER 2 | Higher Education in Science and Engineering

Citizenship, field, race, and ethnicity	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Mathematics and computer sciences	965	891	820	898	922	1,002	1,101	1,287	1,293	1,460	1,597	1,573	1,606	1,687	1,757	1,687
Computer sciences	389	383	391	402	437	483	545	663	651	707	765	753	793	809	844	822
Mathematics and statistics	576	508	429	496	485	519	556	624	642	753	832	820	813	878	913	865
Medical and other health sciences	1,899	2,031	2,714	2,782	3,724	5,136	6,229	7,458	7,071	6,956	3,393	3,558	3,643	3,840	4,184	4,387
Medical sciences	599	554	546	548	624	705	782	811	826	810	1,079	1,041	1,156	1,314	1,556	1,795
Other health sciences	1,300	1,477	2,168	2,234	3,100	4,431	5,447	6,647	6,245	6,146	2,314	2,517	2,487	2,526	2,628	2,592
Physical sciences	2,081	2,075	1,975	1,995	1,896	1,960	2,090	2,174	2,195	2,371	2,381	2,529	2,577	2,641	2,672	2,820
Astronomy	73	74	52	77	73	71	72	84	114	94	115	103	119	117	128	109
Chemistry	1,291	1,324	1,307	1,330	1,263	1,309	1,391	1,399	1,325	1,500	1,470	1,513	1,508	1,564	1,603	1,687
Physics	689	659	585	572	549	569	614	674	734	756	776	891	934	929	903	984
Other physical sciences	28	18	31	16	11	11	13	17	22	21	20	22	16	31	38	40
Social and behavioral sciences	6,596	6,707	6,391	6,339	6,429	6,480	6,451	6,629	6,600	6,225	5,920	6,446	6,505	6,921	7,294	7,420
Psychology	3,775	4,073	3,745	3,812	3,852	4,064	3,863	4,033	3,939	3,454	3,057	3,359	3,275	3,609	3,837	3,773
Social sciences	2,821	2,634	2,646	2,527	2,577	2,416	2,588	2,596	2,661	2,771	2,863	3,087	3,230	3,312	3,457	3,647
Anthropology	401	337	410	391	429	372	400	415	387	397	417	465	454	472	456	456
Area and ethnic studies	173	171	170	141	155	142	174	188	179	170	175	200	199	216	242	237
Economics	456	404	406	357	371	346	350	347	422	390	437	440	521	498	477	531
History of science	17	18	16	24	14	20	26	15	29	12	23	23	16	24	27	18
Linguistics	104	95	81	98	103	92	110	120	111	141	115	143	136	126	132	151

## CHAPTER 2 | Higher Education in Science and Engineering

Citizenship, field, race, and ethnicity	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Political science and public administration	828	825	786	791	766	771	792	777	786	882	921	963	1,028	1,132	1,173	1,230
Sociology	486	449	452	455	436	407	429	436	439	477	475	506	483	477	546	569
Other social sciences	356	335	325	270	303	266	307	298	308	302	300	347	393	367	404	455
Non-S&E	14,105	14,034	13,609	14,089	13,989	14,606	14,728	15,768	16,004	16,182	16,671	17,158	17,925	18,727	19,071	19,986
American Indian or Alaska Native																
All fields	155	170	175	185	206	224	214	232	244	282	224	232	231	261	241	264
S&E	82	88	84	106	117	109	111	128	139	154	121	122	117	130	131	137
Engineering	5	10	6	12	8	6	7	8	15	19	10	15	11	7	13	12
Aerospace	0	0	0	0	0	1	0	0	1	0	0	0	1	0	1	0
Chemical	0	3	1	1	1	0	1	1	2	5	0	4	1	1	1	4
Civil	1	0	1	0	1	0	0	3	2	3	1	1	2	0	0	2
Electrical	1	3	0	3	3	0	2	1	2	2	4	0	1	2	3	1
Industrial	0	0	0	0	0	0	1	0	1	0	1	0	1	1	0	0
Materials	0	0	1	0	0	1	0	0	1	1	1	3	1	0	2	0
Mechanical	2	2	2	1	1	2	2	1	3	2	2	4	2	1	0	3
Other	1	2	1	7	2	2	1	2	3	6	1	3	2	2	6	2
Science	77	78	78	94	109	103	104	120	124	135	111	107	106	123	118	125
Natural sciences	34	33	36	39	53	56	50	62	74	83	63	62	69	67	67	71
Agricultural sciences	2	1	0	1	7	4	1	3	8	5	6	5	9	4	5	8

## CHAPTER 2 | Higher Education in Science and Engineering

Citizenship, field, race, and ethnicity	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Biological sciences	8	14	14	18	16	18	19	23	20	27	21	25	33	25	16	24
Earth, atmospheric, and ocean sciences	6	0	0	1	3	3	0	2	2	2	2	0	2	4	1	3
Atmospheric sciences	0	0	0	0	1	1	0	0	0	0	1	0	0	0	0	0
Earth sciences	5	0	0	1	2	2	0	1	2	1	1	0	1	4	0	3
Oceanography	1	0	0	0	0	0	0	1	0	1	0	0	1	0	1	0
Mathematics and computer sciences	2	3	2	2	1	0	6	4	2	5	5	8	2	3	8	5
Computer sciences	0	1	1	1	1	0	6	3	0	2	3	3	2	0	7	4
Mathematics and statistics	2	2	1	1	0	0	0	1	2	3	2	5	0	3	1	1
Medical and other health sciences	8	10	11	11	14	24	15	23	37	34	18	14	17	23	21	20
Medical sciences	4	4	2	4	2	2	3	5	5	7	4	5	4	7	9	6
Other health sciences	4	6	9	7	12	22	12	18	32	27	14	9	13	16	12	14
Physical sciences	8	5	9	6	12	7	9	7	5	10	11	10	6	8	16	11
Astronomy	1	0	0	0	0	0	0	0	0	0	1	0	1	2	1	0
Chemistry	7	5	7	6	9	6	6	3	4	7	8	7	4	4	12	5
Physics	0	0	2	0	3	1	3	4	1	3	2	3	1	2	3	5
Other physical sciences	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Social and behavioral sciences	43	45	42	55	56	47	54	58	50	52	48	45	37	56	51	54
Psychology	28	27	24	31	36	29	32	36	31	23	19	23	22	31	20	21
Social sciences	15	18	18	24	20	18	22	22	19	29	29	22	15	25	31	33

## CHAPTER 2 | Higher Education in Science and Engineering

Citizenship, field, race, and ethnicity	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Anthropology	4	3	6	6	5	4	4	6	1	6	9	4	6	6	7	8
Area and ethnic studies	2	2	3	2	3	4	5	6	6	11	6	6	6	10	6	10
Economics	0	0	0	2	1	0	2	2	1	1	1	1	0	0	1	3
History of science	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Linguistics	0	1	0	0	0	0	1	1	2	0	1	0	0	2	1	1
Political science and public administration	3	7	1	4	4	3	4	0	6	6	5	4	2	5	8	7
Sociology	4	4	7	6	1	5	0	4	3	3	3	4	0	1	6	3
Other social sciences	2	1	1	4	6	2	6	3	0	2	4	3	1	1	2	1
Non-S&E	73	82	91	79	89	115	103	104	105	128	103	110	114	131	110	127
Asian																
All fields	na	na	na	na	na	na	na	na	na	na	na	3,125	3,340	3,431	3,437	3,664
S&E	na	na	na	na	na	na	na	na	na	na	na	2,333	2,468	2,467	2,513	2,669
Engineering	na	na	na	na	na	na	na	na	na	na	na	599	573	589	637	664
Aerospace	na	na	na	na	na	na	na	na	na	na	na	16	15	16	18	12
Chemical	na	na	na	na	na	na	na	na	na	na	na	58	66	57	70	81
Civil	na	na	na	na	na	na	na	na	na	na	na	46	35	36	42	59
Electrical	na	na	na	na	na	na	na	na	na	na	na	179	184	167	179	157
Industrial	na	na	na	na	na	na	na	na	na	na	na	14	9	11	16	17
Materials	na	na	na	na	na	na	na	na	na	na	na	46	56	51	45	50

## CHAPTER 2 | Higher Education in Science and Engineering

Citizenship, field, race, and ethnicity	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Mechanical	na	na	na	na	na	na	na	na	na	na	na	59	47	60	85	81
Other	na	na	na	na	na	na	na	na	na	na	na	181	161	191	182	207
Science	na	na	na	na	na	na	na	na	na	na	na	1,734	1,895	1,878	1,876	2,005
Natural sciences	na	na	na	na	na	na	na	na	na	na	na	1,327	1,450	1,458	1,425	1,521
Agricultural sciences	na	na	na	na	na	na	na	na	na	na	na	28	34	29	34	35
Biological sciences	na	na	na	na	na	na	na	na	na	na	na	596	659	656	646	667
Earth, atmospheric, and ocean sciences	na	na	na	na	na	na	na	na	na	na	na	22	19	13	21	17
Atmospheric sciences	na	na	na	na	na	na	na	na	na	na	na	6	5	2	3	6
Earth sciences	na	na	na	na	na	na	na	na	na	na	na	12	13	9	14	11
Oceanography	na	na	na	na	na	na	na	na	na	na	na	4	1	2	4	0
Mathematics and computer sciences	na	na	na	na	na	na	na	na	na	na	na	217	199	230	189	192
Computer sciences	na	na	na	na	na	na	na	na	na	na	na	128	129	128	110	112
Mathematics and statistics	na	na	na	na	na	na	na	na	na	na	na	89	70	102	79	80
Medical and other health sciences	na	na	na	na	na	na	na	na	na	na	na	260	302	294	295	354
Medical sciences	na	na	na	na	na	na	na	na	na	na	na	133	138	141	172	202
Other health sciences	na	na	na	na	na	na	na	na	na	na	na	127	164	153	123	152
Physical sciences	na	na	na	na	na	na	na	na	na	na	na	204	237	236	240	256
Astronomy	na	na	na	na	na	na	na	na	na	na	na	4	7	6	7	9
Chemistry	na	na	na	na	na	na	na	na	na	na	na	135	165	155	149	174

## CHAPTER 2 | Higher Education in Science and Engineering

Citizenship, field, race, and ethnicity	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Physics	na	na	na	na	na	na	na	na	na	na	na	63	65	72	82	73
Other physical sciences	na	na	na	na	na	na	na	na	na	na	na	2	0	3	2	0
Social and behavioral sciences	na	na	na	na	na	na	na	na	na	na	na	407	445	420	451	484
Psychology	na	na	na	na	na	na	na	na	na	na	na	189	213	199	213	255
Social sciences	na	na	na	na	na	na	na	na	na	na	na	218	232	221	238	229
Anthropology	na	na	na	na	na	na	na	na	na	na	na	23	21	35	32	21
Area and ethnic studies	na	na	na	na	na	na	na	na	na	na	na	21	24	16	25	14
Economics	na	na	na	na	na	na	na	na	na	na	na	55	60	58	60	65
History of science	na	na	na	na	na	na	na	na	na	na	na	1	1	0	2	1
Linguistics	na	na	na	na	na	na	na	na	na	na	na	14	19	9	8	12
Political science and public administration	na	na	na	na	na	na	na	na	na	na	na	58	57	70	51	59
Sociology	na	na	na	na	na	na	na	na	na	na	na	35	31	22	37	35
Other social sciences	na	na	na	na	na	na	na	na	na	na	na	11	19	11	23	22
Non-S&E	na	na	na	na	na	na	na	na	na	na	na	792	872	964	924	995
Asian or Pacific Islander <sup>b</sup>																
All fields	2,297	2,440	2,184	2,259	2,464	2,695	2,996	3,251	3,201	3,203	3,183	na	na	na	na	na
S&E	1,714	1,767	1,606	1,651	1,816	2,071	2,249	2,414	2,393	2,394	2,325	na	na	na	na	na
Engineering	380	398	357	292	346	372	470	508	501	504	517	na	na	na	na	na
Aerospace	9	11	3	8	8	8	11	8	9	16	12	na	na	na	na	na

## CHAPTER 2 | Higher Education in Science and Engineering

Citizenship, field, race, and ethnicity	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Chemical	50	49	65	44	64	43	70	63	55	56	65	na	na	na	na	na
Civil	37	33	30	19	25	40	44	50	38	35	37	na	na	na	na	na
Electrical	120	127	111	112	97	128	121	156	174	156	154	na	na	na	na	na
Industrial	13	14	10	12	14	17	10	15	17	15	15	na	na	na	na	na
Materials	27	26	22	14	27	17	38	55	27	32	43	na	na	na	na	na
Mechanical	67	76	49	40	52	42	66	52	45	50	46	na	na	na	na	na
Other	57	62	67	43	59	77	110	109	136	144	145	na	na	na	na	na
Science	1,334	1,369	1,249	1,359	1,470	1,699	1,779	1,906	1,892	1,890	1,808	na	na	na	na	na
Natural sciences	979	982	914	1,000	1,086	1,313	1,361	1,451	1,442	1,461	1,393	na	na	na	na	na
Agricultural sciences	26	24	17	28	28	22	25	24	34	34	32	na	na	na	na	na
Biological sciences	429	399	388	475	489	508	477	563	575	567	650	na	na	na	na	na
Earth, atmospheric, and ocean sciences	15	25	12	15	12	16	23	11	17	15	15	na	na	na	na	na
Atmospheric sciences	3	5	1	6	4	6	6	1	1	1	2	na	na	na	na	na
Earth sciences	12	19	8	7	8	6	16	8	12	10	11	na	na	na	na	na
Oceanography	0	1	3	2	0	4	1	2	4	4	2	na	na	na	na	na
Mathematics and computer sciences	127	108	98	98	110	142	155	190	140	194	208	na	na	na	na	na
Computer sciences	56	53	72	55	62	88	92	111	87	116	124	na	na	na	na	na
Mathematics and statistics	71	55	26	43	48	54	63	79	53	78	84	na	na	na	na	na
Medical and other health sciences	196	211	229	214	276	416	461	441	460	447	271	na	na	na	na	na

## CHAPTER 2 | Higher Education in Science and Engineering

Citizenship, field, race, and ethnicity	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Medical sciences	69	69	67	67	69	107	124	104	107	102	136	na	na	na	na	na
Other health sciences	127	142	162	147	207	309	337	337	353	345	135	na	na	na	na	na
Physical sciences	186	215	170	170	171	209	220	222	216	204	217	na	na	na	na	na
Astronomy	8	4	3	5	7	6	6	6	4	3	4	na	na	na	na	na
Chemistry	124	138	120	111	127	139	160	155	150	148	151	na	na	na	na	na
Physics	52	73	45	53	37	62	54	60	57	53	60	na	na	na	na	na
Other physical sciences	2	0	2	1	0	2	0	1	5	0	2	na	na	na	na	na
Social and behavioral sciences	355	387	335	359	384	386	418	455	450	429	415	na	na	na	na	na
Psychology	181	209	177	195	224	221	242	265	252	207	197	na	na	na	na	na
Social sciences	174	178	158	164	160	165	176	190	198	222	218	na	na	na	na	na
Anthropology	16	19	13	22	23	17	23	23	29	18	19	na	na	na	na	na
Area and ethnic studies	7	11	13	17	18	13	14	16	9	10	21	na	na	na	na	na
Economics	44	42	44	38	33	46	47	50	49	48	53	na	na	na	na	na
History of science	0	0	0	1	0	1	2	1	1	0	0	na	na	na	na	na
Linguistics	15	13	10	10	10	10	20	24	9	27	12	na	na	na	na	na
Political science and public administration	44	46	41	42	38	41	38	42	45	60	71	na	na	na	na	na
Sociology	27	33	25	25	25	26	21	23	38	38	28	na	na	na	na	na
Other social sciences	21	14	12	9	13	11	11	11	18	21	14	na	na	na	na	na
Non-S&E	583	673	578	608	648	624	747	837	808	809	858	na	na	na	na	na



## CHAPTER 2 | Higher Education in Science and Engineering

Citizenship, field, race, and ethnicity	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Black or African American																
All fields	2,147	2,091	2,268	2,362	2,725	2,854	2,884	3,452	3,478	3,645	3,372	3,759	4,049	4,331	4,780	5,050
S&E	821	838	871	893	1,034	1,071	1,204	1,287	1,352	1,451	1,239	1,426	1,480	1,637	1,816	1,855
Engineering	91	98	80	94	99	101	110	117	128	139	154	141	175	187	172	165
Aerospace	4	1	1	1	0	1	4	2	2	3	3	4	9	4	2	5
Chemical	8	15	10	8	7	9	13	18	17	11	14	15	11	13	17	11
Civil	8	9	11	11	6	10	9	10	9	9	12	14	13	14	19	26
Electrical	23	28	17	19	33	28	20	24	21	30	27	32	43	34	40	31
Industrial	6	5	6	6	10	6	11	8	18	10	16	13	18	23	10	10
Materials	5	5	4	9	6	7	11	8	13	15	18	10	14	20	12	8
Mechanical	24	17	16	12	18	12	13	16	23	19	15	13	21	29	17	21
Other	13	18	15	28	19	28	29	31	25	42	49	40	46	50	55	53
Science	730	740	791	799	935	970	1,094	1,170	1,224	1,312	1,085	1,285	1,305	1,450	1,644	1,690
Natural sciences	316	308	344	366	459	492	605	664	754	831	661	740	799	862	942	933
Agricultural sciences	20	16	16	26	20	19	28	24	26	28	47	21	38	33	32	31
Biological sciences	106	101	112	110	159	152	173	173	229	252	206	249	267	284	271	219
Earth, atmospheric, and ocean sciences	3	3	3	11	5	3	3	7	7	6	5	5	15	11	12	11
Atmospheric sciences	1	0	1	2	1	0	2	2	1	2	0	1	3	4	0	4
Earth sciences	2	3	2	6	3	2	0	3	5	4	5	3	10	5	9	6

## CHAPTER 2 | Higher Education in Science and Engineering

Citizenship, field, race, and ethnicity	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Oceanography	0	0	0	3	1	1	1	2	1	0	0	1	2	2	3	1
Mathematics and computer sciences	28	26	35	36	26	37	41	51	46	57	57	54	60	79	79	77
Computer sciences	15	9	21	17	18	19	21	30	24	30	33	31	39	52	52	57
Mathematics and statistics	13	17	14	19	8	18	20	21	22	27	24	23	21	27	27	20
Medical and other health sciences	94	90	109	118	185	229	305	323	369	410	266	325	340	360	441	488
Medical sciences	36	30	29	36	46	62	74	75	73	78	106	132	151	157	233	262
Other health sciences	58	60	80	82	139	167	231	248	296	332	160	193	189	203	208	226
Physical sciences	65	72	69	65	64	52	55	86	77	78	80	86	79	95	107	107
Astronomy	1	0	1	1	1	0	1	2	0	0	2	1	0	0	1	1
Chemistry	45	56	46	47	51	37	43	64	62	66	59	67	58	78	81	88
Physics	19	16	22	17	11	15	11	20	15	11	18	17	21	15	21	18
Other physical sciences	0	0	0	0	1	0	0	0	0	1	1	1	0	2	4	0
Social and behavioral sciences	414	432	447	433	476	478	489	506	470	481	424	545	506	588	702	757
Psychology	214	240	231	241	281	275	256	278	271	259	212	275	238	299	362	414
Social sciences	200	192	216	192	195	203	233	228	199	222	212	270	268	289	340	343
Anthropology	20	12	25	23	26	24	21	19	18	22	21	18	14	20	21	17
Area and ethnic studies	17	25	28	17	22	21	36	38	36	33	30	30	36	38	42	39
Economics	22	9	19	11	19	9	18	18	15	8	10	19	15	21	18	11
History of science	0	1	1	0	0	1	1	1	0	1	0	0	0	1	1	1

## CHAPTER 2 | Higher Education in Science and Engineering

Citizenship, field, race, and ethnicity	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Linguistics	1	4	1	0	4	2	5	0	2	2	2	5	3	2	4	3
Political science and public administration	70	79	78	79	67	83	90	85	67	94	80	121	126	143	176	184
Sociology	50	42	44	51	40	44	45	47	45	48	51	47	48	51	55	65
Other social sciences	20	20	20	11	17	19	17	20	16	14	18	30	26	13	23	23
Non-S&E	1,326	1,253	1,397	1,469	1,691	1,783	1,680	2,165	2,126	2,194	2,133	2,333	2,569	2,694	2,964	3,195
Native Hawaiian or Other Pacific Islander																
All fields	na	na	na	na	na	na	na	na	na	na	na	55	55	70	70	76
S&E	na	na	na	na	na	na	na	na	na	na	na	37	23	27	44	34
Engineering	na	na	na	na	na	na	na	na	na	na	na	4	2	7	8	1
Aerospace	na	na	na	na	na	na	na	na	na	na	na	0	0	0	1	0
Chemical	na	na	na	na	na	na	na	na	na	na	na	1	0	1	0	0
Civil	na	na	na	na	na	na	na	na	na	na	na	0	0	0	1	0
Electrical	na	na	na	na	na	na	na	na	na	na	na	0	0	2	1	0
Industrial	na	na	na	na	na	na	na	na	na	na	na	0	0	0	0	0
Materials	na	na	na	na	na	na	na	na	na	na	na	0	0	0	0	1
Mechanical	na	na	na	na	na	na	na	na	na	na	na	0	1	1	1	0
Other	na	na	na	na	na	na	na	na	na	na	na	3	1	3	4	0
Science	na	na	na	na	na	na	na	na	na	na	na	33	21	20	36	33
Natural sciences	na	na	na	na	na	na	na	na	na	na	na	26	20	12	28	25

## CHAPTER 2 | Higher Education in Science and Engineering

Citizenship, field, race, and ethnicity	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Agricultural sciences	na	na	na	na	na	na	na	na	na	na	na	1	0	1	1	1
Biological sciences	na	na	na	na	na	na	na	na	na	na	na	12	10	7	12	8
Earth, atmospheric, and ocean sciences	na	na	na	na	na	na	na	na	na	na	na	0	1	0	0	1
Atmospheric sciences	na	na	na	na	na	na	na	na	na	na	na	0	1	0	0	0
Earth sciences	na	na	na	na	na	na	na	na	na	na	na	0	0	0	0	1
Oceanography	na	na	na	na	na	na	na	na	na	na	na	0	0	0	0	0
Mathematics and computer sciences	na	na	na	na	na	na	na	na	na	na	na	3	2	0	1	2
Computer sciences	na	na	na	na	na	na	na	na	na	na	na	2	0	0	0	0
Mathematics and statistics	na	na	na	na	na	na	na	na	na	na	na	1	2	0	1	2
Medical and other health sciences	na	na	na	na	na	na	na	na	na	na	na	4	3	4	11	8
Medical sciences	na	na	na	na	na	na	na	na	na	na	na	2	2	1	6	2
Other health sciences	na	na	na	na	na	na	na	na	na	na	na	2	1	3	5	6
Physical sciences	na	na	na	na	na	na	na	na	na	na	na	6	4	0	3	5
Astronomy	na	na	na	na	na	na	na	na	na	na	na	0	0	0	0	0
Chemistry	na	na	na	na	na	na	na	na	na	na	na	4	4	0	1	3
Physics	na	na	na	na	na	na	na	na	na	na	na	2	0	0	2	2
Other physical sciences	na	na	na	na	na	na	na	na	na	na	na	0	0	0	0	0
Social and behavioral sciences	na	na	na	na	na	na	na	na	na	na	na	7	1	8	8	8
Psychology	na	na	na	na	na	na	na	na	na	na	na	1	0	4	6	3

## CHAPTER 2 | Higher Education in Science and Engineering

Citizenship, field, race, and ethnicity	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Social sciences	na	na	na	na	na	na	na	na	na	na	na	6	1	4	2	5
Anthropology	na	na	na	na	na	na	na	na	na	na	na	1	0	1	0	1
Area and ethnic studies	na	na	na	na	na	na	na	na	na	na	na	1	0	0	1	2
Economics	na	na	na	na	na	na	na	na	na	na	na	1	0	0	0	0
History of science	na	na	na	na	na	na	na	na	na	na	na	0	0	0	0	0
Linguistics	na	na	na	na	na	na	na	na	na	na	na	0	0	0	0	0
Political science and public administration	na	na	na	na	na	na	na	na	na	na	na	1	1	3	1	2
Sociology	na	na	na	na	na	na	na	na	na	na	na	2	0	0	0	0
Other social sciences	na	na	na	na	na	na	na	na	na	na	na	0	0	0	0	0
Non-S&E	na	na	na	na	na	na	na	na	na	na	na	18	32	43	26	42
White																
All fields	26,471	25,865	25,319	25,864	26,425	28,152	29,114	31,355	31,342	31,526	28,670	29,455	30,345	31,614	32,622	33,218
S&E	14,975	14,663	14,620	14,926	15,765	17,082	18,057	19,929	19,824	20,004	16,736	17,346	17,931	18,615	19,552	19,714
Engineering	1,948	1,844	1,592	1,571	1,633	1,696	1,818	1,973	2,112	2,235	2,286	2,393	2,592	2,701	2,928	3,023
Aerospace	108	79	65	48	61	73	60	81	81	99	90	93	112	128	156	150
Chemical	275	271	240	209	242	275	297	250	296	312	331	307	296	300	357	383
Civil	238	225	205	216	188	209	208	245	231	241	235	228	257	295	324	347
Electrical	436	374	325	282	331	346	346	367	397	415	426	468	486	474	453	494
Industrial	79	79	83	67	88	73	77	82	71	71	66	77	78	76	89	64

## CHAPTER 2 | Higher Education in Science and Engineering

Citizenship, field, race, and ethnicity	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Materials	191	170	135	150	159	136	163	191	209	194	208	183	253	234	233	263
Mechanical	261	285	236	254	200	242	274	265	282	320	310	343	402	428	437	484
Other	360	361	303	345	364	342	393	492	545	583	620	694	708	766	879	838
Science	13,027	12,819	13,028	13,355	14,132	15,386	16,239	17,956	17,712	17,769	14,450	14,953	15,339	15,914	16,624	16,691
Natural sciences	7,621	7,387	7,863	8,263	9,052	10,324	11,300	12,877	12,716	13,094	10,033	10,333	10,578	10,919	11,446	11,501
Agricultural sciences	470	453	474	522	502	519	526	541	534	576	480	509	519	586	577	673
Biological sciences	2,845	2,689	2,613	2,912	3,047	3,172	3,206	3,426	3,608	3,782	3,759	3,787	3,859	3,860	4,067	3,886
Earth, atmospheric, and ocean sciences	344	301	332	318	311	300	328	400	349	390	395	385	404	450	483	444
Atmospheric sciences	50	33	40	36	37	43	30	39	49	61	43	67	61	75	77	82
Earth sciences	230	210	242	224	212	204	258	289	235	263	280	258	274	302	322	302
Oceanography	64	58	50	58	62	53	40	72	65	66	72	60	69	73	84	60
Mathematics and computer sciences	746	687	624	671	697	706	784	895	936	1,042	1,140	1,141	1,162	1,183	1,262	1,211
Computer sciences	289	287	264	282	309	308	356	437	446	483	506	514	526	531	554	535
Mathematics and statistics	457	400	360	389	388	398	428	458	490	559	634	627	636	652	708	676
Medical and other health sciences	1,544	1,643	2,247	2,249	2,995	4,101	4,811	5,948	5,604	5,452	2,458	2,598	2,676	2,799	3,055	3,155
Medical sciences	465	417	422	398	471	475	531	578	583	553	736	657	755	858	971	1,170
Other health sciences	1,079	1,226	1,825	1,851	2,524	3,626	4,280	5,370	5,021	4,899	1,722	1,941	1,921	1,941	2,084	1,985
Physical sciences	1,672	1,614	1,573	1,591	1,500	1,526	1,645	1,667	1,685	1,852	1,801	1,913	1,958	2,041	2,002	2,132
Astronomy	55	52	41	61	63	62	57	63	94	85	97	84	105	98	100	80

## CHAPTER 2 | Higher Education in Science and Engineering

Citizenship, field, race, and ethnicity	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Chemistry	1,030	1,028	1,031	1,078	986	1,021	1,080	1,071	993	1,145	1,095	1,131	1,104	1,197	1,178	1,243
Physics	561	516	473	437	442	435	496	519	582	603	592	681	734	721	695	774
Other physical sciences	26	18	28	15	9	8	12	14	16	19	17	17	15	25	29	35
Social and behavioral sciences	5,406	5,432	5,165	5,092	5,080	5,062	4,939	5,079	4,996	4,675	4,417	4,620	4,761	4,995	5,178	5,190
Psychology	3,186	3,373	3,104	3,145	3,057	3,241	3,034	3,171	3,036	2,664	2,342	2,471	2,435	2,633	2,799	2,661
Social sciences	2,220	2,059	2,061	1,947	2,023	1,821	1,905	1,908	1,960	2,011	2,075	2,149	2,326	2,362	2,379	2,529
Anthropology	332	283	326	313	349	296	325	330	299	308	318	365	359	349	330	331
Area and ethnic studies	123	116	106	84	93	84	91	103	109	95	92	113	106	129	122	138
Economics	349	325	318	272	286	244	237	233	292	281	322	279	375	355	331	372
History of science	11	15	12	20	13	17	19	13	20	11	21	20	12	22	18	16
Linguistics	82	66	65	74	82	73	74	86	95	99	89	104	99	95	100	110
Political science and public administration	659	636	625	596	605	591	580	573	578	622	648	627	710	753	781	817
Sociology	375	343	340	356	352	301	337	326	321	354	355	375	355	360	391	401
Other social sciences	289	275	269	232	243	215	242	244	246	241	230	266	310	299	306	344
Non-S&E	11,496	11,202	10,699	10,938	10,660	11,070	11,057	11,426	11,518	11,522	11,934	12,109	12,414	12,999	13,070	13,504
Two or more races <sup>c</sup>																
All fields	na	na	na	na	na	na	na	na	na	na	na	337	397	522	643	777
S&E	na	na	na	na	na	na	na	na	na	na	na	202	252	328	434	502
Engineering	na	na	na	na	na	na	na	na	na	na	na	32	42	59	78	87

## CHAPTER 2 | Higher Education in Science and Engineering

Citizenship, field, race, and ethnicity	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Aerospace	na	na	na	na	na	na	na	na	na	na	na	2	6	3	3	5
Chemical	na	na	na	na	na	na	na	na	na	na	na	2	2	5	10	4
Civil	na	na	na	na	na	na	na	na	na	na	na	3	3	4	8	14
Electrical	na	na	na	na	na	na	na	na	na	na	na	5	9	16	15	18
Industrial	na	na	na	na	na	na	na	na	na	na	na	0	1	0	3	3
Materials	na	na	na	na	na	na	na	na	na	na	na	5	5	6	6	7
Mechanical	na	na	na	na	na	na	na	na	na	na	na	6	3	9	12	12
Other	na	na	na	na	na	na	na	na	na	na	na	9	13	16	21	24
Science	na	na	na	na	na	na	na	na	na	na	na	170	210	269	356	415
Natural sciences	na	na	na	na	na	na	na	na	na	na	na	101	129	178	232	270
Agricultural sciences	na	na	na	na	na	na	na	na	na	na	na	5	4	7	4	14
Biological sciences	na	na	na	na	na	na	na	na	na	na	na	44	59	62	99	110
Earth, atmospheric, and ocean sciences	na	na	na	na	na	na	na	na	na	na	na	1	6	5	9	8
Atmospheric sciences	na	na	na	na	na	na	na	na	na	na	na	1	1	1	0	0
Earth sciences	na	na	na	na	na	na	na	na	na	na	na	0	5	4	7	8
Oceanography	na	na	na	na	na	na	na	na	na	na	na	0	0	0	2	0
Mathematics and computer sciences	na	na	na	na	na	na	na	na	na	na	na	5	12	14	20	24
Computer sciences	na	na	na	na	na	na	na	na	na	na	na	3	3	3	7	16
Mathematics and statistics	na	na	na	na	na	na	na	na	na	na	na	2	9	11	13	8



## CHAPTER 2 | Higher Education in Science and Engineering

Citizenship, field, race, and ethnicity	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Medical and other health sciences	na	na	na	na	na	na	na	na	na	na	na	20	20	52	57	68
Medical sciences	na	na	na	na	na	na	na	na	na	na	na	8	10	18	24	31
Other health sciences	na	na	na	na	na	na	na	na	na	na	na	12	10	34	33	37
Physical sciences	na	na	na	na	na	na	na	na	na	na	na	26	28	38	43	46
Astronomy	na	na	na	na	na	na	na	na	na	na	na	2	0	0	3	3
Chemistry	na	na	na	na	na	na	na	na	na	na	na	14	15	24	24	32
Physics	na	na	na	na	na	na	na	na	na	na	na	9	13	14	15	10
Other physical sciences	na	na	na	na	na	na	na	na	na	na	na	1	0	0	1	1
Social and behavioral sciences	na	na	na	na	na	na	na	na	na	na	na	69	81	91	124	145
Psychology	na	na	na	na	na	na	na	na	na	na	na	40	45	47	72	78
Social sciences	na	na	na	na	na	na	na	na	na	na	na	29	36	44	52	67
Anthropology	na	na	na	na	na	na	na	na	na	na	na	4	9	5	10	9
Area and ethnic studies	na	na	na	na	na	na	na	na	na	na	na	2	4	2	10	7
Economics	na	na	na	na	na	na	na	na	na	na	na	10	4	5	6	12
History of science	na	na	na	na	na	na	na	na	na	na	na	0	0	0	0	0
Linguistics	na	na	na	na	na	na	na	na	na	na	na	0	2	4	2	5
Political science and public administration	na	na	na	na	na	na	na	na	na	na	na	9	7	15	10	19
Sociology	na	na	na	na	na	na	na	na	na	na	na	3	7	9	8	11
Other social sciences	na	na	na	na	na	na	na	na	na	na	na	1	3	4	6	4

## CHAPTER 2 | Higher Education in Science and Engineering

Citizenship, field, race, and ethnicity	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Non-S&E	na	na	na	na	na	na	na	na	na	na	na	135	145	194	209	275
Other or unknown race and ethnicity																
All fields	1,661	1,945	1,933	2,272	2,248	2,673	3,146	3,460	3,834	3,944	4,016	4,094	4,083	4,066	4,232	4,256
S&E	1,034	1,121	1,089	1,277	1,347	1,659	2,005	2,224	2,387	2,415	2,373	2,433	2,304	2,364	2,467	2,408
Engineering	146	124	138	162	160	179	204	250	294	324	344	347	340	371	368	382
Aerospace	2	3	5	11	1	4	5	10	7	11	10	7	11	7	11	14
Chemical	13	11	21	20	17	13	22	25	27	31	26	30	36	34	37	50
Civil	24	19	20	23	16	24	19	26	36	39	36	43	29	37	43	47
Electrical	44	38	27	40	48	51	60	64	83	81	104	90	88	84	90	100
Industrial	3	7	7	6	5	7	6	12	9	10	7	10	12	12	6	6
Materials	10	6	5	16	7	17	18	23	27	29	27	27	20	21	24	19
Mechanical	20	18	21	14	23	26	21	29	36	53	29	49	52	52	57	47
Other	30	22	32	32	43	37	53	61	69	70	105	91	92	124	100	99
Science	888	997	951	1,115	1,187	1,480	1,801	1,974	2,093	2,091	2,029	2,086	1,964	1,993	2,099	2,026
Natural sciences	510	586	549	715	754	973	1,250	1,443	1,459	1,503	1,413	1,333	1,290	1,230	1,319	1,244
Agricultural sciences	22	29	22	33	27	33	24	36	48	51	41	46	49	65	53	79
Biological sciences	187	221	177	215	221	264	290	302	385	400	485	476	489	423	467	381
Earth, atmospheric, and ocean sciences	32	23	17	23	15	27	23	43	44	50	48	45	33	33	36	51
Atmospheric sciences	2	2	0	1	2	3	5	4	5	4	4	7	2	7	2	5

## CHAPTER 2 | Higher Education in Science and Engineering

Citizenship, field, race, and ethnicity	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Earth sciences	25	20	13	18	10	21	12	34	35	43	40	28	25	20	30	35
Oceanography	5	1	4	4	3	3	6	5	4	3	4	10	6	6	4	11
Mathematics and computer sciences	62	67	61	91	88	117	115	147	169	162	187	145	169	178	198	176
Computer sciences	29	33	33	47	47	68	70	82	94	76	99	72	94	95	114	98
Mathematics and statistics	33	34	28	44	41	49	45	65	75	86	88	73	75	83	84	78
Medical and other health sciences	57	77	118	190	254	366	637	723	601	613	380	337	285	308	304	294
Medical sciences	25	34	26	43	36	59	50	49	58	70	97	104	96	132	141	122
Other health sciences	32	43	92	147	218	307	587	674	543	543	283	233	189	176	163	172
Physical sciences	150	169	154	163	149	166	161	192	212	227	272	284	265	223	261	263
Astronomy	8	18	7	10	2	3	8	13	16	6	11	12	6	11	16	16
Chemistry	85	97	103	88	90	106	102	106	116	134	157	155	158	106	158	142
Physics	57	54	43	65	56	56	50	71	79	86	104	116	100	105	85	102
Other physical sciences	0	0	1	0	1	1	1	2	1	1	0	1	1	1	2	3
Social and behavioral sciences	378	411	402	400	433	507	551	531	634	588	616	753	674	763	780	782
Psychology	166	224	209	200	254	298	299	283	349	301	287	360	322	396	365	341
Social sciences	212	187	193	200	179	209	252	248	285	287	329	393	352	367	415	441
Anthropology	29	20	40	27	26	31	27	37	40	43	50	50	45	56	56	69
Area and ethnic studies	24	17	20	21	19	20	28	25	19	21	26	27	23	21	36	27
Economics	41	28	25	34	32	47	46	44	65	52	51	75	67	59	61	68

## CHAPTER 2 | Higher Education in Science and Engineering

Citizenship, field, race, and ethnicity	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
History of science	6	2	3	3	1	1	4	0	8	0	2	2	3	1	6	0
Linguistics	6	11	5	14	7	7	10	9	3	13	11	20	13	14	17	20
Political science and public administration	52	57	41	70	52	53	80	77	90	100	117	143	125	143	146	142
Sociology	30	27	36	17	18	31	26	36	32	34	38	40	42	34	49	54
Other social sciences	24	25	23	14	24	19	31	20	28	24	34	36	34	39	44	61
Non-S&E	627	824	844	995	901	1,014	1,141	1,236	1,447	1,529	1,643	1,661	1,779	1,702	1,765	1,848
Temporary visa holder																
All fields	10,834	10,963	10,929	11,626	12,753	14,343	15,975	16,999	17,207	16,711	15,646	16,333	16,868	17,654	18,324	18,256
S&E	8,461	8,714	8,478	9,015	9,843	11,355	12,725	13,697	13,886	13,358	12,605	13,174	13,771	14,354	15,210	15,183
Engineering	2,728	2,999	2,935	3,045	3,584	4,096	4,688	5,072	4,930	4,541	4,305	4,765	4,947	5,366	5,684	5,786
Aerospace	78	101	116	106	117	114	129	126	129	120	106	107	112	141	128	116
Chemical	301	323	339	313	368	512	488	542	533	449	460	511	527	573	649	633
Civil	309	347	396	402	479	534	568	576	579	554	504	541	556	626	689	695
Electrical	874	940	855	924	1,103	1,215	1,564	1,735	1,575	1,379	1,412	1,537	1,628	1,656	1,820	1,796
Industrial	114	153	160	165	161	179	185	235	221	221	174	195	224	256	264	243
Materials	214	237	209	259	289	323	369	377	381	380	337	368	352	409	386	436
Mechanical	437	492	478	450	528	625	751	762	743	714	597	667	721	770	811	903
Other	401	406	382	426	539	594	634	719	769	724	715	839	827	935	937	964
Science	5,733	5,715	5,543	5,970	6,259	7,259	8,037	8,625	8,956	8,817	8,300	8,409	8,824	8,988	9,526	9,397

## CHAPTER 2 | Higher Education in Science and Engineering

Citizenship, field, race, and ethnicity	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Natural sciences	4,517	4,402	4,337	4,575	4,901	5,668	6,424	6,936	7,218	6,950	6,572	6,699	7,040	7,262	7,765	7,586
Agricultural sciences	431	390	420	434	415	393	397	425	412	428	343	393	450	448	473	493
Biological sciences	1,268	1,171	1,153	1,311	1,373	1,595	1,761	1,990	2,228	2,119	2,124	2,083	2,112	2,115	2,250	2,170
Earth, atmospheric, and ocean sciences	170	180	194	168	184	212	211	246	247	247	232	215	239	254	278	261
Atmospheric sciences	30	30	25	32	32	42	50	39	48	42	50	37	50	46	41	47
Earth sciences	113	122	138	109	124	135	134	166	167	170	146	155	158	167	211	184
Oceanography	27	28	31	27	28	35	27	41	32	35	36	23	31	41	26	30
Mathematics and computer sciences	868	849	829	899	1,012	1,261	1,579	1,628	1,720	1,592	1,510	1,531	1,689	1,872	1,976	1,989
Computer sciences	375	373	340	403	455	621	865	917	1,029	844	779	790	871	960	1,060	1,087
Mathematics and statistics	493	476	489	496	557	640	714	711	691	748	731	741	818	912	916	902
Medical and other health sciences	484	522	538	445	541	623	673	704	713	634	526	569	670	644	664	676
Medical sciences	278	282	314	273	355	409	436	431	410	406	364	389	468	474	492	488
Other health sciences	206	240	224	172	186	214	237	273	303	228	162	180	202	170	172	188
Physical sciences	1,296	1,290	1,203	1,318	1,376	1,584	1,803	1,943	1,898	1,930	1,837	1,908	1,880	1,929	2,124	1,997
Astronomy	25	25	17	22	26	42	41	39	46	45	41	58	46	54	48	35
Chemistry	754	751	682	784	784	860	1,041	1,142	1,081	1,066	1,022	1,093	1,046	1,077	1,218	1,119
Physics	500	492	492	498	557	669	706	746	753	799	762	742	767	770	817	812
Other physical sciences	17	22	12	14	9	13	15	16	18	20	12	15	21	28	41	31
Social and behavioral sciences	1,216	1,313	1,206	1,395	1,358	1,591	1,613	1,689	1,738	1,867	1,728	1,710	1,784	1,726	1,761	1,811

## CHAPTER 2 | Higher Education in Science and Engineering

Citizenship, field, race, and ethnicity	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Psychology	158	157	143	199	198	229	254	246	241	276	272	258	251	263	254	272
Social sciences	1,058	1,156	1,063	1,196	1,160	1,362	1,359	1,443	1,497	1,591	1,456	1,452	1,533	1,463	1,507	1,539
Anthropology	62	72	78	67	71	67	55	86	75	96	90	91	95	87	99	88
Area and ethnic studies	32	36	29	27	36	30	33	24	56	48	46	43	54	32	51	46
Economics	527	594	542	590	582	743	686	738	734	764	661	696	733	692	712	717
History of science	5	1	4	3	6	7	6	11	5	7	6	3	7	5	12	12
Linguistics	97	93	68	99	89	77	102	96	101	95	85	89	110	106	101	111
Political science and public administration	163	188	171	228	192	243	271	282	282	325	345	301	316	326	303	338
Sociology	92	77	73	106	104	98	108	114	117	136	108	116	99	109	112	110
Other social sciences	80	95	98	76	80	97	98	92	127	120	115	113	119	106	117	117
Non-S&E	2,373	2,249	2,451	2,611	2,910	2,988	3,250	3,302	3,321	3,353	3,041	3,159	3,097	3,300	3,114	3,073

na = not applicable; data were not collected for this detail.

<sup>a</sup> Beginning in 2008, the category includes Hispanic or one or more races.

<sup>b</sup> Pacific Islander includes Native Hawaiian or Other Pacific Islander.

<sup>c</sup> In 2011, the survey required institutions to begin reporting information on more than one race, along with information in the other racial and ethnic categories, but institutions were not required to update the race and ethnicity data of individuals who were already in the system. Therefore, the number reported for more than one race for the years after 2011 is likely to be an undercount.

**Note(s)**

CHAPTER 2 | Higher Education in Science and Engineering

Racial and ethnic breakouts include U.S. citizens and permanent residents only; temporary visa holder includes all racial and ethnic groups. Data in this table differ from doctoral degree data in other tables and figures in this report that are based on the National Science Foundation (NSF) Survey of Earned Doctorates and that refer to research doctorates only. The greatest differences are in psychology, education, and medical and other health sciences. Before 2008, the National Center for Education Statistics (NCES) used two doctoral degree categories (doctor's and first-professional). Data in this table for those years include only the doctor's category. In 2008 and 2009, NCES allowed optional reporting in three new doctoral degree categories (doctor's — research/scholarship, doctor's — professional practice, and doctor's — other) in addition to the doctor's category. For those 2 years, data in this table include only doctorates reported in the doctor's category plus those reported in doctor's — research/ scholarship. In 2010, NCES required institutions to use only the three new doctoral degree categories, and data in this table for 2010 and later include only doctorates reported in the category doctor's — research/ scholarship. This change primarily affects data for other health sciences.

Source(s)

NCES, Integrated Postsecondary Education Data System (IPEDS), Completions Survey; NSF, National Center for Science and Engineering Statistics, Integrated Science and Engineering Resources Data System (WebCASPAR), <https://ncesdata.nsf.gov/webcaspar/>.  
*Science and Engineering Indicators 2018*

## CHAPTER 2 | Higher Education in Science and Engineering

APPENDIX TABLE 2-33



### Expenditures on tertiary education institutions as a percentage of GDP: 2005, 2008, and 2010–13

(Percentage of GDP)

Country	2005	2008	2010	2011	2012	2013
OECD countries						
Australia	1.5	1.5	1.6	1.6	1.6	1.7
Austria	NA	NA	NA	NA	1.8	1.7
Belgium	1.2	1.3	1.3	1.3	1.4	1.4
Canada	2.3	2.4	2.7	2.5	2.5	NA
Chile	2.0	2.1	2.6	2.6	NA	2.4
Czech Republic	1.0	1.1	1.2	1.4	1.4	1.3
Denmark	1.7	1.6	1.8	1.9	NA	1.7
Estonia	1.1	1.3	1.6	1.7	1.6	2.0
Finland	1.7	1.6	1.8	1.9	1.8	1.8
France	1.3	1.4	1.5	1.5	1.4	1.5
Germany	1.0	1.1	1.2	1.2	1.2	1.2
Greece	1.5	NA	NA	NA	NA	NA
Hungary	1.1	NA	NA	NA	1.2	1.3
Iceland	1.2	1.2	1.2	1.1	1.3	1.3
Ireland	1.1	1.4	1.5	1.4	1.4	1.2
Israel	1.8	1.5	1.5	1.6	1.6	1.7
Italy	0.8	0.9	1.0	1.0	0.9	1.0
Japan	1.4	1.5	1.5	1.6	1.5	1.6
South Korea	2.1	2.4	2.4	2.4	2.3	2.3
Latvia	NA	NA	NA	NA	1.4	1.4
Luxembourg	NA	NA	NA	NA	0.4	0.5
Mexico	1.2	1.2	1.4	1.3	1.3	1.3
Netherlands	1.5	1.4	1.6	1.6	1.7	1.7
New Zealand	NA	NA	NA	NA	1.9	1.8



## CHAPTER 2 | Higher Education in Science and Engineering

Country	2005	2008	2010	2011	2012	2013
Norway	NA	1.6	1.7	1.6	1.6	1.6
Poland	1.6	1.2	1.5	1.3	1.3	1.4
Portugal	1.3	1.3	1.4	1.3	1.3	1.4
Slovakia	0.9	0.9	0.9	1.0	1.0	1.1
Slovenia	1.3	1.1	1.2	1.3	1.2	1.2
Spain	1.1	1.2	1.3	1.3	1.3	1.3
Sweden	1.5	1.5	1.7	1.7	1.7	1.7
Switzerland	1.3	1.1	1.2	1.2	1.2	1.2
Turkey	NA	NA	NA	NA	1.4	1.7
United Kingdom	NA	NA	NA	NA	1.8	1.8
United States	2.3	2.5	2.6	2.7	2.7	2.6
OECD average	1.4	1.5	1.6	1.6	1.5	1.5
EU22 average <sup>a</sup>	1.2	1.3	1.4	1.4	1.4	1.4
OECD partner countries						
Argentina	NA	NA	NA	NA	NA	1.1
Brazil	0.7	0.8	0.9	0.9	0.8	0.9
China	NA	NA	NA	NA	NA	NA
Colombia	NA	NA	NA	NA	1.9	2.2
Costa Rica	NA	NA	NA	NA	NA	2.6
India	NA	NA	NA	NA	NA	NA
Indonesia	NA	NA	NA	NA	0.8	0.5
Lithuania	NA	NA	NA	NA	NA	1.7
Russia	0.8	1.5	1.6	1.4	1.4	1.4
Saudi Arabia	NA	NA	NA	NA	NA	NA
South Africa	NA	NA	NA	NA	NA	NA

NA = not available.

EU = European Union; GDP = gross domestic product; OECD = Organisation for Economic Co-operation and Development.

## CHAPTER 2 | Higher Education in Science and Engineering

<sup>a</sup> EU22 average is the unweighted mean of the data value of the 22 countries that are members of the EU and OECD for which data are available or can be estimated. These 22 countries are Austria, Belgium, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Luxembourg, Netherlands, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, and United Kingdom

### Note(s)

Data include public and private sources. Data for Brazil, Hungary, Indonesia, Norway, Switzerland, and Turkey are for public expenditures only.

### Source(s)

OECD, *Education at a Glance 2016: OECD Indicators*, Indicator B2, table B2.2, <https://www.oecd.org/education/skills-beyond-school/education-at-a-glance-2016-indicators.htm>, accessed 7 October 2016.

*Science and Engineering Indicators 2018*

## CHAPTER 2 | Higher Education in Science and Engineering

APPENDIX TABLE 2-34

### First university degrees, by selected region, country, or economy: 2014 or most recent year

(Number)

Region, country, or economy	Field of first university degree								S&E (%)	Natural sciences (%)	Engineering (%)
	All fields	All S&E fields	Physical and biological sciences and mathematics and statistics	Computer sciences	Agricultural sciences	Social and behavioral sciences	Engineering	Non-S&E <sup>a</sup>			
Asia <sup>b</sup>											
Armenia (2015)	19,702	7,833	1,659	499	671	4,177	827	11,869	39.8	14.4	4.2
Cambodia (2008)	16,435	5,250	441	1,122	312	2,850	525	11,185	31.9	11.4	3.2
China <sup>c</sup>	3,413,787	1,653,565	255,304	NA	59,796	206,239	1,132,226	1,760,222	48.4	9.2	33.2
Georgia	15,516	1,409	NA	NA	321	NA	1,088	14,107	9.1	2.1	7.0
India <sup>d</sup>	6,294,907	1,877,421	849,258	182,261	29,265	NA	816,637	4,417,486	29.8	16.9	13.0
Indonesia (2012)	604,435	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Japan <sup>e</sup>	565,573	315,812	17,828	NA	17,326	193,974	86,684	249,761	55.8	6.2	15.3
Kyrgyzstan	39,933	8,155	NA	NA	385	NA	7,770	31,778	20.4	1.0	19.5
Malaysia (2015)	98,055	42,857	7,187	3,158	1,428	13,689	17,395	55,198	43.7	12.0	17.7
Mongolia	29,477	4,878	NA	NA	784	NA	4,094	24,599	16.5	2.7	13.9
Myanmar (2011)	118,066	55,284	39,095	1,411	752	11,718	2,308	62,782	46.8	34.9	2.0
Singapore <sup>f</sup>	15,041	7,107	1,889	997	NA	NA	4,221	7,934	47.3	19.2	28.1

## CHAPTER 2 | Higher Education in Science and Engineering

Region, country, or economy	Field of first university degree								S&E (%)	Natural sciences (%)	Engineering (%)
	All fields	All S&E fields	Physical and biological sciences and mathematics and statistics	Computer sciences	Agricultural sciences	Social and behavioral sciences	Engineering	Non-S&E <sup>a</sup>			
South Korea	329,444	134,761	20,224	11,584	4,473	20,596	77,884	194,683	40.9	11.0	23.6
Taiwan	228,762	83,394	9,408	13,694	4,756	7,538	47,998	145,368	36.5	12.2	21.0
Middle East <sup>b</sup>											
Iran (2015)	450,153	245,453	30,021	35,679	15,088	23,946	140,719	204,700	54.5	17.9	31.3
Israel	50,861	23,786	2,019	1,883	298	13,173	6,414	27,075	46.8	8.3	12.6
Jordan (2011)	55,278	9,638	952	2,850	1,800	2,091	1,945	45,640	17.4	10.1	3.5
Lebanon (2011)	25,926	9,436	2,635	619	152	3,003	3,027	16,490	36.4	13.1	11.7
Palestine (2015)	29,905	8,246	1,140	1,187	245	3,008	2,666	21,659	27.6	8.6	8.9
Qatar	1,662	268	NA	NA	NA	NA	268	1,394	16.1	NA	16.1
Saudi Arabia (2015)	133,833	41,389	15,264	5,663	320	14,195	5,947	92,444	30.9	15.9	4.4
United Arab Emirates (2015)	16,934	6,135	273	1,068	42	2,101	2,651	10,799	36.2	8.2	15.7
Africa <sup>b</sup>											
Egypt (2013)	413,495	45,948	NA	NA	10,000	NA	35,948	367,547	11.1	2.4	8.7
Ethiopia (2012)	79,677	35,763	7,101	13,181	3,227	12,045	209	43,914	44.9	29.5	0.3
Ghana (2013)	44,246	4,442	NA	NA	1,505	NA	2,937	39,804	10.0	3.4	6.6
Madagascar	9,926	872	NA	NA	217	NA	655	9,054	8.8	2.2	6.6

## CHAPTER 2 | Higher Education in Science and Engineering

Region, country, or economy	Field of first university degree								S&E (%)	Natural sciences (%)	Engineering (%)
	All fields	All S&E fields	Physical and biological sciences and mathematics and statistics	Computer sciences	Agricultural sciences	Social and behavioral sciences	Engineering	Non-S&E <sup>a</sup>			
Mozambique (2010)	1,022	129	NA	NA	67	NA	62	893	12.6	6.6	6.1
South Africa	85,203	32,208	7,600	2,670	1,676	13,156	7,106	52,995	38	14	8
Sudan (2012)	71,430	17,393	2,276	3,531	3,268	2,863	5,455	54,037	24.3	12.7	7.6
Europe <sup>b</sup>											
EU											
Austria	37,254	14,285	2,412	1,467	376	5,050	4,981	22,968	38.3	11.4	13.4
Belgium	61,356	18,109	1,556	1,280	1,536	6,372	7,365	43,247	29.5	7.1	12.0
Bulgaria	40,022	15,863	712	1,146	654	6,468	6,883	24,159	39.6	6.3	17.2
Croatia	21,661	6,900	890	703	882	1,416	3,009	14,761	31.9	11.4	13.9
Cyprus	3,677	1,232	146	147	29	312	598	2,445	33.5	8.8	16.3
Czech Republic	59,735	19,955	3,665	2,716	1,818	4,730	7,026	39,780	33.4	13.7	11.8
Denmark	41,234	10,416	1,356	1,537	409	3,031	4,083	30,818	25.3	8.0	9.9
Estonia	7,398	2,450	309	371	130	536	1,104	4,948	33.1	10.9	14.9
Finland	35,061	11,679	786	1,151	714	1,671	7,357	23,382	33.3	7.6	21.0
France	327,823	115,039	21,476	12,123	3,754	33,196	44,490	212,784	35.1	11.4	13.6
Germany	374,904	156,600	29,659	15,695	7,440	22,756	81,051	218,304	41.8	14.1	21.6

## CHAPTER 2 | Higher Education in Science and Engineering

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## CHAPTER 2 | Higher Education in Science and Engineering

Region, country, or economy	Field of first university degree								S&E (%)	Natural sciences (%)	Engineering (%)
	All fields	All S&E fields	Physical and biological sciences and mathematics and statistics	Computer sciences	Agricultural sciences	Social and behavioral sciences	Engineering	Non-S&E <sup>a</sup>			
United Kingdom	444,152	180,340	72,818	17,843	4,011	48,579	37,089	263,812	40.6	21.3	8.4
Other Europe											
Albania (2015)	20,401	6,140	1,119	1,149	958	1,294	1,620	14,261	30.1	15.8	7.9
Iceland (2012)	2,828	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Macedonia	9,863	2,980	252	715	235	547	1,231	6,883	30.2	12.2	12.5
Norway	33,297	8,353	827	1,137	198	3,054	3,137	24,944	25.1	6.5	9.4
Russia (2012)	1,406,050	445,011	22,913	63,072	21,093	92,818	245,115	961,039	31.6	7.6	17.4
Switzerland	52,405	15,922	1,898	1,336	770	3,033	8,885	36,483	30.4	7.6	17.0
Turkey	399,049	128,672	28,154	917	8,050	47,834	43,717	270,377	32.2	9.3	11.0
Ukraine (2015)	121,182	32,536	2,323	1,449	2,673	7,687	18,404	88,646	26.8	5.3	15.2
America <sup>b</sup>											
North America											
Canada (2013)	193,455	76,938	21,025	3,740	1,092	35,611	15,470	116,517	39.8	13.4	8.0
Mexico (2013)	450,922	180,755	12,768	12,557	8,895	46,204	100,331	270,167	40.1	7.6	22.3
United States	1,890,941	741,763	177,001	61,285	19,621	364,358	119,498	1,149,178	39.2	13.6	6.3

## CHAPTER 2 | Higher Education in Science and Engineering

Region, country, or economy	Field of first university degree								S&E (%)	Natural sciences (%)	Engineering (%)
	All fields	All S&E fields	Physical and biological sciences and mathematics and statistics	Computer sciences	Agricultural sciences	Social and behavioral sciences	Engineering	Non-S&E <sup>a</sup>			
Central America and Caribbean											
Costa Rica (2015)	41,546	8,834	335	2,020	427	2,848	3,204	32,712	21.3	6.7	7.7
Cuba	70,341	4,076	NA	NA	1,923	NA	2,153	66,265	5.8	2.7	3.1
Guatemala (2007)	3,751	1,808	118	*	307	531	852	1,943	48.2	11.3	22.7
El Salvador	12,492	2,331	NA	NA	191	NA	2,140	10,161	18.7	1.5	17.1
Honduras (2013)	15,319	2,693	NA	NA	586	NA	2,107	12,626	17.6	3.8	13.8
Panama (2013)	15,184	1,747	NA	NA	102	NA	1,645	13,437	11.5	0.7	10.8
South America											
Argentina	76,413	7,959	4,686	NA	3,273	NA	NA	68,454	10.4	10.4	NA
Brazil (2012)	861,378	165,079	20,567	19,536	16,752	47,012	61,212	696,299	19.2	6.6	7.1
Chile	37,286	11,988	207	2,860	438	1,887	6,596	25,298	32.2	9.4	17.7
Colombia (2014)	167,897	40,932	NA	NA	2,384	NA	38,548	126,965	24.4	1.4	23.0



## CHAPTER 2 | Higher Education in Science and Engineering

Region, country, or economy	Field of first university degree								S&E (%)	Natural sciences (%)	Engineering (%)
	All fields	All S&E fields	Physical and biological sciences and mathematics and statistics	Computer sciences	Agricultural sciences	Social and behavioral sciences	Engineering	Non-S&E <sup>a</sup>			
Uruguay (2010)	6,895	2,377	302	243	326	938	568	4,518	34.5	12.6	8.2
Venezuela (2009)	98,035	24,151	856	452	1,409	5,816	15,618	73,884	24.6	2.8	15.9
Oceania <sup>b</sup>											
Australia	239,223	65,744	14,855	9,515	1,403	18,909	21,062	173,479	27.5	10.8	8.8
New Zealand	34,992	11,306	2,642	1,802	344	3,704	2,814	23,686	32.3	13.7	8.0

\* = nil or negligible; NA = not available.

EU = European Union.

<sup>a</sup> Includes field unknown or unspecified.

<sup>b</sup> Includes only locations for which relatively recent data are available.

<sup>c</sup> China data include computer sciences under engineering.

<sup>d</sup> India data include social sciences in humanities and arts (non-S&E).

<sup>e</sup> In data for Japan, mathematics are included in natural sciences, computer sciences are included in engineering, and business administration is included in social science. Japan data include thesis doctorates, called *ronbun hakase*, earned by employees in industry.

<sup>f</sup> Singapore data include social sciences in humanities (non-S&E).

### Note(s)

## CHAPTER 2 | Higher Education in Science and Engineering

Physical and biological sciences and mathematics and statistics include biological and related sciences, environmental sciences, and physical sciences. Computer sciences include information and communication technologies. Agricultural sciences include agriculture, forestry, fisheries, and veterinary sciences. Social and behavioral sciences include social and behavioral sciences, and journalism and information. Engineering includes engineering and engineering trades, manufacturing and processing, and architecture and construction. To facilitate international comparison, data for the United States reflect the most recent classification in the International Standard Classification of Education Fields of Education and Training (ISCED-F), which varies slightly from the National Science Foundation classification of fields presented in other sections of the chapter. Data for first university degrees use ISCED 2011 level 6 (bachelor's or equivalent first degrees) and level 7 (master's or equivalent long first degrees). S&E data do not include health fields.

### Source(s)

United Nations Educational, Scientific and Cultural Organization (UNESCO) Institute for Statistics database, special tabulations (2016); Organisation for Economic Co-operation and Development (OECD), OECD.Stat, <https://stats.oecd.org/>; National Bureau of Statistics of China, *China Statistical Yearbook* (Beijing) (2015); Government of India, Ministry of Human Resource Development, Department of Higher Education, All India Survey on Higher Education 2014–15 (2016); Government of Japan, Ministry of Education, Culture, Sports, Science and Technology, Survey of Education (2016); Government of Singapore, Ministry of Education, *Education Statistics Digest: 2015*; Ministry of Education, *Educational Statistics of the Republic of China (Taiwan): 2015* (2016); National Center for Education Statistics, Integrated Postsecondary Education Data System (IPEDS), Completions Survey; National Science Foundation, National Center for Science and Engineering Statistics, Integrated Science and Engineering Resources Data System (WebCASPAR), <https://ncesdata.nsf.gov/webcaspar/>.

*Science and Engineering Indicators 2018*

## CHAPTER 2 | Higher Education in Science and Engineering

APPENDIX TABLE 2-35

### S&E first university degrees, by selected Western or Asian country or economy and field: 2000–14

(Number)

Country or economy and field	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Australia															
All fields	129,499	137,877	152,287	130,298	NA	172,818	176,136	177,155	181,457	191,080	196,662	210,638	NA	236,792	239,223
S&E fields	37,064	42,598	47,337	44,521	NA	53,129	51,826	50,029	48,736	48,947	15,564	53,903	NA	63,884	65,744
Physical and biological sciences and mathematics and statistics	9,502	9,173	9,040	10,059	NA	11,355	12,284	12,236	12,257	12,070	NA	12,953	NA	13,766	14,855
Computer sciences	6,896	11,075	14,953	11,904	NA	13,691	10,737	9,210	7,808	7,211	NA	7,308	NA	9,270	9,515
Agricultural sciences	1,666	1,432	1,534	1,503	NA	1,501	1,523	1,448	1,480	1,513	1,522	1,519	NA	1,415	1,403
Social/ behavioral sciences	8,562	9,251	9,673	11,012	NA	14,248	14,619	14,646	14,301	14,907	NA	17,156	NA	18,627	18,909
Engineering	10,438	11,667	12,137	10,043	NA	12,334	12,663	12,489	12,890	13,246	14,042	14,967	NA	20,805	21,062
Canada															
All fields	127,131	NA	NA	NA	137,296	149,910	176,910	160,428	181,580	178,673	178,827	173,021	168,183	193,455	NA
S&E fields	54,029	NA	NA	NA	53,818	60,600	59,937	63,735	72,796	70,474	69,112	67,218	67,338	76,938	NA
Physical and biological sciences and mathematics and statistics	12,120	NA	NA	NA	11,699	11,967	12,138	16,626	19,669	19,176	18,708	18,333	18,429	21,025	NA
Computer sciences	3,657	NA	NA	NA	5,462	6,678	5,565	4,932	3,908	3,512	3,592	3,136	3,221	3,740	NA
Agricultural sciences	1,529	NA	NA	NA	1,609	1,152	1,332	1,206	1,264	1,197	1,194	1,020	930	1,092	NA
Social/ behavioral sciences	27,046	NA	NA	NA	24,390	28,491	28,533	28,662	34,352	33,051	32,337	32,096	31,481	35,611	NA

## CHAPTER 2 | Higher Education in Science and Engineering

[illegible]

## CHAPTER 2 | Higher Education in Science and Engineering

Country or economy and field	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
All fields	169,642	164,862	166,627	172,624	183,384	197,770	212,008	233,317	253,541	281,136	293,984	365,729	365,192	NA	374,904
S&E fields	NA	NA	NA	NA	NA	78,470	NA	NA	124,465	134,781	144,724	152,872	155,223	NA	156,600
Physical and biological sciences and mathematics and statistics	NA	NA	NA	NA	NA	16,358	NA	NA	34,751	39,573	41,441	43,267	41,630	NA	29,659
Computer sciences	NA	NA	NA	NA	NA	12,199	NA	NA	16,186	16,932	16,560	16,276	16,312	NA	15,695
Agricultural sciences	NA	NA	NA	NA	NA	3,192	NA	NA	3,694	3,888	3,836	4,396	4,266	NA	7,440
Social/ behavioral sciences	NA	NA	NA	NA	NA	13,356	NA	NA	29,705	30,224	33,876	34,671	34,368	NA	22,756
Engineering	NA	NA	NA	NA	NA	33,365	NA	NA	40,129	44,164	49,011	54,262	58,647	NA	81,051
Italy															
All fields	159,276	171,806	201,019	231,968	264,574	291,304	273,451	251,155	231,084	222,631	211,770	216,509	213,013	221,907	225,599
S&E fields	62,075	65,964	76,848	91,899	108,879	122,124	115,346	102,942	91,827	89,220	85,224	84,737	NA	82,834	85,799
Physical and biological sciences and mathematics and statistics	11,865	12,622	13,603	14,951	16,750	16,957	15,569	13,455	12,991	13,095	13,094	13,237	NA	13,061	13,234
Computer sciences	1,626	1,519	2,423	2,843	3,211	3,459	3,541	3,385	2,933	2,870	2,778	2,420	NA	2,247	2,240
Agricultural sciences	2,729	3,117	4,083	4,682	4,760	4,968	4,804	4,744	4,286	4,332	3,989	4,133	NA	4,365	4,843
Social/ behavioral sciences	17,082	18,541	21,377	27,434	38,259	47,616	47,003	42,230	36,664	34,654	32,644	32,118	NA	29,354	30,631
Engineering	28,773	30,165	35,362	41,989	45,899	49,124	44,429	39,128	34,953	34,269	32,719	32,829	NA	33,807	34,851
Japan <sup>b</sup>															
All fields	538,683	545,512	547,711	544,894	548,897	551,016	558,184	559,090	555,690	559,539	541,428	541,428	558,692	558,853	565,573
S&E fields	353,465	359,019	357,282	352,088	351,299	349,015	350,137	344,990	336,815	333,553	321,168	325,365	319,783	316,730	315,812

## CHAPTER 2 | Higher Education in Science and Engineering

Country or economy and field	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Physical and biological sciences and mathematics and statistics	13,300	14,192	19,369	19,549	19,727	19,260	19,805	19,536	19,094	18,790	18,413	18,297	18,116	18,063	17,828
Computer sciences	4,941	4,965	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Agricultural sciences	15,562	14,084	16,393	15,933	15,865	16,015	16,019	16,122	16,113	16,797	17,071	17,235	17,388	17,330	17,326
Social/ behavioral sciences	216,506	221,300	217,838	215,205	217,276	215,809	217,638	213,179	206,392	204,282	196,061	199,784	196,735	195,024	193,974
Engineering	103,156	104,478	103,682	101,401	98,431	97,931	96,675	96,153	95,216	93,684	89,623	90,049	87,544	86,313	86,684
Mexico															
All fields	NA	296,485	NA	280,589	276,690	309,266	339,340	343,328	336,810	362,241	372,997	402,476	425,754	450,922	NA
S&E fields	NA	101,635	NA	99,134	NA	121,523	131,743	136,777	130,418	143,152	145,876	159,873	170,472	180,755	NA
Physical and biological sciences and mathematics and statistics	NA	7,252	NA	7,610	NA	9,308	10,261	10,684	11,033	11,682	11,668	11,601	12,745	12,768	NA
Computer sciences	NA	21,305	NA	24,221	NA	27,702	28,844	27,612	26,354	25,604	12,392	12,621	12,676	12,557	NA
Agricultural sciences	NA	5,873	NA	5,978	NA	6,169	6,806	6,764	6,454	7,645	6,656	6,794	8,008	8,895	NA
Social/ behavioral sciences	NA	26,203	NA	14,211	NA	31,016	33,577	38,935	33,751	41,688	43,712	44,621	46,651	46,204	NA
Engineering	NA	41,002	NA	47,114	NA	47,328	52,255	52,782	52,826	56,533	71,448	84,236	90,392	100,331	NA
Netherlands															
All fields	69,809	71,237	75,145	82,425	84,194	90,033	94,600	92,844	89,331	90,445	91,389	93,582	102,042	92,323	93,306
S&E fields	19,219	19,393	20,391	21,027	22,643	25,416	28,541	25,829	23,192	22,502	22,642	23,444	26,414	24,570	25,531
Physical and biological sciences and mathematics and statistics	2,464	2,295	2,467	2,523	2,376	2,517	1,539	1,416	1,318	1,312	1,344	1,566	1,731	1,762	1,887

## CHAPTER 2 | Higher Education in Science and Engineering

Country or economy and field	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Computer sciences	1,108	1,303	1,478	1,620	3,511	3,902	4,617	4,385	4,078	3,918	3,843	3,626	3,994	3,520	3,802
Agricultural sciences	1,561	1,636	1,535	1,640	1,865	1,864	1,234	1,239	1,080	1,058	1,275	1,086	1,026	979	1,062
Social/ behavioral sciences	6,337	6,278	6,544	7,014	8,028	10,172	13,497	11,598	9,849	9,207	9,116	9,777	11,322	10,554	10,978
Engineering	7,749	7,881	8,367	8,230	6,863	6,961	7,654	7,191	6,867	7,007	7,064	7,389	8,341	7,755	7,802
Poland															
All fields	207,791	240,976	260,953	269,861	278,509	287,607	293,045	309,526	321,762	327,241	355,220	359,564	318,912	282,071	256,910
S&E fields	67,689	78,951	85,486	90,170	93,268	96,922	110,568	119,826	120,927	119,857	128,991	131,298	112,374	99,525	92,899
Physical and biological sciences and mathematics and statistics	7,783	8,905	9,801	9,363	8,483	8,720	14,394	15,054	15,382	14,800	17,344	15,544	13,016	11,772	10,534
Computer sciences	1,912	3,542	4,112	5,879	10,681	13,116	14,788	14,209	13,023	12,406	12,535	12,315	10,873	9,534	8,636
Agricultural sciences	4,928	5,359	5,740	5,354	5,323	5,668	5,821	6,934	6,994	6,695	7,524	6,437	4,977	4,562	4,037
Social/ behavioral sciences	28,068	34,602	37,212	38,873	39,506	40,298	41,489	46,535	49,849	50,857	53,216	49,852	40,574	34,509	29,672
Engineering	24,998	26,543	28,621	30,701	29,275	29,120	34,076	37,094	35,679	35,099	38,372	47,150	42,934	39,148	40,020
Romania															
All fields	61,329	66,644	79,497	88,005	97,629	97,649	101,143	115,327	232,310	214,617	191,151	171,175	NA	105,068	90,406
S&E fields	20,038	21,472	26,068	29,020	31,070	33,513	34,013	35,910	81,278	90,828	69,751	59,516	NA	46,475	40,877
Physical and biological sciences and mathematics and statistics	3,895	3,883	4,518	4,763	4,679	4,682	4,642	6,948	10,947	6,513	5,909	5,289	NA	3,923	3,772
Computer sciences	NA	NA	NA	NA	NA	NA	NA	NA	4,553	2,845	2,097	2,001	NA	1,543	1,455
Agricultural sciences	1,588	2,112	2,356	2,106	2,195	2,273	2,495	2,927	2,499	4,461	2,894	2,204	NA	2,173	1,907

## CHAPTER 2 | Higher Education in Science and Engineering

Country or economy and field	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Social/ behavioral sciences	3,836	4,136	6,523	6,875	8,493	9,643	9,902	9,562	43,134	35,326	33,607	28,014	NA	15,003	13,046
Engineering	10,719	11,341	12,671	15,276	15,703	16,915	16,974	16,473	20,145	41,683	25,244	22,008	NA	23,833	20,697
South Korea															
All fields	214,498	239,702	244,852	258,126	267,058	268,833	270,546	277,858	315,204	308,162	NA	321,798	325,665	325,113	329,444
S&E fields	99,352	113,988	116,324	119,104	124,479	123,440	120,612	121,293	134,850	128,788	NA	135,113	133,996	134,627	134,761
Physical and biological sciences and mathematics and statistics	18,096	19,537	17,760	22,232	20,646	19,209	19,039	19,255	19,726	19,902	NA	20,566	20,037	19,703	20,224
Computer sciences	4,630	8,888	8,695	4,934	9,452	9,378	10,519	11,593	13,700	12,306	NA	11,990	12,405	12,436	11,584
Agricultural sciences	6,479	6,210	6,160	2,530	3,520	4,753	4,437	4,215	4,854	4,354	NA	4,419	4,405	4,475	4,473
Social/ behavioral sciences	13,639	17,037	18,767	18,908	20,487	19,298	18,016	18,247	19,332	18,456	NA	20,139	20,641	20,583	20,596
Engineering	56,508	62,316	64,942	70,500	70,374	70,802	68,601	67,983	77,238	73,770	NA	77,999	76,508	77,430	77,884
Spain															
All fields	207,578	211,349	211,979	209,373	202,435	195,946	192,178	185,151	187,420	193,523	197,890	220,221	208,961	NA	235,672
S&E fields	71,842	76,628	76,744	76,313	72,985	70,684	68,432	66,297	64,815	67,114	68,021	77,137	75,110	NA	82,719
Physical and biological sciences and mathematics and statistics	13,772	13,631	12,850	11,957	10,849	9,950	9,206	8,289	8,186	7,612	7,575	8,988	9,545	NA	11,366
Computer sciences	6,146	7,280	6,909	7,519	7,952	8,488	9,205	9,178	8,775	9,031	8,831	7,407	7,768	NA	6,957
Agricultural sciences	6,073	5,746	6,098	6,193	5,592	5,459	4,544	4,330	4,006	4,170	4,122	3,587	3,741	NA	3,824
Social/ behavioral sciences	18,670	19,677	20,093	18,500	17,804	17,925	16,948	16,117	15,668	15,953	16,358	16,303	18,195	NA	21,588
Engineering	27,181	30,294	30,794	32,144	30,788	28,862	28,529	28,383	28,180	30,348	31,135	40,852	35,861	NA	38,984



## CHAPTER 2 | Higher Education in Science and Engineering

Country or economy and field	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Taiwan															
All fields	100,171	117,430	146,166	176,044	192,854	210,763	219,919	228,645	230,198	227,885	227,174	228,878	232,448	226,799	228,762
S&E fields	39,804	48,624	61,540	72,540	79,283	85,891	89,741	92,167	92,636	88,859	88,294	88,102	88,578	84,597	83,394
Physical and biological sciences and mathematics and statistics	6,100	6,211	6,718	7,106	7,283	7,917	8,357	8,986	9,592	9,830	9,864	9,852	10,106	9,882	9,408
Computer sciences	5,391	6,864	9,516	12,979	15,813	18,320	20,292	15,848	15,861	14,680	14,489	14,012	14,447	13,884	13,694
Agricultural sciences	3,259	3,200	3,583	4,016	5,074	5,024	4,988	4,253	4,455	4,349	4,154	4,437	4,529	4,759	4,756
Social/ behavioral sciences	5,489	5,762	6,277	6,492	7,002	7,760	7,971	7,005	6,938	7,320	7,322	7,722	7,607	7,557	7,538
Engineering	19,565	26,587	35,446	41,947	44,111	46,870	48,133	56,075	55,790	52,680	52,465	52,079	51,889	48,515	47,998
Turkey															
All fields	118,882	142,275	168,923	180,513	145,884	150,421	203,108	223,559	245,140	261,582	289,013	284,459	340,396	NA	399,049
S&E fields	51,875	36,517	37,290	36,677	57,428	59,206	75,109	82,341	95,449	103,285	108,861	84,061	99,415	NA	128,672
Physical and biological sciences and mathematics and statistics	12,247	13,797	13,683	13,298	13,152	13,411	14,492	16,877	19,094	20,138	18,035	22,568	26,876	NA	28,154
Computer sciences	773	987	1,281	1,402	1,727	1,970	1,958	2,201	2,468	2,972	3,057	3,037	3,379	NA	917
Agricultural sciences	5,759	5,764	6,159	5,496	5,118	5,209	5,472	5,699	6,197	7,199	6,016	5,772	7,014	NA	8,050
Social/ behavioral sciences	17,503	NA	NA	NA	20,430	20,509	34,863	37,680	45,071	48,860	57,485	28,423	34,618	NA	47,834
Engineering	15,593	15,969	16,167	16,481	17,001	18,107	18,324	19,884	22,619	24,116	24,268	24,261	27,528	NA	43,717
United Kingdom															
All fields	269,841	277,678	279,788	287,506	292,092	306,363	315,934	319,260	334,785	333,721	350,179	367,875	389,296	402,682	444,152

## CHAPTER 2 | Higher Education in Science and Engineering

Country or economy and field	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
S&E fields	108,406	119,491	119,843	122,518	122,791	126,100	128,299	126,934	130,922	129,813	135,845	143,176	150,556	160,363	180,340
Physical and biological sciences and mathematics and statistics	37,966	42,743	41,143	42,621	32,966	33,564	34,039	34,764	36,582	37,574	39,140	41,731	44,119	63,771	72,818
Computer sciences	11,390	14,635	16,310	19,250	20,177	20,096	18,839	16,446	14,909	14,033	14,202	14,335	15,089	15,497	17,843
Agricultural sciences	2,942	3,266	3,319	2,804	3,073	2,915	2,821	2,826	3,034	2,994	3,039	3,375	3,474	3,621	4,011
Social/ behavioral sciences	28,500	27,944	28,639	30,112	40,303	43,638	45,743	45,656	47,657	45,788	47,551	50,648	54,343	43,021	48,579
Engineering	27,608	30,902	30,432	27,730	26,271	25,886	26,856	27,242	28,739	29,424	31,914	33,087	33,531	34,453	37,089
United States															
All fields	1,254,618	1,260,308	1,308,970	1,365,694	1,417,421	1,456,401	1,502,922	1,541,704	1,580,413	1,619,028	1,668,227	1,734,229	1,810,647	1,861,034	1,890,941
S&E fields	483,764	487,352	508,262	538,335	555,607	568,431	578,118	586,149	598,470	608,959	630,254	659,840	693,961	719,695	741,763
Physical and biological sciences and mathematics and statistics	105,332	101,055	101,573	103,569	105,431	110,340	117,404	124,561	129,461	133,574	140,275	148,329	160,278	169,810	177,001
Computer sciences	38,874	44,870	51,040	59,978	62,072	57,217	51,085	46,333	43,749	43,732	45,021	48,599	53,081	56,726	61,285
Agricultural sciences	16,534	16,146	16,095	15,902	15,569	15,915	15,682	15,755	16,119	16,615	16,618	17,143	17,701	18,512	19,621
Social/ behavioral sciences	239,964	242,605	254,769	271,181	284,130	294,648	301,572	306,462	314,290	318,988	328,064	341,473	353,099	360,441	364,358
Engineering	83,060	82,676	84,785	87,705	88,405	90,311	92,375	93,038	94,851	96,050	100,276	104,296	109,802	114,206	119,498

NA = not available.

<sup>a</sup> China data include computer sciences under engineering.

<sup>b</sup> Japan data include thesis doctorates, called *ronbun hakase*, earned by employees in industry. In higher education data for Japan, mathematics are included in natural sciences, and computer sciences are included in engineering.

**Note(s)**

CHAPTER 2 | Higher Education in Science and Engineering

Physical and biological sciences and mathematics and statistics include biological and related sciences, environmental sciences, and physical sciences. Computer sciences include information and communication technologies. Agricultural sciences include agriculture, forestry, fisheries, and veterinary sciences. Social and behavioral sciences include social and behavioral sciences, and journalism and information. Engineering includes engineering and engineering trades, manufacturing and processing, and architecture and construction. To facilitate international comparison, data for the United States reflect the most recent classification in the International Standard Classification of Education Fields of Education and Training (ISCED-F), which varies slightly from the National Science Foundation classification of fields presented in other sections of the chapter. Data for first university degrees use ISCED 2011 level 6 (bachelor's or equivalent first degrees) and level 7 (master's or equivalent long first degrees). S&E data do not include health fields.

Source(s)

United Nations Educational, Scientific and Cultural Organization (UNESCO) Institute for Statistics database, special tabulations (2016); Organisation for Economic Co-operation and Development (OECD), OECD.Stat, <https://stats.oecd.org/>; National Bureau of Statistics of China, *China Statistical Yearbook*, annual series (Beijing) (various years); Government of Japan, Ministry of Education, Culture, Sports, Science and Technology, Survey of Education, annual series (various years); Ministry of Education, *Educational Statistics of the Republic of China (Taiwan)*, annual series (various years); National Center for Education Statistics, Integrated Postsecondary Education Data System (IPEDS), Completions Survey; National Science Foundation, National Center for Science and Engineering Statistics, Integrated Science and Engineering Resources Data System (WebCASPAR), <https://ncesdata.nsf.gov/webcaspar/>.  
*Science and Engineering Indicators 2018*

## CHAPTER 2 | Higher Education in Science and Engineering

APPENDIX TABLE 2-36

### First university degrees, by field, sex, and selected region, country, or economy: 2014 or most recent year

(Number)

Sex and region, country, or economy	All fields	All S&E fields	Physical and biological sciences and mathematics and statistics	Computer sciences	Agricultural sciences	Social and behavioral sciences	Engineering	Non-S&E <sup>a</sup>
Male								
Asia								
Armenia (2015)	7,939	4,032	651	397	372	1,907	705	3,907
China <sup>b</sup>	1,662,286	NA	NA	NA	NA	NA	NA	NA
Georgia	5,563	NA	NA	NA	196	NA	778	NA
India <sup>c</sup>	3,086,332	1,104,457	432,586	96,984	22,432	NA	552,455	1,981,875
Indonesia (2012)	312,426	NA	NA	NA	NA	NA	NA	NA
Japan <sup>d</sup>	310,606	224,917	12,979	NA	9,964	125,739	76,235	85,689
Kyrgyzstan	17,422	5,725	NA	NA	263	NA	5,462	11,697
Malaysia (2015)	35,144	19,254	2,682	1,396	526	5,034	9,616	15,890
Mongolia	10,678	2,824	NA	NA	290	NA	2,534	7,854
Myanmar (2011)	41,546	NA	NA	NA	NA	NA	NA	NA
Philippines (2006)	127,492	NA	NA	NA	NA	NA	NA	NA
Singapore <sup>e</sup>	7,511	4,541	786	708	NA	NA	3,047	2,970
South Korea	166,648	88,783	10,369	8,739	2,558	9,547	57,570	77,865
Taiwan	109,490	61,929	5,917	8,881	2,253	3,010	41,868	47,561

## CHAPTER 2 | Higher Education in Science and Engineering

Sex and region, country, or economy	All fields	All S&E fields	Physical and biological sciences and mathematics and statistics	Computer sciences	Agricultural sciences	Social and behavioral sciences	Engineering	Non-S&E <sup>a</sup>
Middle East								
Iran (2015)	235,731	149,332	8,679	18,923	6,965	7,750	107,015	86,399
Israel	20,601	11,666	1,002	1,321	157	4,560	4,627	8,936
Jordan (2011)	26,073	4,031	233	865	465	810	1,658	22,042
Lebanon (2011)	11,373	NA	NA	NA	NA	NA	NA	NA
Palestine (2015)	11,467	3,880	239	574	148	1,218	1,701	7,587
Qatar	459	131	NA	NA	NA	NA	131	328
Saudi Arabia (2015)	58,446	19,241	4,783	2,399	223	6,497	5,339	39,205
United Arab Emirates (2015)	7,162	2,772	71	478	21	551	1,651	4,390
Africa								
Egypt (2013)	204,285	32,110	NA	NA	5,772	NA	26,338	172,175
Ethiopia (2012)	60,576	29,121	6,165	10,602	2,682	9,479	193	31,455
Ghana (2013)	25,187	3,453	NA	NA	1,246	NA	2,207	21,734
Madagascar	5,203	615	NA	NA	113	NA	502	4,588
Mozambique (2010)	585	100	NA	NA	52	NA	48	485
South Africa	33,097	14,141	3,281	1,634	807	3,528	4,891	18,956
Sudan (2012)	32,281	8,385	877	1,647	1,076	1,247	3,538	23,896
Uganda (2004)	5,532	2,299	299	31	317	1,114	538	3,233

## CHAPTER 2 | Higher Education in Science and Engineering

Sex and region, country, or economy	All fields	All S&E fields	Physical and biological sciences and mathematics and statistics	Computer sciences	Agricultural sciences	Social and behavioral sciences	Engineering	Non-S&E <sup>a</sup>
Europe								
EU								
Austria	14,909	7,601	1,110	1,236	134	1,589	3,533	7,308
Belgium	23,939	10,422	880	1,207	663	1,886	5,786	13,517
Bulgaria	16,725	8,150	247	740	325	2,371	4,467	8,575
Croatia	8,689	4,044	344	569	406	570	2,155	4,645
Cyprus	1,593	633	28	93	5	97	410	960
Czech Republic	22,040	10,588	1,160	2,258	777	1,533	4,860	11,452
Denmark	16,039	6,094	627	1,180	62	1,284	2,941	9,945
Estonia	2,523	1,323	116	279	56	145	727	1,200
Finland	13,739	7,882	337	865	302	505	5,873	5,857
France	141,501	64,723	10,678	10,332	1,425	11,525	30,763	76,778
Germany	183,396	107,498	15,312	13,071	4,747	8,003	66,365	75,899
Greece (2012)	11,907	NA	NA	NA	NA	NA	NA	NA
Hungary	15,598	8,049	705	741	430	1,337	4,836	7,549
Ireland (2012)	11,667	NA	NA	NA	NA	NA	2,551	NA
Italy	90,499	43,670	5,343	1,933	2,412	11,365	22,617	46,829
Latvia	3,120	1,456	106	250	102	281	717	1,664

## CHAPTER 2 | Higher Education in Science and Engineering

Sex and region, country, or economy	All fields	All S&E fields	Physical and biological sciences and mathematics and statistics	Computer sciences	Agricultural sciences	Social and behavioral sciences	Engineering	Non-S&E <sup>a</sup>
Lithuania	9,670	5,328	297	463	278	762	3,528	4,342
Luxembourg	255	111	14	14	0	41	42	144
Malta	975	557	83	190	6	90	188	418
Netherlands	40,210	14,328	1,070	3,221	503	3,376	6,158	25,882
Poland	94,266	45,852	3,104	7,587	1,855	8,173	25,133	48,414
Portugal	23,304	12,354	1,023	524	369	1,982	8,456	10,950
Romania	38,339	20,832	1,262	974	1,329	3,752	13,515	17,507
Slovakia	11,751	5,166	433	917	283	859	2,674	6,585
Slovenia	4,852	2,866	294	474	129	519	1,450	1,986
Spain	97,769	47,710	5,047	5,858	1,915	7,902	26,988	50,059
Sweden (2012)	14,958	NA	NA	NA	NA	NA	NA	NA
United Kingdom	195,994	102,416	34,505	14,925	1,292	21,843	29,851	93,578
Other Europe								
Albania (2015)	7,707	2,824	322	592	560	391	959	4,883
Iceland (2012)	980	NA	NA	NA	NA	NA	NA	NA
Macedonia	4,352	1,628	87	514	149	159	719	2,724
Norway	12,384	4,872	391	981	74	1,098	2,328	7,512
Russia (2012)	550,715	NA	NA	NA	NA	NA	NA	NA

## CHAPTER 2 | Higher Education in Science and Engineering

Sex and region, country, or economy	All fields	All S&E fields	Physical and biological sciences and mathematics and statistics	Computer sciences	Agricultural sciences	Social and behavioral sciences	Engineering	Non-S&E <sup>a</sup>
Switzerland	26,776	11,521	1,126	1,220	560	964	7,651	15,255
Turkey	199,856	68,831	11,579	586	5,155	22,038	29,473	131,025
Ukraine (2015)	54,420	18,906	687	1,120	1,365	2,084	13,650	35,514
America								
North America								
Canada (2013)	77,289	37,019	9,465	3,128	446	11,786	12,194	40,270
Mexico (2013)	208,393	104,700	6,062	7,553	5,711	14,014	71,360	103,693
United States	809,453	370,032	83,431	49,489	9,602	132,396	95,114	439,421
Central America and Caribbean								
Costa Rica (2015)	15,184	4,834	154	1,525	244	768	2,143	10,350
Cuba	24,475	2,925	NA	NA	1,376	NA	1,549	21,550
El Salvador	5,173	1,691	NA	NA	131	NA	1,560	3,482
Guatemala (2007)	2,065	1,082	26	*	245	181	630	983
Honduras (2013)	5,738	1,738	NA	NA	417	NA	1,321	4,000
Panama (2013)	5,216	1,053	NA	NA	59	NA	994	4,163
South America								
Argentina	29,619	4,342	2,422	NA	1,920	NA	NA	25,277
Brazil (2012)	314,140	NA	NA	NA	NA	NA	NA	NA



## CHAPTER 2 | Higher Education in Science and Engineering

Sex and region, country, or economy	All fields	All S&E fields	Physical and biological sciences and mathematics and statistics	Computer sciences	Agricultural sciences	Social and behavioral sciences	Engineering	Non-S&E <sup>a</sup>
Chile	19,509	9,042	112	2,550	289	288	5,803	10,467
Colombia (2015)	70,346	32,631	1,273	5,291	2,057	6,159	17,851	37,715
Uruguay (2010)	2,512	1,130	117	189	206	302	316	1,382
Venezuela (2009)	32,339	NA	NA	NA	NA	NA	NA	NA
Oceania								
Australia	102,660	37,232	7,181	7,594	522	6,492	15,443	65,428
New Zealand	14,082	6,034	1,169	1,436	149	1,270	2,009	8,048
Female								
Asia								
Armenia (2015)	11,763	3,801	1,008	102	299	2,270	122	7,962
China <sup>b</sup>	1,751,501	NA	NA	NA	NA	NA	NA	NA
Georgia	9,953	435	NA	NA	125	NA	310	9,518
India <sup>c</sup>	3,208,575	772,964	416,672	85,277	6,833	NA	264,182	2,435,611
Indonesia (2012)	292,009	NA	NA	NA	NA	NA	NA	NA
Japan <sup>d</sup>	254,967	90,895	4,849	NA	7,362	68,235	10,449	164,072
Kyrgyzstan	22,511	2,430	NA	NA	122	NA	2,308	20,081
Malaysia (2015)	62,911	23,603	4,505	1,762	902	8,655	7,779	39,308
Mongolia	18,799	2,054	NA	NA	494	NA	1,560	16,745

## CHAPTER 2 | Higher Education in Science and Engineering

Sex and region, country, or economy	All fields	All S&E fields	Physical and biological sciences and mathematics and statistics	Computer sciences	Agricultural sciences	Social and behavioral sciences	Engineering	Non-S&E <sup>a</sup>
Myanmar (2011)	76,520	NA	NA	NA	NA	NA	NA	NA
Philippines (2006)	207,379	NA	NA	NA	NA	NA	NA	NA
Singapore <sup>e</sup>	7,530	2,566	1,103	289	NA	NA	1,174	4,964
South Korea	162,796	45,978	9,855	2,845	1,915	11,049	20,314	116,818
Taiwan	119,272	21,465	3,491	4,813	2,503	4,528	6,130	97,807
Middle East								
Iran (2015)	214,422	96,121	21,342	16,756	8,123	16,196	33,704	118,301
Israel	30,260	12,121	1,017	562	141	8,614	1,787	18,140
Jordan (2011)	29,205	5,607	719	1,985	1,335	1,281	287	23,598
Lebanon (2011)	14,553	NA	NA	NA	NA	NA	NA	NA
Palestine (2015)	18,438	4,366	901	613	97	1,790	965	14,072
Qatar	1,203	137	NA	NA	NA	NA	137	1,066
Saudi Arabia (2015)	75,387	22,148	10,481	3,264	97	7,698	608	53,239
United Arab Emirates (2015)	9,772	3,363	202	590	21	1,550	1,000	6,409
Africa								
Egypt (2013)	209,210	13,838	NA	NA	4,228	NA	9,610	195,372
Ethiopia (2012)	19,101	6,642	936	2,579	545	2,566	16	12,459
Ghana (2013)	19,059	989	NA	NA	259	NA	730	18,070

## CHAPTER 2 | Higher Education in Science and Engineering

Sex and region, country, or economy	All fields	All S&E fields	Physical and biological sciences and mathematics and statistics	Computer sciences	Agricultural sciences	Social and behavioral sciences	Engineering	Non-S&E <sup>a</sup>
Madagascar	4,723	257	NA	NA	104	NA	153	4,466
Mozambique (2010)	437	29	NA	NA	15	NA	14	408
South Africa	52,106	18,067	4,319	1,036	869	9,628	2,215	34,039
Sudan (2012)	39,149	9,008	1,399	1,884	2,192	1,616	1,917	30,141
Uganda (2004)	4,089	1,269	109	15	48	882	215	2,820
Europe								
EU								
Austria	22,344	6,684	1,302	231	242	3,462	1,449	15,660
Belgium	37,417	7,687	676	73	873	4,486	1,579	29,730
Bulgaria	23,297	7,713	465	406	329	4,097	2,416	15,584
Croatia	12,972	2,856	546	134	476	846	854	10,116
Cyprus	2,084	599	118	54	24	215	188	1,485
Czech Republic	37,695	9,367	2,505	458	1,041	3,197	2,166	28,328
Denmark	25,195	4,322	729	357	347	1,747	1,142	20,873
Estonia	4,875	1,127	193	92	74	391	377	3,748
Finland	21,322	3,797	449	286	412	1,166	1,484	17,525
France	186,322	50,316	10,798	1,791	2,329	21,671	13,727	136,006
Germany	191,508	49,103	14,347	2,624	2,693	14,753	14,685	142,405

## CHAPTER 2 | Higher Education in Science and Engineering

Sex and region, country, or economy	All fields	All S&E fields	Physical and biological sciences and mathematics and statistics	Computer sciences	Agricultural sciences	Social and behavioral sciences	Engineering	Non-S&E <sup>a</sup>
Greece (2012)	20,902	NA	NA	NA	NA	NA	NA	NA
Hungary	23,980	6,306	874	194	416	2,989	1,833	17,674
Ireland (2012)	15,701	NA	NA	NA	NA	NA	553	NA
Italy	135,100	42,129	7,891	307	2,431	19,266	12,234	92,971
Latvia	5,718	1,338	174	80	58	697	329	4,380
Lithuania	15,674	4,066	476	66	257	2,186	1,081	11,608
Luxembourg	344	88	20	*	*	59	9	256
Malta	1,140	344	80	41	6	156	61	796
Netherlands	53,096	11,203	817	581	559	7,602	1,644	41,893
Poland	162,644	47,047	7,430	1,049	2,182	21,499	14,887	115,597
Portugal	32,120	10,423	1,721	134	683	4,020	3,865	21,697
Romania	52,067	20,045	2,510	481	578	9,294	7,182	32,022
Slovakia	20,603	4,954	925	156	359	2,188	1,326	15,649
Slovenia	7,930	2,404	462	79	148	1,164	552	5,526
Spain	137,903	35,009	6,319	1,099	1,909	13,686	11,996	102,894
Sweden (2012)	28,155	NA	NA	NA	NA	NA	NA	NA
United Kingdom	248,158	77,924	38,313	2,918	2,719	26,736	7,238	170,234
Other Europe								

## CHAPTER 2 | Higher Education in Science and Engineering

Sex and region, country, or economy	All fields	All S&E fields	Physical and biological sciences and mathematics and statistics	Computer sciences	Agricultural sciences	Social and behavioral sciences	Engineering	Non-S&E <sup>a</sup>
Albania	11,609	828	NA	NA	292	NA	536	10,781
Iceland (2012)	1,848	NA	NA	NA	NA	NA	NA	NA
Macedonia	5,511	1,352	165	201	86	388	512	4,159
Norway	20,913	3,481	436	156	124	1,956	809	17,432
Russia (2012)	855,335	NA	NA	NA	NA	NA	NA	NA
Switzerland	25,629	4,401	772	116	210	2,069	1,234	21,228
Turkey	199,193	59,841	16,575	331	2,895	25,796	14,244	139,352
Ukraine (2015)	66,762	13,630	1,636	329	1,308	5,603	4,754	53,132
America								
North America								
Canada (2013)	116,166	39,921	11,560	613	646	23,825	3,277	76,245
Mexico (2013)	242,529	76,055	6,706	5,004	3,184	32,190	28,971	166,474
United States	1,081,488	371,731	93,570	11,796	10,019	231,962	24,384	709,757
Central America and Caribbean								
Costa Rica (2015)	26,362	4,000	181	495	183	2,080	1,061	22,362
Cuba	45,866	1,151	NA	NA	547	NA	604	44,715
El Salvador	7,319	640	NA	NA	60	NA	580	6,679
Guatemala (2007)	1,686	726	92	0	62	350	222	960

## CHAPTER 2 | Higher Education in Science and Engineering

Sex and region, country, or economy	All fields	All S&E fields	Physical and biological sciences and mathematics and statistics	Computer sciences	Agricultural sciences	Social and behavioral sciences	Engineering	Non-S&E <sup>a</sup>
Honduras (2013)	9,581	955	NA	NA	169	NA	786	8,626
Panama (2013)	9,968	694	NA	NA	43	NA	651	9,274
South America								
Argentina	46,794	3,617	2,264	NA	1,353	NA	NA	43,177
Brazil (2012)	547,238	NA	NA	NA	NA	NA	NA	NA
Chile	17,777	2,946	95	310	149	1,600	793	14,831
Colombia (2015)	94,058	27,054	1,423	1,719	1,347	12,252	10,313	67,004
Uruguay (2010)	4,383	1,247	185	54	120	636	252	3,136
Venezuela (2009)	65,696	NA	NA	NA	NA	NA	NA	NA
Oceania								
Australia	136,563	28,511	7,673	1,922	881	12,416	5,619	108,052
New Zealand	20,910	5,273	1,473	366	195	2,434	805	15,637

\* = nil or negligible; NA = not available.

EU = European Union.

<sup>a</sup> Includes field unknown or unspecified.

<sup>b</sup> China data include computer sciences under engineering.

<sup>c</sup> India data include social sciences in humanities and arts (non-S&E).

<sup>d</sup> In data for Japan, mathematics are included in natural sciences, computer sciences are included in engineering, and business administration is included in social science. Japan data include thesis doctorates, called *ronbun hakase*, earned by employees in industry.

<sup>e</sup> Singapore data include social sciences in humanities (non-S&E).

## CHAPTER 2 | Higher Education in Science and Engineering

### Note(s)

Physical and biological sciences and mathematics and statistics include biological and related sciences, environmental sciences, and physical sciences. Computer sciences include information and communication technologies. Agricultural sciences include agriculture, forestry, fisheries, and veterinary sciences. Social and behavioral sciences include social and behavioral sciences, and journalism and information. Engineering includes engineering and engineering trades, manufacturing and processing, and architecture and construction. To facilitate international comparison, data for the United States reflect the most recent classification in the International Standard Classification of Education Fields of Education and Training (ISCED-F), which varies slightly from the National Science Foundation classification of fields presented in other sections of the chapter. Data for first university degrees use ISCED 2011 level 6 (bachelor's or equivalent first degrees) and level 7 (master's or equivalent long first degrees). S&E data do not include health fields.

### Source(s)

United Nations Educational, Scientific and Cultural Organization (UNESCO) Institute for Statistics database, special tabulations (2016); Organisation for Economic Co-operation and Development (OECD), OECD.Stat, <https://stats.oecd.org/>; Government of India, Ministry of Human Resource Development, Department of Higher Education, All India Survey on Higher Education 2014–15 (2016); Government of Japan, Ministry of Education, Culture, Sports, Science and Technology, Survey of Education, special tabulations (2016); Government of Singapore, Ministry of Education, *Education Statistics Digest: 2015*; Ministry of Education, *Educational Statistics of the Republic of China (Taiwan): 2014* (2014); National Center for Education Statistics, Integrated Postsecondary Education Data System (IPEDS), Completions Survey; National Science Foundation, National Center for Science and Engineering Statistics, Integrated Science and Engineering Resources Data System (WebCASPAR), <https://ncesdata.nsf.gov/webcaspar/>.

*Science and Engineering Indicators 2018*

## CHAPTER 2 | Higher Education in Science and Engineering

APPENDIX TABLE 2-37

### Earned doctoral degrees, by selected region, country, or economy and field: 2014 or most recent year

(Number)

Region, country, or economy	All fields	S&E field						Non-S&E
		All S&E	Physical and biological sciences and mathematics and statistics	Computer sciences	Agricultural sciences	Social and behavioral sciences	Engineering	
Asia <sup>a</sup>								
Armenia	247	52	NA	NA	4	NA	48	195
China <sup>b</sup>	53,653	34,103	10,922	NA	2,382	2,262	18,537	19,550
Georgia	450	88	NA	NA	10	NA	78	362
India <sup>c</sup>	21,830	13,144	5,721	321	1,545	2,960	2,597	8,686
Japan <sup>d</sup>	15,045	6,743	1,377	NA	941	887	3,538	8,302
Kyrgyzstan	682	96	NA	NA	10	NA	86	586
Malaysia	2,983	796	NA	NA	51	NA	745	2,187
Mongolia	118	12	NA	NA	10	NA	2	106
Philippines	3,427	286	NA	NA	250	NA	36	3,141
South Korea	12,931	6,032	1,586	157	299	512	3,478	6,899
Taiwan	4,048	2,487	619	57	99	196	1,516	1,561
Tajikistan	382	49	NA	NA	28	NA	21	333
Middle East <sup>a</sup>								
Iran	6,842	1,391	NA	NA	451	NA	940	5,451



## CHAPTER 2 | Higher Education in Science and Engineering

Region, country, or economy	All fields	S&E field						Non-S&E
		All S&E	Physical and biological sciences and mathematics and statistics	Computer sciences	Agricultural sciences	Social and behavioral sciences	Engineering	
Israel	1,546	1,113	698	59	34	183	139	433
Jordan (2015)	693	45	10	*	3	31	1	648
Lebanon (2011)	171	33	*	1	*	28	4	138
Saudi Arabia (2015)	439	82	33	5	3	23	18	357
Africa <sup>a</sup>								
Egypt (2013)	6,877	1,046	NA	NA	673	NA	373	5,831
Madagascar	377	*	NA	NA	NA	NA	NA	377
Mozambique (2013)	15	9	NA	NA	*	NA	9	6
South Africa	2,270	1,175	572	55	79	293	176	1,095
Sudan	1,460	166	NA	NA	48	NA	118	1,294
Tunisia	825	157	NA	NA	7	NA	150	668
Europe <sup>a</sup>								
EU								
Austria	2,207	1,305	416	114	56	209	512	902
Belgium	2,581	1,575	504	64	135	266	606	1,006
Bulgaria	1,363	706	174	33	47	177	275	657
Croatia	855	564	155	29	50	186	144	291

## CHAPTER 2 | Higher Education in Science and Engineering

Region, country, or economy	All fields	S&E field						Non-S&E
		All S&E	Physical and biological sciences and mathematics and statistics	Computer sciences	Agricultural sciences	Social and behavioral sciences	Engineering	
Cyprus	60	37	14	4	*	6	13	23
Czech Republic	2,484	1,551	613	79	150	153	556	933
Denmark	2,126	1,289	373	*	230	213	473	837
Estonia	213	151	71	9	12	23	36	62
Finland	2,013	1,121	306	70	62	224	459	892
France	13,729	10,023	5,731	736	*	1,684	1,872	3,706
Germany	28,147	14,625	7,975	994	834	1,637	3,185	13,522
Greece	1,601	868	218	65	83	151	351	733
Hungary	1,154	659	236	66	67	162	128	495
Ireland	1,738	833	423	106	20	127	157	905
Italy	10,678	6,185	2,571	134	619	808	2,053	4,493
Latvia	264	164	34	12	9	37	72	100
Lithuania	411	262	84	11	23	47	97	149
Luxembourg	82	55	17	16	*	14	8	27
Malta	22	13	4	*	*	*	9	9
Netherlands	4,528	340	NA	NA	340	NA	NA	4,188
Poland	3,376	1,811	734	10	227	279	561	1,565

## CHAPTER 2 | Higher Education in Science and Engineering

Region, country, or economy	All fields	S&E field						Non-S&E
		All S&E	Physical and biological sciences and mathematics and statistics	Computer sciences	Agricultural sciences	Social and behavioral sciences	Engineering	
Portugal	4,008	2,328	717	157	50	535	869	1,680
Romania	3,777	1,982	350	*	231	337	1,064	1,795
Slovakia	2,182	1,068	338	46	68	148	468	1,114
Slovenia	1,003	662	202	36	110	133	181	341
Spain	10,889	6,708	3,396	520	235	1,367	1,190	4,181
Sweden (2013)	3,345	2,055	670	125	68	246	946	1,290
United Kingdom	25,020	14,271	7,198	925	288	2,339	3,521	10,749
Other Europe								
Iceland (2012)	40	19	12	2	*	2	3	21
Macedonia	206	69	11	1	6	13	38	137
Norway	1,442	775	346	74	33	166	156	667
Russia (2013)	36,533	19,340	6,055	3,015	1,223	3,371	5,676	17,193
Serbia	741	192	NA	NA	13	NA	179	549
Switzerland	3,847	2,352	1,051	116	105	317	763	1,495
Turkey	4,516	2,188	844	5	212	388	739	2,328
Ukraine	9,081	2,128	NA	NA	389	NA	1,739	6,953
America <sup>a</sup>								

## CHAPTER 2 | Higher Education in Science and Engineering

Region, country, or economy	All fields	S&E field						Non-S&E
		All S&E	Physical and biological sciences and mathematics and statistics	Computer sciences	Agricultural sciences	Social and behavioral sciences	Engineering	
North America								
Canada (2013)	7,059	5,188	2,299	283	188	1,027	1,391	1,871
Mexico	5,782	2,365	753	65	148	617	782	3,417
United States	67,591	39,834	16,599	1,941	952	10,012	10,330	27,757
Central America and Caribbean								
Cuba	663	108	NA	NA	39	NA	69	555
South America								
Argentina	2,088	1,021	934	NA	87	NA	NA	1,067
Brazil	16,745	9,124	2,798	224	1,941	1,302	2,859	7,621
Chile	606	408	205	9	46	53	96	198
Colombia	408	131	NA	NA	34	NA	97	277
Oceania <sup>a</sup>								
Australia	8,400	4,865	1,668	311	300	1,088	1,498	3,535
New Zealand	1,414	890	382	70	58	157	224	524

\* = nil or negligible; NA = not available.

EU = European Union.

<sup>a</sup> Includes only locations for which relatively recent data are available.

## CHAPTER 2 | Higher Education in Science and Engineering

<sup>b</sup> China data include computer sciences under engineering.

<sup>c</sup> India data include social sciences in humanities and arts (non-S&E).

<sup>d</sup> Japan data include thesis doctorates, called *ronbun hakase*, earned by employees in industry. In higher education data for Japan, mathematics are included in natural sciences, and computer sciences are included in engineering.

### Note(s)

Physical and biological sciences and mathematics and statistics include biological and related sciences, environmental sciences, and physical sciences. Computer sciences include information and communication technologies. Agricultural sciences include agriculture, forestry, fisheries, and veterinary sciences. Social and behavioral sciences include social and behavioral sciences, and journalism and information. Engineering includes engineering and engineering trades, manufacturing and processing, and architecture and construction. To facilitate international comparison, data for the United States reflect the most recent classification in the International Standard Classification of Education Fields of Education and Training (ISCED-F), which varies slightly from the National Science Foundation classification of fields presented in other sections of the chapter. Data for doctoral degrees use ISCED 2011 level 8. S&E data do not include health fields.

### Source(s)

United Nations Educational, Scientific and Cultural Organization (UNESCO) Institute for Statistics database, special tabulations (2016); National Bureau of Statistics of China, *China Statistical Yearbook* (Beijing) (2015); Government of India, Ministry of Human Resource Development, Department of Higher Education, All India Survey on Higher Education 2014–15 (2016); Japan Student Services Organization, special tabulations (2014); Government of Singapore, Ministry of Education, *Education Statistics Digest: 2015*; Ministry of Education, *Educational Statistics of the Republic of China (Taiwan): 2015* (2015); National Center for Education Statistics, Integrated Postsecondary Education Data System (IPEDS), Completions Survey; National Science Foundation, National Center for Science and Engineering Statistics, Integrated Science and Engineering Resources Data System (WebCASPAR), <https://ncesdata.nsf.gov/webcaspar/>.

*Science and Engineering Indicators 2018*

## CHAPTER 2 | Higher Education in Science and Engineering

APPENDIX TABLE 2-38

### S&E doctoral degrees in the United States and selected European countries or economies, by field: 2000–14

(Number)

Country or economy and field	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Austria	1,790	1,871	2,125	2,197	2,445	2,228	2,158	2,085	2,205	2,284	2,500	2,359	2,412	2,228	2,207
All S&E	987	1,059	1,152	1,108	1,193	1,225	NA	537	1,249	1,322	1,386	1,369	1,417	1,330	1,305
Physical and biological sciences and mathematics and statistics	359	384	431	377	373	418	NA	NA	397	461	463	454	440	493	416
Computer sciences	53	21	67	63	71	74	NA	NA	93	99	129	96	139	111	114
Agricultural sciences	85	92	135	135	97	101	NA	103	115	103	96	93	80	71	56
Social and behavioral sciences	149	162	171	210	250	224	NA	NA	206	230	235	262	271	223	209
Engineering	341	400	348	323	402	408	NA	434	438	429	463	464	487	433	512
Belgium	1,147	1,317	1,413	NA	1,479	1,608	1,718	1,716	1,880	1,902	2,126	2,165	2,368	2,464	2,581
All S&E	808	898	919	NA	NA	NA	1,094	1,044	1,186	951	1,281	1,313	1,431	1,546	1,575
Physical and biological sciences and mathematics and statistics	479	519	468	NA	NA	NA	493	439	651	312	422	438	464	455	504
Computer sciences	*	2	80	NA	NA	NA	66	112	82	11	54	58	55	67	64
Agricultural sciences	66	77	76	NA	NA	NA	89	84	109	109	111	105	115	133	135
Social and behavioral sciences	109	124	120	NA	NA	NA	157	130	153	118	193	205	238	264	266
Engineering	154	176	175	NA	NA	NA	289	279	191	401	501	507	559	627	606
Bulgaria	399	376	385	401	392	528	NA	583	601	636	596	638	979	1,202	1,363
All S&E	164	163	166	232	181	237	NA	273	333	364	314	365	483	567	706

## CHAPTER 2 | Higher Education in Science and Engineering

Country or economy and field	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Physical and biological sciences and mathematics and statistics	86	68	63	89	77	89	NA	86	112	126	84	104	131	140	174
Computer sciences	*	*	*	*	*	*	NA	*	8	5	7	15	24	25	33
Agricultural sciences	22	27	28	28	11	36	NA	37	26	26	20	24	32	37	47
Social and behavioral sciences	12	8	14	61	12	22	NA	19	77	74	66	93	132	135	177
Engineering	44	60	61	54	81	90	NA	131	110	133	137	129	164	230	275
Croatia	338	280	255	314	NA	385	439	466	494	572	838	1,072	1,338	NA	855
All S&E	208	172	154	182	NA	228	240	252	265	314	467	NA	692	NA	564
Physical and biological sciences and mathematics and statistics	71	61	55	68	NA	87	88	115	101	106	170	NA	227	NA	155
Computer sciences	5	1	4	7	NA	8	3	3	6	11	19	NA	12	NA	29
Agricultural sciences	27	22	20	14	NA	35	48	32	38	39	50	NA	103	NA	50
Social and behavioral sciences	43	50	21	37	NA	26	35	27	51	61	93	NA	188	NA	186
Engineering	62	38	54	56	NA	72	66	75	69	97	135	NA	162	NA	144
Cyprus	NA	NA	3	2	13	5	29	16	28	30	30	43	48	52	60
All S&E	NA	NA	1	1	8	NA	18	8	18	24	17	31	34	35	37
Physical and biological sciences and mathematics and statistics	NA	NA	*	*	6	NA	14	6	15	10	6	12	14	13	14
Computer sciences	NA	NA	1	*	*	NA	2	1	*	5	6	8	5	4	4
Agricultural sciences	NA	NA	*	*	*	NA	*	*	*	*	*	*	*	1	*
Social and behavioral sciences	NA	NA	*	1	2	NA	2	1	3	6	2	3	7	4	6
Engineering	NA	NA	*	*	*	NA	*	*	*	3	3	8	8	13	13

## CHAPTER 2 | Higher Education in Science and Engineering

Country or economy and field	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Czech Republic	895	1,066	1,327	1,546	1,732	1,905	2,023	2,272	2,382	2,391	2,228	2,462	2,683	2,433	2,484
All S&E	619	727	883	1,055	1,118	1,212	1,312	1,414	1,576	1,533	1,412	1,564	1,672	1,515	1,551
Physical and biological sciences and mathematics and statistics	216	228	305	372	360	423	433	428	580	573	586	623	621	585	613
Computer sciences	110	121	138	29	50	59	50	62	69	80	75	81	97	101	79
Agricultural sciences	57	67	100	109	112	132	136	170	133	113	131	165	183	150	150
Social and behavioral sciences	51	100	104	129	95	83	126	130	174	151	132	188	187	166	153
Engineering	185	211	236	416	501	515	567	624	620	616	488	507	584	513	556
Denmark	NA	795	732	859	788	955	910	973	1,102	1,188	1,388	1,503	1,552	1,888	2,126
All S&E	NA	530	394	602	620	583	572	570	653	704	802	944	968	1,224	1,289
Physical and biological sciences and mathematics and statistics	NA	190	177	131	100	210	166	150	205	212	261	258	276	335	373
Computer sciences	NA	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Agricultural sciences	NA	58	83	84	89	78	67	84	93	98	74	128	136	210	230
Social and behavioral sciences	NA	75	63	51	55	96	108	95	114	134	134	179	170	197	213
Engineering	NA	207	71	336	376	199	231	241	241	260	333	379	386	482	473
Estonia	117	149	188	226	209	131	143	153	161	160	175	250	190	233	213
All S&E	52	38	53	70	76	79	87	87	110	102	112	167	142	153	151
Physical and biological sciences and mathematics and statistics	31	21	27	31	47	33	42	49	47	48	56	74	62	68	71
Computer sciences	5	1	4	1	3	5	5	6	8	7	12	17	14	13	9
Agricultural sciences	6	2	5	8	5	7	5	5	6	6	6	6	9	8	12



## CHAPTER 2 | Higher Education in Science and Engineering

Country or economy and field	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Social and behavioral sciences	4	5	8	11	4	8	14	8	12	12	11	36	22	23	23
Engineering	6	9	9	19	17	26	21	19	37	29	27	34	35	41	36
Finland	1,797	1,797	1,738	1,759	1,861	NA	1,846	1,925	NA	1,943	1,748	1,850	1,830	1,899	2,013
All S&E	955	969	966	NA	NA	NA	NA	707	NA	1,079	984	1,037	1,006	1,076	1,121
Physical and biological sciences and mathematics and statistics	300	281	294	NA	NA	NA	NA	NA	NA	316	276	295	276	274	306
Computer sciences	45	41	51	NA	NA	NA	NA	NA	NA	52	50	67	48	61	70
Agricultural sciences	51	41	40	NA	NA	NA	NA	42	NA	44	38	58	47	55	62
Social and behavioral sciences	222	221	204	NA	NA	NA	NA	231	NA	235	217	234	220	230	224
Engineering	337	385	377	NA	NA	NA	NA	434	NA	432	403	383	415	456	459
France	9,903	NA	10,404	8,420	9,578	9,818	10,650	11,309	11,941	12,595	NA	NA	13,188	13,419	13,729
All S&E	6,653	NA	6,971	5,651	6,867	26	7,408	7,835	8,356	8,905	NA	NA	9,466	9,731	10,023
Physical and biological sciences and mathematics and statistics	4,281	NA	4,494	3,638	3,984	NA	4,521	4,765	4,988	5,215	NA	NA	5,488	5,805	5,731
Computer sciences	478	NA	494	404	449	NA	610	605	642	686	NA	NA	697	698	736
Agricultural sciences	22	NA	23	18	35	26	13	18	13	13	NA	NA	*	*	*
Social and behavioral sciences	939	NA	989	800	1,140	NA	1,086	1,173	1,334	1,315	NA	NA	1,453	1,433	1,684
Engineering	933	NA	971	791	1,259	NA	1,178	1,274	1,379	1,676	NA	NA	1,828	1,795	1,872
Germany	25,780	24,796	23,838	23,043	23,138	25,952	24,946	24,439	25,190	25,084	25,629	26,981	26,807	27,707	28,147
All S&E	11,927	11,292	10,661	10,376	10,146	11,651	10,928	11,146	11,930	11,755	12,632	13,338	13,700	14,646	14,625
Physical and biological sciences and mathematics and statistics	6,937	6,361	5,863	5,701	5,536	6,171	5,789	5,938	6,255	6,328	6,816	7,127	7,385	8,153	7,975

## CHAPTER 2 | Higher Education in Science and Engineering

Country or economy and field	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Computer sciences	441	470	417	387	489	520	566	593	699	738	838	906	886	941	994
Agricultural sciences	917	883	878	895	929	1,106	934	923	878	856	880	902	925	803	834
Social and behavioral sciences	1,151	1,224	1,089	1,144	1,046	1,448	1,395	1,393	1,514	1,475	1,528	1,562	1,658	1,689	1,637
Engineering	2,481	2,354	2,414	2,249	2,146	2,406	2,244	2,299	2,584	2,358	2,570	2,841	2,846	3,060	3,185
Greece	NA	875	1,154	NA	1,295	1,248	1,556	2,436	1,406	NA	1,892	1,696	1,734	1,527	1,601
All S&E	NA	NA	NA	NA	927	926	NA	667	705	NA	1,070	900	745	834	868
Physical and biological sciences and mathematics and statistics	NA	NA	NA	NA	595	492	NA	267	213	NA	278	244	221	221	218
Computer sciences	NA	NA	NA	NA	116	27	NA	20	74	NA	133	85	70	95	65
Agricultural sciences	NA	NA	NA	NA	39	89	NA	63	93	NA	159	80	79	88	83
Social and behavioral sciences	NA	NA	NA	NA	51	59	NA	85	86	NA	139	137	95	149	151
Engineering	NA	NA	NA	NA	126	259	NA	232	239	NA	361	354	280	281	351
Hungary	717	793	983	1,067	893	1,069	1,012	1,059	1,141	1,376	1,275	1,234	1,242	1,069	1,154
All S&E	429	313	380	582	349	348	401	NA	420	603	643	533	569	604	659
Physical and biological sciences and mathematics and statistics	190	137	151	198	162	149	170	NA	188	260	345	254	257	249	236
Computer sciences	4	5	14	10	9	8	11	NA	39	25	51	31	36	52	66
Agricultural sciences	41	55	61	100	66	66	76	NA	73	91	84	83	97	57	67
Social and behavioral sciences	83	66	70	82	76	79	92	NA	90	97	63	93	80	150	162
Engineering	111	50	84	192	36	46	52	NA	30	130	100	72	99	96	128
Ireland	501	572	520	668	683	810	979	1,035	1,090	1,211	1,222	NA	1,447	1,532	1,738

## CHAPTER 2 | Higher Education in Science and Engineering

Country or economy and field	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
All S&E	328	416	354	441	423	192	23	23	30	771	714	NA	846	849	833
Physical and biological sciences and mathematics and statistics	221	274	229	290	237	NA	NA	NA	NA	381	323	NA	384	385	423
Computer sciences	12	19	15	14	28	NA	NA	NA	NA	86	71	NA	128	76	106
Agricultural sciences	17	19	12	19	21	23	23	23	30	23	37	NA	15	40	20
Social and behavioral sciences	29	41	26	41	29	54	NA	NA	NA	93	86	NA	111	130	127
Engineering	49	63	72	77	108	115	NA	NA	NA	188	197	NA	208	218	157
Italy	4,044	3,977	4,456	6,351	8,346	8,466	10,188	10,188	12,591	NA	NA	11,270	11,458	10,687	10,678
All S&E	2,100	1,958	2,760	3,942	NA	5,075	6,107	6,156	NA	NA	NA	6,409	6,294	6,131	6,185
Physical and biological sciences and mathematics and statistics	821	818	1,274	1,867	NA	2,271	2,531	2,484	NA	NA	NA	2,531	2,569	2,502	2,571
Computer sciences	*	*	33	64	NA	66	149	117	NA	NA	NA	140	124	135	134
Agricultural sciences	350	342	306	384	NA	496	669	645	NA	NA	NA	684	688	650	619
Social and behavioral sciences	121	60	294	450	NA	703	799	914	NA	NA	NA	971	877	810	808
Engineering	808	738	853	1,177	NA	1,539	1,959	1,996	NA	NA	NA	2,083	2,036	2,034	2,053
Latvia	40	37	52	64	84	114	106	146	139	174	132	297	267	315	264
All S&E	27	29	29	34	48	76	53	71	72	105	78	157	158	173	164
Physical and biological sciences and mathematics and statistics	4	16	7	4	10	19	9	23	18	36	16	56	38	51	34
Computer sciences	6	2	*	3	5	1	5	9	8	10	4	10	15	17	12
Agricultural sciences	*	2	4	1	6	7	2	5	4	5	10	12	5	10	9
Social and behavioral sciences	1	2	7	10	14	10	14	5	12	19	18	27	40	30	37

## CHAPTER 2 | Higher Education in Science and Engineering

Country or economy and field	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Engineering	16	7	11	16	13	39	23	29	30	35	30	52	60	65	72
Lithuania	442	261	387	252	301	321	326	367	369	397	406	353	398	441	411
All S&E	259	155	180	113	177	169	210	237	233	228	254	219	266	281	262
Physical and biological sciences and mathematics and statistics	58	40	51	34	68	41	81	71	75	60	75	63	72	64	84
Computer sciences	6	2	6	2	2	9	5	16	5	5	11	11	4	13	11
Agricultural sciences	13	4	11	2	11	21	12	19	32	22	16	31	29	21	23
Social and behavioral sciences	85	49	54	34	34	42	49	59	50	56	71	53	71	62	47
Engineering	97	60	58	41	62	56	63	72	71	85	81	61	90	121	97
Luxembourg	NA	NA	NA	NA	NA	NA	NA	NA	8	NA	NA	NA	57	64	82
All S&E	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	41	45	55
Physical and biological sciences and mathematics and statistics	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	17	12	17
Computer sciences	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	12	13	16
Agricultural sciences	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	*	*	*
Social and behavioral sciences	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5	11	14
Engineering	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	7	9	8
Malta	6	6	11	8	5	5	4	9	11	19	12	19	13	24	22
All S&E	2	2	2	0	2	0	2	4	5	3	6	7	NA	12	13
Physical and biological sciences and mathematics and statistics	2	*	*	*	*	*	1	1	4	1	4	3	NA	2	4
Computer sciences	*	*	*	*	*	*	*	*	*	*	*	1	NA	1	*

## CHAPTER 2 | Higher Education in Science and Engineering

Country or economy and field	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Agricultural sciences	*	1	1	*	2	*	*	*	*	*	*	*	NA	*	*
Social and behavioral sciences	*	*	*	*	*	*	*	1	*	*	1	*	NA	3	*
Engineering	*	1	1	*	*	*	1	2	1	2	1	3	NA	6	9
Netherlands	2,489	2,533	2,556	2,584	2,679	2,879	2,993	3,160	3,214	3,301	3,736	3,715	4,040	4,321	4,528
All S&E	1,478	1,524	1,523	1,019	1,552	1,286	785	815	852	823	237	949	1,232	280	340
Physical and biological sciences and mathematics and statistics	446	530	489	NA	499	508	NA	NA	NA	NA	NA	NA	NA	NA	NA
Computer sciences	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Agricultural sciences	209	229	264	219	259	221	250	266	289	222	237	230	213	280	340
Social and behavioral sciences	427	375	326	347	311	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Engineering	396	390	444	453	483	557	535	549	563	601	NA	719	1,019	NA	NA
Poland	NA	4,400	4,400	5,450	5,460	5,722	5,917	6,072	5,616	5,068	3,317	3,055	3,590	3,719	3,376
All S&E	NA	NA	NA	NA	NA	541	581	457	397	293	NA	NA	NA	NA	1,811
Physical and biological sciences and mathematics and statistics	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	734
Computer sciences	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	10
Agricultural sciences	NA	NA	NA	NA	NA	541	581	457	397	293	NA	NA	NA	NA	227
Social and behavioral sciences	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	279
Engineering	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	561
Portugal	1,586	NA	2,991	3,723	3,963	4,150	5,342	6,038	4,863	4,376	2,927	2,314	2,909	4,155	4,008
All S&E	955	NA	1,678	1,998	2,431	2,659	3,287	3,518	3,419	2,702	1,443	1,332	1,777	2,491	2,328

## CHAPTER 2 | Higher Education in Science and Engineering

Country or economy and field	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Physical and biological sciences and mathematics and statistics	284	NA	477	570	822	919	1,192	1,305	1,093	791	404	415	658	820	717
Computer sciences	51	NA	45	75	211	239	321	283	342	253	45	34	69	111	157
Agricultural sciences	38	NA	71	79	68	71	102	86	85	54	45	36	31	49	50
Social and behavioral sciences	244	NA	505	629	636	703	824	961	859	815	396	313	403	593	535
Engineering	338	NA	580	645	694	727	848	883	1,040	789	553	534	616	918	869
Romania	NA	NA	NA	2,580	2,680	3,871	3,180	2,983	3,271	4,618	4,764	5,615	5,158	5,370	3,777
All S&E	NA	NA	NA	NA	1,223	710	1,649	1,076	1,887	2,272	2,783	3,195	1,887	2,756	1,982
Physical and biological sciences and mathematics and statistics	NA	NA	NA	NA	151	214	281	284	462	241	420	521	NA	517	350
Computer sciences	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Agricultural sciences	NA	NA	NA	NA	1	122	800	178	310	353	586	304	501	390	231
Social and behavioral sciences	NA	NA	NA	NA	381	44	128	120	664	137	745	188	NA	431	337
Engineering	NA	NA	NA	NA	690	330	440	494	451	1,541	1,032	2,182	1,386	1,418	1,064
Slovakia	446	532	734	2,126	854	1,022	1,218	1,371	1,655	1,937	2,878	1,672	2,181	2,119	2,182
All S&E	228	312	390	635	438	537	547	688	776	899	1,386	814	1,115	1,087	1,068
Physical and biological sciences and mathematics and statistics	70	110	130	318	167	196	194	247	208	261	408	192	257	303	338
Computer sciences	7	1	6	10	10	14	18	22	26	32	61	45	32	40	46
Agricultural sciences	37	39	52	56	42	50	47	76	74	83	131	70	81	56	68
Social and behavioral sciences	14	31	33	101	64	67	67	81	112	113	210	97	179	149	148
Engineering	100	131	169	150	155	210	221	262	356	410	576	410	566	539	468

## CHAPTER 2 | Higher Education in Science and Engineering

Country or economy and field	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Slovenia	NA	298	318	367	355	369	395	415	405	466	465	523	569	1,165	1,003
All S&E	NA	182	208	227	238	236	240	265	276	301	316	310	416	741	662
Physical and biological sciences and mathematics and statistics	NA	62	77	74	85	74	78	99	108	113	139	83	112	218	202
Computer sciences	NA	14	10	13	8	18	12	19	5	15	16	23	42	44	36
Agricultural sciences	NA	13	10	22	8	11	14	17	23	14	17	22	56	110	110
Social and behavioral sciences	NA	36	28	27	47	41	46	50	47	43	36	54	103	141	133
Engineering	NA	57	83	91	90	92	90	80	93	116	108	128	103	228	181
Spain	6,007	6,453	6,905	7,479	8,168	6,902	7,159	7,150	7,302	7,915	8,696	8,747	9,483	10,504	10,889
All S&E	2,945	3,138	3,398	3,756	3,990	3,587	3,717	3,872	3,917	4,272	4,932	5,576	5,812	6,474	6,708
Physical and biological sciences and mathematics and statistics	1,629	1,699	1,875	1,929	2,032	1,795	2,029	1,984	1,981	2,157	2,100	3,211	3,053	3,374	3,396
Computer sciences	132	143	194	202	217	167	174	190	192	245	305	507	422	439	520
Agricultural sciences	255	213	253	325	322	273	253	233	275	249	292	218	298	297	235
Social and behavioral sciences	513	531	597	740	791	690	697	765	722	738	938	1,032	1,237	1,439	1,367
Engineering	416	552	479	560	628	662	564	700	747	883	1,297	608	802	925	1,190
Sweden	3,049	3,388	3,517	3,558	3,836	2,778	3,781	3,904	3,625	3,564	3,371	3,356	3,343	3,345	NA
All S&E	1,883	2,001	2,124	2,197	2,415	1,489	2,355	2,303	2,175	2,033	1,955	1,998	2,014	2,055	NA
Physical and biological sciences and mathematics and statistics	625	695	725	759	822	521	709	776	704	701	673	678	726	670	NA
Computer sciences	64	51	75	111	122	61	146	146	138	130	106	139	141	125	NA
Agricultural sciences	96	93	106	71	72	64	79	84	63	65	59	60	58	68	NA

## CHAPTER 2 | Higher Education in Science and Engineering

Country or economy and field	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Social and behavioral sciences	253	244	287	294	296	211	278	282	304	254	272	272	220	246	NA
Engineering	845	918	931	962	1,103	632	1,143	1,015	966	883	845	849	869	946	NA
Switzerland	2,733	2,745	2,800	2,742	2,952	3,304	3,381	3,428	3,426	3,641	3,800	3,709	NA	3,631	3,847
All S&E	1,280	1,305	1,332	1,210	1,330	1,541	1,704	1,714	1,631	1,741	1,752	1,804	NA	1,801	2,035
Physical and biological sciences and mathematics and statistics	804	743	770	698	743	897	1,004	984	912	950	922	978	NA	987	1,051
Computer sciences	47	52	54	53	48	82	79	81	65	77	103	96	NA	81	116
Agricultural sciences	114	118	135	127	159	151	164	139	153	147	170	128	NA	106	105
Social and behavioral sciences	74	75	103	121	154	189	208	215	234	252	275	321	NA	294	317
Engineering	315	392	373	332	380	411	457	510	501	567	557	602	NA	627	763
United Kingdom	11,566	14,145	14,232	14,936	15,257	15,778	16,465	17,545	16,606	17,651	18,756	20,076	20,438	25,896	25,020
All S&E	7,480	8,885	8,732	8,980	9,274	9,582	9,919	10,529	9,679	10,437	11,322	11,859	12,103	14,732	14,271
Physical and biological sciences and mathematics and statistics	3,952	4,812	4,827	4,875	4,376	4,450	4,426	4,609	4,203	4,390	4,696	4,965	4,874	7,454	7,198
Computer sciences	312	389	376	377	468	545	711	720	706	797	843	871	902	1,038	925
Agricultural sciences	349	341	339	301	318	310	309	252	194	224	215	218	232	305	288
Social and behavioral sciences	1,020	1,144	1,159	1,179	1,886	2,022	2,074	2,301	2,212	2,395	2,787	2,954	3,091	2,349	2,339
Engineering	1,847	2,199	2,031	2,248	2,226	2,255	2,399	2,647	2,364	2,631	2,780	2,851	3,004	3,586	3,521
United States	44,947	45,068	44,311	46,177	48,560	52,855	56,309	60,887	61,716	61,730	57,405	59,847	62,071	64,887	67,591
All S&E	26,062	26,118	25,086	26,278	27,346	29,353	31,201	33,386	34,338	34,194	33,703	35,194	36,397	37,977	39,834
Physical and biological sciences and mathematics and statistics	10,249	9,903	9,559	10,563	10,881	11,730	12,509	13,564	14,221	14,755	14,752	15,054	15,499	15,871	16,599



## CHAPTER 2 | Higher Education in Science and Engineering

Country or economy and field	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Computer sciences	787	770	759	820	918	1,124	1,419	1,598	1,703	1,576	1,564	1,565	1,699	1,812	1,941
Agricultural sciences	999	942	973	947	921	893	869	944	897	968	824	884	937	992	952
Social and behavioral sciences	8,531	8,801	8,431	8,541	8,591	8,959	8,877	9,168	9,332	8,870	8,611	9,066	9,187	9,632	10,012
Engineering	5,496	5,702	5,364	5,407	6,035	6,647	7,527	8,112	8,185	8,025	7,952	8,625	9,075	9,670	10,330

\* = nil or negligible; NA = not available.

### Note(s)

Physical and biological sciences and mathematics and statistics include biological and related sciences, environmental sciences, and physical sciences. Computer sciences include information and communication technologies. Agricultural sciences include agriculture, forestry, fisheries, and veterinary sciences. Social and behavioral sciences include social and behavioral sciences, and journalism and information. Engineering includes engineering and engineering trades, manufacturing and processing, and architecture and construction. To facilitate international comparison, data for the United States reflect the most recent classification in the International Standard Classification of Education Fields of Education and Training (ISCED-F), which varies slightly from the National Science Foundation classification of fields presented in other sections of the chapter. Data for doctoral degrees use ISCED 2011 level 8. S&E data do not include health fields.

### Source(s)

United Nations Educational, Scientific and Cultural Organization (UNESCO) Institute for Statistics database, special tabulations (2016); National Center for Education Statistics, Integrated Postsecondary Education Data System (IPEDS), Completions Survey; National Science Foundation, National Center for Science and Engineering Statistics, Integrated Science and Engineering Resources Data System (WebCASPAR), <https://ncesdata.nsf.gov/webcaspar/>.

*Science and Engineering Indicators 2018*

## CHAPTER 2 | Higher Education in Science and Engineering

APPENDIX TABLE 2-39

### S&E doctoral degrees, by selected Asian country or economy and field: 2000–14

(Number)

Country or economy and field	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
China <sup>a</sup>	11,383	12,465	14,638	18,806	23,446	27,677	36,247	41,464	43,759	48,658	48,987	50,289	51,713	53,139	53,653
All S&E	7,766	8,153	9,523	12,238	14,858	17,595	22,953	26,582	28,439	31,423	31,410	32,208	32,331	33,490	34,103
Physical and biological sciences and mathematics and statistics	2,306	2,655	2,808	3,705	4,518	5,458	7,241	8,051	8,953	9,570	9,638	9,881	9,762	10,396	10,922
Computer sciences	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Agricultural sciences	462	536	626	756	977	1,093	1,544	1,903	1,936	2,006	1,973	2,241	2,365	2,435	2,382
Social and behavioral sciences	514	621	837	1,204	1,309	1,617	2,038	2,149	2,274	2,461	2,371	2,383	2,314	2,328	2,262
Engineering	4,484	4,341	5,252	6,573	8,054	9,427	12,130	14,479	15,276	17,386	17,428	17,703	17,890	18,331	18,537
India	11,296	11,544	11,974	13,733	17,853	17,898	18,730	NA	NA	NA	NA	21,544	23,630	NA	21,830
All S&E	5,541	5,504	5,637	6,471	7,636	7,537	7,982	NA	NA	NA	NA	13,782	14,658	NA	13,144
Physical and biological sciences and mathematics and statistics	3,885	3,727	3,955	4,497	5,612	5,549	5,625	NA	NA	NA	NA	5,442	4,381	NA	5,721
Computer sciences	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	240	291	NA	321
Agricultural sciences	933	999	948	1,195	1,142	1,020	1,299	NA	NA	NA	NA	1,804	3,203	NA	1,545
Social and behavioral sciences	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	4,215	4,597	NA	2,960
Engineering	723	778	734	779	882	968	1,058	NA	NA	NA	NA	2,081	2,186	NA	2,597
Japan <sup>b</sup>	15,357	16,078	16,183	16,314	16,909	16,851	17,396	17,291	16,735	15,872	16,760	15,911	15,902	15,427	15,045
All S&E	7,089	7,401	7,461	7,581	7,912	7,658	8,122	8,017	7,761	7,396	7,470	7,100	7,100	6,791	6,743

## CHAPTER 2 | Higher Education in Science and Engineering

Country or economy and field	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Physical and biological sciences and mathematics and statistics	1,579	1,586	1,602	1,651	1,679	1,543	1,633	1,686	1,525	1,480	1,534	1,436	1,394	1,423	1,377
Computer sciences	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Agricultural sciences	1,147	1,241	1,248	1,258	1,348	1,257	1,321	1,233	1,222	1,170	1,233	1,046	1,059	1,062	941
Social and behavioral sciences	563	610	656	751	808	943	973	1,025	1,060	988	1,010	1,019	1,011	850	887
Engineering	3,800	3,964	3,955	3,921	4,077	3,915	4,195	4,073	3,954	3,758	3,693	3,599	3,636	3,456	3,538
South Korea	6,143	6,208	6,690	7,172	7,946	8,449	8,657	9,082	9,369	10,542	NA	11,645	12,243	12,625	12,931
All S&E	2,918	3,016	3,294	3,412	3,785	3,923	4,101	3,963	4,043	4,549	NA	5,558	5,782	5,933	6,032
Physical and biological sciences and mathematics and statistics	692	687	692	841	932	854	928	835	889	1,011	NA	1,372	1,488	1,476	1,586
Computer sciences	169	176	156	92	88	31	62	37	65	84	NA	98	141	167	157
Agricultural sciences	276	292	317	219	246	284	299	277	279	303	NA	308	317	314	299
Social and behavioral sciences	123	220	230	260	323	330	387	398	392	458	NA	488	527	536	512
Engineering	1,658	1,641	1,899	2,000	2,196	2,424	2,425	2,416	2,418	2,693	NA	3,292	3,309	3,440	3,478
Taiwan	1,455	1,463	1,501	1,759	1,964	2,165	2,614	2,850	3,140	3,589	3,705	3,846	3,861	4,241	4,048
All S&E	970	970	966	1,167	1,291	1,385	1,643	1,905	2,005	2,295	2,509	2,472	2,478	2,678	2,487
Physical and biological sciences and mathematics and statistics	233	232	255	298	318	398	455	413	469	522	567	568	596	684	619
Computer sciences	16	19	18	31	24	38	46	45	52	62	74	76	74	79	57
Agricultural sciences	87	90	93	93	116	83	92	72	77	104	95	79	94	98	99
Social and behavioral sciences	108	108	72	89	111	108	111	157	165	172	165	148	171	180	196
Engineering	526	521	528	656	722	758	939	1,219	1,242	1,435	1,608	1,601	1,543	1,637	1,516

CHAPTER 2 | Higher Education in Science and Engineering

NA = not available.

<sup>a</sup> China data include computer sciences under engineering.

<sup>b</sup> Japan data include thesis doctorates, called *ronbun hakase*, earned by employees in industry. In higher education data for Japan, mathematics are included in natural sciences, and computer sciences are included in engineering.

**Note(s)**

Data for doctoral degrees use International Standard Classification of Education (ISCED 2011) level 8. S&E data do not include health fields.

**Source(s)**

National Research Center for Science and Technology for Development, and National Bureau of Statistics of China, *China Statistical Yearbook* (Beijing) (various years); Department of Science and Technology (various years); Japan Student Services Organization (various years); United Nations Educational, Scientific and Cultural Organization (UNESCO) Institute for Statistics database, special tabulations (2016); Ministry of Education, *Educational Statistics of the Republic of China (Taiwan)* (annual series).

*Science and Engineering Indicators 2018*

## CHAPTER 2 | Higher Education in Science and Engineering

APPENDIX TABLE 2-40

### Earned S&E doctoral degrees, by sex, selected region, country, or economy, and field: 2014 or most recent year

(Number)

Sex and region, country, or economy	All fields	S&E field						Non-S&E
		All S&E	Physical and biological sciences and mathematics and statistics	Computer sciences	Agricultural sciences	Social and behavioral sciences	Engineering	
Male								
Asia								
Armenia	173	44	NA	NA	4	NA	40	129
Georgia	185	52	NA	NA	7	NA	45	133
India <sup>a</sup>	13,252	8,283	3,513	138	994	1,700	1,938	4,969
Kyrgyzstan	367	73	NA	NA	5	NA	68	294
Malaysia	1,763	555	NA	NA	33	NA	522	1,208
Mongolia	52	5	NA	NA	3	NA	2	47
Philippines	1,382	147	NA	NA	128	NA	19	1,235
South Korea	8,398	4,673	1,075	144	216	291	2,947	3,725
Taiwan	2,870	2,039	463	46	60	117	1,353	831
Tajikistan	244	NA	NA	NA	NA	NA	NA	NA
Middle East								
Iran	4,230	1,041	NA	NA	304	NA	737	3,189
Israel	777	598	362	53	19	61	103	179

## CHAPTER 2 | Higher Education in Science and Engineering

Sex and region, country, or economy	All fields	S&E field						Non-S&E
		All S&E	Physical and biological sciences and mathematics and statistics	Computer sciences	Agricultural sciences	Social and behavioral sciences	Engineering	
Jordan (2015)	489	32	7	*	3	21	1	457
Lebanon (2011)	110	25	*	*	*	22	3	85
Saudi Arabia (2015)	311	54	15	1	3	18	17	257
Africa								
Egypt (2013)	3,861	642	NA	NA	376	NA	266	3,219
Madagascar	206	NA	NA	NA	NA	NA	NA	NA
Mozambique (2013)	13	9	NA	NA	*	NA	9	4
South Africa	1,331	724	345	40	47	144	148	607
Sudan	989	125	NA	NA	27	NA	98	864
Tunisia	357	80	NA	NA	3	NA	77	277
Europe								
EU								
Austria	1,283	856	251	102	25	98	381	428
Belgium	1,444	987	297	57	73	122	438	457
Bulgaria	644	346	74	21	27	71	153	298
Croatia	405	265	59	19	21	52	114	140
Cyprus	27	19	5	3	*	1	10	8

## CHAPTER 2 | Higher Education in Science and Engineering

Sex and region, country, or economy	All fields	S&E field						Non-S&E
		All S&E	Physical and biological sciences and mathematics and statistics	Computer sciences	Agricultural sciences	Social and behavioral sciences	Engineering	
Czech Republic	1,422	963	329	71	72	77	414	459
Denmark	1,124	764	238	*	90	111	325	360
Estonia	100	82	39	9	4	9	21	18
Finland	952	629	151	55	23	69	331	323
France	7,553	5,939	3,315	551	*	812	1,261	1,614
Germany	15,349	9,123	4,660	846	288	759	2,570	6,226
Greece	817	470	102	52	43	60	213	347
Hungary	601	376	124	58	34	70	90	225
Ireland	876	453	208	85	9	42	109	423
Italy	5,090	3,343	1,266	102	286	357	1,332	1,747
Latvia	105	74	19	7	3	10	35	31
Lithuania	168	125	35	6	5	13	66	43
Luxembourg	51	38	12	15	*	3	8	13
Malta	16	9	3	*	*	*	6	7
Netherlands	2,386	169	NA	NA	169	NA	NA	2,217
Poland	1,578	889	339	10	67	113	360	689
Portugal	1,891	1,195	283	113	29	218	552	696

## CHAPTER 2 | Higher Education in Science and Engineering

Sex and region, country, or economy	All fields	S&E field						Non-S&E
		All S&E	Physical and biological sciences and mathematics and statistics	Computer sciences	Agricultural sciences	Social and behavioral sciences	Engineering	
Romania	1,845	1,079	172	*	112	157	638	766
Slovakia	1,100	585	122	35	42	58	328	515
Slovenia	441	310	81	27	42	31	129	131
Spain	5,528	3,603	1,660	395	126	642	780	1,925
Sweden (2013)	1,803	1,309	398	95	27	120	669	494
United Kingdom	13,263	8,335	3,743	708	125	1,166	2,593	4,928
Other Europe								
Iceland (2012)	19	12	7	2	*	1	2	7
Macedonia	100	41	4	1	2	8	26	59
Norway	730	466	203	58	16	73	116	264
Russia (2012)	19,428	NA	NA	NA	NA	NA	NA	NA
Serbia	385	124	NA	NA	4	NA	120	261
Switzerland	2,183	1,430	625	96	31	132	546	753
Turkey	2,361	1,189	404	3	111	206	465	1,172
Ukraine	3,954	1,301	NA	NA	192	NA	1,109	2,653
America								
North America								



## CHAPTER 2 | Higher Education in Science and Engineering

Sex and region, country, or economy	All fields	S&E field						Non-S&E
		All S&E	Physical and biological sciences and mathematics and statistics	Computer sciences	Agricultural sciences	Social and behavioral sciences	Engineering	
Canada (2013)	3,873	3,113	1,339	215	104	368	1,086	760
Mexico	3,024	1,337	433	52	81	272	499	1,687
United States	33,760	23,093	9,409	1,536	504	3,708	7,936	10,667
Central America and Caribbean								
Cuba	398	64	NA	NA	23	NA	41	334
South America								
Argentina	915	404	375	NA	29	NA	NA	511
Brazil	7,641	4,626	1,385	168	978	573	1,522	3,015
Chile	330	241	123	7	19	28	65	89
Colombia	249	83	NA	NA	19	NA	64	166
Oceania								
Australia	4,195	2,642	853	212	135	393	1,049	1,553
New Zealand	701	493	200	51	30	55	157	208
Female								
Asia								
Armenia	74	8	NA	NA	*	NA	8	66
Georgia	265	36	NA	NA	3	NA	33	229

## CHAPTER 2 | Higher Education in Science and Engineering

Sex and region, country, or economy	All fields	S&E field						Non-S&E
		All S&E	Physical and biological sciences and mathematics and statistics	Computer sciences	Agricultural sciences	Social and behavioral sciences	Engineering	
India <sup>a</sup>	8,578	4,861	2,208	183	551	1,260	659	3,717
Kyrgyzstan	315	23	NA	NA	5	NA	18	292
Malaysia	1,220	241	NA	NA	18	NA	223	979
Mongolia	66	7	NA	NA	7	NA	*	59
Philippines	2,045	139	NA	NA	122	NA	17	1,906
South Korea	4,533	1,359	511	13	83	221	531	3,174
Taiwan	1,178	448	156	11	39	79	163	730
Tajikistan	138	NA	NA	NA	NA	NA	NA	NA
Middle East								
Iran	2,612	350	NA	NA	147	NA	203	2,262
Israel	769	515	336	6	15	122	36	254
Jordan (2015)	204	13	3	*	*	10	*	191
Lebanon (2011)	61	8	*	1	*	6	1	53
Saudi Arabia (2015)	128	28	18	4	*	5	1	100
Africa								
Egypt (2013)	3,016	404	NA	NA	297	NA	107	2,612
Madagascar	171	NA	NA	NA	NA	NA	NA	NA

## CHAPTER 2 | Higher Education in Science and Engineering

Sex and region, country, or economy	All fields	S&E field						Non-S&E
		All S&E	Physical and biological sciences and mathematics and statistics	Computer sciences	Agricultural sciences	Social and behavioral sciences	Engineering	
Mozambique (2013)	2	NA	NA	NA	NA	NA	NA	NA
South Africa	939	451	227	15	32	149	28	488
Sudan	471	41	NA	NA	21	NA	20	430
Tunisia	468	77	NA	NA	4	NA	73	391
Europe								
EU								
Austria	924	450	165	12	31	111	131	474
Belgium	1,137	588	207	7	62	144	168	549
Bulgaria	719	360	100	12	20	106	122	359
Croatia	450	299	96	10	29	134	30	151
Cyprus	33	18	9	1	*	5	3	15
Czech Republic	1,062	588	284	8	78	76	142	474
Denmark	1,002	525	135	*	140	102	148	477
Estonia	113	69	32	*	8	14	15	44
Finland	1,061	492	155	15	39	155	128	569
France	6,176	4,084	2,416	185	*	872	611	2,092
Germany	12,798	5,502	3,315	148	546	878	615	7,296

## CHAPTER 2 | Higher Education in Science and Engineering

Sex and region, country, or economy	All fields	S&E field						Non-S&E
		All S&E	Physical and biological sciences and mathematics and statistics	Computer sciences	Agricultural sciences	Social and behavioral sciences	Engineering	
Greece	784	398	116	13	40	91	138	386
Hungary	553	283	112	8	33	92	38	270
Ireland	862	380	215	21	11	85	48	482
Italy	5,588	2,842	1,305	32	333	451	721	2,746
Latvia	159	90	15	5	6	27	37	69
Lithuania	243	137	49	5	18	34	31	106
Luxembourg	31	17	5	1	*	11	*	14
Malta	6	4	1	*	*	*	3	2
Netherlands	2,142	171	NA	NA	171	NA	NA	1,971
Poland	1,798	922	395	*	160	166	201	876
Portugal	2,117	1,133	434	44	21	317	317	984
Romania	1,932	903	178	*	119	180	426	1,029
Slovakia	1,082	483	216	11	26	90	140	599
Slovenia	562	352	121	9	68	102	52	210
Spain	5,361	3,105	1,736	125	109	725	410	2,256
Sweden (2013)	1,542	746	272	30	41	126	277	796
United Kingdom	11,757	5,936	3,455	217	163	1,173	928	5,821

## CHAPTER 2 | Higher Education in Science and Engineering

Sex and region, country, or economy	All fields	S&E field						Non-S&E
		All S&E	Physical and biological sciences and mathematics and statistics	Computer sciences	Agricultural sciences	Social and behavioral sciences	Engineering	
Other Europe								
Iceland (2012)	21	7	5	*	*	1	1	14
Macedonia	106	28	7	*	4	5	12	78
Norway	712	309	143	16	17	93	40	403
Russia (2012)	14,975	NA	NA	NA	NA	NA	NA	NA
Serbia	356	68	NA	NA	9	NA	59	288
Switzerland	1,664	922	426	20	74	185	217	742
Turkey	2,155	999	440	2	101	182	274	1,156
Ukraine	5,127	827	NA	NA	197	NA	630	4,300
America								
North America								
Canada (2013)	3,186	2,075	960	68	84	659	305	1,111
Mexico	2,758	1,028	320	13	67	345	283	1,730
United States	33,831	16,741	7,190	405	448	6,304	2,394	17,090
Central America and Caribbean								
Cuba	265	44	NA	NA	16	NA	28	221
South America								

## CHAPTER 2 | Higher Education in Science and Engineering

Sex and region, country, or economy	All fields	S&E field						Non-S&E
		All S&E	Physical and biological sciences and mathematics and statistics	Computer sciences	Agricultural sciences	Social and behavioral sciences	Engineering	
Argentina	1,173	617	559	NA	58	NA	NA	556
Brazil	9,104	4,498	1,413	56	963	729	1,337	4,606
Chile	276	167	82	2	27	25	31	109
Colombia	159	48	NA	NA	15	NA	33	111
Oceania								
Australia	4,205	2,223	815	99	165	695	449	1,982
New Zealand	713	397	182	19	28	102	67	316

\* = nil or negligible; NA = not available.

EU = European Union.

<sup>a</sup> India data include social sciences in humanities and arts (non-S&E).

### Note(s)

Physical and biological sciences and mathematics and statistics include biological and related sciences, environmental sciences, and physical sciences. Computer sciences include information and communication technologies. Agricultural sciences include agriculture, forestry, fisheries, and veterinary sciences. Social and behavioral sciences include social and behavioral sciences, and journalism and information. Engineering includes engineering and engineering trades, manufacturing and processing, and architecture and construction. To facilitate international comparison, data for the United States reflect the most recent classification in the International Standard Classification of Education Fields of Education and Training (ISCED-F), which varies slightly from the National Science Foundation classification of fields presented in other sections of the chapter. Data for doctoral degrees use ISCED 2011 level 8. S&E data do not include health fields.

### Source(s)

## CHAPTER 2 | Higher Education in Science and Engineering

United Nations Educational, Scientific and Cultural Organization (UNESCO) Institute for Statistics database, special tabulations (2015); Government of India, Ministry of Human Resource Development, Department of Higher Education, All India Survey on Higher Education 2014–15 (2016); Ministry of Education, *Educational Statistics of the Republic of China (Taiwan): 2015* (2016); National Center for Education Statistics, Integrated Postsecondary Education Data System (IPEDS), Completions Survey; National Science Foundation, National Center for Science and Engineering Statistics, Integrated Science and Engineering Resources Data System (WebCASPAR), <https://ncesdata.nsf.gov/webcaspar/>.

*Science and Engineering Indicators 2018*

## CHAPTER 2 | Higher Education in Science and Engineering

APPENDIX TABLE 2-41

### Trends in population age 20–24, by selected country and region: Selected years: 2015–60

(Thousands)

Year	Western Europe	Eastern Europe	Africa	South America	United States	Oceania	China	Japan	South Korea	India	Russia	Brazil
2015	10,856	18,104	107,514	34,762	22,740	2,974	106,139	6,112	3,523	118,192	8,940	16,669
2020	10,653	13,709	119,758	35,301	22,059	3,009	78,489	5,999	3,295	122,258	6,420	17,378
2025	10,449	13,787	135,675	35,387	22,077	3,092	74,617	5,666	2,532	125,067	7,054	17,311
2030	10,221	15,809	154,515	33,392	22,299	3,371	77,848	5,466	2,331	124,819	8,029	15,305
2035	10,226	16,974	174,425	33,030	22,183	3,511	82,236	5,340	2,351	120,689	9,250	14,905
2040	10,371	16,182	188,562	32,380	22,866	3,682	77,765	5,156	2,371	121,269	8,906	14,423
2045	10,351	14,750	202,230	31,528	23,383	3,744	67,916	4,947	2,359	120,400	8,106	13,907
2050	10,232	13,294	216,954	30,557	23,615	3,791	62,073	4,792	2,389	118,390	7,256	13,327
2055	10,101	12,646	232,738	29,614	23,757	3,836	60,852	4,685	2,288	114,905	6,932	12,773
2060	9,992	13,073	248,105	28,752	23,999	3,909	61,107	4,596	2,060	110,685	7,297	12,269

#### Source(s)

United Nations Secretariat, Department of Economic and Social Affairs, Population Division, *World Population Prospects: The 2015 Revision*, [https://esa.un.org/unpd/wpp/unpp/panel\\_indicators.htm](https://esa.un.org/unpd/wpp/unpp/panel_indicators.htm), accessed 4 October 2016; Census Bureau, Population Division, 2014 National Population Projections, Table 1, <https://www.census.gov/data/tables/2014/demo/popproj/2014-summary-tables.htm>, accessed 2 January 2015.

*Science and Engineering Indicators 2018*



## CHAPTER 2 | Higher Education in Science and Engineering

APPENDIX TABLE 2-42

### Foreign S&E student enrollment in United Kingdom universities, by enrollment level, place of origin, and field: Academic years 2005–06 and 2015–16

(Number)

Academic year, enrollment level, and place of origin	All S&E fields	Physical, biological, and agricultural sciences	Mathematics and computer sciences	Social and behavioral sciences	Engineering
2005–06					
All undergraduates	536,310	149,140	123,410	166,040	97,720
All foreign	55,950	8,990	12,560	15,210	19,200
China	8,590	890	2,850	2,450	2,400
Malaysia	3,380	270	500	320	2,280
France	3,080	530	480	620	1,450
Greece	2,890	300	650	600	1,330
Ireland	2,890	930	240	630	1,090
Hong Kong	2,680	540	580	770	790
Germany	2,160	500	290	950	410
Cyprus	1,840	360	590	420	470
Nigeria	1,800	170	460	370	800
India	1,690	190	360	240	900
Other	24,950	4,310	5,560	7,840	7,280
Foreign (%)	10.4	6.0	10.2	9.2	19.6
All graduates	156,020	39,370	29,170	48,500	38,980
All foreign	67,630	13,250	14,530	18,460	21,400
China	10,090	1,120	2,850	2,010	4,120
India	6,410	1,210	2,150	530	2,520
Greece	5,260	880	1,090	1,290	2,000
United States	3,100	600	240	2,000	270
Pakistan	2,670	200	1,060	240	1,170
Nigeria	2,530	470	700	440	930

## CHAPTER 2 | Higher Education in Science and Engineering

Academic year, enrollment level, and place of origin	All S&E fields	Physical, biological, and agricultural sciences	Mathematics and computer sciences	Social and behavioral sciences	Engineering
Germany	2,370	580	400	860	530
France	2,240	660	350	390	840
Ireland	1,800	540	190	600	470
Malaysia	1,740	270	310	170	990
Other	29,420	6,720	5,190	9,930	7,560
Foreign (%)	43.3	33.6	49.8	38.1	54.9
2015–16					
All undergraduates	648,855	199,585	116,215	208,580	124,475
All foreign	91,590	17,140	16,125	28,675	29,650
China	12,935	1,590	3,345	3,090	4,910
Malaysia	5,375	865	675	1,050	2,785
Hong Kong	5,330	1,165	700	2,060	1,405
France	3,175	665	550	1,315	645
Cyprus	3,045	825	775	555	890
Romania	2,935	435	1,120	920	460
United States	2,930	990	265	1,475	200
Nigeria	2,845	305	555	635	1,350
India	2,655	295	425	640	1,295
Italy	2,485	560	360	1,110	455
Other	47,880	9,445	7,355	15,825	15,255
Foreign (%)	14.1	8.6	13.9	13.7	23.8
All graduates	181,200	49,600	26,340	59,205	46,055
All foreign	85,225	18,420	14,265	24,715	27,825
China	17,190	2,065	3,155	4,710	7,260
Nigeria	4,780	1,070	1,035	715	1,960
India	4,370	760	1,010	835	1,765

## CHAPTER 2 | Higher Education in Science and Engineering

Academic year, enrollment level, and place of origin	All S&E fields	Physical, biological, and agricultural sciences	Mathematics and computer sciences	Social and behavioral sciences	Engineering
United States	3,730	920	280	2,220	310
Germany	3,700	990	555	1,370	785
Italy	3,260	1,015	435	915	895
Greece	2,740	545	560	605	1,030
Saudi Arabia	2,545	725	960	225	635
France	2,505	605	430	540	930
Malaysia	1,965	500	280	305	880
Other	38,440	9,225	5,565	12,275	11,375
Foreign (%)	47.0	37.1	54.2	41.7	60.4

### Note(s)

Academic year 2006 includes enrollment between 1 August 2005 and 31 July 2006. Academic year 2016 includes enrollment between 1 August 2015 and 31 July 2015. Data are rounded to the nearest 5. Detail may not add to total because of rounding. Percentages are based on rounded data. Physical, biological, and agricultural sciences include earth, atmospheric, and ocean sciences.

### Source(s)

Higher Education Statistics Agency, special tabulations (2017).

*Science and Engineering Indicators 2018*

## CHAPTER 2 | Higher Education in Science and Engineering

APPENDIX TABLE 2-43

### Foreign S&E student enrollment in Japanese universities, by enrollment level, place of origin, and field: 2004 and 2016

(Number)

Year, enrollment level, and place of origin	S&E fields					Non-S&E fields
	All S&E	Physical and biological sciences and mathematics	Agricultural sciences	Social and behavioral sciences	Engineering	
2004						
All undergraduates	1,557,939	87,398	69,672	961,762	439,107	947,984
Foreign	39,914	595	540	32,916	5,863	18,050
China	29,192	324	318	25,470	3,080	11,980
South Korea	7,018	185	122	5,403	1,308	4,911
Malaysia	1,142	15	15	198	914	97
Vietnam	424	6	10	242	166	115
Indonesia	233	3	14	152	64	65
Thailand	226	3	12	179	32	62
Mongolia	160	1	9	133	17	53
Sri Lanka	146	1	2	101	42	25
United Kingdom	78	1	0	73	4	59
United States	76	7	0	65	4	157
Other	1,219	49	38	900	232	526
Foreign (%)	2.6	0.7	0.8	3.4	1.3	1.9

## CHAPTER 2 | Higher Education in Science and Engineering

[illegible]

## CHAPTER 2 | Higher Education in Science and Engineering

Year, enrollment level, and place of origin	S&E fields					Non-S&E fields
	All S&E	Physical and biological sciences and mathematics	Agricultural sciences	Social and behavioral sciences	Engineering	
All undergraduates	1,369,855	79,290	76,404	829,399	384,762	1,197,175
Foreign	43,760	1,016	685	33,274	8,785	36,633
China	24,615	531	317	19,157	4,610	15,466
South Korea	6,856	250	125	5,199	1,282	6,428
Vietnam	4,671	30	44	3,982	615	2,471
Nepal	1,235	3	4	1,114	114	1,148
Malaysia	1,118	25	10	190	893	300
Taiwan	762	21	11	629	101	1,964
Indonesia	694	30	36	454	174	445
Thailand	667	21	30	467	149	593
Mongolia	326	7	14	218	87	244
Brazil	304	7	14	193	90	491
Other	2,512	91	80	1,671	670	7,083
Foreign (%)	3.2	1.3	0.9	4.0	2.3	3.1
All graduates	131,751	18,550	12,295	22,050	78,856	101,214
Master's	104,074	13,539	8,715	15,930	65,890	55,040
Doctorate	27,677	5,011	3,580	6,120	12,966	46,174

## CHAPTER 2 | Higher Education in Science and Engineering

Year, enrollment level, and place of origin	S&E fields					Non-S&E fields
	All S&E	Physical and biological sciences and mathematics	Agricultural sciences	Social and behavioral sciences	Engineering	
Foreign	24,899	1,870	2,373	9,877	10,779	20,667
China	13,092	771	838	6,469	5,014	11,728
South Korea	1,488	138	101	554	695	1,386
Indonesia	1,314	185	237	208	684	666
Vietnam	1,203	78	138	345	642	607
Thailand	904	44	149	176	535	480
Taiwan	684	46	71	328	239	734
Bangladesh	539	69	158	91	221	360
Malaysia	513	41	44	74	354	184
India	405	56	25	63	261	185
Myanmar	302	8	48	102	144	185
Other	4,455	434	564	1,467	1,990	4,152
Foreign (%)	18.9	10.1	19.3	44.8	13.7	20.4

### Note(s)

Data are for students of non-Japanese citizenship, including permanent residents. Undergraduates include those attending 4-year colleges and universities. Engineering includes computer sciences. Physical and biological sciences and mathematics include earth, atmospheric, and ocean sciences and mathematics. Social and behavioral sciences include business and law. Enrollment is as of May of the reference year.

### Source(s)

## CHAPTER 2 | Higher Education in Science and Engineering

Government of Japan, Ministry of Education, Culture, Sports, Science and Technology, Survey of Education, special tabulations (2016).

*Science and Engineering Indicators 2018*



## CHAPTER 2 | Higher Education in Science and Engineering

APPENDIX TABLE 2-44

### S&E student enrollment in Canadian universities, by enrollment level, place of origin, and S&E field: 2004 and 2014

(Number)

Year, enrollment level, and place of origin	All S&E fields	Physical and biological sciences	Mathematics and computer sciences	Agricultural sciences	Social and behavioral sciences	Engineering
2004						
Undergraduates	334,797	77,748	30,105	10,083	150,783	66,078
Foreign	19,962	3,336	3,198	426	7,257	5,745
China	3,456	453	975	60	1,272	696
United States	2,445	588	156	120	1,299	282
France	1,101	150	93	30	561	267
Morocco	1,056	96	168	6	138	648
India	594	81	123	6	105	279
South Korea	501	153	75	9	183	81
Hong Kong	483	84	99	9	195	96
Pakistan	468	57	129	0	123	159
Lebanon	462	72	48	0	75	267
Bangladesh	372	39	138	6	60	129
Other	9,024	1,563	1,194	180	3,246	2,841
Foreign (%)	6.0	4.3	10.6	4.2	4.8	8.7
Graduates	65,976	15,927	7,704	4,134	20,082	18,129

## CHAPTER 2 | Higher Education in Science and Engineering

Year, enrollment level, and place of origin	All S&E fields	Physical and biological sciences	Mathematics and computer sciences	Agricultural sciences	Social and behavioral sciences	Engineering
Foreign	12,999	2,529	1,881	708	2,895	4,986
China	2,769	459	624	57	411	1,218
France	1,368	456	93	117	408	294
United States	765	219	108	39	279	120
Iran	663	84	75	18	36	450
India	657	75	108	33	57	384
Morocco	567	84	111	30	99	243
Algeria	408	54	102	18	30	204
Romania	372	93	57	12	81	129
Tunisia	348	39	78	9	87	135
Bangladesh	312	21	45	3	36	207
Other	4,770	945	480	372	1,371	1,602
Foreign (%)	19.7	15.9	24.4	17.1	14.4	27.5
2014						
Undergraduates	436,098	101,622	33,420	14,532	191,151	95,373
Foreign	30,873	5,448	3,612	1,032	10,647	10,134
China	8,994	1,464	1,821	432	2,871	2,406
France	4,449	555	165	72	2,211	1,446

## CHAPTER 2 | Higher Education in Science and Engineering

Year, enrollment level, and place of origin	All S&E fields	Physical and biological sciences	Mathematics and computer sciences	Agricultural sciences	Social and behavioral sciences	Engineering
United States	3,141	843	312	168	1,338	480
Saudi Arabia	882	123	120	15	132	492
India	870	144	117	21	156	432
Nigeria	816	183	87	21	252	273
United Arab Emirates	765	159	48	18	159	381
Hong Kong	639	162	63	30	285	99
Pakistan	561	54	57	3	150	297
Brazil	519	63	27	18	36	375
Other	9,237	1,698	795	234	3,057	3,453
Foreign (%)	7.1	5.4	10.8	7.1	5.6	10.6
Graduates	92,505	20,076	9,981	5,082	29,568	27,798
Foreign	19,188	3,756	2,571	969	3,267	8,625
China	3,648	525	504	213	558	1,848
France	2,544	702	171	135	735	801
India	2,418	291	462	72	63	1,530
Iran	1,884	237	276	33	72	1,266
United States	1,341	429	189	84	417	222
Bangladesh	432	63	93	15	51	210

## CHAPTER 2 | Higher Education in Science and Engineering

Year, enrollment level, and place of origin	All S&E fields	Physical and biological sciences	Mathematics and computer sciences	Agricultural sciences	Social and behavioral sciences	Engineering
Tunisia	423	75	63	15	39	231
Egypt	321	51	27	6	9	228
Saudi Arabia	303	75	84	12	24	108
Nigeria	297	30	51	21	42	153
Other	5,577	1,278	651	363	1,257	2,028
Foreign (%)	20.7	18.7	25.8	19.1	11.0	31.0

### Note(s)

Enrollment is as of 31 October of the reference year. Data exclude respondents with unknown country of permanent residence. Data are rounded to the nearest 3. Detail may not add to total because of rounding. Physical and biological sciences include earth, atmospheric, and ocean sciences. Engineering includes architecture. Social and behavioral sciences include law.

### Source(s)

Statistics Canada, Center for Education Statistics, special tabulations (2016).

*Science and Engineering Indicators 2018*

## CHAPTER 3

# Science and Engineering Labor Force

## List of Appendix Tables

Appendix Table 3-1	S&E occupations in the 1960 U.S. Census and 2015 American Community Survey.....	3-3
Appendix Table 3-2	Bureau of Labor Statistics projections of occupational employment: 2014–24.....	3-6
Appendix Table 3-3	Scientists and engineers, by occupation and degree field: 2015.....	3-15
Appendix Table 3-4	Employment sector of S&E highest degree holders and workers in S&E occupations: 1993, 2003, and 2015.....	3-31
Appendix Table 3-5	Employment sector of S&E highest degree holders, by level and field of highest degree: 2015.....	3-33
Appendix Table 3-6	Scientists and engineers participating in work-related training, by labor force status, highest degree level, and sex: 2015.....	3-36
Appendix Table 3-7	Most important reason for scientists and engineers to participate in work-related training, by labor force status: 2015.....	3-37
Appendix Table 3-8	Unemployment rates of scientists and engineers, by level of highest degree and broad occupational category: Selected years, 2003–15.....	3-38
Appendix Table 3-9	Median annual salaries for employed college-educated individuals, by broad field and level of highest degree and broad occupational category: 2015.....	3-39
Appendix Table 3-10	Postgraduation plans of doctorate recipients with definite commitments, by broad field of study: Selected years, 1975–2015.....	3-40
Appendix Table 3-11	Age profile of employed scientists and engineers, by sex and field of highest degree: 2015.....	3-43
Appendix Table 3-12	Employed scientists and engineers, by sex and occupation: 2015.....	3-47
Appendix Table 3-13	Employed S&E highest degree holders, by sex and field of degree: 2015.....	3-54
Appendix Table 3-14	Employed S&E highest degree holders, by sex, race, ethnicity, field of highest degree, and broad occupational category: 2015.....	3-59
Appendix Table 3-15	Employed scientists and engineers, by race, ethnicity, and occupation: 2015.....	3-63
Appendix Table 3-16	Employed S&E highest degree holders, by race, ethnicity, and field of degree: 2015.....	3-74
Appendix Table 3-17	Estimate and median salary of full-time workers with highest degree in S&E field, by sex and occupation: 2015.....	3-81
Appendix Table 3-18	Estimate and median salary of full-time workers with highest degree in S&E field, by race, ethnicity, and occupation: 2015.....	3-92
Appendix Table 3-19	Race and ethnic distribution of workers in S&E occupations, by nativity: 2015.....	3-106
Appendix Table 3-20	Occupations of new H-1B visa recipients: FY 2016.....	3-107
Appendix Table 3-21	Plans of foreign recipients of U.S. doctorates to stay in the United States, by field of doctorate and place of origin: 2004–15.....	3-108
Appendix Table 3-22	R&D personnel in selected regions or countries: 2000–15.....	3-114



Appendix Table 3-23	Researchers as a share of total employment and GERD per researcher in selected regions, countries, or economies: 2015.....	3-115
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## CHAPTER 3 | Science and Engineering Labor Force

APPENDIX TABLE 3-1



### S&E occupations in the 1960 U.S. Census and 2015 American Community Survey

(List of S&amp;E occupations)

Decennial Census, 1960	American Community Survey, 2015
Biological, agricultural, and environmental life scientists	Biological, agricultural, and environmental life scientists
Agricultural scientists	Agricultural and food scientists
Biological scientists	Biological scientists
Foresters and conservationists	Conservation scientists and foresters
	Medical scientists
	Life scientists, all other
Mathematical scientists	Computer and mathematical scientists
Mathematicians	Computer and information research scientists
Statisticians and actuaries	Computer network architects
	Computer support specialists
	Computer systems analysts
	Database administrators
	Information security analysts
	Network and computer systems administrators
	Operations research analysts
	Software developers, applications and systems software
	Web developers
	Computer occupations, all other
	Logisticians
	Mathematicians
	Operations research analysts
	Statisticians
	Miscellaneous mathematical science occupations
Physical scientists	Physical scientists
Chemists	Astronomers and physicists

## CHAPTER 3 | Science and Engineering Labor Force

Decennial Census, 1960	American Community Survey, 2015
Geologists and geophysicists	Atmospheric and space scientists
Physicists	Chemists and materials scientists
Miscellaneous natural scientists	Environmental scientists and geoscientists
	Physical scientists, all other
Social scientists	Social scientists
Economists	Economists
Psychologists	Psychologists
Miscellaneous social scientists	Sociologists
	Survey researchers
	Urban and regional planners
	Miscellaneous social scientists and related workers
Engineers	Engineers
Aeronautical engineers	Aerospace engineers
Chemical engineers	Agricultural engineers
Civil engineers	Biomedical engineers
Electrical engineers	Chemical engineers
Industrial engineers	Civil engineers
Mechanical engineers	Computer hardware engineers
Metallurgical engineers and metallurgists	Electrical engineers
Mining engineers	Environmental engineers
Sales engineers	Industrial engineers, including health and safety engineers
Engineers nec	Marine engineers and naval architects
	Materials engineers
	Mechanical engineers
	Mining and geological engineers, including mining safety engineers
	Nuclear engineers
	Petroleum engineers



## CHAPTER 3 | Science and Engineering Labor Force

Decennial Census, 1960	American Community Survey, 2015
	Sales engineers
	Engineers, all others

nec = not elsewhere classified.

### Note(s)

The data reported here on the S&E employment levels for 1960 and 2015 were calculated using the Census Bureau's 1960 Decennial Census and 2015 American Community Survey (ACS) microdata, respectively, adjusted by the Integrated Public Use Microdata Series (IPUMS) from the University of Minnesota's Minnesota Population Center (<https://www.ipums.org/>). Computer occupations were not present in the occupational classification system used in 1960. For more information on how occupational classification systems have changed over time, see Wyatt and Hecker's report, "Occupational Changes During the 20th Century" (*Monthly Labor Review*, March 2006). S&E employment levels for 1960 and 2015 do not include S&E postsecondary teachers. Although the 1960 Census data allow for separate identification of S&E postsecondary teachers, the 2015 ACS data aggregate postsecondary teachers of both S&E and non-S&E fields into one occupation code.

### Source(s)

National Science Foundation, National Center for Science and Engineering Statistics, based on 1960 Decennial Census and 2015 ACS, Census Bureau.

*Science and Engineering Indicators 2018*

## CHAPTER 3 | Science and Engineering Labor Force

APPENDIX TABLE 3-2



### Bureau of Labor Statistics projections of occupational employment: 2014–24

(Thousands)

Occupation	BLS National Employment Matrix 2014 estimate	BLS projected 2024 employment	Job openings from growth and net replacements, 2014–24	10-year growth in total employment (%)	10-year job openings as % of 2014 employment
Total, all occupations	150,539.9	160,328.8	46,506.9	6.5	30.9
All S&E	6,261.7	6,956.7	1,880.5	11.1	30.0
Computer and mathematical scientists (excluding computer programmers)	3,714.1	4,267.7	1,063.8	14.9	28.6
Computer and information scientists, research	25.6	28.3	6.0	10.5	23.4
Computer and information analysts	650.7	784.1	217.1	20.5	33.4
Software and web developers	1,262.5	1,488.7	404.5	17.9	32.0
Network architects and database and systems administrators	648.8	705.0	150.1	8.7	23.1
Computer support specialists	766.9	855.7	187.4	11.6	24.4
Computer specialists, all other	233.0	240.8	37.7	3.3	16.2
Mathematicians	3.5	4.2	1.3	20.0	37.1
Operations research analysts	91.3	118.9	43.9	30.2	48.1
Statisticians	30.0	40.1	15.4	33.7	51.3
Mathematical scientists, all other	1.8	1.9	0.4	5.6	22.2
Engineers	1,636.3	1,701.2	510.7	4.0	31.2
Aerospace engineers	72.5	70.8	20.7	-2.3	28.6
Agricultural engineers	2.9	3.0	0.7	3.4	24.1

## CHAPTER 3 | Science and Engineering Labor Force

Occupation	BLS National Employment Matrix 2014 estimate	BLS projected 2024 employment	Job openings from growth and net replacements, 2014–24	10-year growth in total employment (%)	10-year job openings as % of 2014 employment
Biomedical engineers	22.1	27.2	10.9	23.1	49.3
Chemical engineers	34.3	34.9	10.0	1.7	29.2
Civil engineers	281.4	305.0	106.7	8.4	37.9
Computer hardware engineers	77.7	80.1	18.4	3.1	23.7
Electrical and electronics engineers	315.9	315.7	71.4	-0.1	22.6
Electrical engineers	178.4	180.2	41.1	1.0	23.0
Electronics engineers, except computer	137.4	135.5	30.3	-1.4	22.1
Environmental engineers	55.1	62.0	22.4	12.5	40.7
Industrial engineers, including health and safety	266.3	270.0	81.8	1.4	30.7
Health and safety engineers, except mining safety engineers and inspectors	25.2	26.8	9.0	6.3	35.7
Industrial engineers	241.1	243.2	72.8	0.9	30.2
Marine engineers and naval architects	8.3	9.0	2.9	8.4	34.9
Materials engineers	25.3	25.6	9.2	1.2	36.4
Mechanical engineers	277.5	292.1	102.5	5.3	36.9
Mining and geological engineers, including mining safety engineers	8.3	8.8	2.7	6.0	32.5
Nuclear engineers	16.8	16.2	4.4	-3.6	26.2
Petroleum engineers	35.1	38.5	13.0	9.7	37.0
Engineers, all other	136.9	142.3	33.0	3.9	24.1

## CHAPTER 3 | Science and Engineering Labor Force

Occupation	BLS National Employment Matrix 2014 estimate	BLS projected 2024 employment	Job openings from growth and net replacements, 2014–24	10-year growth in total employment (%)	10-year job openings as % of 2014 employment
Life scientists	310.9	330.0	116.6	6.1	37.5
Agricultural and food scientists	36.1	38.0	14.5	5.3	40.2
Animal scientists	2.9	3.2	1.2	10.3	41.4
Food scientists and technologists	15.4	16.0	5.9	3.9	38.3
Soil and plant scientists	17.7	18.9	7.3	6.8	41.2
Biological scientists	114.1	118.4	35.0	3.8	30.7
Biochemists and biophysicists	34.1	36.9	11.9	8.2	34.9
Microbiologists	22.4	23.2	6.8	3.6	30.4
Zoologists and wildlife biologists	21.3	22.2	6.6	4.2	31.0
Biological scientists, all other	36.4	36.2	9.7	-0.5	26.6
Conservation scientists and foresters	36.5	39.3	18.7	7.7	51.2
Conservation scientists	21.1	22.5	10.6	6.6	50.2
Foresters	15.5	16.8	8.0	8.4	51.6
Medical scientists	113.6	123.0	44.5	8.3	39.2
Epidemiologists	5.8	6.1	2.2	5.2	37.9
Medical scientists, except epidemiologists	107.9	116.8	42.4	8.2	39.3
All other life scientists	10.6	11.3	4.0	6.6	37.7
Physical scientists	296.8	316.6	92.7	6.7	31.2
Astronomers and physicists	20.0	21.4	5.3	7.0	26.5
Astronomers	1.9	1.9	0.4	0.0	21.1
Physicists	18.1	19.5	4.9	7.7	27.1

## CHAPTER 3 | Science and Engineering Labor Force

Occupation	BLS National Employment Matrix 2014 estimate	BLS projected 2024 employment	Job openings from growth and net replacements, 2014–24	10-year growth in total employment (%)	10-year job openings as % of 2014 employment
Atmospheric and space scientists	11.8	12.9	3.3	9.3	28.0
Chemists and materials scientists	98.4	101.0	24.2	2.6	24.6
Chemists	91.1	93.5	22.4	2.6	24.6
Materials scientists	7.3	7.5	1.8	2.7	24.7
Environmental scientists and geoscientists	138.0	152.5	56.9	10.5	41.2
Environmental scientists and specialists, including health	94.6	104.8	39.3	10.8	41.5
Geoscientists, except hydrologists and geographers	36.4	40.2	15.0	10.4	41.2
Hydrologists	7.0	7.5	2.6	7.1	37.1
All other physical scientists	28.5	28.8	3.0	1.1	10.5
Social and related scientists (excluding historians)	303.6	341.2	96.7	12.4	31.9
Economists	21.5	22.7	7.0	5.6	32.6
Survey researchers	16.7	18.7	3.9	12.0	23.4
Psychologists	173.9	206.4	69.8	18.7	40.1
Clinical, counseling, and school psychologists	155.3	185.9	63.8	19.7	41.1
Industrial- organizational psychologists	2.0	2.3	0.8	15.0	40.0
Psychologists, all other	16.6	18.3	5.2	10.2	31.3
Sociologists	2.6	2.5	0.3	-3.8	11.5

## CHAPTER 3 | Science and Engineering Labor Force

Occupation	BLS National Employment Matrix 2014 estimate	BLS projected 2024 employment	Job openings from growth and net replacements, 2014–24	10-year growth in total employment (%)	10-year job openings as % of 2014 employment
Urban and regional planners	38.0	40.4	9.4	6.3	24.7
Miscellaneous social scientists and related workers	50.9	50.3	6.3	-1.2	12.4
Anthropologists and archeologists	7.7	8.0	1.2	3.9	15.6
Geographers	1.4	1.4	0.2	0.0	14.3
Political scientists	6.2	6.0	0.7	-3.2	11.3
Social scientists and related workers, all other	35.6	34.9	4.2	-2.0	11.8
Selected other occupations					
S&E managers	918.7	1,034.2	308.1	12.6	33.5
Computer and information systems managers	348.5	402.2	94.8	15.4	27.2
Architectural and engineering managers	182.1	185.8	59.5	2.0	32.7
Medical and health services managers	333.0	389.3	140.5	16.9	42.2
Natural sciences managers	55.1	56.9	13.3	3.3	24.1
S&E technicians and technologists, except computer programmers	1,158.1	1,172.3	334.9	1.2	28.9
Agricultural and food science technicians	33.0	34.7	12.4	5.2	37.6
Biological technicians	79.3	83.5	26.3	5.3	33.2
Chemical technicians	66.5	67.7	21.1	1.8	31.7
Geological and petroleum technicians	16.5	18.5	8.0	12.1	48.5

## CHAPTER 3 | Science and Engineering Labor Force

Occupation	BLS National Employment Matrix 2014 estimate	BLS projected 2024 employment	Job openings from growth and net replacements, 2014–24	10-year growth in total employment (%)	10-year job openings as % of 2014 employment
Nuclear technicians	6.8	6.4	2.8	-5.9	41.2
Social science research assistants	32.0	33.8	15.2	5.6	47.5
Miscellaneous life, physical, and social science technicians	161.4	172.2	80.2	6.7	49.7
Drafters	204.4	198.3	25.8	-3.0	12.6
Surveying and mapping technicians	57.3	52.9	6.5	-7.7	11.3
Aerospace engineering and operations technicians	11.4	11.8	3.2	3.5	28.1
Civil engineering technicians	74.0	77.6	21.6	4.9	29.2
Electrical and electronic engineering technicians	139.4	136.6	34.1	-2.0	24.5
Electro-mechanical technicians	14.7	14.8	3.7	0.7	25.2
Environmental engineering technicians	18.6	20.4	6.4	9.7	34.4
Industrial engineering technicians	66.5	63.5	16.3	-4.5	24.5
Mechanical engineering technicians	48.4	49.3	12.8	1.9	26.4
Engineering technicians, all other	70.1	69.9	17.1	-0.3	24.4
Mathematical technicians	1.2	1.1	0.2	-8.3	16.7
Surveyors, cartographers, photogrammetrists	56.6	59.3	21.2	4.8	37.5
Computer programmers	328.6	302.2	81.0	-8.0	24.7
Health care practitioners and technical occupations	8,236.5	9,584.6	3,161.6	16.4	38.4

## CHAPTER 3 | Science and Engineering Labor Force

Occupation	BLS National Employment Matrix 2014 estimate	BLS projected 2024 employment	Job openings from growth and net replacements, 2014–24	10-year growth in total employment (%)	10-year job openings as % of 2014 employment
Health diagnosing and treating practitioners	5,132.4	5,994.7	2,073.4	16.8	40.4
Chiropractors	45.2	53.1	16.0	17.5	35.4
Dentists	151.5	178.2	57.6	17.6	38.0
Dietitians and nutritionists	66.7	77.6	16.0	16.3	24.0
Optometrists	40.6	51.6	25.5	27.1	62.8
Pharmacists	297.1	306.2	78.4	3.1	26.4
Physicians and surgeons	708.3	807.6	290.0	14.0	40.9
Physician assistants	94.4	123.2	50.0	30.5	53.0
Registered nurses	2,751.0	3,190.3	1,088.4	16.0	39.6
Nurse practitioners	126.9	171.7	74.7	35.3	58.9
Therapists	655.9	813.8	311.2	24.1	47.4
Veterinarians	78.3	85.2	19.0	8.8	24.3
Health diagnosing and treating practitioners, all other	116.5	136.2	46.6	16.9	40.0
Health technologists and technicians	2,946.6	3,416.1	1,040.4	15.9	35.3
Clinical laboratory technologists and technicians	328.2	380.3	130.5	15.9	39.8
Dental hygienists	200.5	237.9	70.3	18.7	35.1
Diagnostic-related technologists and technicians	363.9	412.4	117.3	13.3	32.2
Emergency medical technicians and paramedics	241.2	299.6	98.0	24.2	40.6



## CHAPTER 3 | Science and Engineering Labor Force

Occupation	BLS National Employment Matrix 2014 estimate	BLS projected 2024 employment	Job openings from growth and net replacements, 2014–24	10-year growth in total employment (%)	10-year job openings as % of 2014 employment
Health practitioner support technicians	712.8	794.7	154.5	11.5	21.7
Licensed practical and licensed vocational nurses	719.9	837.2	322.2	16.3	44.8
Medical records and health information technicians	188.6	217.6	71.2	15.4	37.8
Opticians, dispensing	75.2	93.0	37.9	23.7	50.4
Health care technologists and technicians, all other	116.4	143.5	38.6	23.3	33.2
Other health care practitioners and technical occupations	157.4	173.8	47.8	10.4	30.4
Occupational health and safety specialists and technicians	85.5	89.6	21.3	4.8	24.9
Health care practitioners and technical workers, all other	72.0	84.1	26.5	16.8	36.8
Lawyers	778.7	822.5	157.7	5.6	20.3
Postsecondary teachers	1,869.4	2,088.8	550.6	11.7	29.5

BLS = Bureau of Labor Statistics.

### Note(s)

Estimates of current and projected employment for the 2014–24 period are from BLS's National Employment Matrix. Data in the matrix are from the Occupational Employment Statistics (OES) survey and the Current Population Survey (CPS). Together, these sources cover paid workers, self-employed workers, and unpaid family workers in all industries, agriculture, and private households. Because the numbers are derived from multiple sources, data can often differ from employment data provided by the OES survey, CPS, or other employment surveys alone. BLS does not make projections for S&E occupations as a group; numbers in the table are based on the sum of BLS projections in occupations that the National Science Foundation considers S&E. Detail may not add to total because of rounding.

## CHAPTER 3 | Science and Engineering Labor Force

### Source(s)

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National Science Foundation, National Center for Science and Engineering Statistics, special tabulations (2016) of BLS Employment Projections.

*Science and Engineering Indicators 2018*

## CHAPTER 3 | Science and Engineering Labor Force

APPENDIX TABLE 3-3

### Scientists and engineers, by occupation and degree field: 2015

(Number)

Occupation	All employed scientists and engineers	Highest degree in S&E						S&E-related fields	Non-S&E fields
		All S&E highest degree	Computer and mathematical sciences	Biological, agricultural, and environmental life sciences	Physical and related sciences	Social and related sciences	Engineering		
All occupations	25,306,000	13,497,000	2,346,000	2,116,000	789,000	5,056,000	3,190,000	6,191,000	5,618,000
S&E occupations	6,407,000	4,854,000	1,350,000	624,000	386,000	660,000	1,834,000	367,000	1,186,000
Computer and mathematical scientists	3,156,000	2,178,000	1,280,000	116,000	67,000	203,000	512,000	157,000	820,000
Computer and information scientists	2,823,000	1,951,000	1,159,000	65,000	60,000	181,000	486,000	141,000	731,000
Computer and information scientists, research	64,000	50,000	31,000	s	s	s	6,000	s	10,000
Computer network architects	48,000	39,000	26,000	s	s	s	9,000	s	8,000
Computer support specialists	242,000	130,000	82,000	6,000	4,000	19,000	19,000	19,000	94,000
Computer system analysts	333,000	213,000	139,000	7,000	5,000	23,000	39,000	21,000	99,000
Database administrators	146,000	80,000	44,000	s	1,000	22,000	12,000	5,000	61,000
Information security analysts	69,000	49,000	38,000	s	s	s	7,000	s	18,000
Network and computer systems administrators	188,000	133,000	84,000	7,000	s	13,000	25,000	7,000	48,000

## CHAPTER 3 | Science and Engineering Labor Force

Occupation	All employed scientists and engineers	Highest degree in S&E						S&E-related fields	Non-S&E fields
		All S&E highest degree	Computer and mathematical sciences	Biological, agricultural, and environmental life sciences	Physical and related sciences	Social and related sciences	Engineering		
Software developers — applications and systems software	623,000	485,000	288,000	10,000	23,000	27,000	137,000	21,000	117,000
Web developers	174,000	82,000	47,000	11,000	3,000	8,000	13,000	7,000	85,000
Other computer information science occupations	345,000	192,000	102,000	9,000	8,000	47,000	25,000	16,000	137,000
Computer engineers — software	592,000	499,000	279,000	7,000	8,000	11,000	194,000	38,000	55,000
Mathematical scientists	218,000	139,000	45,000	s	5,000	17,000	21,000	s	73,000
Mathematicians	7,000	7,000	6,000	s	s	s	s	s	s
Operations research analysts, including modeling	122,000	54,000	15,000	s	2,000	12,000	16,000	1,000	67,000
Statisticians	74,000	67,000	17,000	s	s	4,000	s	s	2,000
Other mathematical scientists	15,000	s	s	s	s	1,000	1,000	*	4,000
Postsecondary teachers — computer and mathematical sciences	114,000	89,000	76,000	1,000	s	5,000	5,000	10,000	15,000
Computer science	22,000	14,000	10,000	s	s	s	3,000	s	8,000

## CHAPTER 3 | Science and Engineering Labor Force

Occupation	All employed scientists and engineers	Highest degree in S&E						S&E-related fields	Non-S&E fields
		All S&E highest degree	Computer and mathematical sciences	Biological, agricultural, and environmental life sciences	Physical and related sciences	Social and related sciences	Engineering		
Mathematics and statistics	92,000	75,000	66,000	s	s	4,000	1,000	10,000	8,000
Biological, agricultural, and environmental life scientists	631,000	496,000	4,000	422,000	37,000	19,000	13,000	72,000	63,000
Agricultural and food scientists	52,000	45,000	s	38,000	3,000	s	s	1,000	s
Biological and medical scientists	443,000	346,000	4,000	290,000	27,000	13,000	11,000	65,000	33,000
Biochemists and biophysicists	72,000	68,000	s	53,000	11,000	s	2,000	2,000	2,000
Biological scientists (e.g., botanists, ecologists, zoologists)	137,000	121,000	s	111,000	5,000	4,000	*	4,000	12,000
Medical scientists (excluding practitioners)	136,000	85,000	4,000	65,000	5,000	5,000	6,000	44,000	7,000
Other biological and life scientists	98,000	72,000	*	61,000	6,000	2,000	3,000	15,000	10,000
Forestry and conservation scientists	59,000	35,000	s	34,000	s	1,000	s	*	s
Postsecondary teachers — life and related sciences	78,000	69,000	s	60,000	6,000	2,000	1,000	6,000	3,000
Agriculture	5,000	5,000	s	3,000	s	s	s	s	s

## CHAPTER 3 | Science and Engineering Labor Force

Occupation	All employed scientists and engineers	Highest degree in S&E						S&E-related fields	Non-S&E fields
		All S&E highest degree	Computer and mathematical sciences	Biological, agricultural, and environmental life sciences	Physical and related sciences	Social and related sciences	Engineering		
Biological sciences	62,000	57,000	s	55,000	s	s	s	3,000	2,000
Other natural sciences	11,000	8,000	s	2,000	5,000	s	s	s	s
Physical and related scientists	331,000	309,000	1,000	41,000	232,000	9,000	26,000	12,000	10,000
Chemists, except biochemists	105,000	96,000	s	15,000	74,000	1,000	5,000	6,000	3,000
Earth scientists, geologists, and oceanographers	66,000	64,000	s	3,000	55,000	2,000	3,000	s	2,000
Atmospheric and space scientists	15,000	14,000	s	s	12,000	s	1,000	s	1,000
Geologists, including earth scientists	48,000	46,000	s	3,000	40,000	1,000	2,000	s	2,000
Oceanographers	4,000	4,000	s	s	3,000	s	s	s	s
Physicists and astronomers	49,000	47,000	*	s	41,000	s	4,000	2,000	s
Astronomers	7,000	7,000	s	s	6,000	s	s	s	s
Physicists, except biophysicists	42,000	40,000	*	s	35,000	s	4,000	2,000	s
Other physical and related scientists	45,000	38,000	s	15,000	7,000	5,000	11,000	4,000	4,000

## CHAPTER 3 | Science and Engineering Labor Force

Occupation	All employed scientists and engineers	Highest degree in S&E						S&E-related fields	Non-S&E fields
		All S&E highest degree	Computer and mathematical sciences	Biological, agricultural, and environmental life sciences	Physical and related sciences	Social and related sciences	Engineering		
Postsecondary teachers — physical and related sciences	65,000	64,000	s	6,000	55,000	*	2,000	s	s
Chemistry	28,000	28,000	s	1,000	26,000	s	s	s	s
Earth, environmental, and marine sciences	15,000	15,000	s	5,000	9,000	*	s	s	s
Physics	22,000	21,000	s	s	20,000	s	1,000	s	s
Social and related scientists	570,000	423,000	8,000	10,000	1,000	400,000	2,000	31,000	116,000
Economists	32,000	28,000	s	s	s	27,000	s	s	3,000
Political scientists	25,000	19,000	s	s	s	17,000	s	s	5,000
Psychologists, including clinical	213,000	189,000	s	s	s	187,000	s	4,000	21,000
Sociologists and anthropologists	31,000	24,000	s	*	s	23,000	s	s	s
Anthropologists	11,000	10,000	s	s	s	10,000	s	s	1,000
Sociologists	20,000	14,000	s	*	s	13,000	s	s	s
Other social and related scientists	108,000	57,000	3,000	6,000	1,000	45,000	2,000	21,000	29,000
Postsecondary teachers — social and related sciences	162,000	106,000	3,000	s	s	101,000	s	4,000	52,000
Economics	21,000	16,000	s	s	s	15,000	s	s	4,000

## CHAPTER 3 | Science and Engineering Labor Force

Occupation	All employed scientists and engineers	Highest degree in S&E						S&E-related fields	Non-S&E fields
		All S&E highest degree	Computer and mathematical sciences	Biological, agricultural, and environmental life sciences	Physical and related sciences	Social and related sciences	Engineering		
Political science	21,000	18,000	s	s	s	18,000	s	s	s
Psychology	38,000	35,000	s	s	s	33,000	s	s	3,000
Sociology	14,000	12,000	s	s	s	12,000	s	s	2,000
Other social sciences	68,000	24,000	s	s	s	23,000	s	4,000	41,000
Engineers	1,719,000	1,448,000	56,000	34,000	48,000	28,000	1,281,000	94,000	176,000
Aerospace, aeronautical, or astronautical engineers	96,000	83,000	4,000	s	5,000	s	73,000	3,000	10,000
Chemical engineers	80,000	73,000	s	1,000	3,000	s	69,000	1,000	6,000
Civil, architectural, or sanitary engineers	251,000	217,000	3,000	3,000	3,000	5,000	204,000	17,000	17,000
Electrical or computer hardware engineers	360,000	321,000	23,000	s	10,000	s	281,000	13,000	26,000
Computer engineers, hardware	70,000	59,000	13,000	s	*	s	38,000	2,000	9,000
Electrical and electronics engineers	290,000	262,000	10,000	s	9,000	s	243,000	12,000	17,000
Industrial engineers	82,000	63,000	1,000	6,000	1,000	4,000	51,000	6,000	12,000
Mechanical engineers	337,000	292,000	8,000	s	2,000	s	280,000	15,000	30,000



## CHAPTER 3 | Science and Engineering Labor Force

Occupation	All employed scientists and engineers	Highest degree in S&E						S&E-related fields	Non-S&E fields
		All S&E highest degree	Computer and mathematical sciences	Biological, agricultural, and environmental life sciences	Physical and related sciences	Social and related sciences	Engineering		
Other engineers	460,000	349,000	15,000	22,000	24,000	12,000	277,000	37,000	74,000
Agricultural engineers	7,000	7,000	s	s	s	s	5,000	s	s
Bioengineers or biomedical engineers	26,000	21,000	s	3,000	*	s	17,000	4,000	s
Environmental engineers	66,000	60,000	s	11,000	8,000	s	40,000	4,000	2,000
Marine engineers and naval architects	12,000	10,000	s	s	s	s	9,000	s	s
Materials and metallurgical engineers	31,000	27,000	s	s	2,000	s	24,000	s	3,000
Mining and geological engineers	5,000	5,000	s	s	*	s	4,000	s	s
Nuclear engineers	25,000	23,000	s	s	s	s	22,000	s	2,000
Petroleum engineers	19,000	17,000	s	s	3,000	s	12,000	s	s
Sales engineers	90,000	58,000	7,000	s	1,000	7,000	42,000	5,000	27,000
Other engineers	178,000	122,000	8,000	4,000	7,000	2,000	102,000	22,000	34,000
Postsecondary teachers — engineering	53,000	49,000	2,000	s	s	s	45,000	2,000	2,000
S&E-related occupations	7,867,000	1,953,000	326,000	600,000	160,000	390,000	477,000	4,437,000	1,478,000

## CHAPTER 3 | Science and Engineering Labor Force

Occupation	All employed scientists and engineers	Highest degree in S&E						S&E-related fields	Non-S&E fields
		All S&E highest degree	Computer and mathematical sciences	Biological, agricultural, and environmental life sciences	Physical and related sciences	Social and related sciences	Engineering		
Health-related occupations	4,883,000	666,000	24,000	341,000	63,000	223,000	15,000	3,685,000	532,000
Diagnosing or treating practitioners (e.g., dentists, optometrists, physicians, psychiatrists, podiatrists, surgeons, veterinarians)	1,205,000	58,000	s	44,000	6,000	7,000	s	1,134,000	13,000
Registered nurses, pharmacists, dieticians, therapists, physician assistants, nurse practitioners	2,307,000	168,000	s	67,000	13,000	71,000	s	1,971,000	168,000
Health technologists and technicians (e.g., dental hygienists, health record technicians, licensed practical nurses, laboratory or radiology technicians)	513,000	205,000	2,000	130,000	33,000	37,000	2,000	197,000	111,000
Other health occupations	718,000	212,000	7,000	89,000	7,000	102,000	8,000	286,000	219,000
Postsecondary teachers — health and related sciences	140,000	22,000	s	12,000	s	6,000	s	97,000	20,000
S&E managers	967,000	477,000	99,000	56,000	26,000	54,000	242,000	281,000	208,000
Computer and information systems managers	229,000	144,000	85,000	3,000	s	22,000	30,000	11,000	74,000

## CHAPTER 3 | Science and Engineering Labor Force

Occupation	All employed scientists and engineers	Highest degree in S&E						S&E-related fields	Non-S&E fields
		All S&E highest degree	Computer and mathematical sciences	Biological, agricultural, and environmental life sciences	Physical and related sciences	Social and related sciences	Engineering		
Engineering managers	362,000	244,000	13,000	5,000	11,000	7,000	208,000	53,000	65,000
Medical and health services managers	320,000	51,000	s	24,000	s	23,000	s	213,000	56,000
Natural sciences managers	55,000	38,000	s	23,000	11,000	s	2,000	4,000	13,000
S&E precollege teachers	1,029,000	269,000	63,000	103,000	33,000	62,000	7,000	233,000	526,000
Secondary — computer, mathematics, or sciences	729,000	224,000	63,000	103,000	33,000	18,000	7,000	200,000	304,000
Secondary — social sciences	300,000	45,000	s	s	s	44,000	s	34,000	222,000
S&E technicians and technologists	782,000	506,000	124,000	98,000	37,000	44,000	202,000	83,000	193,000
Technologists and technicians in the biological and life sciences	102,000	77,000	s	64,000	4,000	4,000	3,000	21,000	4,000
Computer programmers (business, scientific, process control)	166,000	130,000	87,000	7,000	5,000	4,000	28,000	10,000	26,000
Electrical, electronic, industrial, and mechanical technicians	243,000	125,000	6,000	4,000	8,000	5,000	102,000	22,000	96,000
Drafting occupations, including computer drafting	28,000	10,000	s	s	s	s	6,000	10,000	9,000

## CHAPTER 3 | Science and Engineering Labor Force

Occupation	All employed scientists and engineers	Highest degree in S&E						S&E-related fields	Non-S&E fields
		All S&E highest degree	Computer and mathematical sciences	Biological, agricultural, and environmental life sciences	Physical and related sciences	Social and related sciences	Engineering		
Surveying and mapping technicians	15,000	10,000	s	1,000	s	3,000	3,000	s	s
Other engineering technologists and technicians	177,000	115,000	27,000	8,000	11,000	17,000	52,000	15,000	47,000
Surveyors, cartographers, photogrammetrists	11,000	9,000	s	s	s	6,000	2,000	s	s
Technologists and technicians in the mathematical sciences	3,000	2,000	s	s	s	s	s	s	s
Technologists and technicians in the physical sciences	37,000	28,000	s	14,000	6,000	s	4,000	s	7,000
Other S&E-related occupations	207,000	36,000	15,000	s	s	7,000	12,000	154,000	17,000
Architects	174,000	19,000	3,000	s	s	3,000	11,000	139,000	16,000
Actuaries	33,000	17,000	12,000	s	s	s	s	15,000	s
Non-S&E occupations	11,007,000	6,666,000	670,000	893,000	242,000	3,983,000	879,000	1,387,000	2,954,000
Non-S&E managers	1,818,000	1,105,000	138,000	124,000	48,000	494,000	301,000	201,000	513,000

## CHAPTER 3 | Science and Engineering Labor Force

Occupation	All employed scientists and engineers	Highest degree in S&E						S&E-related fields	Non-S&E fields
		All S&E highest degree	Computer and mathematical sciences	Biological, agricultural, and environmental life sciences	Physical and related sciences	Social and related sciences	Engineering		
Top-level managers, executives, administrators (e.g., chief executive officer, chief operating officer, chief financial officer; president; district manager, general manager, provost)	1,092,000	688,000	89,000	71,000	35,000	283,000	210,000	137,000	267,000
Education administrators (e.g., registrar, dean, principal)	132,000	40,000	14,000	2,000	s	23,000	s	8,000	83,000
Other mid-level managers	593,000	376,000	35,000	50,000	12,000	187,000	91,000	55,000	162,000
Management-related occupations	2,085,000	1,345,000	197,000	161,000	40,000	770,000	177,000	207,000	532,000
Accountants, auditors, and other financial specialists	720,000	483,000	85,000	37,000	10,000	303,000	49,000	48,000	188,000
Personnel, training, and labor relations specialists	295,000	191,000	23,000	24,000	s	126,000	17,000	28,000	76,000
Other management-related occupations	1,070,000	671,000	89,000	101,000	29,000	340,000	111,000	131,000	269,000
Non-S&E precollege teachers	815,000	339,000	20,000	24,000	15,000	270,000	10,000	181,000	294,000
Prekindergarten and kindergarten	127,000	60,000	s	s	s	53,000	s	48,000	18,000
Elementary	377,000	168,000	15,000	9,000	13,000	126,000	4,000	68,000	141,000

## CHAPTER 3 | Science and Engineering Labor Force

Occupation	All employed scientists and engineers	Highest degree in S&E						S&E-related fields	Non-S&E fields
		All S&E highest degree	Computer and mathematical sciences	Biological, agricultural, and environmental life sciences	Physical and related sciences	Social and related sciences	Engineering		
Secondary — other subjects	124,000	47,000	1,000	6,000	s	37,000	2,000	29,000	49,000
Special education — primary and secondary	138,000	40,000	*	2,000	s	35,000	s	21,000	77,000
Other precollegiate area	48,000	25,000	1,000	4,000	s	19,000	s	15,000	9,000
Non-S&E postsecondary teachers	179,000	65,000	8,000	2,000	s	51,000	4,000	29,000	84,000
Art, drama, and music	6,000	s	s	s	s	s	s	s	4,000
Business, commerce, and marketing	31,000	11,000	2,000	s	s	7,000	s	s	19,000
Education	30,000	11,000	1,000	s	s	8,000	s	9,000	11,000
English	28,000	13,000	s	s	s	12,000	s	s	15,000
Foreign language	9,000	7,000	s	s	s	4,000	s	s	2,000
History	9,000	4,000	s	s	s	4,000	s	s	5,000
Physical education	3,000	s	s	s	s	s	s	s	1,000
Other postsecondary fields	64,000	19,000	2,000	1,000	s	14,000	2,000	16,000	28,000
Social services and related occupations	883,000	429,000	8,000	21,000	s	391,000	7,000	115,000	338,000
Clergy and other religious workers	120,000	39,000	s	s	s	26,000	4,000	s	77,000

## CHAPTER 3 | Science and Engineering Labor Force

Occupation	All employed scientists and engineers	Highest degree in S&E						S&E-related fields	Non-S&E fields
		All S&E highest degree	Computer and mathematical sciences	Biological, agricultural, and environmental life sciences	Physical and related sciences	Social and related sciences	Engineering		
Counselors (e.g., educational, vocational, mental health, substance abuse)	435,000	224,000	s	10,000	s	208,000	s	77,000	134,000
Social workers	327,000	167,000	s	5,000	s	157,000	s	34,000	127,000
Sales and marketing occupations	1,467,000	1,053,000	84,000	178,000	54,000	614,000	123,000	186,000	228,000
Insurance, securities, real estate, and business services	406,000	294,000	19,000	47,000	10,000	192,000	25,000	48,000	64,000
Sales — commodities, except retail (e.g., industrial/ medical/ dental machinery, equipment, supplies)	216,000	156,000	10,000	49,000	7,000	67,000	23,000	33,000	26,000
Sales — retail (e.g., furnishings, clothing, motor vehicles, cosmetics)	345,000	259,000	28,000	40,000	27,000	133,000	31,000	49,000	37,000
Other marketing and sales occupations	501,000	345,000	27,000	42,000	10,000	222,000	44,000	56,000	100,000
Arts, humanities, and related occupations	331,000	224,000	20,000	27,000	11,000	143,000	23,000	32,000	75,000
Writers, editors, public relations specialists, artists, entertainers, broadcasters	328,000	222,000	19,000	27,000	11,000	141,000	23,000	32,000	74,000

## CHAPTER 3 | Science and Engineering Labor Force

Occupation	All employed scientists and engineers	Highest degree in S&E						S&E-related fields	Non-S&E fields
		All S&E highest degree	Computer and mathematical sciences	Biological, agricultural, and environmental life sciences	Physical and related sciences	Social and related sciences	Engineering		
Historians	4,000	3,000	s	s	s	s	s	1,000	*
Other non-S&E occupations	3,430,000	2,105,000	195,000	355,000	71,000	1,251,000	233,000	435,000	890,000
Accounting clerks and bookkeepers	163,000	134,000	17,000	8,000	s	103,000	s	20,000	9,000
Secretaries, receptionists, typists	222,000	159,000	8,000	14,000	s	126,000	10,000	36,000	26,000
Other administrative (e.g., record clerks, telephone operators)	577,000	424,000	55,000	69,000	18,000	269,000	13,000	90,000	64,000
Farmers, foresters, and fishermen	99,000	76,000	2,000	59,000	s	9,000	3,000	12,000	12,000
Lawyers, judges	635,000	40,000	s	3,000	s	33,000	s	s	594,000
Librarians, archivists, curators	95,000	48,000	5,000	s	4,000	35,000	s	s	43,000
Food preparation and service (e.g., cooks, waitresses, bartenders)	136,000	100,000	3,000	21,000	s	61,000	13,000	29,000	7,000
Protective services (e.g., firefighters, police, guards, wardens, park rangers)	155,000	127,000	5,000	7,000	s	103,000	3,000	16,000	13,000



## CHAPTER 3 | Science and Engineering Labor Force

Occupation	All employed scientists and engineers	Highest degree in S&E						S&E-related fields	Non-S&E fields
		All S&E highest degree	Computer and mathematical sciences	Biological, agricultural, and environmental life sciences	Physical and related sciences	Social and related sciences	Engineering		
Other service occupations, except health (e.g., probation officer, human services work)	380,000	265,000	29,000	43,000	2,000	174,000	16,000	65,000	50,000
Other teachers and instructors (e.g., private tutors, dance, flying, martial arts)	230,000	167,000	18,000	23,000	10,000	97,000	18,000	33,000	30,000
Construction and extraction occupations	88,000	59,000	s	22,000	s	16,000	17,000	23,000	5,000
Installation, maintenance, and repair occupations	127,000	104,000	12,000	12,000	s	40,000	37,000	20,000	3,000
Precision or production occupations (e.g., metal or wood workers, butchers, bakers, assemblers, tailors)	140,000	101,000	14,000	33,000	4,000	29,000	21,000	33,000	6,000
Transportation and material moving occupations	199,000	165,000	15,000	26,000	9,000	69,000	46,000	24,000	9,000
Other occupations	183,000	135,000	8,000	10,000	3,000	86,000	28,000	28,000	20,000

\* = estimate < 500; s = suppressed for reasons of confidentiality and/or reliability.

### Note(s)

## CHAPTER 3 | Science and Engineering Labor Force

Scientists and engineers include those with one or more S&E or S&E-related degrees at the bachelor's level or higher or those who have only a non-S&E degree at the bachelor's level or higher and are employed in an S&E or S&E-related occupation. Detail may not add to total because of rounding. Numbers are rounded to the nearest 1,000.

### Source(s)

National Science Foundation, National Center for Science and Engineering Statistics, National Survey of College Graduates (NSCG) (2015), <https://www.nsf.gov/statistics/srvygrads/>.

*Science and Engineering Indicators 2018*

## CHAPTER 3 | Science and Engineering Labor Force

APPENDIX TABLE 3-4

### Employment sector of S&E highest degree holders and workers in S&E occupations: 1993, 2003, and 2015

(Percent)

Employment sector	1993		2003		2015	
	Highest degree in S&E	S&E occupations	Highest degree in S&E	S&E occupations	Highest degree in S&E	S&E occupations
Total (number)	7,036,000	3,303,000	9,579,000	4,817,000	13,497,000	6,407,000
Business or industry	68.7	67.8	71.3	71.7	72.3	71.5
For-profit businesses	57.3	61.1	59.1	64.2	58.9	63.6
Nonprofit businesses	5.2	3.2	6.3	3.7	7.3	4.7
Self-employed, unincorporated businesses	6.2	3.5	5.9	3.9	6.1	3.2
Education	16.8	17.8	15.6	15.9	15.8	17.2
4-year institutions	9.1	14.3	8.5	12.9	8.8	14.2
2-year and precollege institutions	7.7	3.5	7.2	3.0	7.1	3.0
Government	14.5	14.4	13.1	12.4	11.9	11.3
Federal	6.9	8.4	5.3	5.9	5.3	5.8
State or local	7.7	5.9	7.8	6.5	6.5	5.5

#### Note(s)

Detail may not add to total because of rounding.

#### Source(s)



## CHAPTER 3 | Science and Engineering Labor Force

National Science Foundation, National Center for Science and Engineering Statistics, Scientists and Engineers Statistical Data System (SESTAT) (1993 and 2003), <https://www.nsf.gov/statistics/sestat/>, and the National Survey of College Graduates (NSCG) (2015), <https://www.nsf.gov/statistics/srvygrads/>.

*Science and Engineering Indicators 2018*

## CHAPTER 3 | Science and Engineering Labor Force

APPENDIX TABLE 3-5

### Employment sector of S&E highest degree holders, by level and field of highest degree: 2015

(Percent distribution)

Highest degree field and level	Total (number)	Education (%)		Business or industry (%)			Government (%)	
		4-year institutions	2-year and precollege institutions	For-profit businesses	Self-employed, unincorporated businesses	Nonprofit businesses	Federal government	State or local government
All S&E highest degree holders	13,497,000	8.8	7.1	58.9	6.1	7.3	5.3	6.5
Computer and mathematical sciences	2,346,000	6.6	6.2	69.8	3.6	4.8	5.1	3.8
Biological, agricultural, and environmental life sciences	2,116,000	15.3	7.5	47.8	6.7	10.4	5.4	7.0
Physical and related sciences	789,000	17.7	8.5	54.8	4.3	3.7	5.4	5.4
Social and related sciences	5,056,000	8.1	10.8	48.0	8.6	11.0	4.7	8.8
Engineering	3,190,000	5.0	1.0	76.5	4.2	2.0	6.5	4.8
Highest degree: bachelor's	9,539,000	5.0	6.3	63.0	6.8	7.1	4.9	6.8
Computer and mathematical sciences	1,540,000	4.0	5.6	72.7	4.4	4.4	5.3	3.6
Biological, agricultural, and environmental life sciences	1,499,000	7.6	7.5	53.6	8.1	11.3	4.4	7.5
Physical and related sciences	454,000	9.0	9.0	61.7	5.3	2.6	4.4	7.9

## CHAPTER 3 | Science and Engineering Labor Force

Highest degree field and level	Total (number)	Education (%)		Business or industry (%)			Government (%)	
		4-year institutions	2-year and precollege institutions	For-profit businesses	Self-employed, unincorporated businesses	Nonprofit businesses	Federal government	State or local government
Social and related sciences	3,826,000	5.0	8.9	54.1	8.7	10.0	4.3	8.9
Engineering	2,219,000	3.1	1.2	78.0	4.7	1.9	6.4	4.8
Highest degree: master's	2,934,000	10.6	10.6	53.6	4.0	8.0	6.3	6.9
Computer and mathematical sciences	719,000	7.6	7.9	66.8	2.4	6.0	4.3	4.9
Biological, agricultural, and environmental life sciences	345,000	24.9	11.3	36.8	2.9	8.1	8.1	7.8
Physical and related sciences	163,000	17.2	12.3	52.8	3.7	4.3	5.5	3.7
Social and related sciences	918,000	10.2	20.5	31.2	6.3	15.4	6.4	10.2
Engineering	788,000	6.0	0.9	75.1	3.0	2.3	7.4	5.3
Highest degree: doctorate	992,000	39.6	3.6	36.2	5.2	6.9	6.5	2.0
Computer and mathematical sciences	87,000	43.7	2.3	43.7	1.1	1.1	6.9	s
Biological, agricultural, and environmental life sciences	272,000	45.2	2.9	29.4	2.9	8.5	7.7	2.9
Physical and related sciences	171,000	40.9	3.5	38.6	2.3	5.8	8.2	0.6
Social and related sciences	278,000	42.8	6.8	20.9	11.5	10.1	5.0	2.9

## CHAPTER 3 | Science and Engineering Labor Force

Highest degree field and level	Total (number)	Education (%)		Business or industry (%)			Government (%)	
		4-year institutions	2-year and precollege institutions	For-profit businesses	Self-employed, unincorporated businesses	Nonprofit businesses	Federal government	State or local government
Engineering	183,000	23.5	0.5	63.9	3.3	2.7	4.9	1.1

s = suppressed for reasons of confidentiality and/or reliability.

### Note(s)

All S&E highest degree holders includes professional degree holders not reported separately. The 2-year and precollege institutions include 2-year colleges and community colleges or technical institutes and also preschool, elementary, middle, and secondary schools. The 4-year institutions include 4-year colleges or universities, medical schools, and university-affiliated research institutes. The education sector includes public and private institutions. Detail may not add to total because of rounding. Numbers are rounded to the nearest 1,000. Percentages are based on rounded numbers.

### Source(s)

National Science Foundation, National Center for Science and Engineering Statistics, National Survey of College Graduates (NSCG) (2015), <https://www.nsf.gov/statistics/srvygrads/>.

*Science and Engineering Indicators 2018*

## CHAPTER 3 | Science and Engineering Labor Force

APPENDIX TABLE 3-6

### Scientists and engineers participating in work-related training, by labor force status, highest degree level, and sex: 2015

(Percent)

Labor force status and highest degree level	Total	Female	Male
All scientists and engineers	52.0	55.0	49.3
Employed	61.0	65.7	56.8
Bachelor's	55.5	59.5	52.2
Master's	66.5	73.3	59.2
Professional	78.6	76.9	79.9
Doctorate	56.5	64.6	51.6
Unemployed	32.5	36.2	28.6
Bachelor's	31.4	34.3	28.4
Master's	37.7	43.4	31.8
Professional	29.2	45.5	21.4
Doctorate	22.2	15.4	21.7
Not in labor force	10.6	12.4	8.3
Bachelor's	9.7	10.8	8.3
Master's	9.8	13.3	5.1
Professional	24.8	25.2	24.6
Doctorate	11.9	17.5	8.4

#### Note(s)

Scientists and engineers include those with one or more S&E or S&E-related degrees at the bachelor's level or higher or those who have only a non-S&E degree at the bachelor's level or higher and are employed in an S&E or S&E-related occupation. Unemployed individuals are those not working but who have looked for a job in the preceding 4 weeks. Not in labor force includes those neither working nor looking for work in the 4 weeks prior to February 2015. Detail may not add to total because of rounding.

#### Source(s)

National Science Foundation, National Center for Science and Engineering Statistics, National Survey of College Graduates (NSCG) (2015), <https://www.nsf.gov/statistics/srvygrads/>.

*Science and Engineering Indicators 2018*



## CHAPTER 3 | Science and Engineering Labor Force

APPENDIX TABLE 3-7

### Most important reason for scientists and engineers to participate in work-related training, by labor force status: 2015

(Percent distribution)

Reason	Total	Labor force status		
		Employed	Unemployed	Not in labor force
All scientists and engineers engaged in work-related training (number)	16,243,000	15,431,000	282,000	530,000
All reasons	100.0	100.0	100.0	100.0
To improve skills or knowledge in current occupational field	52.3	53.3	35.5	33.8
To increase opportunities for promotion or advancement in current occupational field	6.0	5.9	17.7	3.8
For licensure or certification in current occupational field	19.7	19.3	15.2	34.3
To facilitate change to different occupational field	1.3	1.1	9.9	4.7
Required or expected by employer	18.7	18.9	16.3	13.4
For leisure or personal interest	1.4	1.2	s	7.5
Other reason	0.5	0.4	s	2.6

s = suppressed for reasons of reliability and/or confidentiality.

#### Note(s)

Scientists and engineers include those with one or more S&E or S&E-related degrees at the bachelor's level or higher or those who have only a non-S&E degree at the bachelor's level or higher and are employed in an S&E or S&E-related occupation. Unemployed individuals are those not working but who have looked for a job in the preceding 4 weeks. Not in labor force includes those neither working nor looking for work in the 4 weeks prior to February 2015. The question was not asked of those who never worked. Detail may not add to total because of rounding.

#### Source(s)

National Science Foundation, National Center for Science and Engineering Statistics, National Survey of College Graduates (NSCG) (2015), <https://www.nsf.gov/statistics/srvygrads/>.

Science and Engineering Indicators 2018

## CHAPTER 3 | Science and Engineering Labor Force

APPENDIX TABLE 3-8 

### Unemployment rates of scientists and engineers, by level of highest degree and broad occupational category: Selected years, 2003–15

(Percent)

Degree and occupation	2003	2006	2008	2010	2013	2015
All scientists and engineers	3.2	2.5	3.1	4.3	3.8	3.3
Highest degree level						
Bachelor's	3.4	2.9	3.5	4.9	4.2	4.0
Master's	3.4	2.3	2.9	4.1	3.7	2.8
Professional	1.9	1.1	1.8	2.7	2.3	1.1
Doctorate	2.3	1.6	2.0	2.6	2.3	2.6
Occupation						
Computer and mathematical scientists	3.7	2.5	3.0	3.7	3.1	2.7
Biological, agricultural, and environmental life scientists	2.4	2.2	2.4	3.7	3.3	4.1
Physical and related scientists	2.8	2.3	3.0	3.3	4.5	3.2
Social and related scientists	1.6	2.5	2.1	2.3	3.3	3.6
Engineers	3.8	2.4	2.8	4.6	2.8	2.1
S&E-related occupations	2.0	1.5	1.9	2.5	2.2	1.8
Non-S&E occupations	3.8	3.0	3.9	5.6	5.0	4.3

#### Note(s)

Scientists and engineers include those with one or more S&E or S&E-related degrees at the bachelor's level or higher or those who have only a non-S&E degree at the bachelor's level or higher and are employed in an S&E or S&E-related occupation. For data on unemployment rates by occupation, calculations assume that unemployed individuals are seeking further employment in their most recent occupation.

#### Source(s)

National Science Foundation, National Center for Science and Engineering Statistics, Scientists and Engineers Statistical Data System (SESTAT) (2003, 2006, 2008, 2010, 2013), <https://www.nsf.gov/statistics/sestat/>, and the National Survey of College Graduates (NSCG) (2015), <https://www.nsf.gov/statistics/srvygrads/>.

*Science and Engineering Indicators 2018*

## CHAPTER 3 | Science and Engineering Labor Force

APPENDIX TABLE 3-9

### Median annual salaries for employed college-educated individuals, by broad field and level of highest degree and broad occupational category: 2015

(Current dollars)

Highest degree field	All occupations	S&E occupations	S&E-related occupations	Non-S&E occupations
All degrees	60,000	83,000	67,000	58,000
S&E	68,000	85,000	65,000	54,000
Bachelor's	60,000	85,000	60,000	50,000
Master's	80,000	87,000	75,000	66,000
Doctorate	98,000	90,000	124,000	114,000
Professional	65,000	72,000	s	51,000
S&E-related	68,000	75,000	74,000	45,000
Bachelor's	60,000	72,000	60,000	41,000
Master's	68,000	73,000	72,000	57,000
Doctorate	80,000	89,000	77,000	70,000
Professional	125,000	58,000	128,000	49,000
Non-S&E	55,000	75,000	54,000	75,000
Bachelor's	50,000	70,000	50,000	51,000
Master's	61,000	89,000	61,000	68,000
Doctorate	66,000	70,000	88,000	75,000
Professional	100,000	86,000	s	115,000

s = suppressed for reasons of confidentiality and/or reliability.

#### Note(s)

See Table 3-2 for definitions of S&amp;E, S&amp;E-related, and non-S&amp;E degrees and occupations. Salaries are rounded to the nearest \$1,000.

#### Source(s)

National Science Foundation, National Center for Science and Engineering Statistics, National Survey of College Graduates (NSCG) (2015), <https://www.nsf.gov/statistics/srvygrads/>.

*Science and Engineering Indicators 2018*

## CHAPTER 3 | Science and Engineering Labor Force

APPENDIX TABLE 3-10

### Postgraduation plans of doctorate recipients with definite commitments, by broad field of study: Selected years, 1975–2015

(Number and percent)

Definite commitment and plan	All fields	Life sciences <sup>a</sup>	Physical sciences and earth sciences	Mathematics and computer sciences	Psychology and social sciences	Engineering	Education	Humanities	Other <sup>b</sup>
All definite commitments (number)									
1975	22,925	3,713	2,564	755	4,458	2,050	5,286	2,937	1,162
1985	20,951	4,043	2,476	689	3,818	1,983	4,665	2,057	1,220
1995	24,977	5,141	2,686	1,275	4,095	3,068	4,374	2,749	1,589
2000	26,868	5,797	2,736	1,337	4,692	3,374	4,355	3,107	1,470
2005	27,416	5,999	2,863	1,565	4,649	3,732	4,049	2,979	1,580
2010	29,841	6,908	3,314	2,102	5,077	4,551	3,357	2,748	1,784
2015	30,393	6,679	3,271	2,376	5,408	5,168	2,920	2,723	1,848
Reported type of plan (number)									
1975	22,709	3,686	2,550	749	4,419	2,040	5,230	2,882	1,153
1985	20,867	4,037	2,469	686	3,801	1,977	4,639	2,044	1,214
1995	24,821	5,126	2,677	1,265	4,063	3,060	4,328	2,721	1,581
2000	26,744	5,765	2,724	1,332	4,676	3,358	4,329	3,096	1,464
2005	27,086	5,906	2,847	1,556	4,594	3,702	3,978	2,943	1,560
2010	28,995	6,768	3,268	2,063	4,900	4,445	3,213	2,644	1,694
2015	27,787	6,154	3,092	2,207	4,949	4,758	2,612	2,402	1,613

## CHAPTER 3 | Science and Engineering Labor Force

Definite commitment and plan	All fields	Life sciences <sup>a</sup>	Physical sciences and earth sciences	Mathematics and computer sciences	Psychology and social sciences	Engineering	Education	Humanities	Other <sup>b</sup>
Employment (percent <sup>c</sup> )									
1975	83.0	53.0	52.6	89	91.4	88.6	98.1	96.3	98.4
1985	77.7	44.8	51.8	85	85.4	85.1	96.9	94.8	97.6
1995	70.3	35.6	35.2	76	78.7	75.1	96.1	93.0	96.5
2000	71.4	39.8	44.0	77	76.2	78.9	95.2	91.9	95.4
2005	64.5	33.1	33.3	65	70.7	67.2	93.8	88.9	94.4
2010	57.1	30.0	26.9	58	65.6	54.9	93.2	84.7	92.1
2015	60.3	36.7	35.7	66	62.5	64.4	91.2	79.9	91.1
Postdoctoral study (percent <sup>c</sup> )									
1975	17.0	47.0	47.4	11	8.6	11.4	1.9	3.7	1.6
1985	22.3	55.2	48.2	15	14.6	14.9	3.1	5.2	2.4
1995	29.7	64.4	64.8	24	21.3	24.9	3.9	7.0	3.5
2000	28.6	60.2	56.0	23	23.8	21.1	4.8	8.1	4.6
2005	35.5	66.9	66.7	35	29.3	32.8	6.2	11.1	5.6
2010	42.9	70.0	73.1	42	34.4	45.1	6.8	15.3	7.9
2015	39.7	63.3	64.3	34	37.5	35.6	8.8	20.1	8.9

<sup>a</sup> Life sciences includes agricultural sciences and natural resources, biological and biomedical sciences, and health sciences.

<sup>b</sup> Non-S&E fields are not shown separately.

## CHAPTER 3 | Science and Engineering Labor Force

<sup>c</sup> Percentages are based on the number of doctorate recipients reporting definite postgraduation commitments with response to type of plan (employment or postdoctoral study).

### Source(s)

National Science Foundation, National Center for Science and Engineering Statistics, 2015 Survey of Earned Doctorates (SED), special tabulation (December 2016).

*Science and Engineering Indicators 2018*

## CHAPTER 3 | Science and Engineering Labor Force

APPENDIX TABLE 3-11

### Age profile of employed scientists and engineers, by sex and field of highest degree: 2015

(Number and percent)

S&E highest degree field	Total				Female				Male			
	Number	Age younger than 30 (%)	Age 30–50 (%)	Age 51–75 (%)	Number	Age younger than 30 (%)	Age 30–50 (%)	Age 51–75 (%)	Number	Age younger than 30 (%)	Age 30–50 (%)	Age 51–75 (%)
Total	25,306,000	15.4	51.3	33.3	11,879,000	18.2	52.7	29.1	13,409,000	12.9	50.0	37.1
S&E fields	13,497,000	18.5	50.4	31.1	5,359,000	22.8	51.4	25.8	8,121,000	15.7	49.6	34.7
Computer and mathematical sciences	2,346,000	15.7	56.8	27.5	663,000	13.7	56.4	29.9	1,683,000	16.5	56.9	26.6
Computer and information sciences	1,826,000	15.3	60.4	24.4	456,000	12.1	60.4	27.4	1,370,000	16.4	60.3	23.4
Mathematics and statistics	520,000	17.1	44.2	38.7	206,000	17.5	47.6	35.4	314,000	16.9	42.0	40.8
Biological, agricultural, and environmental life sciences	2,116,000	22.5	46.5	31.0	1,072,000	27.1	46.0	27.0	1,044,000	17.8	47.0	35.2
Agricultural and food sciences	291,000	8.9	40.5	50.2	102,000	13.7	53.9	32.4	189,000	6.9	33.3	59.8
Biological sciences	1,632,000	26.0	45.5	28.5	896,000	29.4	43.2	27.3	736,000	21.7	48.4	29.8
Environmental life sciences	194,000	13.4	62.9	23.2	74,000	17.6	67.6	13.5	120,000	10.8	60.0	29.2
Physical and related sciences	789,000	18.0	46.3	35.6	270,000	29.6	51.5	18.5	519,000	11.9	43.5	44.5
Chemistry, except biochemistry	370,000	23.8	43.5	32.4	153,000	39.2	42.5	18.3	217,000	12.9	44.2	42.9

## CHAPTER 3 | Science and Engineering Labor Force

S&E highest degree field	Total				Female				Male			
	Number	Age younger than 30 (%)	Age 30–50 (%)	Age 51–75 (%)	Number	Age younger than 30 (%)	Age 30–50 (%)	Age 51–75 (%)	Number	Age younger than 30 (%)	Age 30–50 (%)	Age 51–75 (%)
Earth, atmospheric, and ocean sciences	218,000	10.1	52.3	38.1	82,000	11.0	68.3	22.0	136,000	9.6	41.9	47.8
Physics and astronomy	187,000	16.0	44.9	39.0	3,000	36.7	50.0	13.3	157,000	12.1	43.3	44.6
Other physical sciences	14,000	14.3	50.0	35.7	5,000	20.0	s	s	9,000	11.1	44.4	33.3
Social and related sciences	5,056,000	19.7	49.2	31.1	2,864,000	22.5	51.0	26.5	2,175,000	16.3	46.4	37.3
Economics	817,000	18.4	46.1	35.5	232,000	21.1	50.0	29.3	578,000	17.5	44.1	38.4
Political and related sciences	908,000	22.7	49.9	27.4	424,000	23.3	54.5	22.2	485,000	22.3	45.8	32.0
Psychology	1,967,000	20.7	48.2	31.0	1,355,000	24.2	50.0	25.8	602,000	13.3	43.4	43.4
Sociology and anthropology	789,000	18.3	51.0	30.8	513,000	20.1	51.5	28.3	277,000	14.8	49.8	35.0
Other social sciences	574,000	15.7	53.1	31.2	341,000	19.1	50.4	30.2	233,000	10.7	57.1	32.6
Engineering	3,190,000	16.0	51.1	32.9	490,000	24.1	58.6	17.3	2,700,000	14.5	49.8	35.7
Aerospace, aeronautical, and astronautical engineering	135,000	20.0	45.9	34.1	19,000	15.8	63.2	s	116,000	21.6	43.1	35.3
Chemical engineering	211,000	16.1	40.3	43.6	46,000	23.9	50.0	23.9	165,000	13.9	37.6	48.5
Civil and architectural engineering	451,000	14.2	51.9	33.7	68,000	25.0	55.9	19.1	382,000	12.3	51.3	36.4



## CHAPTER 3 | Science and Engineering Labor Force

S&E highest degree field	Total				Female				Male			
	Number	Age younger than 30 (%)	Age 30–50 (%)	Age 51–75 (%)	Number	Age younger than 30 (%)	Age 30–50 (%)	Age 51–75 (%)	Number	Age younger than 30 (%)	Age 30–50 (%)	Age 51–75 (%)
Electrical and computer engineering	1,112,000	13.4	57.6	29.1	138,000	18.1	65.9	15.9	974,000	12.6	56.4	31.0
Industrial engineering	201,000	13.4	51.2	35.3	59,000	22.0	59.3	20.3	141,000	9.9	48.2	42.6
Mechanical engineering	659,000	21.1	45.8	33.1	67,000	43.3	46.3	10.4	592,000	18.6	45.9	35.6
Other engineering	421,000	16.9	48.7	34.7	92,000	21.7	62.0	16.3	329,000	15.5	45.0	39.8
S&E-related fields	6,191,000	14.1	51.2	34.6	3,840,000	17.0	51.5	31.5	2,350,000	9.4	50.8	39.8
Health	4,933,000	14.3	51.9	33.8	3,384,000	17.0	52.3	30.7	1,549,000	8.5	51.1	40.4
Science and mathematics teacher education	404,000	10.4	47.8	41.8	239,000	11.3	46.9	42.3	165,000	9.1	49.1	41.8
Technology and technical fields	413,000	9.4	53.8	36.8	56,000	10.7	55.4	33.9	357,000	9.2	53.5	37.3
Other S&E-related fields	441,000	20.0	44.2	36.1	162,000	27.8	39.5	32.1	279,000	15.1	46.6	38.4
Non-S&E fields	5,618,000	9.4	53.6	37.0	2,680,000	10.7	57.2	32.2	2,937,000	8.1	50.4	41.5
Management and administration fields	1,800,000	4.8	55.8	39.4	591,000	6.3	56.7	37.1	1,208,000	4.1	55.5	40.5
Education, except science and mathematics teacher education	1,124,000	8.9	55.2	36.0	810,000	10.2	57.3	32.5	314,000	5.4	49.7	45.2

## CHAPTER 3 | Science and Engineering Labor Force

S&E highest degree field	Total				Female				Male			
	Number	Age younger than 30 (%)	Age 30–50 (%)	Age 51–75 (%)	Number	Age younger than 30 (%)	Age 30–50 (%)	Age 51–75 (%)	Number	Age younger than 30 (%)	Age 30–50 (%)	Age 51–75 (%)
Social service and related fields	423,000	9.0	43.7	47.0	240,000	10.8	48.8	40.4	182,000	6.6	37.4	56.0
Sales and marketing fields	145,000	s	49.0	39.3	53,000	11.3	56.6	32.1	93,000	s	45.2	43.0
Arts and humanities fields	653,000	20.8	47.2	31.9	252,000	13.9	51.2	34.9	401,000	25.2	44.6	29.9
Other non-S&E fields	1,473,000	10.0	55.9	34.1	735,000	13.6	62.2	24.1	739,000	6.5	49.5	43.8

s = suppressed for reasons of confidentiality and/or reliability.

### Note(s)

Scientists and engineers include those with one or more S&E or S&E-related degrees at the bachelor's level or higher or those who have only a non-S&E degree at the bachelor's level or higher and are employed in an S&E or S&E-related occupation. Detail may not add to total because of rounding. Numbers are rounded to the nearest 1,000. Percentages are based on rounded numbers.

### Source(s)

National Science Foundation, National Center for Science and Engineering Statistics, National Survey of College Graduates (NSCG) (2015), <https://www.nsf.gov/statistics/srvygrads/>.

*Science and Engineering Indicators 2018*

## CHAPTER 3 | Science and Engineering Labor Force

APPENDIX TABLE 3-12

### Employed scientists and engineers, by sex and occupation: 2015

(Number and percent)

Occupation	Total	Female		Male	
		Number	Percent	Number	Percent
All occupations	25,306,000	11,897,000	47.0	13,409,000	53.0
S&E occupations	6,407,000	1,818,000	28.4	4,590,000	71.6
Computer and mathematical scientists	3,156,000	833,000	26.4	2,323,000	73.6
Computer and information scientists	2,823,000	689,000	24.4	2,134,000	75.6
Computer and information scientists, research	64,000	23,000	35.9	41,000	64.1
Computer network architects	48,000	s	s	48,000	100.0
Computer support specialists	242,000	65,000	26.9	177,000	73.1
Computer system analysts	333,000	101,000	30.3	232,000	69.7
Database administrators	146,000	62,000	42.5	84,000	57.5
Information security analysts	69,000	23,000	33.3	46,000	66.7
Network and computer systems administrators	188,000	23,000	12.2	165,000	87.8
Software developers — applications and systems software	623,000	119,000	19.1	504,000	80.9
Web developers	174,000	38,000	21.8	137,000	78.7
Other computer information science occupations	345,000	138,000	40.0	207,000	60.0
Computer engineers — software	592,000	97,000	16.4	495,000	83.6
Mathematical scientists	218,000	94,000	43.1	124,000	56.9
Mathematicians	7,000	3000	42.9	4,000	57.1
Operations research analysts, including modeling	122,000	34,000	27.9	88,000	72.1
Statisticians	74,000	s	s	23,000	s
Other mathematical scientists	15000	5,000	33.3	s	s
Postsecondary teachers — computer and mathematical sciences	114,000	50,000	43.9	65,000	57.0
Computer science	22,000	9,000	40.9	14,000	63.6
Mathematics and statistics	92,000	41,000	44.6	51,000	55.4
Biological, agricultural, and environmental life scientists	631,000	302,000	47.9	329,000	52.1

## CHAPTER 3 | Science and Engineering Labor Force

Occupation	Total	Female		Male	
		Number	Percent	Number	Percent
Agricultural and food scientists	52,000	25,000	48.1	27,000	51.9
Biological and medical scientists	443,000	236,000	53.3	207,000	46.7
Biochemists and biophysicists	72,000	31,000	43.1	41,000	56.9
Biological scientists (e.g., botanists, ecologists, zoologists)	137,000	65,000	47.4	72,000	52.6
Medical scientists (excluding practitioners)	136,000	76,000	55.9	60,000	44.1
Other biological and life scientists	98,000	64,000	65.3	34,000	34.7
Forestry and conservation scientists	59,000	12,000	20.3	47,000	79.7
Postsecondary teachers — life and related sciences	78,000	30,000	38.5	48,000	61.5
Agriculture	5,000	3,000	60.0	2,000	40.0
Biological sciences	62,000	24,000	38.7	38,000	61.3
Other natural sciences	11,000	3,000	27.3	8,000	72.7
Physical and related scientists	331,000	92,000	27.8	239,000	72.2
Chemists, except biochemists	105,000	34,000	32.4	71,000	67.6
Earth scientists, geologists, and oceanographers	66,000	15,000	22.7	51,000	77.3
Atmospheric and space scientists	15,000	4,000	26.7	10,000	66.7
Geologists, including earth scientists	48,000	10,000	20.8	38,000	79.2
Oceanographers	4,000	1,000	25.0	2,000	50.0
Physicists and astronomers	49,000	9,000	18.4	40,000	81.6
Astronomers	7,000	s	s	5,000	71.4
Physicists, except biophysicists	42,000	7,000	16.7	35,000	83.3
Other physical and related scientists	45,000	18,000	40.0	28,000	62.2
Postsecondary teachers — physical and related sciences	65,000	16,000	24.6	49,000	75.4
Chemistry	28,000	9,000	32.1	19,000	67.9
Earth, environmental, and marine sciences	15,000	5,000	33.3	10,000	66.7
Physics	22,000	s	s	20,000	90.9
Social and related scientists	570,000	341,000	59.8	229,000	40.2

## CHAPTER 3 | Science and Engineering Labor Force

Occupation	Total	Female		Male	
		Number	Percent	Number	Percent
Economists	32,000	12,000	37.5	20,000	62.5
Political scientists	25,000	7,000	28.0	18,000	72.0
Psychologists, including clinical	213,000	155,000	72.8	58,000	27.2
Sociologists and anthropologists	31,000	21,000	67.7	10,000	32.3
Anthropologists	11,000	7,000	63.6	4,000	36.4
Sociologists	20,000	14,000	70.0	6,000	30.0
Other social and related scientists	108,000	63,000	58.3	44,000	40.7
Postsecondary teachers — social and related sciences	162,000	83,000	51.2	79,000	48.8
Economics	21,000	7,000	33.3	14,000	66.7
Political science	21,000	7,000	33.3	14,000	66.7
Psychology	38,000	20,000	52.6	18,000	47.4
Sociology	14,000	9,000	64.3	4,000	28.6
Other social sciences	68,000	39,000	57.4	29,000	42.6
Engineers	1,719,000	250,000	14.5	1,469,000	85.5
Aerospace, aeronautical, or astronautical engineers	96,000	12,000	12.5	84,000	87.5
Chemical engineers	80,000	18,000	22.5	63,000	78.8
Civil, architectural, or sanitary engineers	251,000	49,000	19.5	202,000	80.5
Electrical or computer hardware engineers	360,000	36,000	10.0	325,000	90.3
Computer engineers — hardware	70,000	5,000	7.1	65,000	92.9
Electrical and electronics engineers	290,000	31,000	10.7	260,000	89.7
Industrial engineers	82,000	15,000	18.3	67,000	81.7
Mechanical engineers	337,000	29,000	8.6	309,000	91.7
Other engineers	460,000	84,000	18.3	376,000	81.7
Agricultural engineers	7,000	*	*	6,000	85.7
Bioengineers or biomedical engineers	26,000	7,000	26.9	19,000	73.1
Environmental engineers	66,000	22,000	33.3	44,000	66.7

## CHAPTER 3 | Science and Engineering Labor Force

Occupation	Total	Female		Male	
		Number	Percent	Number	Percent
Marine engineers and naval architects	12,000	3,000	25.0	10,000	83.3
Materials and metallurgical engineers	31,000	5,000	16.1	26,000	83.9
Mining and geological engineers	5,000	s	s	4,000	80.0
Nuclear engineers	25,000	5,000	20.0	19,000	76.0
Petroleum engineers	19,000	2,000	10.5	17,000	89.5
Sales engineers	90,000	12,000	13.3	78,000	86.7
Other engineers	178,000	28,000	15.7	151,000	84.8
Postsecondary teachers — engineering	53,000	8,000	15.1	45,000	84.9
S&E-related occupations	7,867,000	4,558,000	57.9	3,309,000	42.1
Health-related occupations	4,883,000	3,412,000	69.9	1,471,000	30.1
Diagnosing or treating practitioners (e.g., dentists, optometrists, physicians, psychiatrists, podiatrists, surgeons, veterinarians)	1,205,000	505,000	41.9	700,000	58.1
Registered nurses, pharmacists, dieticians, therapists, physician assistants, nurse practitioners	2,307,000	1,917,000	83.1	390,000	16.9
Health technologists and technicians (e.g., dental hygienists, health record technicians, licensed practical nurses, laboratory or radiology technicians)	513,000	378,000	73.7	135,000	26.3
Other health occupations	718,000	522,000	72.7	196,000	27.3
Postsecondary teachers — health and related sciences	140,000	90,000	64.3	50,000	35.7
S&E managers	967,000	305,000	31.5	661,000	68.4
Computer and information systems managers	229,000	70,000	30.6	160,000	69.9
Engineering managers	362,000	39,000	10.8	323,000	89.2
Medical and health services managers	320,000	179,000	55.9	141,000	44.1
Natural sciences managers	55,000	17,000	30.9	38,000	69.1
S&E precollege teachers	1,029,000	592,000	57.5	437,000	42.5
Secondary — computer, mathematics, or sciences	729,000	467,000	64.1	262,000	35.9
Secondary — social sciences	300,000	125,000	41.7	175,000	58.3
S&E technicians and technologists	782,000	188,000	24.0	594,000	76.0

## CHAPTER 3 | Science and Engineering Labor Force

Occupation	Total	Female		Male	
		Number	Percent	Number	Percent
Technologists and technicians in the biological and life sciences	102,000	60,000	58.8	42,000	41.2
Computer programmers (business, scientific, process control)	166,000	43,000	25.9	123,000	74.1
Electrical, electronic, industrial, and mechanical technicians	243,000	13,000	5.3	229,000	94.2
Drafting occupations, including computer drafting	28,000	3,000	10.7	25,000	89.3
Surveying and mapping technicians	15,000	4,000	26.7	11,000	73.3
Other engineering technologists and technicians	177,000	48,000	27.1	129,000	72.9
Surveyors, cartographers, photogrammetrists	11,000	1000	s	10,000	90.9
Technologists and technicians in the mathematical sciences	3,000	s	s	3,000	100.0
Technologists and technicians in the physical sciences	37,000	14,000	37.8	22,000	59.5
Other S&E-related occupations	207,000	61,000	29.5	146,000	70.5
Architects	174,000	50,000	28.7	124,000	71.3
Actuaries	33,000	11,000	33.3	22,000	66.7
Non-S&E occupations	11,031,000	5,521,000	50.0	5,510,000	50.0
Non-S&E managers	1,825,000	503,000	27.6	1,322,000	72.4
Top-level managers, executives, administrators (e.g., chief executive officer, chief operating officer, chief financial officer; president; district, general manager, provost)	1,099,000	247,000	22.5	852,000	77.5
Education administrators (e.g., registrar, dean, principal)	132,000	63,000	47.7	69,000	52.3
Other mid-level managers	594,000	192,000	32.3	401,000	67.5
Management-related occupations	2,085,000	1,043,000	50.0	1,042,000	50.0
Accountants, auditors, and other financial specialists	720,000	301,000	41.8	419,000	58.2
Personnel, training, and labor relations specialists	295,000	197,000	66.8	97,000	32.9
Other management-related occupations	1,070,000	544,000	50.8	526,000	49.2
Non-S&E precollege teachers	825,000	692,000	83.9	134,000	16.2
Prekindergarten and kindergarten	129,000	125,000	96.9	s	s
Elementary	385,000	328,000	85.2	56,000	14.5
Secondary — other subjects	124,000	79,000	63.7	45,000	36.3

## CHAPTER 3 | Science and Engineering Labor Force

Occupation	Total	Female		Male	
		Number	Percent	Number	Percent
Special education — primary and secondary	139,000	123,000	88.5	16,000	11.5
Other precollegiate area	48,000	37,000	77.1	11,000	22.9
Non-S&E postsecondary teachers	184,000	87,000	47.3	98,000	53.3
Art, drama, and music	6,000	4,000	66.7	2,000	33.3
Business, commerce, and marketing	31,000	9,000	29.0	22,000	71.0
Education	30,000	19,000	63.3	12,000	40.0
English	28,000	18,000	64.3	10,000	35.7
Foreign language	13,000	5,000	38.5	8,000	61.5
History	9,000	3,000	33.3	6,000	66.7
Physical education	3,000	s	s	2,000	66.7
Other postsecondary fields	65,000	29,000	44.6	36,000	55.4
Social services and related occupations	883,000	620,000	70.2	263,000	29.8
Clergy and other religious workers	120,000	27,000	22.5	93,000	77.5
Counselors (e.g., educational, vocational, mental health, substance abuse)	436,000	328,000	75.2	107,000	24.5
Social workers	327,000	264,000	80.7	63,000	19.3
Sales and marketing occupations	1,467,000	662,000	45.1	805,000	54.9
Insurance, securities, real estate, and business services	406,000	188,000	46.3	218,000	53.7
Sales — commodities, except retail (e.g., industrial, medical, dental machinery, equipment, supplies)	216,000	61,000	28.2	154,000	71.3
Sales — retail (e.g., furnishings, clothing, motor vehicles, cosmetics)	345,000	166,000	48.1	179,000	51.9
Other marketing and sales occupations	501,000	247,000	49.3	254,000	50.7
Arts, humanities, and related occupations	331,000	192,000	58.0	139,000	42.0
Writers, editors, public relations specialists, artists, entertainers, broadcasters	328,000	189,000	57.6	139,000	42.4
Historians	4,000	3,000	75.0	s	s
Other non-S&E occupations	3,430,000	1,723,000	50.2	1,707,000	49.8
Accounting clerks and bookkeepers	163,000	146,000	89.6	18,000	11.0



## CHAPTER 3 | Science and Engineering Labor Force

Occupation	Total	Female		Male	
		Number	Percent	Number	Percent
Secretaries, receptionists, typists	222,000	210,000	94.6	12,000	5.4
Other administrative (e.g., record clerks, telephone operators)	577,000	377,000	65.3	200,000	34.7
Farmers, foresters, and fishermen	99,000	21,000	21.2	78,000	78.8
Lawyers, judges	635,000	251,000	39.5	384,000	60.5
Librarians, archivists, curators	95,000	79,000	83.2	16,000	16.8
Food preparation and service (e.g., cooks, waitresses, bartenders)	136,000	66,000	48.5	71,000	52.2
Protective services (e.g., firefighters, police, guards, wardens, park rangers)	155,000	45,000	29.0	111,000	71.6
Other service occupations, except health (e.g., probation officers, human services work)	380,000	198,000	52.1	182,000	47.9
Other teachers and instructors (e.g., private tutors, dance, flying, martial arts)	230,000	145,000	63.0	85,000	37.0
Construction and extraction occupations	88,000	s	s	77,000	87.5
Installation, maintenance, and repair occupations	127,000	8,000	6.3	119,000	93.7
Precision or production occupations (e.g., metal or wood workers, butchers, bakers, assemblers, tailors)	140,000	45,000	32.1	95,000	67.9
Transportation and material moving occupations	199,000	13,000	6.5	185,000	93.0
Other occupations	183,000	108,000	59.0	74,000	40.4

\* = estimate < 500; s = suppressed for reasons of confidentiality and/or reliability.

### Note(s)

Scientists and engineers include those with one or more S&E or S&E-related degrees at the bachelor's level or higher and those who have only a non-S&E degree at the bachelor's level or higher and are employed in an S&E or S&E-related occupation. Detail may not add to total because of rounding. Numbers are rounded to the nearest 1,000. Percentages are based on rounded numbers.

### Source(s)

National Science Foundation, National Center for Science and Engineering Statistics, National Survey of College Graduates (NSCG) (2015), <https://www.nsf.gov/statistics/srvygrads/>.

*Science and Engineering Indicators 2018*

## CHAPTER 3 | Science and Engineering Labor Force

APPENDIX TABLE 3-13

### Employed S&E highest degree holders, by sex and field of degree: 2015

(Number and percent)

Field of S&E highest degree	Total	Female		Male	
		Number	Percent	Number	Percent
All S&E highest degree	13,497,000	5,376,000	39.8	8,121,000	60.2
Computer and mathematical sciences	2,346,000	663,000	28.3	1,683,000	71.7
Computer and information sciences	1,826,000	457,000	25.0	1,370,000	75.0
Computer and information sciences, general	340,000	99,000	29.1	241,000	70.9
Computer science	968,000	208,000	21.5	761,000	78.6
Computer systems analysis	49,000	13,000	26.5	36,000	73.5
Information services and systems	371,000	108,000	29.1	264,000	71.2
Other computer and information sciences	97,000	29,000	29.9	68,000	70.1
Mathematics and statistics	520,000	206,000	39.6	314,000	60.4
Applied mathematics	49,000	21,000	42.9	29,000	59.2
Mathematics, general	363,000	147,000	40.5	216,000	59.5
Operations research	34,000	7,000	20.6	27,000	79.4
Statistics	58,000	27,000	46.6	31,000	53.4
Other mathematics	16,000	s	s	11,000	68.8
Biological, agricultural, and environmental life sciences	2,116,000	1,072,000	50.7	1,044,000	49.3
Agricultural and food sciences	291,000	102,000	35.1	189,000	64.9
Animal sciences	102,000	41,000	40.2	61,000	59.8
Food sciences and technology	35,000	17,000	48.6	17,000	48.6
Plant sciences	92,000	38,000	41.3	53,000	57.6
Other agricultural sciences	62,000	5,000	8.1	57,000	91.9
Biological sciences	1,632,000	896,000	54.9	736,000	45.1
Biochemistry and biophysics	139,000	71,000	51.1	68,000	48.9
Biology, general	807,000	451,000	55.9	356,000	44.1
Botany	18,000	8,000	44.4	10,000	55.6

## CHAPTER 3 | Science and Engineering Labor Force

Field of S&E highest degree	Total	Female		Male	
		Number	Percent	Number	Percent
Cell and molecular biology	95,000	44,000	46.3	51,000	53.7
Ecology	87,000	34,000	39.1	53,000	60.9
Genetics, animal and plant	20,000	8,000	40.0	13,000	65.0
Microbiological sciences and immunology	118,000	73,000	61.9	46,000	39.0
Nutritional sciences	71,000	62,000	87.3	9,000	12.7
Pharmacology, human and animal	26,000	12,000	46.2	14,000	53.8
Physiology and pathology, human and animal	58,000	25,000	43.1	33,000	56.9
Zoology, general	56,000	21,000	37.5	35,000	62.5
Other biological sciences	135,000	87,000	64.4	48,000	35.6
Environmental life sciences	194,000	74,000	38.1	120,000	61.9
Environmental science or studies	157,000	68,000	43.3	90,000	57.3
Forestry sciences	36,000	6,000	16.7	30,000	83.3
Physical and related sciences	789,000	270,000	34.2	519,000	65.8
Chemistry, except biochemistry	370,000	153,000	41.4	217,000	58.6
Earth, atmospheric, and ocean sciences	218,000	82,000	37.6	136,000	62.4
Atmospheric sciences and meteorology	35,000	17,000	48.6	18,000	51.4
Earth sciences	45,000	21,000	46.7	23,000	51.1
Geology	98,000	32,000	32.7	66,000	67.3
Geological sciences, other	32,000	9,000	28.1	23,000	71.9
Oceanography	9,000	3,000	33.3	6,000	66.7
Physics and astronomy	187,000	30,000	16.0	157,000	84.0
Astronomy and astrophysics	14,000	1,000	7.1	13,000	92.9
Physics	173,000	28,000	16.2	144,000	83.2
Other physical sciences	14,000	5,000	35.7	9,000	64.3
Social and related sciences	5,056,000	2,881,000	57.0	2,175,000	43.0
Economics	817,000	239,000	29.3	578,000	70.7

## CHAPTER 3 | Science and Engineering Labor Force

Field of S&E highest degree	Total	Female		Male	
		Number	Percent	Number	Percent
Agricultural economics	63,000	17,000	27.0	46,000	73.0
Economics	754,000	222,000	29.4	533,000	70.7
Political and related sciences	908,000	424,000	46.7	485,000	53.4
Public policy studies	57,000	36,000	63.2	21,000	36.8
International relations	198,000	122,000	61.6	75,000	37.9
Political science and government	653,000	266,000	40.7	388,000	59.4
Psychology	1,967,000	1,364,000	69.3	602,000	30.6
Educational psychology	124,000	95,000	76.6	30,000	24.2
Clinical psychology	217,000	130,000	59.9	87,000	40.1
Counseling psychology	289,000	211,000	73.0	78,000	27.0
Experimental psychology	48,000	20,000	41.7	28,000	58.3
General psychology	896,000	631,000	70.4	265,000	29.6
Industrial/ organizational psychology	74,000	51,000	68.9	23,000	31.1
Social psychology	102,000	62,000	60.8	40,000	39.2
Other psychology	217,000	166,000	76.5	51,000	23.5
Sociology and anthropology	789,000	513,000	65.0	277,000	35.1
Anthropology and archaeology	156,000	100,000	64.1	57,000	36.5
Criminology	89,000	47,000	52.8	42,000	47.2
Sociology	544,000	366,000	67.3	178,000	32.7
Other social sciences	574,000	341,000	59.4	233,000	40.6
Area and ethnic studies	117,000	84,000	71.8	33,000	28.2
Linguistics	84,000	68,000	81.0	16,000	19.0
Philosophy of science	15,000	s	s	6,000	s
Geography	140,000	44,000	31.4	96,000	68.6
History of science	6,000	4,000	66.7	s	s
Other social sciences	212,000	133,000	62.7	79,000	37.3

## CHAPTER 3 | Science and Engineering Labor Force

Field of S&E highest degree	Total	Female		Male	
		Number	Percent	Number	Percent
Engineering	3,190,000	490,000	15.4	2,700,000	84.6
Aerospace, aeronautical, and astronautical engineering	135,000	19,000	14.1	116,000	85.9
Chemical engineering	211,000	46,000	21.8	165,000	78.2
Civil and architectural engineering	451,000	68,000	15.1	382,000	84.7
Architectural engineering	27,000	4,000	14.8	23,000	85.2
Civil engineering	424,000	64,000	15.1	359,000	84.7
Electrical and computer engineering	1,112,000	138,000	12.4	974,000	87.6
Computer and systems engineering	297,000	44,000	14.8	253,000	85.2
Electrical, electronics, and communications engineering	815,000	94,000	11.5	721,000	88.5
Industrial and manufacturing engineering	201,000	59,000	29.4	141,000	70.1
Mechanical engineering	659,000	67,000	10.2	592,000	89.8
Other engineering	421,000	92,000	21.9	329,000	78.1
Agricultural engineering	26,000	5,000	19.2	22,000	84.6
Bioengineering and biomedical engineering	49,000	19,000	38.8	30,000	61.2
Engineering sciences, mechanics, and physics	29,000	4,000	13.8	26,000	89.7
Environmental engineering	53,000	15,000	28.3	37,000	69.8
Engineering, general	23,000	5,000	21.7	18,000	78.3
Geophysical and geological engineering	14,000	2,000	14.3	12,000	85.7
Materials engineering, including ceramics and textiles	52,000	12,000	23.1	40,000	76.9
Metallurgical engineering	10,000	s	s	7,000	70.0
Mining and minerals engineering	8,000	s	s	7,000	87.5
Naval architecture and marine engineering	15,000	s	s	14,000	93.3
Nuclear engineering	19,000	2,000	10.5	16,000	84.2
Petroleum engineering	28,000	7,000	25.0	21,000	75.0
Other engineering	96,000	16,000	16.7	80,000	83.3

s = suppressed for reasons of confidentiality and/or reliability.

## CHAPTER 3 | Science and Engineering Labor Force

**Note(s)**

Detail may not add to total because of rounding. Numbers are rounded to the nearest 1,000. Percentages are based on rounded numbers.

**Source(s)**

National Science Foundation, National Center for Science and Engineering Statistics, National Survey of College Graduates (NSCG) (2015), <https://www.nsf.gov/statistics/srvygrads/>.

*Science and Engineering Indicators 2018*

## CHAPTER 3 | Science and Engineering Labor Force

APPENDIX TABLE 3-14

### Employed S&E highest degree holders, by sex, race, ethnicity, field of highest degree, and broad occupational category: 2015

(Percent)

Sex, race, ethnicity, and field of highest degree	S&E occupations			S&E-related occupations	Non-S&E occupations
	All S&E	In field	Out of field		
All employed S&E highest degree holders	36.0	26.8	9.2	14.5	49.6
Female					
All S&E fields	24.0	18.0	6.1	16.3	59.7
Computer and mathematical sciences	45.6	43.3	2.3	17.9	36.5
Biological, agricultural, and environmental life sciences	26.8	17.9	8.9	36.8	36.4
Physical and related sciences	34.4	20.0	14.1	29.3	36.7
Social and related sciences	12.0	8.6	3.4	7.4	80.6
Engineering	54.1	37.8	16.3	14.3	31.8
Male					
All S&E fields	43.9	32.6	11.2	13.3	42.9
Computer and mathematical sciences	62.3	59.0	3.3	12.3	25.4
Biological, agricultural, and environmental life sciences	32.3	22.0	10.2	19.6	48.2
Physical and related sciences	56.5	34.3	22.4	15.8	27.7
Social and related sciences	14.4	6.9	7.5	8.1	77.5
Engineering	58.1	40.6	17.5	15.1	26.8
Asian					
All S&E fields	55.3	36.6	18.8	14.3	30.4
Computer and mathematical sciences	70.7	67.2	3.7	10.0	19.4
Biological, agricultural, and environmental life sciences	47.0	26.3	s	29.2	24.2
Physical and related sciences	61.6	35.5	26.1	14.5	23.9

## CHAPTER 3 | Science and Engineering Labor Force

Sex, race, ethnicity, and field of highest degree	S&E occupations			S&E-related occupations	Non-S&E occupations
	All S&E	In field	Out of field		
Social and related sciences	17.3	9.5	7.8	7.0	75.7
Engineering	64.7	31.1	33.5	15.3	19.9
American Indian or Alaska Native					
All S&E fields	22.5	15.0	s	20.0	60.0
Computer and mathematical sciences	s	s	s	*	s
Biological, agricultural, and environmental life sciences	28.6	s	*	s	42.9
Physical and related sciences	s	*	s	*	s
Social and related sciences	s	s	s	s	85.0
Engineering	22.2	22.2	s	44.4	33.3
Black					
All S&E fields	25.4	20.3	5.2	15.1	59.5
Computer and mathematical sciences	48.3	44.8	3.5	15.7	36.0
Biological, agricultural, and environmental life sciences	11.4	7.0	4.4	45.6	43.0
Physical and related sciences	60.0	36.0	24.0	16.0	28.0
Social and related sciences	10.8	7.6	3.2	7.1	82.2
Engineering	52.9	41.3	12.4	13.2	33.1
Hispanic, any race					
All S&E fields	27.8	20.9	6.9	14.0	58.1
Computer and mathematical sciences	47.1	44.9	2.2	15.4	37.5
Biological, agricultural, and environmental life sciences	21.3	14.9	6.3	27.6	51.1
Physical and related sciences	39.5	25.6	14.0	18.6	39.5
Social and related sciences	11.5	8.7	2.8	7.3	81.2
Engineering	50.5	34.7	15.9	15.9	33.6
White					



## CHAPTER 3 | Science and Engineering Labor Force

Sex, race, ethnicity, and field of highest degree	S&E occupations			S&E-related occupations	Non-S&E occupations
	All S&E	In field	Out of field		
All S&E fields	33.9	26.1	7.8	14.5	51.6
Computer and mathematical sciences	55.0	52.1	2.8	14.8	30.2
Biological, agricultural, and environmental life sciences	28.4	20.1	8.2	27.1	44.5
Physical and related sciences	45.9	28.2	17.7	22.1	32.0
Social and related sciences	13.2	7.8	5.5	7.9	78.9
Engineering	56.2	43.9	12.3	14.5	29.2
Native Hawaiian or Other Pacific Islander					
All S&E fields	21.4	14.3	4.8	7.1	73.8
Computer and mathematical sciences	s	s	s	s	s
Biological, agricultural, and environmental life sciences	25.0	s	s	s	50.0
Physical and related sciences	s	s	s	s	s
Social and related sciences	s	*	s	s	87.5
Engineering	66.7	66.7	s	s	s
More than one race					
All S&E fields	32.5	25.5	6.7	16.9	50.6
Computer and mathematical sciences	57.1	54.8	2.4	s	21.4
Biological, agricultural, and environmental life sciences	36.4	30.3	6.1	27.3	36.4
Physical and related sciences	62.5	25.0	25.0	25.0	25.0
Social and related sciences	11.2	7.2	4.0	10.4	78.4
Engineering	60.9	47.8	13.0	21.7	17.4

\* = estimate < 500; s = suppressed for reasons of reliability and/or confidentiality.

### Note(s)

## CHAPTER 3 | Science and Engineering Labor Force

Hispanic may be any race; American Indian or Alaska Native, Asian, black or African American, Native Hawaiian or Other Pacific Islander, white, and more than one race refer to individuals who are not of Hispanic origin. For each broad S&E highest degree field, S&E occupations in field includes individuals who report being in an occupation in the same broad category as their highest degree, and S&E occupations out of field includes those who report being in an occupation not in the same broad category as their highest degree. For example, for highest degree holders in computer and mathematical sciences, S&E occupations in field includes those who report computer and mathematical sciences as their occupation, and S&E occupations out of field includes those who report an S&E occupation other than computer and mathematical sciences occupations, that is, who report biological, agricultural, and environmental life sciences; physical sciences; social sciences; or engineering as their occupation. Detail may not add to total because of rounding. Percentages are based on rounded numbers.

### Source(s)

National Science Foundation, National Center for Science and Engineering Statistics, National Survey of College Graduates (NSCG) (2015), <https://www.nsf.gov/statistics/srvygrads/>.

*Science and Engineering Indicators 2018*

## CHAPTER 3 | Science and Engineering Labor Force

APPENDIX TABLE 3-15

## Employed scientists and engineers, by race, ethnicity, and occupation: 2015

(Number and percent)

Occupation	Total	Asian		American Indian or Alaska Native		Black		Hispanic		White		Native Hawaiian or Other Pacific Islander		More than one race	
		Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
All occupations	25,306,000	3,123,000	12.3	76,000	0.3	1,716,000	6.8	2,029,000	8.0	17,842,000	70.5	76,000	0.3	443,000	1.8
S&E occupations	6,407,000	1,321,000	20.6	10,000	0.2	308,000	4.8	387,000	6.0	4,267,000	66.6	12,000	0.2	103,000	1.6
Computer and mathematical scientists	3,156,000	813,000	25.8	2,000	0.1	162,000	5.1	159,000	5.0	1,965,000	62.3	6,000	0.2	50,000	1.6
Computer and information scientists	2,823,000	722,000	25.6	1,000	0.0	152,000	5.4	145,000	5.1	1,752,000	62.1	6,000	0.2	45,000	1.6
Computer and information scientists, research	64,000	23,000	35.9	s	s	s	s	s	s	39,000	60.9	s	s	s	s
Computer network architects	48,000	11,000	22.9	s	s	4,000	8.3	s	s	31,000	64.6	s	s	s	s
Computer support specialists	242,000	27,000	11.2	s	s	24,000	9.9	12,000	5.0	176,000	72.7	s	s	s	s
Computer system analysts	333,000	91,000	27.3	s	s	26,000	7.8	18,000	5.4	188,000	56.5	2,000.0	0.6	8,000	2.4
Database administrators	146,000	27,000	18.5	s	s	10,000	6.8	4,000	2.7	104,000	71.2	s	s	s	s
Information security analysts	69,000	13,000	18.8	s	s	9,000	13.0	s	s	37,000	53.6	s	s	s	s
Network and computer systems administrators	188,000	34,000	18.1	s	s	16,000	8.5	11,000	5.9	124,000	66.0	s	s	1,000	0.5
Software developers — applications and systems software	623,000	210,000	33.7	s	s	16,000	2.6	26,000	4.2	363,000	58.3	s	s	8,000	1.3
Web developers	174,000	21,000	12.1	s	s	3,000	1.7	9,000	5.2	137,000	78.7	s	s	3,000	1.7
Other computer information science occupations	345,000	39,000	11.3	s	s	25,000	7.2	15,000	4.3	255,000	73.9	s	s	10,000	2.9

## CHAPTER 3 | Science and Engineering Labor Force

Occupation	Total	Asian		American Indian or Alaska Native		Black		Hispanic		White		Native Hawaiian or Other Pacific Islander		More than one race	
		Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Computer engineers — software	592,000	224,000	37.8	s	s	18,000	3.0	42,000	7.1	300,000	50.7	s	s	7,000	1.2
Mathematical scientists	218,000	75,000	34.4	s	s	5,000	2.3	8,000	3.7	126,000	57.8	s	s	4,000	1.8
Mathematicians	7,000	s	s	s	s	s	s	s	s	5,000	71.4	s	s	s	s
Operations research analysts, including modeling	122,000	22,000	18.0	s	s	3,000	s	5,000	4.1	90,000	73.8	s	s	3,000.0	s
Statisticians	74,000	s	s	s	s	1,000	s	1,000	s	25,000	s	s	s	s	s
Other mathematical scientists	15,000	s	s	s	s	*	*	s	s	7,000	46.7	s	s	s	s
Postsecondary teachers — computer and mathematical sciences	114,000	16,000	14.0	s	s	5,000	4.4	5,000	4.4	86,000	75.4	s	s	s	s
Computer science	22,000	3,000	13.6	s	s	s	s	2,000	9.1	14,000	63.6	s	s	s	s
Mathematics and statistics	92,000	13,000	14.1	s	s	3,000	3.3	3,000	3.3	72,000	78.3	s	s	s	s
Biological, agricultural, and environmental life scientists	631,000	114,000	18.1	2,000	0.3	16,000	2.5	37,000	5.9	449,000	71.2	1,000	0.2	12,000	1.9
Agricultural and food scientists	52,000	8,000	15.4	s	s	2,000	3.8	3,000	5.8	38,000	73.1	s	s	*	*
Biological and medical scientists	443,000	98,000	22.1	1,000	0.2	11,000	2.5	28,000	6.3	296,000	66.8	*	*	10,000	2.3
Biochemists and biophysicists	72,000	28,000	38.9	s	s	1,000	1.4	4,000	5.6	37,000	51.4	s	s	1,000	1.4
Biological scientists (e.g., botanists, ecologists, zoologists)	137,000	17,000	12.4	s	s	3,000	2.2	7,000	5.1	105,000	76.6	s	s	6,000	4.4
Medical scientists (excluding practitioners)	136,000	34,000	25.0	s	s	4,000	2.9	7,000	5.1	90,000	66.2	s	s	1,000	0.7
Other biological and life scientists	98,000	19,000	19.4	s	s	3,000	3.1	10,000	10.2	64,000	65.3	s	s	2,000	2.0
Forestry and conservation scientists	59,000	*	*	s	s	*	*	3,000	s	55,000	93.2	s	s	s	s

## CHAPTER 3 | Science and Engineering Labor Force

Occupation	Total	Asian		American Indian or Alaska Native		Black		Hispanic		White		Native Hawaiian or Other Pacific Islander		More than one race	
		Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Postsecondary teachers — life and related sciences	78,000	7,000	9.0	s	s	3,000	3.8	4,000	5.1	61,000	78.2	s	s	2,000	2.6
Agriculture	5,000	s	s	s	s	s	s	*	*	5,000	100.0	s	s	s	s
Biological sciences	62,000	7,000	11.3	s	s	2,000	3.2	4,000	6.5	48,000	77.4	s	s	2,000	3.2
Other natural sciences	11,000	s	s	s	s	s	s	*	*	9,000	81.8	s	s	s	s
Physical and related scientists	331,000	64,000	19.3	1,000	0.3	13,000	3.9	17,000	5.1	233,000	70.4	s	s	3,000	0.9
Chemists, except biochemists	105,000	24,000	22.9	s	s	6,000	5.7	7,000	6.7	67,000	63.8	s	s	1,000	1.0
Earth scientists, geologists, and oceanographers	66,000	6,000	9.1	s	s	1,000	1.5	2,000	3.0	56,000	84.8	s	s	1,000	1.5
Atmospheric and space scientists	15,000	s	s	s	s	s	s	*	*	11,000	73.3	s	s	*	*
Geologists, including earth scientists	48,000	2,000	4.2	s	s	1,000	2.1	2,000	4.2	43,000	89.6	s	s	1,000	2.1
Oceanographers	4,000	s	s	s	s	s	s	s	s	2,000	50.0	s	s	s	s
Physicists and astronomers	49,000	16,000	32.7	s	s	s	s	2,000	4.1	29,000	59.2	s	s	s	s
Astronomers	7,000	2,000	28.6	s	s	s	s	s	s	5,000	71.4	s	s	s	s
Physicists, except biophysicists	42,000	14,000	33.3	s	s	s	s	1,000	2.4	25,000	59.5	s	s	s	s
Other physical and related scientists	45,000	6,000	13.3	s	s	1,000	2.2	3,000	6.7	34,000	75.6	s	s	s	s
Postsecondary teachers — physical and related sciences	65,000	12,000	18.5	s	s	4,000	6.2	3,000	4.6	46,000	70.8	s	s	s	s
Chemistry	28,000	7,000	25.0	s	s	3,000	10.7	2,000	7.1	17,000	60.7	s	s	s	s
Earth, environmental, and marine sciences	15,000	1,000	6.7	s	s	s	s	*	*	13,000	86.7	s	s	s	s

## CHAPTER 3 | Science and Engineering Labor Force

Occupation	Total	Asian		American Indian or Alaska Native		Black		Hispanic		White		Native Hawaiian or Other Pacific Islander		More than one race	
		Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Physics	22,000	4,000	18.2	s	s	s	s	s	s	16,000	72.7	s	s	s	s
Social and related scientists	570,000	51,000	8.9	2,000	0.4	42,000	7.4	55,000	9.6	407,000	71.4	s	s	11,000	1.9
Economists	32,000	5,000	15.6	s	s	2,000	6.3	4,000	12.5	20,000	62.5	s	s	*	*
Political scientists	25,000	s	s	s	s	s	s	s	s	19,000	76.0	s	s	s	s
Psychologists, including clinical	213,000	12,000	5.6	s	s	18,000	8.5	28,000	13.1	151,000	70.9	s	s	3,000	1.4
Sociologists and anthropologists	31,000	1,000	s	s	s	s	s	2,000	6.5	24,000	77.4	s	s	s	s
Anthropologists	11,000	s	s	s	s	s	s	*	*	9,000	81.8	s	s	s	s
Sociologists	20,000	s	s	s	s	s	s	2,000	s	15,000	75.0	s	s	s	s
Other social and related scientists	108,000	15,000	13.9	s	s	7,000	6.5	8,000	7.4	74,000	68.5	s	s	3,000	2.8
Postsecondary teachers — social and related sciences	162,000	16,000	9.9	s	s	13,000	8.0	9,000	5.6	120,000	74.1	s	s	4,000	2.5
Economics	21,000	4,000	19.0	s	s	2,000	9.5	1,000	4.8	15,000	71.4	s	s	s	s
Political science	21,000	s	s	s	s	1,000	4.8	1,000	4.8	17,000	81.0	s	s	s	s
Psychology	38,000	4,000	10.5	s	s	4,000	10.5	3,000	7.9	26,000	68.4	s	s	1,000	2.6
Sociology	14,000	1,000	7.1	s	s	s	s	1,000	7.1	10,000	71.4	s	s	1,000	7.1
Other social sciences	68,000	5,000	7.4	s	s	6,000	8.8	3,000	4.4	53,000	77.9	s	s	s	s
Engineers	1,719,000	279,000	16.2	4,000	0.2	74,000	4.3	120,000	7.0	1,213,000	70.6	4,000	0.2	27,000	1.6
Aerospace, aeronautical, or astronautical engineers	96,000	12,000	12.5	s	s	2,000	2.1	11,000	11.5	68,000	70.8	s	s	s	s

## CHAPTER 3 | Science and Engineering Labor Force

Occupation	Total	Asian		American Indian or Alaska Native		Black		Hispanic		White		Native Hawaiian or Other Pacific Islander		More than one race	
		Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Chemical engineers	80,000	13,000	16.3	s	s	s	s	4,000	5.0	59,000	73.8	s	s	2,000	2.5
Civil, architectural, or sanitary engineers	251,000	37,000	14.7	s	s	11,000	4.4	20,000	8.0	176,000	70.1	s	s	5,000	2.0
Electrical or computer hardware engineers	360,000	85,000	23.6	s	s	17,000	4.7	25,000	6.9	226,000	62.8	1,000	0.3	5,000	1.4
Computer engineers — hardware	70,000	24,000	34.3	s	s	1,000.0	1.4	4,000	5.7	40,000	57.1	s	s	s	s
Electrical and electronics engineers	290,000	62,000	21.4	s	s	16,000	5.5	21,000	7.2	186,000	64.1	1,000	0.3	4,000	1.4
Industrial engineers	82,000	13,000	15.9	s	s	7,000	8.5	7,000	8.5	55,000	67.1	s	s	*	*
Mechanical engineers	337,000	46,000	13.6	s	s	12,000	3.6	19,000	5.6	255,000	75.7	1,000	0.3	5,000	1.5
Other engineers	460,000	57,000	12.4	s	s	21,000	4.6	29,000	6.3	343,000	74.6	s	s	7,000	1.5
Agricultural engineers	7,000	s	s	s	s	s	s	s	s	6,000	85.7	s	s	s	s
Bioengineers or biomedical engineers	26,000	4,000	15.4	s	s	1,000	3.8	2,000	7.7	19,000	73.1	s	s	s	s
Environmental engineers	66,000	6,000	9.1	s	s	4,000	6.1	4,000	6.1	49,000	74.2	s	s	s	s
Marine engineers and naval architects	12,000	*	*	s	s	s	s	s	s	10,000	83.3	s	s	s	s
Materials and metallurgical engineers	31,000	3,000	9.7	s	s	s	s	2,000	6.5	23,000	74.2	s	s	s	s
Mining and geological engineers	5,000	s	s	s	s	s	s	s	s	3,000	60.0	s	s	s	s
Nuclear engineers	25,000	1,000	4.0	s	s	*	*	s	s	19,000	76.0	s	s	s	s
Petroleum engineers	19,000	3,000	15.8	s	s	s	s	1,000	5.3	14,000	73.7	s	s	s	s
Sales engineers	90,000	5,000	5.6	s	s	4,000	4.4	5,000	5.6	73,000	81.1	s	s	s	s

## CHAPTER 3 | Science and Engineering Labor Force

Occupation	Total	Asian		American Indian or Alaska Native		Black		Hispanic		White		Native Hawaiian or Other Pacific Islander		More than one race	
		Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Other engineers	178,000	33,000	18.5	s	s	8,000	4.5	8,000	4.5	126,000	70.8	s	s	3,000	1.7
Postsecondary teachers — engineering	53,000	16,000	30.2	s	s	1,000	1.9	3,000	5.7	32,000	60.4	s	s	s	s
S&E-related occupations	7,867,000	871,000	11.1	27,000	0.3	515,000	6.5	629,000	8.0	5,676,000	72.1	21,000	0.3	128,000	1.6
Health-related occupations	4,883,000	542,000	11.1	19,000	0.4	312,000	6.4	415,000	8.5	3,512,000	71.9	15,000	0.3	69,000	1.4
Diagnosing or treating practitioners (e.g., dentists, optometrists, physicians, psychiatrists, podiatrists, surgeons, veterinarians)	1,205,000	189,000	15.7	s	s	54,000	4.5	90,000	7.5	855,000	71.0	s	s	14,000	1.2
Registered nurses, pharmacists, dieticians, therapists, physician assistants, nurse practitioners	2,307,000	234,000	10.1	9,000	0.4	120,000	5.2	160,000	6.9	1,739,000	75.4	10,000	0.4	36,000	1.6
Health technologists and technicians (e.g., dental hygienists, health record technicians, licensed practical nurses, laboratory or radiology technicians)	513,000	47,000	9.2	s	s	57,000	11.1	41,000	8.0	356,000	69.4	s	s	9,000	1.8
Other health occupations	718,000	62,000	8.6	4,000	0.6	74,000	10.3	118,000	16.4	446,000	62.1	s	s	9,000	1.3
Postsecondary teachers — health and related sciences	140,000	10,000	7.1	s	s	7,000	5.0	7,000	5.0	116,000	82.9	s	s	s	s
S&E managers	967,000	124,000	12.8	5,000	0.5	63,000	6.5	60,000	6.2	701,000	72.5	s	s	11,000	1.1
Computer and information systems managers	229,000	55,000	24.0	s	s	21,000	9.2	10,000	4.4	142,000	62.0	s	s	2,000	0.9
Engineering managers	362,000	41,000	11.3	4,000	1.1	10,000	2.8	25,000	6.9	276,000	76.2	s	s	5,000	1.4
Medical and health services managers	320,000	23,000	7.2	s	s	29,000	9.1	23,000	7.2	239,000	74.7	s	s	4,000	1.3
Natural sciences managers	55,000	5,000	9.1	s	s	s	s	3,000	5.5	44,000	80.0	s	s	s	s



## CHAPTER 3 | Science and Engineering Labor Force

Occupation	Total	Asian		American Indian or Alaska Native		Black		Hispanic		White		Native Hawaiian or Other Pacific Islander		More than one race	
		Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
S&E precollege teachers	1,029,000	34,000	3.3	2,000	0.2	64,000	6.2	81,000	7.9	817,000	79.4	*	*	31,000	3.0
Secondary — computer, mathematics, or sciences	729,000	28,000	3.8	1,000.0	0.1	50,000	6.9	62,000	8.5	572,000	78.5	*	*	17,000	2.3
Secondary — social sciences	300,000	6,000	2.0	s	s	15,000	5.0	19,000	6.3	245,000	81.7	s	s	14,000	4.7
S&E technicians and technologists	782,000	145,000	18.5	s	s	70,000	9.0	57,000	7.3	489,000	62.5	s	s	16,000	2.0
Technologists and technicians in the biological and life sciences	102,000	22,000	21.6	s	s	8,000	7.8	10,000	9.8	61,000	59.8	s	s	1,000	1.0
Computer programmers (business, scientific, process control)	166,000	37,000	22.3	s	s	12,000	7.2	5,000	3.0	109,000	65.7	s	s	s	s
Electrical, electronic, industrial, and mechanical technicians	243,000	49,000	20.2	s	s	35,000	14.4	21,000	8.6	132,000	54.3	s	s	6,000	2.5
Drafting occupations, including computer drafting	28,000	3,000	10.7	s	s	s	s	2,000	7.1	17,000	60.7	s	s	s	s
Surveying and mapping technicians	15,000	s	s	s	s	s	s	s	s	11,000	73.3	s	s	s	s
Other engineering technologists and technicians	177,000	27,000	15.3	s	s	12,000	6.8	13,000	7.3	118,000	66.7	s	s	s	s
Surveyors, cartographers, photogrammetrists	11,000	s	s	s	s	s	s	s	s	9,000	81.8	s	s	s	s
Technologists and technicians in the mathematical sciences	3,000	*	*	s	s	s	s	s	s	2,000	66.7	s	s	s	s
Technologists and technicians in the physical sciences	37,000	3,000	8.1	s	s	s	s	s	s	30,000	81.1	s	s	s	s
Other S&E-related occupations	207,000	25,000	12.1	s	s	5,000	2.4	16,000	7.7	157,000	75.8	s	s	1,000	0.5
Architects	174,000	22,000	12.6	s	s	5,000	2.9	15,000	8.6	129,000	74.1	s	s	s	s
Actuaries	33,000	3,000	9.1	s	s	s	s	s	s	28,000	84.8	s	s	s	s
Non-S&E occupations	11,031,000	931,000	8.4	39,000	0.4	894,000	8.1	1,012,000	9.2	7,900,000	71.6	43,000	0.4	211,000	1.9

## CHAPTER 3 | Science and Engineering Labor Force

Occupation	Total	Asian		American Indian or Alaska Native		Black		Hispanic		White		Native Hawaiian or Other Pacific Islander		More than one race	
		Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Non-S&E managers	1,825,000	158,000	8.7	4,000	0.2	75,000	4.1	117,000	6.4	1,440,000	78.9	6,000	0.3	24,000	1.3
Top-level managers, executives, administrators (e.g., chief executive officer, chief operating officer, chief financial officer; president; district manager, general manager, provost)	1,099,000	92,000	8.4	2,000	0.2	28,000	2.5	62,000	5.6	899,000	81.8	5,000	0.5	10,000	0.9
Education administrators (e.g., registrar, dean, principal)	132,000	10,000	7.6	s	s	11,000	8.3	9,000	6.8	101,000	76.5	s	s	s	s
Other mid-level managers	594,000	57,000	9.6	2,000	0.3	36,000	6.1	46,000	7.7	440,000	74.1	*	*	13,000	2.2
Management-related occupations	2,085,000	220,000	10.6	5,000	0.2	193,000	9.3	196,000	9.4	1,431,000	68.6	12,000	0.6	28,000	1.3
Accountants, auditors, and other financial specialists	720,000	102,000	14.2	s	s	48,000	6.7	59,000	8.2	500,000	69.4	1,000	0.1	8,000	1.1
Personnel, training, and labor relations specialists	295,000	11,000	3.7	s	s	41,000	13.9	30,000	10.2	208,000	70.5	s	s	3,000	1.0
Other management-related occupations	1,070,000	106,000	9.9	s	s	104,000	9.7	106,000	9.9	724,000	67.7	10,000	0.9	17,000	1.6
Non-S&E precollege teachers	825,000	47,000	5.7	s	s	89,000	10.8	85,000	10.3	586,000	71.0	9,000	1.1	8,000	1.0
Prekindergarten and kindergarten	129,000	9,000	7.0	s	s	20,000	15.5	15,000	11.6	83,000	64.3	s	s	s	?
Elementary	385,000	20,000	5.2	s	s	46,000	11.9	42,000	10.9	273,000	70.9	s	s	4,000	1.0
Secondary — other subjects	124,000	s	s	s	s	7,000	5.6	12,000	9.7	88,000	71.0	s	s	1,000	0.8
Special education — primary and secondary	139,000	6,000	4.3	s	s	12,000	8.6	13,000	9.4	107,000	77.0	s	s	1,000	0.7
Other precollegiate area	48,000	4,000	8.3	s	s	5,000	10.4	4,000	8.3	34,000	70.8	s	s	s	s
Non-S&E postsecondary teachers	184,000	16,000	8.7	s	s	13,000	7.1	12,000	6.5	137,000	74.5	s	s	2,000	1.1
Arts, drama, and music	6,000	s	s	s	s	s	s	s	s	5,000	83.3	s	s	s	s

## CHAPTER 3 | Science and Engineering Labor Force

Occupation	Total	Asian		American Indian or Alaska Native		Black		Hispanic		White		Native Hawaiian or Other Pacific Islander		More than one race	
		Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Business, commerce, and marketing	31,000	6,000	19.4	s	s	2,000	6.5	1,000	3.2	22,000	71.0	s	s	s	s
Education	30,000	5,000	16.7	s	s	2,000	6.7	2,000	6.7	21,000	70.0	s	s	s	s
English	28,000	1,000	3.6	s	s	s	s	s	s	23,000	82.1	s	s	1,000	s
Foreign language	13,000	1,000	7.7	s	s	s	s	3,000	23.1	3,000	23.1	s	s	s	s
History	9,000	s	s	s	s	s	s	s	s	8,000	88.9	s	s	s	s
Physical education	3,000	s	s	s	s	s	s	s	s	3,000	100.0	s	s	s	s
Other postsecondary fields	65,000	3,000	4.6	s	s	4,000	6.2	4,000	6.2	52,000	80.0	s	s	1,000	1.5
Social services and related occupations	883,000	40,000	4.5	5,000	0.6	124,000	14.0	109,000	12.3	581,000	65.8	s	s	23,000	2.6
Clergy and other religious workers	120,000	11,000	9.2	s	s	9,000	7.5	10,000	8.3	88,000	73.3	s	s	s	s
Counselors (e.g., educational, vocational, mental health, substance abuse)	436,000	20,000	4.6	s	s	51,000	11.7	49,000	11.2	295,000	67.7	s	s	18,000	4.1
Social workers	327,000	9,000	2.8	s	s	64,000	19.6	50,000	15.3	198,000	60.6	s	s	5,000	1.5
Sales and marketing occupations	1,467,000	139,000	9.5	s	s	93,000	6.3	122,000	8.3	1,066,000	72.7	s	s	36,000	2.5
Insurance, securities, real estate, and business services	406,000	42,000	10.3	s	s	27,000	6.7	37,000	9.1	294,000	72.4	s	s	4,000	1.0
Sales — commodities except retail (e.g., industrial, medical, dental machinery, equipment, supplies)	216,000	9,000	4.2	s	s	8,000	3.7	21,000	9.7	176,000	81.5	s	s	2,000	0.9
Sales — retail (e.g., furnishings, clothing, motor vehicles, cosmetics)	345,000	42,000	12.2	s	s	19,000	5.5	32,000	9.3	234,000	67.8	s	s	17,000	4.9
Other marketing and sales occupations	501,000	46,000	9.2	s	s	39,000	7.8	32,000	6.4	361,000	72.1	s	s	13,000	2.6

## CHAPTER 3 | Science and Engineering Labor Force

Occupation	Total	Asian		American Indian or Alaska Native		Black		Hispanic		White		Native Hawaiian or Other Pacific Islander		More than one race	
		Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Arts, humanities, and related occupations	331,000	21,000	6.3	s	s	16,000	4.8	16,000	4.8	267,000	80.7	s	s	9,000	2.7
Writers, editors, public relations specialists, artists, entertainers, broadcasters	328,000	21,000	6.4	s	s	16,000	4.9	16,000	4.9	264,000	80.5	s	s	9,000	2.7
Historians	4,000	s	s	s	s	s	s	s	s	4,000	100.0	s	s	s	s
Other non-S&E occupations	3,430,000	290,000	8.5	11,000	0.3	291,000	8.5	355,000	10.3	2,391,000	69.7	10,000	0.3	81,000	2.4
Accounting clerks and bookkeepers	163,000	25,000	15.3	s	s	s	s	7,000	4.3	106,000	65.0	s	s	s	s
Secretaries, receptionists, typists	222,000	26,000	11.7	s	s	23,000	10.4	30,000	13.5	134,000	60.4	s	s	s	s
Other administrative (e.g., record clerks, telephone operators)	577,000	69,000	12.0	*	*	78,000	13.5	79,000	13.7	335,000	58.1	s	s	13,000	2.3
Farmers, foresters, and fishermen	99,000	2,000	2.0	s	s	s	s	s	s	90,000	90.9	s	s	*	*
Lawyers, judges	635,000	30,000	4.7	s	s	26,000	4.1	37,000	5.8	527,000	83.0	s	s	13,000	2.0
Librarians, archivists, curators	95,000	2,000	2.1	s	s	3,000	3.2	6,000	6.3	74,000	77.9	s	s	9,000	9.5
Food preparation and service (e.g., cooks, waitresses, bartenders)	136,000	19,000	14.0	s	s	4,000	2.9	13,000	9.6	93,000	68.4	s	s	7,000	5.1
Protective services (e.g., firefighters, police, guards, wardens, park rangers)	155,000	4,000	2.6	s	s	20,000	12.9	13,000	8.4	113,000	72.9	s	s	5,000	3.2
Other service occupations, except health (e.g., probation officer, human services work)	380,000	25,000	6.6	s	s	36,000	9.5	56,000	14.7	239,000	62.9	s	s	16,000	4.2
Other teachers and instructors (e.g., private tutors, dance, flying, martial arts)	230,000	13,000	5.7	s	s	25,000	10.9	15,000	6.5	173,000	75.2	s	s	3,000	1.3

## CHAPTER 3 | Science and Engineering Labor Force

Occupation	Total	Asian		American Indian or Alaska Native		Black		Hispanic		White		Native Hawaiian or Other Pacific Islander		More than one race	
		Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Construction and extraction occupations	88,000	s	s	s	s	3,000	3.4	5,000	5.7	70,000	79.5	s	s	s	s
Installation, maintenance, and repair occupations	127,000	8,000	6.3	s	s	s	s	12,000	9.4	104,000	81.9	s	s	s	s
Precision or production occupations (e.g., metal or wood workers, butchers, bakers, assemblers, tailors)	140,000	14,000	10.0	s	s	14,000	10.0	17,000	12.1	93,000	66.4	s	s	s	s
Transportation and material moving occupations	199,000	20,000	10.1	s	s	19,000	9.5	15,000	7.5	143,000	71.9	s	s	s	s
Other occupations	183,000	26,000	14.2	s	s	11,000	6.0	45,000	24.6	96,000	52.5	s	s	2,000	1.1

\* = estimate < 500; s = suppressed for reasons of confidentiality and/or reliability.

### Note(s)

Scientists and engineers include those with one or more S&E or S&E-related degrees at the bachelor's level or higher or those who have only a non-S&E degree at the bachelor's level or higher and are employed in an S&E or S&E-related occupation. Hispanic may be any race; American Indian or Alaska Native, Asian, black or African American, Native Hawaiian or Other Pacific Islander, white, and more than one race refer to individuals who are not of Hispanic origin. Detail may not add to total because of rounding. Numbers are rounded to the nearest 1,000. Percentages are based on rounded numbers.

### Source(s)

National Science Foundation, National Center for Science and Engineering Statistics, National Survey of College Graduates (NSCG) (2015), <https://www.nsf.gov/statistics/srvygrads/>.

*Science and Engineering Indicators 2018*

## CHAPTER 3 | Science and Engineering Labor Force

APPENDIX TABLE 3-16

## Employed S&amp;E highest degree holders, by race, ethnicity, and field of degree: 2015

(Number and percent)

Highest degree field	Total	Asian		American Indian or Alaska Native		Black		Hispanic		White		Native Hawaiian or Other Pacific Islander		More than one race	
		Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
All S&E degrees	13,497,000	2,035,000	15.1	40,000	0.3	869,000	6.4	1,135,000	8.4	9,122,000	67.6	42,000	0.3	255,000	1.9
Computer and mathematical sciences	2,346,000	542,000	23.1	2,000	0.1	172,000	7.3	136,000	5.8	1,446,000	61.6	8,000	0.3	42,000	1.8
Computer and information sciences	1,826,000	462,000	25.3	2,000	0.1	146,000	8.0	109,000	6.0	1,069,000	58.5	2,000	0.1	36,000	2.0
Computer and information sciences, general	340,000	85,000	25.0	s	s	39,000	11.5	23,000	6.8	184,000	54.1	s	s	10,000	2.9
Computer science	968,000	306,000	31.6	s	s	54,000	5.6	54,000	5.6	537,000	55.5	s	s	17,000	1.8
Computer systems analysis	49,000	6,000	12.2	s	s	4,000	8.2	3,000	6.1	36,000	73.5	s	s	s	s
Information services and systems	371,000	52,000	14.0	s	s	36,000	9.7	26,000	7.0	248,000	66.8	s	s	7,000	1.9
Other computer and information sciences	97,000	14,000	14.4	s	s	13,000	13.4	4,000	4.1	64,000	66.0	s	s	s	s
Mathematics and statistics	520,000	79,000	15.2	*	*	26,000	5.0	27,000	5.2	377,000	72.5	s	s	6,000	1.2
Applied mathematics	49,000	11,000	22.4	s	s	s	s	2,000	4.1	35,000	71.4	s	s	s	s
Mathematics, general	363,000	38,000	10.5	*	*	20,000	5.5	17,000	4.7	283,000	78.0	s	s	4,000	1.1
Operations research	34,000	6,000	17.6	s	s	s	s	2,000	5.9	25,000	73.5	s	s	s	s
Statistics	58,000	23,000	39.7	s	s	s	s	3,000	5.2	28,000	48.3	s	s	1,000	1.7
Other mathematics	16,000	1,000	s	s	s	s	s	s	s	6,000	37.5	s	s	s	s
Biological, agricultural, and environmental life sciences	2,116,000	281,000	13.3	7,000	0.3	114,000	5.4	174,000	8.2	1,504,000	71.1	4,000	0.2	33,000	1.6

## CHAPTER 3 | Science and Engineering Labor Force

Highest degree field	Total	Asian		American Indian or Alaska Native		Black		Hispanic		White		Native Hawaiian or Other Pacific Islander		More than one race	
		Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Agricultural and food sciences	291,000	14,000	4.8	s	s	6,000	2.1	13,000	4.5	253,000	86.9	1,000	0.3	2,000	0.7
Animal sciences	102,000	s	s	s	s	1,000	s	6,000	5.9	92,000	90.2	s	s	1,000	1.0
Food sciences and technology	35,000	5,000	14.3	s	s	1,000	2.9	2,000	5.7	25,000	71.4	s	s	s	s
Plant sciences	92,000	6,000	6.5	s	s	s	s	4,000	4.3	79,000	85.9	s	s	s	s
Other agricultural sciences	62,000	3,000	4.8	s	s	s	s	s	s	57,000	91.9	s	s	s	s
Biological sciences	1,632,000	263,000	16.1	4,000	0.2	102,000	6.3	137,000	8.4	1,095,000	67.1	3,000	0.2	29,000	1.8
Biochemistry and biophysics	139,000	34,000	24.5	s	s	2,000	1.4	8,000	5.8	93,000	66.9	s	s	2,000	1.4
Biology, general	807,000	117,000	14.5	2,000	0.2	75,000	9.3	58,000	7.2	541,000	67.0	1,000	0.1	12,000	1.5
Botany	18,000	4,000	22.2	s	s	s	s	s	s	14,000	77.8	s	s	*	*
Cell and molecular biology	95,000	23,000	24.2	s	s	s	s	11,000	11.6	53,000	55.8	s	s	2,000	2.1
Ecology	87,000	2,000	2.3	s	s	s	s	s	s	72,000	82.8	s	s	s	s
Genetics, animal and plant	20,000	3,000	15.0	s	s	s	s	1,000	5.0	16,000	80.0	s	s	s	s
Microbiological sciences and immunology	118,000	19,000	16.1	s	s	s	s	14,000	11.9	78,000	66.1	s	s	1,000	0.8
Nutritional sciences	71,000	13,000	18.3	s	s	2,000	2.8	3,000	4.2	50,000	70.4	s	s	s	s
Pharmacology, human and animal	26,000	6,000	23.1	s	s	s	s	s	s	16,000	61.5	s	s	s	s
Physiology and pathology, human and animal	58,000	10,000	17.2	s	s	1,000	1.7	3,000	5.2	41,000	70.7	s	s	s	s
Zoology, general	56,000	10,000	17.9	s	s	1,000	1.8	3,000	5.4	42,000	75.0	s	s	s	s

## CHAPTER 3 | Science and Engineering Labor Force

Highest degree field	Total	Asian		American Indian or Alaska Native		Black		Hispanic		White		Native Hawaiian or Other Pacific Islander		More than one race	
		Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Other biological sciences	135,000	22,000	16.3	s	s	5,000	3.7	s	s	79,000	58.5	s	s	2,000	s
Environmental life sciences	194,000	5,000	2.6	1,000	0.5	6,000	3.1	24,000	12.4	156,000	80.4	s	s	2,000	1.0
Environmental science or studies	157,000	4,000	2.5	s	s	5,000	3.2	24,000	15.3	122,000	77.7	s	s	2,000	1.3
Forestry sciences	36,000	1,000	2.8	s	s	*	*	s	s	34,000	94.4	s	s	s	s
Physical and related sciences	789,000	138,000	17.5	s	s	25,000	3.2	43,000	5.4	571,000	72.4	s	s	8,000	1.0
Chemistry, except biochemistry	370,000	85,000	23.0	s	s	16,000	4.3	20,000	5.4	243,000	65.7	s	s	3,000	0.8
Earth, atmospheric, and ocean sciences	218,000	8,000	3.7	*	*	s	s	9,000	4.1	196,000	89.9	s	s	2,000	0.9
Atmospheric sciences and meteorology	35,000	4,000	11.4	s	s	s	s	s	s	27,000	77.1	s	s	*	*
Earth sciences	45,000	1,000	2.2	s	s	s	s	s	s	42,000	93.3	s	s	s	s
Geology	98,000	s	s	s	s	s	s	4,000	4.1	90,000	91.8	s	s	1,000	1.0
Geological sciences, other	32,000	2,000	6.3	s	s	s	s	1,000	3.1	29,000	90.6	s	s	s	s
Oceanography	9,000	s	s	s	s	s	s	s	s	8,000	88.9	s	s	s	s
Physics and astronomy	187,000	43,000	23.0	s	s	7,000	3.7	12,000	6.4	122,000	65.2	s	s	3,000	1.6
Astronomy and astrophysics	14,000	2,000	14.3	s	s	s	s	s	s	11,000	78.6	s	s	s	s
Physics	173,000	41,000	23.7	s	s	6,000	3.5	12,000	6.9	111,000	64.2	s	s	3,000	1.7
Other physical sciences	14,000	s	s	s	s	s	s	s	s	10,000	71.4	s	s	s	s
Other physical sciences	5,056,000	358,000	7.1	20,000	0.4	437,000	8.6	505,000	10.0	3,587,000	70.9	24,000	0.5	125,000	2.5



## CHAPTER 3 | Science and Engineering Labor Force

Highest degree field	Total	Asian		American Indian or Alaska Native		Black		Hispanic		White		Native Hawaiian or Other Pacific Islander		More than one race	
		Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Science, unclassified	817,000	110,000	13.5	s	s	62,000	7.6	51,000	6.2	570,000	69.8	s	s	18,000	2.2
Social and related sciences	63,000	2,000	3.2	s	s	*	*	s	s	57,000	90.5	s	s	s	s
Economics	754,000	108,000	14.3	s	s	62,000	8.2	49,000	6.5	513,000	68.0	s	s	16,000	2.1
Agricultural economics	908,000	69,000	7.6	4,000	0.4	55,000	6.1	94,000	10.4	669,000	73.7	s	s	16,000	1.8
Economics	57,000	7,000	12.3	s	s	6,000	10.5	10,000	17.5	33,000	57.9	s	s	*	*
Political and related sciences	198,000	21,000	10.6	s	s	8,000	4.0	15,000	7.6	145,000	73.2	s	s	8,000	4.0
Public policy studies	653,000	41,000	6.3	4,000	0.6	41,000	6.3	68,000	10.4	491,000	75.2	s	s	8,000	1.2
International relations	1,967,000	112,000	5.7	5,000	0.3	171,000	8.7	212,000	10.8	1,409,000	71.6	5,000	0.3	53,000	2.7
Political science and government	124,000	10,000	8.1	s	s	8,000	6.5	14,000	11.3	90,000	72.6	s	s	1,000	0.8
Psychology	217,000	10,000	4.6	s	s	18,000	8.3	32,000	14.7	148,000	68.2	s	s	6,000	2.8
Educational psychology	289,000	5,000	1.7	s	s	41,000	14.2	31,000	10.7	203,000	70.2	s	s	6,000	2.1
Clinical psychology	48,000	1,000	2.1	s	s	s	s	2,000	4.2	44,000	91.7	s	s	*	*
Counseling psychology	896,000	57,000	6.4	s	s	61,000	6.8	92,000	10.3	652,000	72.8	s	s	28,000	3.1
Experimental psychology	74,000	3,000	4.1	s	s	5,000	6.8	5,000	6.8	59,000	79.7	s	s	s	s
General psychology	102,000	s	s	s	s	3,000	2.9	10,000	9.8	79,000	77.5	s	s	2,000	2.0
Industrial and organizational psychology	217,000	18,000	8.3	s	s	33,000	15.2	25,000	11.5	133,000	61.3	s	s	7,000	3.2
Social psychology	789,000	37,000	4.7	s	s	108,000	13.7	89,000	11.3	520,000	65.9	11,000	1.4	20,000	2.5

## CHAPTER 3 | Science and Engineering Labor Force

Highest degree field	Total	Asian		American Indian or Alaska Native		Black		Hispanic		White		Native Hawaiian or Other Pacific Islander		More than one race	
		Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Other psychology	156,000	4,000	2.6	s	s	s	s	9,000	5.8	128,000	82.1	*	*	6,000	3.8
Sociology and anthropology	89,000	s	s	s	s	4,000	4.5	18,000	20.2	52,000	58.4	s	s	s	s
Anthropology and archaeology	544,000	24,000	4.4	s	s	95,000	17.5	62,000	11.4	340,000	62.5	10,000	1.8	7,000	1.3
Criminology	574,000	30,000	5.2	s	s	42,000	7.3	60,000	10.5	419,000	73.0	1,000	0.2	18,000	3.1
Sociology	117,000	9,000	7.7	s	s	13,000	11.1	13,000	11.1	77,000	65.8	s	s	4,000	3.4
Other social sciences	84,000	6,000	7.1	s	s	s	s	18,000	21.4	55,000	65.5	s	s	s	s
Area and ethnic studies	15,000	s	s	s	s	s	s	s	s	14,000	93.3	s	s	s	s
Linguistics	140,000	7,000	5.0	s	s	1,000	s	5,000	3.6	118,000	84.3	s	s	9,000	6.4
Philosophy of science	6,000	s	s	s	s	s	s	s	s	5,000.0	83.3	s	s	s	s
Geography	212,000	8,000	3.8	s	s	26,000	12.3	22,000	10.4	150,000	70.8	s	s	5,000	2.4
History of science	3,190,000	717,000	22.5	9,000	0.3	121,000	3.8	277,000	8.7	2,014,000	63.1	6,000	0.2	46,000	1.4
Other social sciences	135,000	22,000	16.3	s	s	2,000	1.5	11,000	8.1	98,000	72.6	s	s	s	s
Engineering	211,000	38,000	18.0	s	s	11,000	5.2	13,000	6.2	144,000	68.2	s	s	4,000	1.9
Aerospace, aeronautical, and astronautical engineering	451,000	79,000	17.5	s	s	13,000	2.9	39,000	8.6	313,000	69.4	s	s	4,000	0.9
Chemical engineering	27,000	s	s	s	s	s	s	s	s	21,000	77.8	s	s	s	s
Civil and architectural engineering	424,000	75,000	17.7	s	s	12,000	2.8	37,000	8.7	292,000	68.9	s	s	4,000	0.9
Architectural engineering	1,112,000	360,000	32.4	3,000	0.3	48,000	4.3	102,000	9.2	581,000	52.2	2,000	0.2	17,000	1.5

## CHAPTER 3 | Science and Engineering Labor Force

Highest degree field	Total	Asian		American Indian or Alaska Native		Black		Hispanic		White		Native Hawaiian or Other Pacific Islander		More than one race	
		Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Civil engineering	297,000	100,000	33.7	s	s	10,000	3.4	41,000	13.8	139,000	46.8	s	s	6,000	2.0
Electrical and computer engineering	815,000	259,000	31.8	3,000	0.4	39,000	4.8	61,000	7.5	442,000	54.2	1,000	0.1	11,000	1.3
Computer and systems engineering	201,000	28,000	13.9	s	s	10,000	5.0	30,000	14.9	131,000	65.2	s	s	1,000	0.5
Electrical, electronics, and communications engineering	201,000	28,000	13.9	s	s	10,000	5.0	30,000	14.9	131,000	65.2	s	s	1,000	0.5
Industrial and manufacturing engineering	659,000	118,000	17.9	5,000.0	0.8	19,000	2.9	58,000	8.8	448,000	68.0	s	s	11,000	1.7
Mechanical engineering	659,000	118,000	17.9	5,000	0.8	19,000	2.9	58,000	8.8	448,000	68.0	s	s	11,000	1.7
Other engineering	421,000	71,000	16.9	s	s	18,000	4.3	25,000	5.9	300,000	71.3	s	s	7,000	1.7
Agricultural engineering	26,000	1,000	3.8	s	s	s	s	2,000	7.7	22,000	84.6	s	s	s	s
Bioengineering and biomedical engineering	49,000	13,000	26.5	s	s	2,000	4.1	5,000	10.2	28,000	57.1	s	s	1,000	2.0
Engineering sciences, mechanics, and physics	29,000	8,000	27.6	s	s	1,000	3.4	2,000	6.9	18,000	62.1	s	s	s	s
Environmental engineering	53,000	5,000	9.4	s	s	s	s	4,000	7.5	41,000	77.4	s	s	s	s
Engineering, general	23,000	3,000	13.0	s	s	*	*	*	*	18,000	78.3	s	s	s	s
Geophysical and geological engineering	14,000	s	s	s	s	s	s	s	s	11,000	78.6	s	s	s	s
Materials engineering, including ceramics and textiles	52,000	14,000	26.9	s	s	1,000	1.9	2,000	3.8	35,000	67.3	s	s	s	s
Metallurgical engineering	10,000	1,000	10.0	s	s	s	s	s	s	8,000	80.0	s	s	s	s
Mining and minerals engineering	8,000	2,000	25.0	s	s	s	s	s	s	5,000	62.5	s	s	s	s
Naval architecture and marine engineering	15,000	s	s	s	s	s	s	s	s	12,000	80.0	s	s	s	s

CHAPTER 3 | Science and Engineering Labor Force

Highest degree field	Total	Asian		American Indian or Alaska Native		Black		Hispanic		White		Native Hawaiian or Other Pacific Islander		More than one race	
		Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Nuclear engineering	19,000	1,000	s	s	s	s	s	*	*	17,000	89.5	s	s	s	s
Petroleum engineering	28,000	2,000	7.1	s	s	s	s	1,000	3.6	17,000	60.7	s	s	s	s
Other engineering	96,000	19,000	19.8	s	s	3,000	3.1	6,000	6.3	67,000	69.8	s	s	s	s

\* = estimate < 500; s = suppressed for reasons of confidentiality and/or reliability.

**Note(s)**

Hispanic may be any race; American Indian or Alaska Native, Asian, black or African American, Native Hawaiian or Other Pacific Islander, white, and more than one race refer to individuals who are not of Hispanic origin. Detail may not add to total because of rounding. Numbers are rounded to the nearest 1,000. Percentages are based on rounded numbers.

**Source(s)**

National Science Foundation, National Center for Science and Engineering Statistics, National Survey of College Graduates (NSCG) (2015), <https://www.nsf.gov/statistics/srvygrads/>.

*Science and Engineering Indicators 2018*

## CHAPTER 3 | Science and Engineering Labor Force

APPENDIX TABLE 3-17

### Estimate and median salary of full-time workers with highest degree in S&E field, by sex and occupation: 2015

(Number and dollars)

Occupation	Total		Female		Male	
	Number	Median salary (\$)	Number	Median salary (\$)	Number	Median salary (\$)
All occupations	11,555,000	75,000	4,222,000	57,000	7,334,000	86,000
S&E occupations	4,383,000	90,000	1,071,000	75,000	3,312,000	95,000
Computer and mathematical scientists	1,988,000	97,000	422,000	85,000	1,565,000	100,000
Computer and information scientists	1,836,000	98,000	368,000	86,000	1,468,000	100,000
Computer and information scientists, research	45,000	90,000	16,000	s	28,000	100,000
Computer network architect	39,000	115,000	s	s	38,000	115,000
Computer support specialists	120,000	60,000	27,000	51,000	94,000	65,000
Computer system analysts	205,000	87,000	59,000	79,000	145,000	90,000
Database administrators	69,000	82,000	23,000	s	46,000	100,000
Information security analysts	49,000	107,000	19,000	89,000	30,000	116,000
Network and computer systems administrators	124,000	83,000	13,000	84,000	111,000	81,000
Software developers — applications and systems software	455,000	103,000	68,000	94,000	387,000	105,000
Web developers	77,000	88,000	14,000	72,000	63,000	89,000
Other computer information science occupations	177,000	100,000	58,000	85,000	119,000	107,000
Computer engineers — software	477,000	107,000	72,000	99,000	405,000	109,000

## CHAPTER 3 | Science and Engineering Labor Force

Occupation	Total		Female		Male	
	Number	Median salary (\$)	Number	Median salary (\$)	Number	Median salary (\$)
Mathematical scientists	99,000	84,000	37,000	77,000	62,000	89,000
Mathematicians	6,000	99,000	2,000	98,000	4,000	95,000
Operations research analysts, including modeling	53,000	80,000	19,000	66,000	34,000	87,000
Statisticians	29,000	107,000	13,000	83,000	16,000	122,000
Other mathematical scientists	s	s	s	s	s	s
Postsecondary teachers — computer and mathematical sciences	52,000	67,000	18,000	61,000	35,000	69,000
Computer science	11,000	94,000	3,000	65,000	8,000	100,000
Mathematics and statistics	41,000	61,000	15,000	61,000	27,000	65,000
Biological, agricultural, and environmental life scientists	439,000	62,000	186,000	55,000	252,000	68,000
Agricultural and food scientists	44,000	64,000	20,000	63,000	24,000	64,000
Biological and medical scientists	304,000	58,000	142,000	50,000	162,000	61,000
Biochemists and biophysicists	66,000	53,000	28,000	56,000	38,000	49,000
Biological scientists (e.g., botanists, ecologists, zoologists)	105,000	57,000	47,000	45,000	58,000	64,000
Medical scientists (excluding practitioners)	80,000	64,000	39,000	55,000	41,000	65,000
Other biological and life scientists	54,000	56,000	29,000	56,000	25,000	55,000
Forestry and conservation scientists	34,000	77,000	5,000	51,000	29,000	89,000
Postsecondary teachers — life and related sciences	56,000	84,000	19,000	71,000	38,000	87,000

## CHAPTER 3 | Science and Engineering Labor Force

Occupation	Total		Female		Male	
	Number	Median salary (\$)	Number	Median salary (\$)	Number	Median salary (\$)
Agriculture	4,000	87,000	s	s	2,000	58,000
Biological sciences	47,000	80,000	16,000	70,000	31,000	87,000
Other natural sciences	6,000	86,000	1,000	s	4,000	88,000
Physical and related scientists	273,000	78,000	69,000	60,000	204,000	83,000
Chemists, except biochemists	91,000	69,000	28,000	55,000	64,000	77,000
Earth scientists, geologists, and oceanographers	59,000	88,000	13,000	77,000	47,000	88,000
Atmospheric and space scientists	13,000	91,000	3,000	90,000	9,000	96,000
Geologists, including earth scientists	43,000	84,000	8,000	71,000	35,000	88,000
Oceanographers	3,000	77,000	1000	s	2,000	64,000
Physicists and astronomers	41,000	59,000	7,000	s	33,000	86,000
Astronomers	6,000	30,000	s	s	4,000	s
Physicists, except biophysicists	34,000	70,000	5,000	54,000	29,000	92,000
Other physical and related scientists	35,000	70,000	11,000	61,000	24,000	77,000
Postsecondary teachers — physical and related sciences	47,000	90,000	10,000	76,000	37,000	90,000
Chemistry	21,000	77,000	5,000	67,000	16,000	79,000
Earth, environmental, and marine sciences	11,000	97,000	3,000	71,000	8,000	99,000
Physics	14,000	97,000	s	s	13,000	91,000

## CHAPTER 3 | Science and Engineering Labor Force

Occupation	Total		Female		Male	
	Number	Median salary (\$)	Number	Median salary (\$)	Number	Median salary (\$)
Social and related scientists	321,000	69,000	196,000	63,000	125,000	82,000
Economists	24,000	125,000	9,000	116,000	15,000	132,000
Political scientists	13,000	101,000	4,000	66,000	9,000	102,000
Psychologists, including clinical	149,000	64,000	108,000	61,000	41,000	71,000
Sociologists and anthropologists	20,000	39,000	15,000	30,000	5,000	60,000
Anthropologists	9,000	40,000	6,000	37,000	3,000	50,000
Sociologists	11,000	31,000	9,000	29,000	2,000	67,000
Other social and related scientists	49,000	79,000	28,000	69,000	21,000	85,000
Postsecondary teachers — social and related sciences	66,000	71,000	32,000	69,000	34,000	74,000
Economics	11,000	82,000	4,000	67,000	8,000	95,000
Political science	11,000	72,000	5,000	68,000	6,000	80,000
Psychology	21,000	66,000	9,000	63,000	12,000	70,000
Sociology	6,000	75,000	4,000	76,000	2,000	67,000
Other social sciences	16,000	70,000	10,000	69,000	6,000	78,000
Engineers	1,362,000	92,000	198,000	88,000	1,164,000	95,000
Aerospace, aeronautical, or astronautical engineers	81,000	107,000	11,000	98,000	70,000	110,000
Chemical engineers	70,000	104,000	14,000	94,000	56,000	112,000



## CHAPTER 3 | Science and Engineering Labor Force

Occupation	Total		Female		Male	
	Number	Median salary (\$)	Number	Median salary (\$)	Number	Median salary (\$)
Civil, architectural, or sanitary engineers	205,000	80,000	39,000	77,000	166,000	80,000
Electrical or computer hardware engineers	306,000	100,000	30,000	100,000	276,000	101,000
Computer engineer — hardware	57,000	99,000	5,000	105,000	52,000	99,000
Electrical and electronics engineers	249,000	102,000	25,000	99,000	224,000	103,000
Industrial engineers	62,000	74,000	12,000	90,000	50,000	72,000
Mechanical engineers	275,000	88,000	21,000	87,000	253,000	89,000
Other engineers	335,000	92,000	65,000	80,000	270,000	99,000
Agricultural engineers	6,000	90,000	s	s	6,000	90,000
Bioengineers or biomedical engineers	20,000	85,000	5,000	85,000	15,000	85,000
Environmental engineers	57,000	80,000	18,000	70,000	39,000	84,000
Marine engineers and naval architects	9,000	117,000	s	s	7,000	125,000
Materials and metallurgical engineers	26,000	90,000	5,000	89,000	22,000	90,000
Mining and geological engineers	4,000	98,000	s	s	4,000	101,000
Nuclear engineers	23,000	109,000	5,000	129,000	17,000	94,000
Petroleum engineers	16,000	133,000	2,000	91,000	14,000	138,000
Sales engineers	57,000	99,000	8,000	70,000	49,000	102,000
Other engineers	117,000	99,000	20,000	89,000	97,000	100,000

## CHAPTER 3 | Science and Engineering Labor Force

Occupation	Total		Female		Male	
	Number	Median salary (\$)	Number	Median salary (\$)	Number	Median salary (\$)
Postsecondary teachers — engineering	29,000	95,000	6,000	85,000	23,000	100,000
S&E-related occupations	1,678,000	73,000	707,000	56,000	972,000	90,000
Health-related occupations	468,000	55,000	329,000	55,000	139,000	51,000
Diagnosing or treating practitioners (e.g., dentists, optometrists, physicians, psychiatrists, podiatrists, surgeons, veterinarians)	51,000	73,000	24,000	60,000	26,000	142,000
Registered nurses, pharmacists, dieticians, therapists, physician assistants, nurse practitioners	117,000	63,000	95,000	68,000	22,000	51,000
Health technologists and technicians (e.g., dental hygienists, health record technicians, licensed practical nurses, laboratory or radiology technicians)	142,000	47,000	113,000	49,000	29,000	40,000
Other health occupations	141,000	43,000	91,000	43,000	50,000	38,000
Postsecondary teachers — health and related sciences	18,000	91,000	6,000	79,000	12,000	92,000
S&E managers	469,000	124,000	107,000	108,000	362,000	127,000
Computer and information systems managers	144,000	130,000	44,000	120,000	99,000	135,000
Engineering managers	241,000	126,000	24,000	128,000	217,000	126,000
Medical and health services managers	47,000	85,000	26,000	79,000	21,000	100,000
Natural sciences managers	37,000	100,000	12,000	92,000	25,000	100,000
S&E precollege teachers	239,000	50,000	146,000	50,000	93,000	55,000
Secondary — computer, mathematics, or sciences	200,000	50,000	134,000	50,000	66,000	56,000
Secondary — social sciences	39,000	54,000	12,000	54,000	27,000	54,000

## CHAPTER 3 | Science and Engineering Labor Force

Occupation	Total		Female		Male	
	Number	Median salary (\$)	Number	Median salary (\$)	Number	Median salary (\$)
S&E technicians and technologists	471,000	75,000	118,000	60,000	353,000	80,000
Technologists and technicians in the biological and life sciences	75,000	53,000	42,000	59,000	33,000	43,000
Computer programmers (business, scientific, process control)	119,000	90,000	28,000	85,000	91,000	90,000
Electrical, electronic, industrial, and mechanical technicians	119,000	77,000	8,000	59,000	111,000	80,000
Drafting occupations, including computer drafting	7,000	60,000	s	s	5,000	59,000
Surveying and mapping technicians	10,000	55,000	2,000.0	46,000.0	8,000	55,000
Other engineering technologists and technicians	107,000	74,000	25,000	55,000	81,000	80,000
Surveyors, cartographers, photogrammetrists	8,000	57,000	*	*	8,000	57,000
Technologists and technicians in the mathematical sciences	2,000	135,000	s	s	2,000	138,000
Technologists and technicians in the physical sciences	25,000	58,000	10,000	57,000	15,000	70,000
Other S&E-related occupations	31,000	97,000	7,000	90,000	24,000	98,000
Architects	16,000	119,000	3,000	76,000	12,000	120,000
Actuaries	15,000	85,000	s	s	12,000	85,000
Non-S&E occupations	5,471,000	60,000	2,427,000	50,000	3,044,000	75,000
Non-S&E managers	1,039,000	119,000	213,000	90,000	826,000	125,000
Top-level managers, executives, administrators (e.g., chief executive officer, chief operating officer, chief financial officer; president; district manager, general manager, provost)	631,000	130,000	100,000	97,000	531,000	148,000

## CHAPTER 3 | Science and Engineering Labor Force

Occupation	Total		Female		Male	
	Number	Median salary (\$)	Number	Median salary (\$)	Number	Median salary (\$)
Education administrators (e.g., registrar, dean, principal)	40,000	75,000	19,000	72,000	20,000	75,000
Other mid-level managers	368,000	100,000	93,000	90,000	274,000	104,000
Management-related occupations	1,232,000	74,000	573,000	60,000	659,000	85,000
Accountants, auditors, and other financial specialists	432,000	72,000	177,000	60,000	256,000	85,000
Personnel, training, and labor relations specialists	182,000	56,000	113,000	47,000	69,000	82,000
Other management-related occupations	618,000	75,000	283,000	72,000	335,000	85,000
Non-S&E precollege teachers	242,000	42,000	207,000	42,000	35,000	50,000
Prekindergarten and kindergarten	37,000	23,000	37,000	23,000	s	s
Elementary	124,000	42,000	114,000	42,000	11,000	42,000
Secondary — other subjects	45,000	46,000	26,000	39,000	19,000	69,000
Secondary — other subjects	28,000	45,000	24,000	45,000	3,000	47,000
Other precollegiate area	8,000	50,000	7,000	52,000	s	s
Non-S&E postsecondary teachers	46,000	75,000	19,000	69,000	27,000	75,000
Arts, drama, and music	s	s	s	s	s	s
Business, commerce, and marketing	9,000	140,000	s	s	8,000	137,000
Education	7,000	74,000	5,000	80,000	2,000	71,000.0
English	9,000	65,000	5,000	51,000	s	s

## CHAPTER 3 | Science and Engineering Labor Force

Occupation	Total		Female		Male	
	Number	Median salary (\$)	Number	Median salary (\$)	Number	Median salary (\$)
Foreign language	5,000	54,000	1,000	73,000	4,000	s
History	3,000	44,000	s	s	2,000	37000
Physical education	s	s	s	s	s	s
Other postsecondary fields	12,000	79,000	4,000	78,000	8,000	78,000
Social services and related occupations	328,000	42,000	234,000	41,000	93,000	47,000
Clergy and other religious workers	22,000	55,000	6000	39,000	16,000	56,000
Counselors (e.g., educational, vocational, mental health, substance abuse)	158,000	46,000	112,000	46,000	46,000	46,000
Social workers	148,000	39,000	117,000	39,000	31,000	40,000
Sales and marketing occupations	848,000	60,000	353,000	55,000	495,000	69,000
Insurance, securities, real estate, and business services	233,000	70,000	102,000	50,000	131,000	75,000
Sales — commodities except retail (e.g., industrial, medical, dental machinery, equipment, supplies)	145,000	83,000	37,000	70,000	108,000	85,000
Sales — retail (e.g., furnishings, clothing, motor vehicles, cosmetics)	174,000	38,000	60,000	39,000	114,000	35,000
Other marketing and sales occupations	296,000	65,000	154,000	60,000	142,000	68,000
Art, humanities, and related occupations	150,000	60,000	60,000	64,000	91,000	58,000
Writers, editors, public relations specialists, artists, entertainers, broadcasters	149,000	60,000	59,000	64,000	90,000	58,000
Historians	s	s	*	*	*	*
Other non-S&E occupations	1,586,000	42,000	768,000	40,000	818,000	48,000

## CHAPTER 3 | Science and Engineering Labor Force

Occupation	Total		Female		Male	
	Number	Median salary (\$)	Number	Median salary (\$)	Number	Median salary (\$)
Accounting clerks and bookkeepers	101,000	42,000	89,000	42,000	12,000	43,000
Secretaries, receptionists, typists	123,000	37,000	117,000	35,000	6,000	39,000
Other administrative (e.g., record clerks, telephone operators)	342,000	39,000	224,000	38,000	117,000	40,000
Farmers, foresters, and fishermen	69,000	40,000	13,000	36,000	56,000	41,000
Lawyers, judges	34,000	96,000	15,000	s	19,000	95,000
Librarians, archivists, curators	37,000	34,000	27,000	38,000	10,000	3,000
Food preparation and service (e.g., cooks, waitresses, bartenders)	53,000	37,000	16,000	39,000	37,000	36,000
Protective services (e.g., firefighters, police, guards, wardens, park rangers)	111,000	60,000	38,000	67,000	72,000	58,000
Other service occupations, except health (e.g., probation officer, human services work)	207,000	46,000	108,000	47,000	99,000	45,000
Other teachers and instructors (e.g., private tutors, dance, flying, martial arts)	64,000	42,000	34,000	38,000	30,000	65,000
Construction and extraction occupations	52,000	55,000	2,000	53,000	50,000	55,000
Installation, maintenance, and repair occupations	88,000	48,000	7,000	49,000	81,000	47,000
Precision or production occupations (e.g., metal or wood workers, butchers, bakers, assemblers, tailors)	88,000	34,000	18,000	39,000	69,000	31,000
Transportation and material moving occupations	122,000	42,000	3,000	42,000	119,000	42,000
Other occupations	97,000	57,000	56,000	s	41,000	59,000

\* = estimate < 500; s = suppressed for reasons of confidentiality and/or reliability.



## CHAPTER 3 | Science and Engineering Labor Force

### Note(s)

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Detail may not add to total because of rounding. Numbers are rounded to the nearest 1,000.

### Source(s)

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National Science Foundation, National Center for Science and Engineering Statistics, National Survey of College Graduates (NSCG) (2015), <https://www.nsf.gov/statistics/srvygrads/>.

*Science and Engineering Indicators 2018*

## CHAPTER 3 | Science and Engineering Labor Force

APPENDIX TABLE 3-18

## Estimate and median salary of full-time workers with highest degree in S&amp;E field, by race, ethnicity, and occupation: 2015

(Number and dollars)

Occupation	Total		Asian		American Indian or Alaska Native		Black		Hispanic		White		Native Hawaiian or Other Pacific Islander		More than one race	
	Number	Median salary (\$)	Number	Median salary (\$)	Number	Median salary (\$)	Number	Median salary (\$)	Number	Median salary (\$)	Number	Median salary (\$)	Number	Median salary (\$)	Number	Median salary (\$)
All occupations	11,555,000	75,000	1,744,000	85,000	35,000	62,000	748,000	55,000	991,000	59,000	7,778,000	78,000	38,000	74,000	222,000	61,000
S&E occupations	4,383,000	90,000	992,000	91,000	8,000	85,000	201,000	80,000	289,000	80,000	2,809,000	90,000	8,000	86,000	75,000	83,000
Computer and mathematical scientists	1,988,000	97,000	601,000	99,000	s	s	101,000	84,000	114,000	88,000	1,134,000	98,000	3,000	60,000	35,000	104,000
Computer and information scientists	1,836,000	98,000	563,000	100,000	s	s	98,000	83,000	104,000	90,000	1,038,000	100,000	3,000	60,000	31,000	99,000
Computer and information scientists, research	45,000	90,000	15,000	86,000	s	s	s	s	s	s	27,000	99,000	s	s	s	s
Computer network architects	39,000	115,000	10,000	114,000	s	s	4,000.0	93,000.0	s	s	24,000	118,000	s	s	s	s
Computer support specialists	120,000	60,000	17,000	60,000	s	s	13,000	40,000	6,000	72,000	82,000	65,000	s	s	s	s
Computer system analysts	205,000	87,000	67,000	88,000	s	s	15,000	92,000	9,000	71,000	108,000	87,000	s	s	s	s
Database administrators	69,000	82,000	19,000	106,000	s	s	4,000	85,000	s	s	43,000	70,000	s	s	s	s
Information security analysts	49,000	107,000	11,000	109,000	s	s	7,000	97,000	s	s	23,000	113,000	s	s	s	s
Network and computer systems administrators	124,000	83,000	31,000	78,000	s	s	13,000	80,000	9,000	85,000	70,000	84,000	s	s	1,000	70,000



## CHAPTER 3 | Science and Engineering Labor Force

Occupation	Total		Asian		American Indian or Alaska Native		Black		Hispanic		White		Native Hawaiian or Other Pacific Islander		More than one race	
	Number	Median salary (\$)	Number	Median salary (\$)	Number	Median salary (\$)	Number	Median salary (\$)	Number	Median salary (\$)	Number	Median salary (\$)	Number	Median salary (\$)	Number	Median salary (\$)
Software developers, applications and systems software	455,000	103,000	163,000	100,000	s	s	9,000	89,000	22,000	97,000	255,000	104,000	s	s	6,000	117,000
Web developers	77,000	88,000	17,000	69,000	s	s	2,000	50,000	3,000	41,000	52,000	92,000	s	s	s	s
Other computer information science occupations	177,000	100,000	26,000	101,000	s	s	18,000	55,000	9,000	69,000	117,000	104,000	s	s	5,000	s
Computer engineers — software	477,000	107,000	186,000	100,000	s	s	12,000	90,000	38,000	124,000	236,000	109,000	s	s	5,000	126,000
Mathematical scientists	99,000	84,000	31,000	87,000	s	s	2,000	87,000	6,000	60,000	56,000	84,000	s	s	4,000	114,000
Mathematicians	6,000	99,000	s	s	s	s	s	s	*	*	4,000	98,000	s	s	s	s
Operations research analysts, including modeling	53,000	80,000	14,000	88,000	s	s	s	s	3,000	60,000	32,000	75,000	s	s	3,000	s
Statisticians	29,000	107,000	9,000	114,000	s	s	1,000	87,000	1,000	100,000	17,000	110,000	s	s	s	s
Other mathematical scientists	s	s	s	s	s	s	s	s	s	s	3,000	67,000	s	s	s	s
Postsecondary teachers — computer and mathematical sciences	52,000	67,000	7,000	99,000	s	s	s	s	4,000	70,000	40,000	62,000	s	s	s	s
Computer science	11,000	94,000	3,000	101,000	s	s	s	s	s	s	5,000	93,000	s	s	s	s
Mathematics and statistics	41,000	61,000	4,000	70,000	s	s	1,000	73,000	2,000	70,000	35,000	58,000	s	s	s	s
Biological, agricultural, and environmental life scientists	439,000	62,000	82,000	50,000	2,000	39,000	9,000	59,000	29,000	45,000	307,000	68,000	s	s	9,000	57,000

## CHAPTER 3 | Science and Engineering Labor Force

Occupation	Total		Asian		American Indian or Alaska Native		Black		Hispanic		White		Native Hawaiian or Other Pacific Islander		More than one race	
	Number	Median salary (\$)	Number	Median salary (\$)	Number	Median salary (\$)	Number	Median salary (\$)	Number	Median salary (\$)	Number	Median salary (\$)	Number	Median salary (\$)	Number	Median salary (\$)
Agricultural and food scientists	44,000	64,000	8,000	59,000	s	s	2,000	46,000.0	2,000	s	31,000	69,000	s	s	s	s
Biological and medical scientists	304,000	58,000	69,000	50,000	*	*	6,000	74,000	22,000	45,000	199,000	62,000	s	s	8,000	56,000
Biochemists and biophysicists	66,000	53,000	25,000	45,000	s	s	1,000	s	4,000	55,000	35,000	61,000	s	s	*	*
Biological scientists (e.g., botanists, ecologists, zoologists)	105,000	57,000	13,000	50,000	s	s	2,000	s	6,000	40,000	78,000	59,000	s	s	s	s
Medical scientists (excluding practitioners)	80,000	64,000	20,000	57,000	s	s	2,000	101,000	4,000	34,000	53,000	68,000	s	s	s	s
Other biological and life scientists	54,000	56,000	11,000	48,000	s	s	1,000	59,000	8,000	50,000	32,000	62,000	s	s	2,000	75,000
Forestry and conservation scientists	34,000	77,000	s	s	s	s	s	s	2,000	39,000	30,000	82,000	s	s	s	s
Postsecondary teachers — life and related sciences	56,000	84,000	5,000	79,000	s	s	1,000	s	3,000	44,000	47,000	85,000	s	s	1,000	s
Agriculture	4,000	87,000	s	s	s	s	s	s	s	s	4,000	88,000	s	s	s	s
Biological sciences	47,000	80,000	5,000	81,000	s	s	1,000	s	3,000	44,000	37,000	84,000	s	s	1,000	s
Other natural sciences	6,000	86,000	s	s	s	s	s	s	s	s	6,000	86,000	s	s	s	s
Physical and related scientists	273,000	78,000	51,000	50,000	*	*	10,000	50,000	13,000	65,000	195,000	83,000	s	s	3,000	90,000
Chemists, except biochemists	91,000	69,000	21,000	64,000	s	s	6,000	48,000	6,000	78,000	58,000	71,000	s	s	s	s
Earth scientists, geologists, and oceanographers	59,000	88,000	5,000	90,000	s	s	1,000	s	2,000	65,000	51,000	88,000	s	s	1,000	102,000

## CHAPTER 3 | Science and Engineering Labor Force

Occupation	Total		Asian		American Indian or Alaska Native		Black		Hispanic		White		Native Hawaiian or Other Pacific Islander		More than one race	
	Number	Median salary (\$)	Number	Median salary (\$)	Number	Median salary (\$)	Number	Median salary (\$)	Number	Median salary (\$)	Number	Median salary (\$)	Number	Median salary (\$)	Number	Median salary (\$)
Atmospheric and space scientists	13,000	91,000	s	s	s	s	s	s	*	*	9,000	85,000	s	s	*	*
Geologists, including earth scientists	43,000	84,000	1,000	58,000	s	s	s	s	2,000	63,000	39,000	84,000	s	s	1,000	s
Oceanographers	3,000	77,000	s	s	s	s	s	s	s	s	2,000	88,000	s	s	s	s
Physicists and astronomers	41,000	59,000	14,000	48,000	s	s	*	*	1,000	s	25,000	105,000	s	s	s	s
Astronomers	6,000	30,000	s	s	s	s	s	s	s	s	4,000	s	s	s	s	s
Physicists, except biophysicists	34,000	70,000	13,000	48,000	s	s	*	*	1,000	s	20,000	115,000	s	s	s	s
Other physical and related scientists	35,000	70,000	s	s	s	s	1,000	92,000	2,000	54,000	26,000	77,000	s	s	s	s
Postsecondary teachers — physical and related sciences	47,000	90,000	6,000	87,000	s	s	s	s	2,000	57,000	36,000	93,000	s	s	s	s
Chemistry	21,000	77,000	3,000	66,000	s	s	s	s	1,000	57,000	14,000	82,000	s	s	s	s
Earth, environmental, and marine sciences	11,000	97,000	*	*	s	s	s	s	s	s	10,000	97,000	s	s	s	s
Physics	14,000	97,000	2,000	95,000	s	s	s	s	s	s	11,000	101,000	s	s	s	s
Social and related scientists	321,000	69,000	30,000	60,000	s	s	25,000	53,000	36,000	66,000	222,000	72,000	*	*	7,000	62,000
Economists	24,000	125,000	4,000	s	s	s	1,000	75,000	4,000	128,000	15,000	126,000	s	s	*	*
Political scientists	13,000	101,000	s	s	s	s	s	s	1,000	s	11,000	102,000	s	s	s	s
Psychologists, including clinical	149,000	64,000	s	s	s	s	14,000	43,000	24,000	65,000	98,000	69,000	s	s	3,000	69,000

## CHAPTER 3 | Science and Engineering Labor Force

Occupation	Total		Asian		American Indian or Alaska Native		Black		Hispanic		White		Native Hawaiian or Other Pacific Islander		More than one race	
	Number	Median salary (\$)	Number	Median salary (\$)	Number	Median salary (\$)	Number	Median salary (\$)	Number	Median salary (\$)	Number	Median salary (\$)	Number	Median salary (\$)	Number	Median salary (\$)
Sociologists and anthropologists	20,000	39,000	*	*	s	s	*	*	2,000	40,000	17,000	38,000	s	s	s	s
Anthropologists	9,000	40,000	s	s	s	s	s	s	*	*	8,000	41,000	s	s	s	s
Sociologists	11,000	31,000	s	s	s	s	*	*	s	s	9,000	29,000	s	s	s	s
Other social and related scientists	49,000	79,000	8,000	83,000	s	s	5,000	54,000	s	s	32,000	79,000	s	s	s	s
Postsecondary teachers — social and related sciences	66,000	71,000	7,000	70,000	s	s	5,000	68,000	3,000	68,000	49,000	71,000	s	s	1,000	66,000
Economics	11,000	82,000	1,000	59,000	s	s	s	s	1,000	78,000	9,000	81,000	s	s	s	s
Political science	11,000	72,000	*	*	s	s	s	s	s	s	9,000	76,000	s	s	s	s
Psychology	21,000	66,000	3,000	70,000	s	s	2,000	67,000	1,000	70,000	15,000	60,000	s	s	s	s
Sociology	6,000	75,000	*	*	s	s	*	*	1,000	s	4,000	78,000	s	s	s	s
Other social sciences	16,000	70,000	1,000	s	s	s	1,000	s	*	*	12,000	70,000	s	s	s	s
Engineers	1,362,000	92,000	228,000	90,000	4,000	86,000	56,000	90,000	98,000	80,000	951,000	95,000	4,000	97,000	22,000	84,000
Aerospace, aeronautical, or astronautical engineers	81,000	107,000	10,000	82,000	s	s	1,000	130,000	7,000	89,000	59,000	115,000	s	s	s	s
Chemical engineers	70,000	104,000	11,000	106,000	s	s	s	s	3,000	79,000	51,000	111,000	s	s	s	s
Civil, architectural, or sanitary engineers	205,000	80,000	29,000	80,000	s	s	9,000	69,000	16,000	79,000	145,000	80,000	s	s	3,000	79,000
Electrical or computer hardware engineers	306,000	100,000	76,000	104,000	s	s	14,000	91,000	21,000	97,000	188,000	102,000	1,000	s	5,000	83,000

## CHAPTER 3 | Science and Engineering Labor Force

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	Number	Median salary (\$)	Number	Median salary (\$)	Number	Median salary (\$)	Number	Median salary (\$)	Number	Median salary (\$)	Number	Median salary (\$)	Number	Median salary (\$)	Number	Median salary (\$)
Computer engineers — hardware	57,000	99,000	21,000	109,000	s	s	1,000.0	78,000.0	3,000	95,000	30,000	90,000	s	s	s	s
Electrical and electronics engineers	249,000	102,000	54,000	100,000	s	s	14,000	91,000	18,000	96,000	158,000	105,000	1,000	s	4,000	85,000
Industrial engineers	62,000	74,000	10,000	63,000	s	s	s	s	6,000	55,000	40,000	75,000	s	s	*	*
Mechanical engineers	275,000	88,000	39,000	80,000	*	*	10,000	98,000	17,000	77,000	204,000	90,000	1,000	s	4,000	82,000
Other engineers	335,000	92,000	45,000	85,000	s	s	12,000	92,000	25,000	73,000	245,000	98,000	s	s	6,000	102,000
Agricultural engineers	6,000	90,000	s	s	s	s	s	s	s	s	6,000	90,000	s	s	s	s
Bioengineers or biomedical engineers	20,000	85,000	4,000	s	s	s	1,000.0	83,000.0	2,000	s	13,000	86,000	s	s	s	s
Environmental engineers	57,000	80,000	6,000	66,000	s	s	3,000	87,000	3,000	71,000	42,000	80,000	s	s	s	s
Marine engineers and naval architects	9,000	117,000	*	*	s	s	s	s	s	s	8,000	107,000	s	s	s	s
Materials and metallurgical engineers	26,000	90,000	3,000	107,000	s	s	1,000	79,000	2,000	69,000.0	20,000	90,000	s	s	s	s
Mining and geological engineers	4,000	98,000	s	s	s	s	s	s	s	s	3,000	90,000	s	s	s	s
Nuclear engineers	23,000	109,000	1,000	s	s	s	*	*	s	s	17,000	136,000	s	s	s	s
Petroleum engineers	16,000	133,000	2,000	165,000	s	s	s	s	1,000	130,000	12,000	130,000	s	s	s	s
Sales engineers	57,000	99,000	4,000	116,000	s	s	s	s	4,000	84,000	45,000	98,000	s	s	s	s
Other engineers	117,000	99,000	24,000	74,000	s	s	5,000	83,000	7,000	86,000	79,000	104,000	s	s	2,000	93,000
Postsecondary teachers — engineering	29,000	95,000	7,000	97,000	s	s	1,000	101,000	1,000	91,000	19,000	100,000	s	s	s	s

## CHAPTER 3 | Science and Engineering Labor Force

Occupation	Total		Asian		American Indian or Alaska Native		Black		Hispanic		White		Native Hawaiian or Other Pacific Islander		More than one race	
	Number	Median salary (\$)	Number	Median salary (\$)	Number	Median salary (\$)	Number	Median salary (\$)	Number	Median salary (\$)	Number	Median salary (\$)	Number	Median salary (\$)	Number	Median salary (\$)
S&E-related occupations	1,678,000	73,000	257,000	85,000	7,000	72,000	118,000	60,000	147,000	55,000	1,111,000	75,000	3,000	64,000	36,000	50,000
Health-related occupations	468,000	55,000	59,000	59,000	2,000	s	53,000	54,000	40,000	38,000	301,000	55,000	s	s	12,000	47,000
Diagnosing or treating practitioners (e.g., dentists, optometrists, physicians, psychiatrists, podiatrists, surgeons, veterinarians)	51,000	73,000	11,000	61,000.0	s	s	s	s	s	s	29,000	s	s	s	s	s
Registered nurses, pharmacists, dieticians, therapists, physician assistants, nurse practitioners	117,000	63,000	12,000	74,000	s	s	5,000	58,000	11,000	60,000	87,000	61,000	s	s	s	s
Health technologists and technicians (e.g., dental hygienists, health record technicians, licensed practical nurses, laboratory or radiology technicians)	142,000	47,000	15,000	49,000	s	s	28,000	53,000	10,000	37,000	86,000	45,000	s	s	s	s
Other health occupations	141,000	43,000	19,000	45,000	s	s	17,000	s	15,000	31,000	85,000	48,000	s	s	s	s
Postsecondary teachers — health and related sciences	18,000	91,000	2,000	93,000	s	s	*	*	s	s	14,000	90,000	s	s	s	s
S&E managers	469,000	124,000	72,000	128,000	4,000	s	22,000	103,000	34,000	101,000	331,000	125,000	s	s	6,000	120,000
Computer and information systems managers	144,000	130,000	32,000	123,000	s	s	13,000	94,000	7,000	92,000	90,000	137,000	s	s	s	s
Engineering managers	241,000	126,000	31,000	135,000	4,000	s	4,000	110,000	20,000	116,000	177,000	125,000	s	s	3,000	119,000

## CHAPTER 3 | Science and Engineering Labor Force

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Medical and health services managers	47,000	85,000	5,000	88,000	s	s	s	s	5,000.0	62,000.0	34,000	80,000	s	s	s	s
Natural sciences managers	37,000	100,000	3,000	132,000	s	s	s	s	2,000	88,000	29,000	99,000	s	s	s	s
S&E precollege teachers	239,000	50,000	17,000	47,000	s	s	15,000	42,000	27,000	50,000	174,000	50,000	*	*	5,000	40,000
Secondary — computer, mathematics, or sciences	200,000	50,000	16,000	47,000	*	*	12,000	41,000	21,000	51,000	146,000	50,000	*	*	4,000	35,000
Secondary — social sciences	39,000	54,000	*	*	s	s	s	s	s	s	28,000	56,000	s	s	s	s
S&E technicians and technologists	471,000	75,000	103,000	85,000	s	s	28,000	68,000	45,000	55,000	281,000	78,000	s	s	13,000	s
Technologists and technicians in the biological and life sciences	75,000	53,000	14,000	52,000	s	s	s	s	10,000	39,000	44,000	56,000	s	s	1,000	36,000
Computer programmers (business, scientific, process control)	119,000	90,000	28,000	93,000	s	s	s	s	5,000	67,000	77,000	91,000	s	s	s	s
Electrical, electronic, industrial, and mechanical technicians	119,000	77,000	30,000	86,000	s	s	8,000	75,000	14,000	59,000	61,000	81,000	s	s	6,000	70,000.0
Drafting occupations, including computer drafting	7,000	60,000	3,000	74,000	s	s	s	s	s	s	3,000	64,000	s	s	s	s
Surveying and mapping technicians	10,000	55,000	s	s	s	s	s	s	s	s	6,000	56,000	s	s	s	s
Other engineering technologists and technicians	107,000	74,000	23,000	67,000	s	s	5,000	62,000	11,000	55,000	62,000	86,000	s	s	s	s

## CHAPTER 3 | Science and Engineering Labor Force

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Surveyors, cartographers, photogrammetrists	8,000	57,000	s	s	s	s	s	s	s	s	5,000	48,000	s	s	s	s
Technologists and technicians in the mathematical sciences	2,000.0	135,000	*	*	s	s	s	s	s	s	s	s	s	s	s	s
Technologists and technicians in the physical sciences	25,000	58,000	3,000	s	s	s	s	s	s	s	21,000	58,000	s	s	s	s
Other S&E-related occupations	31,000	97,000	6,000	114,000	s	s	s	s	s	s	24,000	92,000	s	s	s	s
Architects	16,000	119,000	5,000	117,000	s	s	s	s	s	s	10,000	106,000	s	s	s	s
Actuaries	15,000	85,000	s	s	s	s	s	s	s	s	14,000	86,000	s	s	s	s
Non-S&E occupations	5,494,000	60,000	495,000	60,000	20,000	52,000	429,000	45,000	555,000	50,000	3,858,000	65,000	27,000	74,000	110,000	50,000
Non-S&E managers	1,046,000	119,000	102,000	117,000	3,000	105,000	25,000	100,000	67,000	84,000	836,000	120,000	s	s	12,000	98,000
Top-level managers, executives, administrators (e.g., chief executive officer, chief operating officer, chief financial officer; president; district manager, general manager, provost)	638,000	129,000	56,000	148,000	s	s	9,000	150,000	36,000	84,000	526,000	134,000	s	s	7,000	93,000
Education administrators (e.g., registrar, dean, principal)	40,000	75,000	s	s	s	s	2,000	s	2,000	76,000	31,000	71,000	s	s	s	s
Other mid-level managers	368,000	100,000	40,000	101,000	s	s	15,000	79,000	29,000	81,000	278,000	107,000	*	*	4,000	97,000



## CHAPTER 3 | Science and Engineering Labor Force

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Management-related occupations	1,232,000	74,000	143,000	67,000	s	s	98,000	50,000	119,000	60,000	846,000	77,000	8,000	99,000	18,000	67,000
Accountants, auditors, and other financial specialists	432,000	72,000	72,000	59,000	s	s	27,000	46,000	44,000	76,000	284,000	79,000	s	s	5,000	63,000
Personnel, training, and labor relations specialists	182,000	56,000	7,000	60,000	s	s	22,000	47,000	17,000	55,000	133,000	58,000	s	s	3,000	44,000
Other management-related occupations	618,000	75,000	64,000	79,000	*	*	48,000	58,000	58,000	55,000	430,000	81,000	7,000	s	10,000	76,000
Non-S&E precollege teachers	252,000	42,000	8,000	25,000	s	s	32,000	38,000	38,000	48,000	163,000	42,000	s	s	2,000	27,000.0
Prekindergarten and kindergarten	39,000	23,000	s	s	s	s	s	s	10,000	s	18,000	23,000	s	s	s	s
Elementary	132,000	44,000	s	s	s	s	15,000	84,000	19,000	60,000	93,000	42,000	s	s	s	s
Secondary — other subjects	45,000	46,000	1,000	51,000	s	s	s	s	5,000	46,000	27,000	43,000	s	s	s	s
Special education — primary and secondary	28,000	45,000	s	s	s	s	2,000	36,000	4,000	49,000	20,000	44,000	s	s	s	s
Other precollegiate area	8,000	50,000	s	s	s	s	2,000	s	s	s	5,000	54,000	s	s	s	s
Non-S&E postsecondary teachers	51,000	74,000	6,000	89,000	s	s	6,000	52,000	2,000	s	32,000	76,000	s	s	s	s
Art, drama, and music	s	s	s	s	s	s	s	s	s	s	s	s	s	s	s	s
Business, commerce, and marketing	9,000	139,000	s	s	s	s	s	s	s	s	7,000	144,000	s	s	s	s
Education	7,000	74,000	2,000	s	s	s	s	s	s	s	3,000	73,000	s	s	s	s
English	9,000	65,000	s	s	s	s	s	s	s	s	7,000	65,000	s	s	s	s

## CHAPTER 3 | Science and Engineering Labor Force

Occupation	Total		Asian		American Indian or Alaska Native		Black		Hispanic		White		Native Hawaiian or Other Pacific Islander		More than one race	
	Number	Median salary (\$)	Number	Median salary (\$)	Number	Median salary (\$)	Number	Median salary (\$)	Number	Median salary (\$)	Number	Median salary (\$)	Number	Median salary (\$)	Number	Median salary (\$)
Foreign language	9,000	69,000	s	s	s	s	s	s	s	s	1,000	s	s	s	s	s
History	3,000	44,000	s	s	s	s	s	s	s	s	3,000	44,000	s	s	s	s
Physical education	s	s	s	s	s	s	s	s	s	s	s	s	s	s	s	s
Other postsecondary fields	14,000	70,000	s	s	s	s	s	s	*	*	10,000	80,000	s	s	s	s
Social services and related occupations	328,000	42,000	9,000	51,000	s	s	49,000	41,000	54,000	39,000	207,000	44,000	s	s	5,000	41,000
Clergy and other religious workers	22,000	55,000	s	s	s	s	s	s	s	s	17,000	57,000	s	s	s	s
Counselors (e.g., educational, vocational, mental health, substance abuse)	159,000	46,000	3,000	46,000	s	s	27,000	52,000	17,000	47,000	105,000	45,000	s	s	3,000	43,000
Social workers	148,000	39,000	4,000	52,000	s	s	20,000	40,000	37,000	36,000	85,000	39,000	s	s	1,000.0	32,000
Sales and marketing occupations	848,000	60,000	72,000	61,000	s	s	49,000	51,000	84,000	45,000	610,000	68,000	s	s	23,000	71,000
Insurance, securities, real estate, and business services	233,000	70,000	17,000	71,000	s	s	15,000	68,000	31,000	18,000	167,000	78,000	s	s	2,000	119,000
Sales, commodities except retail (e.g., industrial, medical, dental machinery, equipment, supplies)	145,000	83,000	7,000	93,000	s	s	5,000	50,000	16,000	67,000	116,000	85,000	s	s	2,000	s
Sales, retail (e.g., furnishings, clothing, motor vehicles, cosmetics)	174,000	38,000	18,000	s	s	s	8,000	44,000	20,000	s	114,000	34,000	s	s	13,000	66,000
Other marketing and sales occupations	296,000	65,000	30,000	59,000	s	s	21,000	51,000	18,000	50,000	213,000	70,000	s	s	6,000	69,000

## CHAPTER 3 | Science and Engineering Labor Force

Occupation	Total		Asian		American Indian or Alaska Native		Black		Hispanic		White		Native Hawaiian or Other Pacific Islander		More than one race	
	Number	Median salary (\$)	Number	Median salary (\$)	Number	Median salary (\$)	Number	Median salary (\$)	Number	Median salary (\$)	Number	Median salary (\$)	Number	Median salary (\$)	Number	Median salary (\$)
Arts, humanities, and related occupations	150,000	60,000	9,000	70,000	s	s	s	s	4,000	s	128,000	58,000	s	s	1,000	s
Writers, editors, public relations specialists, artists, entertainers, broadcasters	149,000	60,000	9,000	70,000	s	s	s	s	4,000	63,000	127,000	58,000	s	s	1,000	s
Historians	s	s	s	s	s	s	s	s	s	s	s	s	s	s	s	s
Other non-S&E occupations	1,586,000	42,000	146,000	41,000	2,000	39,000	163,000	36,000	187,000	39,000	1,037,000	45,000	3,000	32,000	50,000	39,000
Accounting clerks and bookkeepers	101,000	42,000	12,000	47,000	s	s	s	s	3,000	40,000	66,000	42,000	s	s	*	*
Secretaries, receptionists, typists	123,000	37,000	12,000	37,000	s	s	11,000	32,000	17,000	28,000	77,000	40,000	s	s	s	s
Other administrative (e.g., record clerks, telephone operators)	342,000	39,000	37,000	38,000	s	s	53,000	36,000	50,000	39,000	188,000	41,000	s	s	12,000	41,000
Farmers, foresters, and fishermen	69,000	40,000	2,000	s	s	s	s	s	s	s	61,000	42,000	s	s	*	*
Lawyers, judges	34,000	96,000	3,000	122,000	s	s	s	s	s	s	26,000	s	s	s	s	s
Librarians, archivists, curators	37,000	35,000	s	s	s	s	s	s	s	s	27,000	38,000	s	s	s	s
Food preparation and service (e.g., cooks, waitresses, bartenders)	53,000	37,000	8,000	48,000	s	s	1,000	s	6,000	s	37,000	37,000	s	s	s	s
Protective services (e.g., firefighters, police, guards, wardens, park rangers)	111,000	60,000	2,000	78,000	s	s	13,000	50,000	9,000	54,000	84,000	62,000	s	s	s	s

## CHAPTER 3 | Science and Engineering Labor Force

Occupation	Total		Asian		American Indian or Alaska Native		Black		Hispanic		White		Native Hawaiian or Other Pacific Islander		More than one race	
	Number	Median salary (\$)	Number	Median salary (\$)	Number	Median salary (\$)	Number	Median salary (\$)	Number	Median salary (\$)	Number	Median salary (\$)	Number	Median salary (\$)	Number	Median salary (\$)
Other service occupations, except health (e.g., probation officer, human services work)	207,000	46,000	13,000	30,000	s	s	23,000	39,000	26,000	53,000	130,000	50,000	s	s	13,000	48,000
Other teachers and instructors (e.g., private tutors, dance, flying, martial arts)	64,000	42,000	4,000	s	s	s	10,000	38,000	4,000	29,000	45,000	56,000	s	s	s	s
Construction and extraction occupations	52,000	55,000	s	s	s	s	s	s	3,000	53,000	46,000	54,000	s	s	s	s
Installation, maintenance, and repair occupations	88,000	48,000	7,000	58,000	s	s	s	s	9,000	s	69,000	47,000	s	s	s	s
Precision or production occupations (metal or wood workers, butchers, bakers, assemblers, tailors)	88,000	34,000	12,000	35,000	s	s	10,000	s	7,000	30,000	55,000	34,000	s	s	s	s
Transportation and material moving occupations	122,000	42,000	17,000	31,000	s	s	8,000	s	10,000	66,000	86,000	42,000	s	s	1,000	s
Other occupations	97,000	57,000	15,000	81,000	s	s	6,000	s	35,000	27,000	40,000	78,000	s	s	s	s

\* = estimate < 500; s = suppressed for reasons of confidentiality and/or reliability.

### Note(s)

Hispanic may be any race; American Indian or Alaska Native, Asian, black or African American, Native Hawaiian or Other Pacific Islander, white, and more than one race refer to individuals who are not of Hispanic origin. Detail may not add to total because of rounding. Numbers are rounded to the nearest 1,000.

### Source(s)



**CHAPTER 3 | Science and Engineering Labor Force**

National Science Foundation, National Center for Science and Engineering Statistics, National Survey of College Graduates (NSCG) (2015), <https://www.nsf.gov/statistics/srvygrads/>.  
*Science and Engineering Indicators 2018*

## CHAPTER 3 | Science and Engineering Labor Force

### APPENDIX TABLE 3-19

#### Race and ethnic distribution of workers in S&E occupations, by nativity: 2015

(Percent distribution)

Race and ethnicity	All	Foreign born	U.S. native born
Total (number)	6,407,000	1,923,000	4,484,000
American Indian or Alaska Native	0.2	s	0.2
Asian	20.6	61.4	3.1
Black	4.8	4.5	4.9
Hispanic	6.0	9.0	4.8
Native Hawaiian or Other Pacific Islander	0.2	0.3	0.1
White	66.6	23.9	84.9
More than one race	1.6	0.8	1.9

s = suppressed for reasons of confidentiality and/or reliability.

#### Note(s)

Hispanic may be any race; American Indian or Alaska Native, Asian, black or African American, Native Hawaiian or Other Pacific Islander, white, and more than one race refer to individuals who are not of Hispanic origin. Detail may not add to total because of rounding. Numbers are rounded to the nearest 1,000. Percentages are based on rounded numbers.

#### Source(s)

National Science Foundation, National Center for Science and Engineering Statistics, National Survey of College Graduates (NSCG) (2015), <https://www.nsf.gov/statistics/srvygrads/>.

*Science and Engineering Indicators 2018*

## CHAPTER 3 | Science and Engineering Labor Force

### APPENDIX TABLE 3-20

#### Occupations of new H-1B visa recipients: FY 2016

(Number and percent)

Occupation	Number	Percent
Computer-related occupations	69,846	61.2
Administrative specializations, managers, officials	10,341	9.1
Education	9,414	8.2
Architecture, engineering, and surveying	10,243	9.0
Medicine and health	4,979	4.4
Other, including occupations unknown	2,237	2.0
Life sciences	1,533	1.3
Mathematics and physical sciences	2,786	2.4
Social sciences	1,502	1.3
Other professional, technical, and managerial	1,622	1.4

#### Note(s)

Percentages may not sum to 100% due to rounding.

#### Source(s)

Department of Homeland Security (DHS), *U.S. Citizenship and Immigration Services; Characteristics of H-1B Specialty Occupation Workers, Fiscal Year 2016 Annual Report to Congress* (May 5, 2017). <https://www.uscis.gov/sites/default/files/USCIS/Resources/Reports%20and%20Studies/H-1B/h-1B-FY16.pdf>.

*Science and Engineering Indicators 2018*

## CHAPTER 3 | Science and Engineering Labor Force

APPENDIX TABLE 3-21

### Plans of foreign recipients of U.S. doctorates to stay in the United States, by field of doctorate and place of origin: 2004–15

(Number and percent)

Field and place of origin	Foreign S&E doctorate recipients			Plans to stay (%)			Definite plans to stay (%)		
	2004–07	2008–11	2012–15	2004–07	2008–11	2012–15	2004–07	2008–11	2012–15
All S&E fields	49,857	55,506	59,922	76.7	75.5	75.4	51.0	49.6	45.2
China	15,561	16,120	19,078	91.0	85.6	83.4	58.9	54.9	49.4
India	5,774	8,936	9,113	89.1	86.6	86.5	61.9	57.8	50.9
South Korea	4,735	4,836	4,303	69.5	68.1	65.7	43.7	44.7	40.5
Taiwan	1,925	2,275	2,430	65.0	69.9	74.6	38.1	41.8	42.3
Iran	513	773	2,100	92.0	90.3	89.9	62.4	59.1	53.0
Turkey	1,486	1,920	1,632	68.0	67.1	65.9	47.0	46.3	41.5
Canada	1,603	1,749	1,545	66.9	66.2	66.3	50.0	47.1	44.5
Thailand	1,064	959	877	26.4	31.6	27.3	14.6	14.2	14.6
Germany	723	802	764	69.2	66.8	61.6	52.4	51.7	43.7
Japan	894	902	752	58.4	57.6	58.4	40.4	39.4	35.8
Mexico	771	739	744	49.9	56.0	63.0	37.2	39.9	37.2
Colombia	384	599	710	62.0	64.3	65.8	40.1	42.2	41.1
Nepal	96	319	635	84.4	87.8	88.0	60.4	55.8	49.0
Brazil	594	580	586	47.0	52.2	55.3	33.3	37.2	35.8
Sri Lanka	241	342	541	80.5	84.2	80.0	51.0	54.7	42.5
Other	13,493	13,655	14,112	69.3	68.3	66.5	47.0	45.5	40.4
Agricultural sciences and natural resources	2,120	2,093	2,309	59.9	63.4	65.5	36.9	38.4	36.2
China	414	380	567	85.7	78.7	78.1	52.4	48.2	42.3
India	152	276	269	88.8	85.1	82.9	56.6	45.7	42.4
South Korea	181	181	110	72.9	69.1	60.0	43.1	42.5	36.4
Thailand	98	73	96	17.3	19.2	20.8	7.1	9.6	10.4



## CHAPTER 3 | Science and Engineering Labor Force

Field and place of origin	Foreign S&E doctorate recipients			Plans to stay (%)			Definite plans to stay (%)		
	2004-07	2008-11	2012-15	2004-07	2008-11	2012-15	2004-07	2008-11	2012-15
Brazil	68	61	84	27.9	45.9	50.0	19.1	27.9	32.1
Mexico	108	94	81	31.5	36.2	55.6	21.3	21.3	33.3
Nepal	19	37	68	84.2	86.5	85.3	57.9	45.9	45.6
Taiwan	68	64	53	54.4	62.5	83.0	36.8	40.6	34.0
Canada	64	66	39	56.3	57.6	74.4	40.6	40.9	53.8
Colombia	30	39	37	53.3	59.0	59.5	26.7	48.7	40.5
Kenya	25	39	34	72.0	56.4	67.6	44.0	25.6	41.2
Sri Lanka	16	14	32	75.0	57.1	62.5	31.3	35.7	37.5
Philippines	24	38	31	50.0	52.6	67.7	37.5	42.1	41.9
Turkey	44	28	31	56.8	57.1	64.5	34.1	35.7	48.4
Ecuador	16	21	29	68.8	57.1	55.2	62.5	28.6	37.9
Other	793	682	748	49.7	55.9	56.3	30.0	34.8	30.6
Biological and biomedical sciences	8,135	10,092	10,204	84.7	82.7	81.0	58.6	54.9	47.7
China	2,859	3,277	3,155	93.9	88.6	84.6	62.3	56.6	49.6
India	1,073	1,807	2,101	92.3	90.4	89.1	65.6	58.8	49.5
Taiwan	344	508	569	82.3	80.9	83.8	53.8	53.7	50.3
South Korea	581	650	503	90.2	85.8	88.5	67.8	61.5	55.7
Canada	338	426	314	75.1	73.7	73.6	57.4	53.3	39.8
Turkey	135	164	170	79.3	79.3	79.4	60.0	59.8	50.6
Japan	112	153	154	78.6	77.1	76.0	59.8	54.9	44.2
Germany	125	151	146	81.6	72.8	72.6	64.8	52.3	39.0
Colombia	74	128	134	54.1	70.3	71.6	32.4	49.2	41.8
Brazil	116	135	129	53.4	58.5	64.3	39.7	43.0	37.2
Thailand	106	106	126	17.9	33.0	34.9	15.1	20.8	23.8
Mexico	104	108	114	61.5	64.8	70.2	51.9	45.4	38.6
Nepal	8	44	114	87.5	86.4	89.5	s	54.5	50.9

## CHAPTER 3 | Science and Engineering Labor Force

Field and place of origin	Foreign S&E doctorate recipients			Plans to stay (%)			Definite plans to stay (%)		
	2004-07	2008-11	2012-15	2004-07	2008-11	2012-15	2004-07	2008-11	2012-15
Singapore	47	45	107	66.0	44.4	36.4	40.4	31.1	28.0
Iran	30	42	89	100.0	100.0	85.4	63.3	61.9	51.7
Other	2,083	2,348	2,279	77.1	76.7	74.4	s	51.5	45.9
Health sciences	1,941	2,105	2,227	65.8	71.7	70.8	41.3	44.4	40.1
India	308	425	454	91.6	88.2	87.2	58.4	53.9	45.2
China	337	382	439	88.7	83.2	82.9	60.2	54.7	51.0
South Korea	159	187	177	73.0	79.7	72.3	37.7	49.7	37.3
Taiwan	197	186	153	44.2	58.1	62.1	21.8	38.2	37.3
Canada	110	113	110	68.2	68.1	63.6	54.5	45.1	46.4
Thailand	120	89	73	11.7	18.0	11.0	5.8	s	s
Jordan	38	45	58	18.4	37.8	41.4	s	11.1	13.8
Saudi Arabia	31	17	46	s	s	19.6	0.0	0.0	s
Japan	45	51	44	64.4	47.1	68.2	44.4	29.4	34.1
Nigeria	18	25	42	77.8	92.0	85.7	61.1	32.0	33.3
Egypt	39	28	35	53.8	78.6	82.9	33.3	42.9	57.1
Brazil	46	35	34	47.8	45.7	73.5	26.1	31.4	41.2
Ghana	5	7	24	100.0	100.0	70.8	s	s	33.3
Nepal	s	13	21	s	84.6	90.5	0.0	38.5	57.1
Colombia	12	21	20	83.3	81.0	60.0	50.0	47.6	40.0
Germany	19	30	20	63.2	80.0	65.0	31.6	46.7	60.0
United Kingdom	27	28	20	66.7	85.7	70.0	51.9	67.9	45.0
Other	s	423	457	s	s	63.0	37.1	41.4	36.3
Physical and earth sciences	8,051	8,674	9,031	81.1	78.1	76.9	55.7	53.8	46.8
China	2,836	3,064	3,392	90.9	85.8	84.1	59.8	57.3	49.5
India	645	1,109	1,234	86.7	83.3	83.4	61.4	58.7	49.9
South Korea	579	549	450	80.8	74.5	64.4	57.0	57.6	42.0

## CHAPTER 3 | Science and Engineering Labor Force

Field and place of origin	Foreign S&E doctorate recipients			Plans to stay (%)			Definite plans to stay (%)		
	2004-07	2008-11	2012-15	2004-07	2008-11	2012-15	2004-07	2008-11	2012-15
Taiwan	208	241	332	77.9	73.4	73.8	57.2	51.0	49.7
Sri Lanka	94	159	251	81.9	83.6	80.1	53.2	54.1	41.8
Nepal	20	110	200	100.0	87.3	88.5	80.0	60.9	52.5
Canada	283	246	177	66.1	63.8	65.5	50.2	48.8	51.4
Turkey	169	251	169	78.7	77.7	63.3	53.3	52.2	40.2
Russian Federation	330	209	159	81.8	82.3	83.6	57.6	58.9	52.8
Germany	142	143	153	66.9	58.0	57.5	48.6	46.2	42.5
Iran	62	47	136	85.5	83.0	81.6	59.7	48.9	50.0
Mexico	95	106	102	56.8	58.5	65.7	42.1	46.2	42.2
Japan	127	134	100	57.5	64.9	60.0	36.2	47.0	39.0
Colombia	54	72	98	70.4	58.3	72.4	57.4	33.3	46.9
Thailand	84	89	95	35.7	33.7	26.3	22.6	19.1	13.7
Other	2,323	2,145	1,983	74.7	71.8	69.4	52.3	49.1	43.0
Mathematics and computer sciences	5,807	6,700	7,851	78.4	76.9	79.4	56.3	53.3	52.9
China	2,101	2,443	3,300	91.3	86.0	87.0	65.1	58.6	56.9
India	638	976	970	86.4	84.4	84.6	64.7	60.5	58.8
South Korea	445	475	470	75.1	71.4	70.9	47.2	43.4	46.8
Taiwan	171	177	228	63.7	70.1	72.8	40.4	42.4	46.9
Turkey	169	237	206	69.2	62.4	74.3	53.8	46.4	49.0
Iran	60	57	196	83.3	77.2	89.3	60.0	47.4	62.2
Canada	130	141	144	65.4	59.6	68.8	53.8	48.9	59.0
Vietnam	21	62	139	81.0	71.0	79.1	66.7	53.2	51.8
Bangladesh	23	45	105	100.0	88.9	94.3	91.3	60.0	53.3
Thailand	68	104	93	17.6	27.9	28.0	10.3	12.5	16.1
Jordan	35	42	91	37.1	35.7	50.5	20.0	23.8	22.0
Greece	82	70	88	58.5	65.7	78.4	50.0	50.0	59.1

## CHAPTER 3 | Science and Engineering Labor Force

Field and place of origin	Foreign S&E doctorate recipients			Plans to stay (%)			Definite plans to stay (%)		
	2004-07	2008-11	2012-15	2004-07	2008-11	2012-15	2004-07	2008-11	2012-15
Romania	213	161	85	87.3	85.1	87.1	67.6	65.2	62.4
Germany	101	107	84	62.4	57.0	65.5	47.5	45.8	46.4
Italy	50	64	81	64.0	62.5	64.2	60.0	45.3	42.0
Mexico	64	77	81	51.6	67.5	63.0	35.9	46.8	39.5
Other	1,436	1,462	1,490	66.9	69.9	69.1	47.3	49.7	46.9
Psychology and social sciences	6,730	7,589	7,578	59.7	57.6	56.1	42.5	39.4	35.8
China	811	1,104	1,320	77.9	69.6	62.7	57.6	47.5	40.5
South Korea	738	780	807	47.3	46.9	48.7	29.8	29.9	29.9
India	371	539	506	77.4	75.5	72.9	55.3	53.2	45.8
Canada	444	454	470	58.8	55.5	55.1	43.7	39.4	37.0
Turkey	307	464	340	49.8	46.1	41.8	36.8	32.1	27.1
Taiwan	278	281	296	42.4	44.8	45.3	24.5	23.8	23.6
Japan	373	373	284	47.7	50.4	47.9	35.7	33.8	30.3
Germany	199	239	213	65.8	65.7	59.6	52.3	54.0	48.4
Mexico	172	160	158	41.3	50.6	53.2	33.1	36.3	26.6
Brazil	133	130	134	44.4	43.1	42.5	34.6	30.8	25.4
Italy	151	130	133	64.9	54.6	55.6	53.6	43.8	43.6
United Kingdom	122	116	133	79.5	71.6	66.9	59.8	54.3	43.6
Argentina	128	122	132	68.0	56.6	59.8	55.5	45.9	50.0
Colombia	74	96	111	43.2	45.8	45.0	27.0	32.3	33.3
Russian Federation	150	107	94	74.0	70.1	61.7	48.7	42.1	37.2
Other	2,279	2,494	2,447	59.3	56.8	56.0	41.2	37.9	34.8
Engineering	17,073	18,253	20,722	80.1	79.1	79.2	49.5	49.5	45.2
China	6,203	5,470	6,905	91.7	87.5	85.2	55.5	52.9	48.0
India	2,587	3,804	3,579	90.4	87.8	88.6	61.4	58.3	52.0
South Korea	2,052	2,014	1,786	66.6	66.8	65.7	37.8	41.6	39.5

## CHAPTER 3 | Science and Engineering Labor Force

Field and place of origin	Foreign S&E doctorate recipients			Plans to stay (%)			Definite plans to stay (%)		
	2004–07	2008–11	2012–15	2004–07	2008–11	2012–15	2004–07	2008–11	2012–15
Iran	321	576	1,581	93.8	91.1	91.5	64.2	61.3	52.5
Taiwan	659	818	799	69.0	73.8	81.5	34.1	38.5	40.7
Turkey	647	768	706	71.7	75.4	72.9	46.4	50.7	44.1
Thailand	465	360	310	33.5	40.3	31.9	17.2	16.1	16.5
Canada	234	303	291	74.8	77.6	75.6	49.6	49.8	48.1
Egypt	232	177	273	70.7	74.6	70.0	46.6	43.5	36.6
Colombia	114	192	260	77.2	71.4	71.9	50.0	41.1	41.9
Bangladesh	120	144	259	87.5	83.3	86.5	50.8	50.0	42.1
Mexico	208	176	191	56.7	59.7	69.1	38.9	41.5	42.4
Pakistan	83	122	184	75.9	61.5	54.3	42.2	40.2	30.4
Jordan	173	181	170	61.8	61.3	54.7	31.8	39.2	27.6
Vietnam	19	95	159	78.9	74.7	76.7	47.4	49.5	45.3
Other	2,956	3,053	3,269	70.2	69.6	67.7	44.4	44.4	38.7

s = suppressed for reasons of confidentiality and/or reliability.

### Note(s)

For each broad field of doctorate, data are presented for the source countries with the largest numbers of U.S. doctorate recipients in that field in 2012–15. Data include foreign doctorate recipients who are on permanent or temporary visas and also those whose visa status is unknown. The information on a plan to stay or a definite plan to stay reflects intentions within the year after graduation as reported by the doctoral recipient around the graduation date. Recipients who plan to stay think they will locate in the United States; those with definite plans have a postdoctoral research appointment or a definite employment plan in the United States. Percentages are based on the total number of foreign S&E doctorate recipients, including those who did not report their postgraduate location plans or employment plans. The percentage of foreign S&E doctorate recipients who did not report postgraduate location plans ranged from 1.9% to 4.5% over the 2004–15 period, and the percentage who either did not report postgraduate location plans or did not report employment plans ranged from 3.3% to 6.8% over that period.

### Source(s)

National Science Foundation, National Center for Science and Engineering Statistics, special tabulations (2016) of the Survey of Earned Doctorates (SED) (2015).

*Science and Engineering Indicators 2018*

## CHAPTER 3 | Science and Engineering Labor Force

APPENDIX TABLE 3-22

### R&D personnel in selected regions or countries: 2000–15

(Thousands)

Year	EU	Japan	South Korea	China	Russia
2000	2,000	897	138	922	1,007
2001	2,033	869	166	956	1,008
2002	2,082	834	172	1,035	987
2003	2,101	859	186	1,095	973
2004	2,144	873	194	1,153	952
2005	2,202	897	215	1,365	920
2006	2,294	910	238	1,502	917
2007	2,370	912	269	1,736	912
2008	2,462	883	294	1,965	870
2009	2,486	878	309	2,291	846
2010	2,540	878	335	2,554	840
2011	2,613	870	361	2,883	839
2012	2,671	851	396	3,247	828
2013	2,711	866	401	3,533	827
2014	2,779	895	431	3,711	829
2015	2,869	875	442	3,759	834

EU = European Union.

#### Note(s)

Personnel are full-time equivalents. R&D personnel includes researchers, technicians, and other support staff. Counts for China before 2009 were not consistent with Organisation for Economic Co-operation and Development (OECD) standards. Counts for South Korea before 2007 exclude social sciences and humanities researchers.

#### Source(s)

OECD, Main Science and Technology Indicators (2017/1), <https://www.oecd.org/sti/msti.htm>.

Science and Engineering Indicators 2018

## CHAPTER 3 | Science and Engineering Labor Force

APPENDIX TABLE 3-23



### Researchers as a share of total employment and GERD per researcher in selected regions, countries, or economies: 2015

(Percent and PPP thousands of constant 2010 dollars)

Region, country, or economy	Researchers (% of total employment)	GERD per researcher (PPP constant 2010 \$thousands)
Argentina	0.29	96.9
Austria	0.99	272.4
Belgium	1.20	204.8
Canada <sup>a</sup>	0.88	157.2
China	0.21	232.8
Czech Republic	0.74	160.1
Denmark	1.50	176.5
EU	0.80	188.2
Finland	1.50	160.7
France	1.01	196.3
Germany	0.90	262.1
Israel <sup>b</sup>	1.74	155.0
Italy	0.49	222.2
Japan	1.00	233.6
Mexico <sup>a</sup>	0.08	320.0
Netherlands	0.88	199.8
Norway	1.11	188.8
Poland	0.52	113.1
Portugal	0.86	89.0
Russian Federation	0.62	81.8
Singapore <sup>c</sup>	1.01	256.3
South Korea	1.37	206.8
Spain	0.66	147.3
Sweden	1.36	217.2

## CHAPTER 3 | Science and Engineering Labor Force

Region, country, or economy	Researchers (% of total employment)	GERD per researcher (PPP constant 2010 \$thousands)
Taiwan	1.30	212.5
Turkey	0.36	164.9
United Kingdom	0.92	145.6
United States	0.91	335.3

EU = European Union; GERD = gross domestic expenditures on R&D; PPP = purchasing power parity.

<sup>a</sup> 2015 data are not available for the region, country, or economy; 2013 data are shown.

<sup>b</sup> 2015 data are not available for the region, country, or economy; 2012 data are shown.

<sup>c</sup> 2015 data are not available for the region, country, or economy; 2014 data are shown.

### Note(s)

Researchers are full-time equivalents. Quality of data and methods of collecting data can vary between and within regions, countries, or economies across years. Data are presented for regions, countries, or economies with 25,000 or more researchers according to the most recent estimates.

### Source(s)

Organisation for Economic Co-operation and Development, Main Science and Technology Indicators (2017/1), <https://www.oecd.org/sti/msti.htm>, accessed 20 September 2017.

*Science and Engineering Indicators 2018*



## CHAPTER 4

# Research and Development: U.S. Trends and International Comparisons

## List of Appendix Tables

Appendix Table 4-1	U.S. gross domestic product, R&D, and ratio of R&D to gross domestic product (and components): 1953–2015.....	4-3
Appendix Table 4-2	U.S. research and development expenditures, by performing sector and source of funds: 1953–2015 .....	4-8
Appendix Table 4-3	U.S. basic research expenditures, by performing sector and source of funds: 1953–2015 .....	4-17
Appendix Table 4-4	U.S. applied research expenditures, by performing sector and source of funds: 1953–2015 .....	4-26
Appendix Table 4-5	U.S. development expenditures, by performing sector and source of funds: 1953–2015 .....	4-35
Appendix Table 4-6	U.S. R&D expenditures, by source of funds and performing sector: 1953–2015 .....	4-44
Appendix Table 4-7	U.S. basic research expenditures, by source of funds and performing sector: 1953–2015.....	4-52
Appendix Table 4-8	U.S. applied research expenditures, by source of funds and performing sector: 1953–2015.....	4-60
Appendix Table 4-9	U.S. development expenditures, by source of funds and performing sector: 1953–2015.....	4-68
Appendix Table 4-10	U.S. R&D expenditures, by state, performing sector, and funding sector: 2015 .....	4-76
Appendix Table 4-11	U.S. R&D and gross domestic product, by state: 2015 .....	4-81
Appendix Table 4-12	Gross expenditures on R&D and expenditures for R&D as a share of gross domestic product, for selected countries or regions: 1981–2015.....	4-84
Appendix Table 4-13	Funds spent for business R&D performed in the United States, by source of funds and selected industry: 2008–14.....	4-90
Appendix Table 4-14	Federal research and experimentation tax credit claims, by NAICS industry: 2001–13 .....	4-101
Appendix Table 4-15	R&D performed by majority-owned affiliates of foreign companies in the United States, by region, country, or economy of ultimate beneficial owner: 1997–2014.....	4-106
Appendix Table 4-16	R&D performed by majority-owned affiliates of foreign companies in the United States, by NAICS industry of affiliate: 2007–14 .....	4-110
Appendix Table 4-17	R&D performed abroad by majority-owned foreign affiliates of U.S. parent companies, by region, country, or economy: 1997–2014.....	4-113
Appendix Table 4-18	R&D performed abroad by majority-owned foreign affiliates of U.S. parent companies, by selected NAICS industry of affiliate: 2009–14 .....	4-118
Appendix Table 4-19	R&D performed in the United States by U.S. multinational company parent companies, by NAICS industry: 2009–14 .....	4-122
Appendix Table 4-20	Difference in federal R&D support, as reported by performers and federal agencies: 1985–2015 .....	4-126



Appendix Table 4-21	Federal obligations for R&D and R&D plant, by type of work: FYs 1953–2016 .....	4-128
Appendix Table 4-22	Federal funding for R&D and R&D plant, budget authority versus obligations: FYs 1953–2016 .....	4-134
Appendix Table 4-23	Federal obligations for R&D and R&D plant, by agency, performer, and type of work: FY 2015 .....	4-140
Appendix Table 4-24	Federal obligations for research, by agency and S&E field: FY 2015 .....	4-151
Appendix Table 4-25	Federal obligations for research, by detailed S&E field: Selected years, FYs 1990–2015 .....	4-157

## CHAPTER 4 | Research and Development: U.S. Trends and International Comparisons

APPENDIX TABLE 4-1

### U.S. gross domestic product, R&D, and ratio of R&D to gross domestic product (and components): 1953–2015

(Billions of current and of constant 2009 dollars and R&amp;D-to-GDP ratio)

Year	GDP			Total R&D		R&D/GDP (%)							
	Current \$billions	Constant 2009 \$billions	Deflator <sup>a</sup> (2009 = 1.00000)	Current \$billions	Constant 2009 \$billions	Total	R&D, by performer				R&D, by source of funding		
							Business	Federal <sup>b</sup>	Higher education	Other <sup>c</sup>	Business	Federal	Other <sup>d</sup>
1953	389.7	2,571.4	0.15155	5.2	34.0	1.32	0.93	0.29	0.07	0.03	0.58	0.71	0.03
1954	391.1	2,556.9	0.15296	5.6	36.7	1.44	1.04	0.29	0.08	0.03	0.61	0.79	0.04
1955	426.2	2,739.0	0.15560	6.2	39.7	1.45	1.04	0.30	0.08	0.03	0.59	0.82	0.04
1956	450.1	2,797.4	0.16090	8.5	52.8	1.89	1.39	0.38	0.09	0.03	0.74	1.11	0.04
1957	474.9	2,856.3	0.16626	9.9	59.6	2.09	1.54	0.42	0.09	0.04	0.73	1.31	0.04
1958	482.0	2,835.3	0.17000	10.9	64.2	2.26	1.67	0.45	0.10	0.04	0.77	1.45	0.05
1959	522.5	3,031.0	0.17239	12.5	72.5	2.39	1.76	0.47	0.11	0.04	0.78	1.56	0.05
1960	543.3	3,108.7	0.17477	13.7	78.5	2.52	1.85	0.50	0.13	0.05	0.83	1.64	0.05
1961	563.3	3,188.1	0.17669	14.6	82.4	2.59	1.84	0.55	0.15	0.05	0.84	1.68	0.06
1962	605.1	3,383.1	0.17886	15.6	87.4	2.58	1.82	0.54	0.16	0.06	0.85	1.68	0.06
1963	638.6	3,530.4	0.18089	17.5	96.9	2.74	1.91	0.58	0.18	0.06	0.85	1.82	0.07
1964	685.8	3,734.0	0.18366	19.1	104.0	2.79	1.90	0.62	0.20	0.06	0.86	1.86	0.07
1965	743.7	3,976.7	0.18701	20.3	108.3	2.72	1.86	0.59	0.21	0.06	0.88	1.77	0.07
1966	815.0	4,238.9	0.19227	22.1	114.8	2.71	1.86	0.56	0.22	0.07	0.90	1.74	0.07

## CHAPTER 4 | Research and Development: U.S. Trends and International Comparisons

Year	GDP			Total R&D		R&D/GDP (%)							
	Current \$billions	Constant 2009 \$billions	Deflator <sup>a</sup> (2009 = 1.00000)	Current \$billions	Constant 2009 \$billions	Total	R&D, by performer				R&D, by source of funding		
							Business	Federal <sup>b</sup>	Higher education	Other <sup>c</sup>	Business	Federal	Other <sup>d</sup>
1967	861.7	4,355.2	0.19786	23.3	118.0	2.71	1.85	0.56	0.24	0.07	0.95	1.69	0.07
1968	942.5	4,569.0	0.20628	24.7	119.6	2.62	1.81	0.52	0.23	0.06	0.96	1.59	0.07
1969	1,019.9	4,712.5	0.21642	26.0	120.1	2.55	1.75	0.51	0.22	0.06	0.98	1.49	0.07
1970	1,075.9	4,722.0	0.22785	26.3	115.3	2.44	1.64	0.52	0.22	0.06	0.97	1.39	0.08
1971	1,167.8	4,877.6	0.23942	27.0	112.6	2.31	1.53	0.50	0.22	0.06	0.93	1.30	0.08
1972	1,282.4	5,134.3	0.24977	28.7	115.1	2.24	1.48	0.48	0.21	0.06	0.91	1.25	0.08
1973	1,428.5	5,424.1	0.26336	31.0	117.5	2.17	1.45	0.45	0.21	0.06	0.93	1.16	0.07
1974	1,548.8	5,396.0	0.28703	33.4	116.2	2.15	1.44	0.45	0.21	0.06	0.96	1.12	0.08
1975	1,688.9	5,385.4	0.31361	35.7	113.7	2.11	1.39	0.45	0.21	0.06	0.94	1.10	0.08
1976	1,877.6	5,675.4	0.33083	39.4	119.2	2.10	1.39	0.44	0.21	0.06	0.94	1.08	0.08
1977	2,086.0	5,937.0	0.35136	43.3	123.3	2.08	1.38	0.43	0.21	0.06	0.94	1.06	0.08
1978	2,356.6	6,267.2	0.37602	48.7	129.6	2.07	1.37	0.43	0.21	0.06	0.95	1.04	0.08
1979	2,632.1	6,466.2	0.40706	55.4	136.0	2.10	1.41	0.42	0.22	0.06	0.99	1.03	0.08
1980	2,862.5	6,450.4	0.44377	63.2	142.5	2.21	1.51	0.42	0.23	0.06	1.08	1.05	0.08
1981	3,211.0	6,617.7	0.48521	72.3	149.0	2.25	1.57	0.40	0.22	0.06	1.12	1.05	0.08
1982	3,345.0	6,491.3	0.51531	80.7	156.7	2.41	1.71	0.42	0.23	0.06	1.22	1.11	0.09

## CHAPTER 4 | Research and Development: U.S. Trends and International Comparisons

Year	GDP			Total R&D		R&D/GDP (%)							
	Current \$billions	Constant 2009 \$billions	Deflator <sup>a</sup> (2009 = 1.00000)	Current \$billions	Constant 2009 \$billions	Total	R&D, by performer				R&D, by source of funding		
							Business	Federal <sup>b</sup>	Higher education	Other <sup>c</sup>	Business	Federal	Other <sup>d</sup>
1983	3,638.1	6,792.0	0.53564	89.9	167.9	2.47	1.75	0.44	0.23	0.06	1.24	1.14	0.09
1984	4,040.7	7,285.0	0.55466	102.2	184.3	2.53	1.81	0.43	0.23	0.06	1.29	1.15	0.09
1985	4,346.7	7,593.8	0.57240	114.7	200.3	2.64	1.90	0.44	0.24	0.06	1.33	1.21	0.09
1986	4,590.2	7,860.5	0.58396	120.2	205.9	2.62	1.87	0.43	0.25	0.06	1.33	1.19	0.10
1987	4,870.2	8,132.6	0.59885	126.4	211.0	2.59	1.85	0.42	0.26	0.06	1.28	1.20	0.11
1988	5,252.6	8,474.5	0.61981	133.9	216.0	2.55	1.81	0.41	0.27	0.06	1.29	1.14	0.11
1989	5,657.7	8,786.4	0.64392	141.9	220.4	2.51	1.77	0.40	0.28	0.06	1.33	1.07	0.11
1990	5,979.6	8,955.0	0.66774	152.0	227.6	2.54	1.80	0.39	0.28	0.07	1.39	1.03	0.12
1991	6,174.0	8,948.4	0.68996	160.9	233.2	2.61	1.86	0.38	0.29	0.08	1.49	0.98	0.13
1992	6,539.3	9,266.6	0.70568	165.4	234.3	2.53	1.79	0.37	0.30	0.08	1.47	0.93	0.13
1993	6,878.7	9,521.0	0.72248	165.7	229.4	2.41	1.68	0.36	0.30	0.08	1.40	0.88	0.13
1994	7,308.8	9,905.4	0.73786	169.2	229.3	2.32	1.61	0.34	0.30	0.08	1.36	0.83	0.13
1995	7,664.1	10,174.8	0.75324	183.6	243.8	2.40	1.69	0.33	0.30	0.08	1.45	0.82	0.13
1996	8,100.2	10,561.0	0.76699	197.3	257.3	2.44	1.76	0.31	0.29	0.08	1.52	0.78	0.13
1997	8,608.5	11,034.9	0.78012	211.9	271.6	2.46	1.81	0.29	0.29	0.08	1.58	0.75	0.13
1998	9,089.2	11,525.9	0.78859	225.8	286.3	2.48	1.84	0.28	0.28	0.08	1.63	0.73	0.13

## CHAPTER 4 | Research and Development: U.S. Trends and International Comparisons

Year	GDP			Total R&D		R&D/GDP (%)							
	Current \$billions	Constant 2009 \$billions	Deflator <sup>a</sup> (2009 = 1.00000)	Current \$billions	Constant 2009 \$billions	Total	R&D, by performer				R&D, by source of funding		
							Business	Federal <sup>b</sup>	Higher education	Other <sup>c</sup>	Business	Federal	Other <sup>d</sup>
1999	9,660.6	12,065.9	0.80065	244.5	305.3	2.53	1.88	0.28	0.28	0.08	1.70	0.69	0.14
2000	10,284.8	12,559.7	0.81887	267.9	327.2	2.61	1.94	0.28	0.29	0.09	1.81	0.65	0.14
2001	10,621.8	12,682.2	0.83754	278.5	332.6	2.62	1.90	0.31	0.31	0.10	1.77	0.69	0.15
2002	10,977.5	12,908.8	0.85039	277.9	326.8	2.53	1.77	0.32	0.33	0.11	1.65	0.72	0.17
2003	11,510.7	13,271.1	0.86735	291.4	335.9	2.53	1.74	0.32	0.35	0.11	1.62	0.74	0.17
2004	12,274.9	13,773.5	0.89120	302.7	339.7	2.47	1.70	0.31	0.35	0.11	1.56	0.74	0.17
2005	13,093.7	14,234.2	0.91988	325.3	353.6	2.48	1.73	0.30	0.35	0.11	1.59	0.73	0.17
2006	13,855.9	14,613.8	0.94814	350.9	370.1	2.53	1.79	0.30	0.34	0.10	1.64	0.72	0.17
2007	14,477.6	14,873.7	0.97337	377.9	388.2	2.61	1.86	0.30	0.34	0.10	1.70	0.73	0.18
2008	14,718.6	14,830.4	0.99246	404.8	407.8	2.75	1.97	0.31	0.35	0.11	1.75	0.80	0.20
2009	14,418.7	14,418.7	1.00000	402.9	402.9	2.79	1.96	0.33	0.38	0.13	1.71	0.87	0.21
2010	14,964.4	14,783.8	1.01222	406.6	401.7	2.72	1.86	0.34	0.39	0.13	1.66	0.85	0.21
2011	15,517.9	15,020.6	1.03311	426.2	412.5	2.75	1.90	0.34	0.39	0.12	1.72	0.82	0.21
2012	16,155.3	15,354.6	1.05215	433.6	412.1	2.68	1.87	0.32	0.38	0.11	1.71	0.77	0.21
2013	16,691.5	15,612.2	1.06913	454.0	424.6	2.72	1.93	0.31	0.37	0.11	1.78	0.72	0.22
2014	17,427.6	16,013.3	1.08832	475.4	436.8	2.73	1.96	0.30	0.36	0.11	1.83	0.68	0.22

## CHAPTER 4 | Research and Development: U.S. Trends and International Comparisons

Year	GDP			Total R&D		R&D/GDP (%)							
	Current \$billions	Constant 2009 \$billions	Deflator <sup>a</sup> (2009 = 1.00000)	Current \$billions	Constant 2009 \$billions	Total	R&D, by performer				R&D, by source of funding		
							Business	Federal <sup>b</sup>	Higher education	Other <sup>c</sup>	Business	Federal	Other <sup>d</sup>
2015 <sup>e</sup>	18,120.7	16,471.5	1.10012	495.1	450.1	2.73	1.96	0.30	0.36	0.11	1.84	0.67	0.23

GDP = gross domestic product.

<sup>a</sup> Implicit price deflator for GDP.

<sup>b</sup> Includes federal intramural R&D and that by federally funded R&D centers.

<sup>c</sup> Includes R&D in the United States performed by nonfederal government and other nonprofit organizations.

<sup>d</sup> Includes funding for U.S. R&D by nonfederal government, higher education, and other nonprofit organizations.

<sup>e</sup> Data are preliminary and may later be revised.

### Note(s)

Detail may not add to total because of rounding.

### Source(s)

GDP figures from Bureau of Economic Analysis, National Economic Accounts, Gross Domestic Product, <https://www.bea.gov/national/>, accessed 29 August 2017; R&D figures from National Science Foundation, National Center for Science and Engineering Statistics, National Patterns of R&D Resources (annual series).

*Science and Engineering Indicators 2018*

CHAPTER 4 | Research and Development: U.S. Trends and International Comparisons

APPENDIX TABLE 4-2

U.S. research and development expenditures, by performing sector and source of funds: 1953–2015

(Millions of current and of constant 2009 dollars)

Year	All per-formers	All federal	Federal intramural <sup>a</sup>	FFRDCs <sup>b</sup>		Nonfederal govern-ment <sup>c</sup>	Business <sup>d</sup>						Higher education <sup>e</sup>					Other nonprofit organizations <sup>f</sup>				
	All funding sources	Total	Federal	Total	Federal	Total	Total	Own domestic	Federal	Other domestic business	Foreign business	Other	Total	Federal	Nonfederal govern-ment	Busi-ness	Higher education	ONP	Total	Federal	Busi-ness	ONP
Current \$millions																						
1953	5,160	1,146	1,015	131	131	NA	3,630	2,200	1,430	NA	NA	NA	273	149	40	21	37	27	112	58	26	28
1954	5,621	1,127	963	165	165	NA	4,070	2,320	1,750	NA	NA	NA	301	165	45	24	40	29	123	61	31	31
1955	6,185	1,292	973	319	319	NA	4,420	2,460	1,960	NA	NA	NA	342	191	50	27	42	32	132	65	35	32
1956	8,501	1,692	1,131	561	561	NA	6,272	3,277	2,995	NA	NA	NA	391	221	57	32	46	36	146	71	37	38
1957	9,908	1,985	1,297	688	688	NA	7,324	3,396	3,928	NA	NA	NA	433	242	64	37	51	40	167	79	37	51
1958	10,915	2,163	1,507	657	657	NA	8,066	3,630	4,436	NA	NA	NA	491	280	72	39	56	45	195	95	38	62
1959	12,490	2,470	1,681	789	789	NA	9,200	3,983	5,217	NA	NA	NA	586	356	81	40	61	50	234	125	42	67
1960	13,711	2,711	1,801	910	910	NA	10,032	4,428	5,604	NA	NA	NA	705	453	90	40	67	55	264	148	48	68
1961	14,564	3,074	1,987	1,087	1,087	NA	10,353	4,668	5,685	NA	NA	NA	834	557	101	40	75	62	304	169	49	86
1962	15,636	3,244	2,188	1,056	1,056	NA	11,037	5,029	6,008	NA	NA	NA	993	687	112	41	84	70	363	200	54	109
1963	17,519	3,717	2,559	1,159	1,159	NA	12,216	5,360	6,856	NA	NA	NA	1,178	839	125	41	96	78	408	234	55	119
1964	19,103	4,263	2,966	1,297	1,297	NA	13,049	5,792	7,257	NA	NA	NA	1,375	995	138	41	114	88	417	250	55	112
1965	20,253	4,374	3,157	1,218	1,218	NA	13,812	6,445	7,367	NA	NA	NA	1,595	1,167	150	42	136	101	472	286	62	124
1966	22,072	4,525	3,308	1,217	1,217	NA	15,193	7,216	7,977	NA	NA	NA	1,818	1,335	160	45	165	114	537	329	70	138



CHAPTER 4 | Research and Development: U.S. Trends and International Comparisons

Year	All per-formers	All federal	Federal intramural <sup>a</sup>	FFRDCs <sup>b</sup>		Nonfederal govern-ment <sup>c</sup>	Business <sup>d</sup>						Higher education <sup>e</sup>						Other nonprofit organizations <sup>f</sup>			
	All funding sources	Total	Federal	Total	Federal	Total	Total	Own domestic	Federal	Other domestic business	Foreign business	Other	Total	Federal	Nonfederal govern-ment	Busi-ness	Higher education	ONP	Total	Federal	Busi-ness	ONP
1967	23,347	4,785	3,445	1,340	1,340	NA	15,966	8,020	7,946	NA	NA	NA	2,035	1,491	168	52	200	126	561	342	74	145
1968	24,667	4,870	3,498	1,372	1,372	NA	17,014	8,869	8,145	NA	NA	NA	2,187	1,586	185	58	221	139	596	364	81	151
1969	25,996	5,230	3,790	1,440	1,440	NA	17,844	9,857	7,987	NA	NA	NA	2,280	1,624	208	61	233	155	642	388	93	161
1970	26,271	5,583	4,154	1,430	1,430	NA	17,594	10,288	7,306	NA	NA	NA	2,418	1,686	237	66	259	171	677	410	95	172
1971	26,952	5,849	4,409	1,441	1,441	NA	17,829	10,654	7,175	NA	NA	NA	2,565	1,760	262	72	290	182	709	427	98	184
1972	28,740	6,209	4,676	1,533	1,533	NA	19,004	11,535	7,469	NA	NA	NA	2,757	1,890	282	79	312	195	771	472	101	198
1973	30,952	6,413	4,837	1,576	1,576	NA	20,704	13,104	7,600	NA	NA	NA	2,954	2,009	301	90	344	210	882	566	105	211
1974	33,359	6,916	5,132	1,784	1,784	NA	22,239	14,667	7,572	NA	NA	NA	3,216	2,160	320	105	394	239	988	639	114	235
1975	35,671	7,580	5,561	2,019	2,019	NA	23,460	15,582	7,878	NA	NA	NA	3,570	2,400	348	118	432	272	1,062	675	124	262
1976	39,435	8,291	5,890	2,401	2,401	NA	26,107	17,436	8,671	NA	NA	NA	3,899	2,619	369	131	480	300	1,139	711	135	292
1977	43,338	8,916	6,211	2,704	2,704	NA	28,863	19,340	9,523	NA	NA	NA	4,346	2,893	394	155	569	337	1,213	740	147	326
1978	48,719	10,148	6,962	3,186	3,186	NA	32,222	22,115	10,107	NA	NA	NA	4,996	3,329	443	182	679	364	1,353	830	160	363
1979	55,379	11,038	7,471	3,567	3,567	NA	37,062	25,708	11,354	NA	NA	NA	5,715	3,848	482	215	785	386	1,564	985	174	405
1980	63,224	11,882	7,831	4,052	4,052	NA	43,228	30,476	12,752	NA	NA	NA	6,455	4,335	519	264	920	419	1,658	1,017	189	452
1981	72,292	12,998	8,605	4,393	4,393	NA	50,425	35,428	14,997	NA	NA	NA	7,085	4,670	581	314	1,058	463	1,784	1,075	206	504
1982	80,748	14,065	9,501	4,563	4,563	NA	57,166	40,105	17,061	NA	NA	NA	7,603	4,879	621	363	1,207	534	1,915	1,129	224	561
1983	89,949	15,840	10,830	5,011	5,011	NA	63,683	44,588	19,095	NA	NA	NA	8,251	5,210	658	432	1,357	595	2,175	1,306	244	626
1984	102,244	17,518	11,916	5,602	5,602	NA	73,061	51,404	21,657	NA	NA	NA	9,154	5,748	721	518	1,514	654	2,511	1,548	265	698

CHAPTER 4 | Research and Development: U.S. Trends and International Comparisons

Year	All per-formers	All federal	Federal intramural <sup>a</sup>	FFRDCs <sup>b</sup>		Nonfederal govern-ment <sup>c</sup>	Business <sup>d</sup>							Higher education <sup>e</sup>					Other nonprofit organizations <sup>f</sup>			
	All funding sources	Total	Federal	Total	Federal	Total	Total	Own domestic	Federal	Other domestic business	Foreign business	Other	Total	Federal	Nonfederal govern-ment	Busi-ness	Higher education	ONP	Total	Federal	Busi-ness	ONP
1985	114,671	19,227	13,093	6,134	6,134	NA	82,376	57,043	25,333	NA	NA	NA	10,308	6,388	834	630	1,743	713	2,761	1,694	289	778
1986	120,249	19,909	13,505	6,405	6,405	NA	85,932	59,932	26,000	NA	NA	NA	11,540	7,028	969	745	2,019	780	2,867	1,686	314	867
1987	126,360	20,380	13,588	6,792	6,792	NA	90,160	61,403	28,757	NA	NA	NA	12,807	7,768	1,065	831	2,262	882	3,013	1,704	342	967
1988	133,881	21,555	14,342	7,212	7,212	NA	94,893	66,672	28,221	NA	NA	NA	14,221	8,593	1,165	933	2,527	1,003	3,212	1,762	372	1,078
1989	141,891	22,728	15,231	7,497	7,497	NA	99,860	73,501	26,359	NA	NA	NA	15,634	9,317	1,274	1,061	2,852	1,131	3,669	2,062	405	1,202
1990	151,993	23,524	15,671	7,853	7,853	NA	107,404	81,602	25,802	NA	NA	NA	16,939	9,939	1,399	1,166	3,187	1,249	4,126	2,346	440	1,340
1991	160,876	23,343	15,249	8,093	8,093	NA	114,675	90,580	24,095	NA	NA	NA	18,206	10,667	1,483	1,242	3,458	1,358	4,652	2,679	479	1,494
1992	165,350	24,212	15,853	8,360	8,360	NA	116,757	94,388	22,369	NA	NA	NA	19,388	11,528	1,525	1,320	3,569	1,448	4,993	2,806	521	1,666
1993	165,730	24,534	16,531	8,003	8,003	NA	115,435	94,591	20,844	NA	NA	NA	20,495	12,307	1,557	1,392	3,709	1,531	5,267	2,843	567	1,857
1994	169,207	24,610	16,355	8,254	8,254	NA	117,392	97,131	20,261	NA	NA	NA	21,607	12,996	1,623	1,456	3,938	1,595	5,599	2,911	617	2,071
1995	183,625	25,352	16,904	8,448	8,448	NA	129,830	108,652	21,178	NA	NA	NA	22,617	13,592	1,751	1,548	4,110	1,617	5,827	2,847	671	2,308
1996	197,346	25,049	16,585	8,464	8,464	NA	142,371	121,015	21,356	NA	NA	NA	23,718	14,084	1,861	1,672	4,436	1,666	6,209	2,906	730	2,574
1997	211,894	25,232	16,819	8,413	8,413	NA	155,409	133,611	21,798	NA	NA	NA	24,627	14,317	1,902	1,788	4,852	1,767	6,626	3,014	809	2,804
1998	225,759	25,843	17,362	8,480	8,480	NA	167,102	145,016	22,086	NA	NA	NA	25,583	14,699	1,920	1,898	5,193	1,871	7,232	3,281	859	3,092
1999	244,451	26,846	18,142	8,704	8,704	NA	182,090	161,594	20,496	NA	NA	NA	27,475	15,714	2,036	2,020	5,654	2,050	8,040	3,761	931	3,349
2000	267,950	28,516	19,247	9,269	9,269	NA	199,961	182,844	17,117	NA	NA	NA	29,916	17,095	2,182	2,112	6,270	2,258	9,557	4,510	1,020	4,027
2001	278,539	32,812	22,374	10,438	10,056	NA	202,017	185,118	16,899	NA	NA	NA	32,750	18,976	2,319	2,120	6,874	2,461	10,960	5,488	1,029	4,443
2002	277,911	35,482	23,798	11,684	11,242	NA	193,868	177,467	16,401	NA	NA	NA	36,684	21,655	2,521	2,103	7,673	2,732	11,878	5,778	998	5,102

CHAPTER 4 | Research and Development: U.S. Trends and International Comparisons

Year	All per-formers	All federal	Federal intramural <sup>a</sup>	FFRDCs <sup>b</sup>		Nonfederal govern-ment <sup>c</sup>		Business <sup>d</sup>					Higher education <sup>e</sup>					Other nonprofit organizations <sup>f</sup>				
	All funding sources	Total	Federal	Total	Federal	Total	Total	Own domestic	Federal	Other domestic business	Foreign business	Other	Total	Federal	Nonfederal govern-ment	Busi-ness	Higher education	ONP	Total	Federal	Busi-ness	ONP
2003	291,365	37,235	24,982	12,253	11,841	NA	200,724	182,926	17,798	NA	NA	NA	40,577	24,567	2,756	2,090	8,286	2,879	12,829	5,945	1,020	5,864
2004	302,731	37,685	24,898	12,788	12,471	NA	208,301	188,035	20,266	NA	NA	NA	43,296	26,624	2,896	2,148	8,637	2,993	13,448	6,537	1,041	5,870
2005	325,288	39,568	26,322	13,246	12,894	NA	226,159	204,250	21,909	NA	NA	NA	45,490	27,743	2,945	2,279	9,353	3,170	14,072	6,545	1,107	6,420
2006	350,908	41,610	28,240	13,370	12,969	309	247,669	223,365	24,304	NA	NA	NA	47,369	28,277	3,059	2,464	10,176	3,394	13,952	6,044	1,182	6,726
2007	377,890	44,132	29,859	14,273	13,845	388	269,267	242,682	26,585	NA	NA	NA	49,430	28,725	3,308	2,697	10,933	3,767	14,674	5,980	1,257	7,438
2008	404,773	45,649	29,839	15,810	15,369	491	290,680	225,848	36,360	12,181	15,533	758	52,054	29,635	3,567	2,954	11,738	4,161	15,898	6,236	1,301	8,362
2009	402,931	47,572	30,560	17,013	16,571	606	282,393	221,104	39,573	9,567	11,464	685	54,909	31,741	3,679	3,033	12,056	4,400	17,452	7,097	1,258	9,097
2010	406,580	50,798	31,970	18,828	18,409	691	278,977	218,187	34,199	11,013	14,532	1,046	58,084	34,682	3,673	2,953	12,262	4,515	18,030	7,093	1,265	9,672
2011	426,160	53,524	34,950	18,574	18,176	694	294,092	235,426	31,309	11,124	15,351	882	60,089	35,742	3,615	2,999	13,104	4,630	17,762	6,564	1,333	9,865
2012	433,619	52,144	34,017	18,128	17,727	665	302,251	242,674	30,621	11,624	16,699	633	60,896	34,968	3,560	3,169	14,300	4,899	17,663	6,239	1,366	10,059
2013	453,964	51,086	33,406	17,680	17,296	620	322,528	259,908	29,362	13,450	18,795	1,013	61,546	33,839	3,643	3,375	15,378	5,312	18,185	5,970	1,444	10,770
2014	475,426	52,687	34,783	17,903	17,523	583	340,728	277,272	26,554	13,227	22,544	1,131	62,354	33,121	3,715	3,601	16,217	5,701	19,075	6,135	1,520	11,420
2015 <sup>g</sup>	495,144	54,322	35,673	18,649	18,287	610	355,821	289,892	26,990	14,595	23,102	1,242	64,653	33,546	3,772	3,842	17,334	6,159	19,738	6,189	1,572	11,978
Constant 2009 \$millions																						
1953	34,048	7,562	6,697	864	864	NA	23,952	14,516	9,436	NA	NA	NA	1,798	983	261	135	241	178	736	379	172	185
1954	36,745	7,368	6,293	1,075	1,075	NA	26,608	15,167	11,441	NA	NA	NA	1,968	1,075	291	154	258	190	801	396	203	203
1955	39,748	8,300	6,253	2,047	2,047	NA	28,405	15,809	12,596	NA	NA	NA	2,198	1,227	321	174	270	206	845	415	225	206
1956	52,831	10,513	7,026	3,487	3,487	NA	38,981	20,367	18,614	NA	NA	NA	2,430	1,374	351	196	286	224	907	441	230	236

CHAPTER 4 | Research and Development: U.S. Trends and International Comparisons

Year	All per-formers	All federal	Federal intramural <sup>a</sup>	FFRDCs <sup>b</sup>		Nonfederal govern-ment <sup>c</sup>	Business <sup>d</sup>						Higher education <sup>e</sup>					Other nonprofit organizations <sup>f</sup>				
	All funding sources	Total	Federal	Total	Federal	Total	Total	Own domestic	Federal	Other domestic business	Foreign business	Other	Total	Federal	Nonfederal govern-ment	Busi-ness	Higher education	ONP	Total	Federal	Busi-ness	ONP
1957	59,592	11,936	7,801	4,135	4,135	NA	44,050	20,425	23,625	NA	NA	NA	2,604	1,453	385	220	307	241	1,001	472	223	307
1958	64,206	12,724	8,862	3,862	3,862	NA	47,447	21,353	26,094	NA	NA	NA	2,888	1,647	424	229	326	262	1,147	559	224	365
1959	72,451	14,328	9,751	4,577	4,577	NA	53,369	23,105	30,264	NA	NA	NA	3,399	2,062	467	229	354	287	1,355	722	244	389
1960	78,453	15,509	10,302	5,207	5,207	NA	57,402	25,337	32,065	NA	NA	NA	4,031	2,589	515	229	383	315	1,511	847	275	389
1961	82,428	17,395	11,246	6,149	6,149	NA	58,595	26,419	32,175	NA	NA	NA	4,717	3,150	569	226	422	351	1,721	956	277	487
1962	87,421	18,134	12,230	5,904	5,904	NA	61,708	28,117	33,591	NA	NA	NA	5,549	3,838	626	226	470	389	2,030	1,118	302	609
1963	96,851	20,549	14,144	6,405	6,405	NA	67,534	29,632	37,902	NA	NA	NA	6,512	4,636	691	224	531	431	2,256	1,294	304	658
1964	104,011	23,208	16,146	7,062	7,062	NA	71,048	31,536	39,512	NA	NA	NA	7,484	5,418	749	221	618	479	2,270	1,361	299	610
1965	108,294	23,389	16,878	6,510	6,510	NA	73,855	34,463	39,393	NA	NA	NA	8,526	6,240	799	222	727	537	2,524	1,529	332	663
1966	114,799	23,532	17,205	6,327	6,327	NA	79,020	37,531	41,489	NA	NA	NA	9,456	6,943	832	234	856	590	2,790	1,709	364	718
1967	118,000	24,184	17,412	6,773	6,773	NA	80,695	40,535	40,161	NA	NA	NA	10,285	7,533	849	260	1,008	634	2,835	1,729	374	733
1968	119,577	23,606	16,955	6,651	6,651	NA	82,480	42,995	39,485	NA	NA	NA	10,602	7,689	894	279	1,069	671	2,889	1,765	393	732
1969	120,114	24,166	17,513	6,654	6,654	NA	82,449	45,545	36,904	NA	NA	NA	10,535	7,501	961	280	1,077	716	2,964	1,790	430	744
1970	115,302	24,504	18,231	6,274	6,274	NA	77,218	45,153	32,065	NA	NA	NA	10,610	7,397	1,040	287	1,135	750	2,969	1,797	417	755
1971	112,571	24,431	18,414	6,017	6,017	NA	74,467	44,499	29,968	NA	NA	NA	10,713	7,349	1,094	301	1,209	760	2,959	1,781	409	769
1972	115,066	24,857	18,720	6,138	6,138	NA	76,086	46,182	29,903	NA	NA	NA	11,038	7,567	1,129	316	1,247	779	3,085	1,888	404	793
1973	117,527	24,349	18,365	5,984	5,984	NA	78,614	49,757	28,858	NA	NA	NA	11,215	7,626	1,143	342	1,306	797	3,349	2,149	399	801
1974	116,224	24,097	17,881	6,215	6,215	NA	77,480	51,100	26,381	NA	NA	NA	11,205	7,525	1,113	364	1,371	831	3,442	2,225	398	820

CHAPTER 4 | Research and Development: U.S. Trends and International Comparisons

Year	All per-formers	All federal	Federal intramural <sup>a</sup>	FFRDCs <sup>b</sup>		Nonfederal govern-ment <sup>c</sup>	Business <sup>d</sup>							Higher education <sup>e</sup>					Other nonprofit organizations <sup>f</sup>			
	All funding sources	Total	Federal	Total	Federal	Total	Total	Own domestic	Federal	Other domestic business	Foreign business	Other	Total	Federal	Nonfederal govern-ment	Busi-ness	Higher education	ONP	Total	Federal	Busi-ness	ONP
1975	113,745	24,171	17,733	6,438	6,438	NA	74,807	49,686	25,121	NA	NA	NA	11,382	7,653	1,110	376	1,376	867	3,385	2,152	396	836
1976	119,199	25,060	17,804	7,256	7,256	NA	78,913	52,704	26,210	NA	NA	NA	11,784	7,916	1,115	396	1,451	905	3,442	2,149	409	884
1977	123,345	25,375	17,678	7,697	7,697	NA	82,147	55,044	27,104	NA	NA	NA	12,369	8,232	1,121	440	1,618	958	3,453	2,107	419	928
1978	129,565	26,988	18,515	8,473	8,473	NA	85,692	58,813	26,879	NA	NA	NA	13,285	8,852	1,178	483	1,806	967	3,600	2,207	426	967
1979	136,047	27,117	18,354	8,762	8,762	NA	91,049	63,156	27,893	NA	NA	NA	14,039	9,453	1,183	527	1,928	947	3,843	2,420	428	995
1980	142,470	26,776	17,646	9,130	9,130	NA	97,411	68,675	28,736	NA	NA	NA	14,546	9,767	1,168	594	2,072	944	3,737	2,292	427	1,018
1981	148,990	26,788	17,733	9,054	9,054	NA	103,923	73,015	30,908	NA	NA	NA	14,602	9,624	1,197	647	2,179	954	3,677	2,214	425	1,038
1982	156,699	27,294	18,438	8,855	8,855	NA	110,936	77,828	33,109	NA	NA	NA	14,753	9,467	1,205	704	2,341	1,035	3,716	2,191	435	1,090
1983	167,927	29,572	20,218	9,354	9,354	NA	118,890	83,242	35,649	NA	NA	NA	15,404	9,727	1,228	807	2,532	1,110	4,061	2,437	456	1,169
1984	184,335	31,583	21,483	10,101	10,101	NA	131,722	92,677	39,046	NA	NA	NA	16,503	10,362	1,300	933	2,730	1,178	4,527	2,790	479	1,258
1985	200,332	33,589	22,873	10,716	10,716	NA	143,913	99,656	44,257	NA	NA	NA	18,007	11,160	1,456	1,101	3,045	1,246	4,823	2,959	505	1,359
1986	205,920	34,094	23,126	10,968	10,968	NA	147,154	102,631	44,524	NA	NA	NA	19,762	12,034	1,659	1,276	3,457	1,336	4,910	2,887	538	1,485
1987	211,005	34,032	22,691	11,341	11,341	NA	150,555	102,535	48,020	NA	NA	NA	21,386	12,972	1,778	1,388	3,777	1,472	5,032	2,846	571	1,615
1988	216,002	34,776	23,139	11,637	11,637	NA	153,100	107,568	45,532	NA	NA	NA	22,944	13,864	1,880	1,505	4,077	1,618	5,183	2,843	600	1,740
1989	220,356	35,297	23,653	11,643	11,643	NA	155,082	114,147	40,935	NA	NA	NA	24,280	14,469	1,979	1,647	4,429	1,756	5,698	3,202	628	1,867
1990	227,623	35,229	23,469	11,760	11,760	NA	160,847	122,206	38,641	NA	NA	NA	25,368	14,885	2,095	1,745	4,772	1,870	6,179	3,513	659	2,007
1991	233,168	33,832	22,102	11,730	11,730	NA	166,206	131,284	34,923	NA	NA	NA	26,387	15,460	2,149	1,799	5,011	1,968	6,743	3,883	694	2,166
1992	234,312	34,311	22,465	11,846	11,846	NA	165,452	133,754	31,698	NA	NA	NA	27,474	16,335	2,161	1,870	5,057	2,051	7,075	3,976	738	2,361

CHAPTER 4 | Research and Development: U.S. Trends and International Comparisons

Year	All per-formers	All federal	Federal intramural <sup>a</sup>	FFRDCs <sup>b</sup>		Nonfederal govern-ment <sup>c</sup>	Business <sup>d</sup>							Higher education <sup>e</sup>					Other nonprofit organizations <sup>f</sup>			
	All funding sources	Total	Federal	Total	Federal	Total	Total	Own domestic	Federal	Other domestic business	Foreign business	Other	Total	Federal	Nonfederal govern-ment	Busi-ness	Higher education	ONP	Total	Federal	Busi-ness	ONP
1993	229,392	33,958	22,880	11,077	11,077	NA	159,777	130,926	28,851	NA	NA	NA	28,367	17,034	2,155	1,926	5,133	2,118	7,291	3,935	785	2,571
1994	229,321	33,353	22,166	11,187	11,187	NA	159,098	131,639	27,459	NA	NA	NA	29,283	17,612	2,199	1,973	5,337	2,161	7,588	3,945	836	2,806
1995	243,780	33,657	22,441	11,215	11,215	NA	172,361	144,246	28,116	NA	NA	NA	30,026	18,045	2,325	2,054	5,456	2,146	7,736	3,780	891	3,065
1996	257,299	32,658	21,623	11,035	11,035	NA	185,623	157,779	27,844	NA	NA	NA	30,923	18,363	2,426	2,179	5,783	2,171	8,096	3,788	952	3,355
1997	271,619	32,344	21,560	10,785	10,785	NA	199,213	171,271	27,942	NA	NA	NA	31,568	18,353	2,438	2,293	6,219	2,265	8,494	3,864	1,037	3,594
1998	286,282	32,771	22,017	10,754	10,754	NA	211,900	183,893	28,007	NA	NA	NA	32,441	18,640	2,435	2,407	6,585	2,373	9,170	4,160	1,089	3,921
1999	305,315	33,530	22,659	10,871	10,871	NA	227,427	201,828	25,599	NA	NA	NA	34,315	19,627	2,544	2,524	7,061	2,560	10,042	4,697	1,162	4,183
2000	327,218	34,823	23,504	11,319	11,319	NA	244,190	223,287	20,903	NA	NA	NA	36,533	20,876	2,665	2,579	7,656	2,757	11,671	5,508	1,245	4,918
2001	332,570	39,177	26,715	12,462	12,006	NA	241,204	221,027	20,177	NA	NA	NA	39,103	22,657	2,769	2,531	8,207	2,939	13,086	6,552	1,229	5,305
2002	326,805	41,724	27,984	13,740	13,219	NA	227,976	208,689	19,286	NA	NA	NA	43,138	25,464	2,965	2,473	9,023	3,213	13,967	6,794	1,174	5,999
2003	335,926	42,930	28,803	14,127	13,652	NA	231,422	210,902	20,520	NA	NA	NA	46,782	28,324	3,177	2,410	9,553	3,319	14,791	6,854	1,176	6,761
2004	339,690	42,286	27,937	14,349	13,993	NA	233,732	210,992	22,740	NA	NA	NA	48,582	29,874	3,249	2,410	9,691	3,358	15,090	7,335	1,168	6,587
2005	353,622	43,014	28,615	14,399	14,017	NA	245,858	222,041	23,817	NA	NA	NA	49,452	30,159	3,202	2,477	10,167	3,446	15,297	7,115	1,203	6,980
2006	370,102	43,886	29,784	14,101	13,678	325	261,216	235,583	25,633	NA	NA	NA	49,960	29,823	3,227	2,598	10,732	3,579	14,715	6,374	1,247	7,094
2007	388,229	45,339	30,676	14,663	14,224	399	276,634	249,322	27,312	NA	NA	NA	50,782	29,511	3,399	2,771	11,232	3,870	15,075	6,143	1,291	7,641
2008	407,848	45,995	30,066	15,930	15,485	495	292,888	227,564	36,636	12,274	15,651	764	52,450	29,860	3,594	2,976	11,827	4,193	16,019	6,283	1,310	8,426
2009	402,931	47,572	30,560	17,013	16,571	606	282,393	221,104	39,573	9,567	11,464	685	54,909	31,741	3,679	3,033	12,056	4,400	17,452	7,097	1,258	9,097
2010	401,673	50,185	31,584	18,601	18,187	683	275,610	215,554	33,786	10,880	14,357	1,033	57,383	34,263	3,629	2,917	12,114	4,460	17,812	7,008	1,250	9,555

CHAPTER 4 | Research and Development: U.S. Trends and International Comparisons

Year	All per-formers	All federal	Federal intramural <sup>a</sup>	FFRDCs <sup>b</sup>		Nonfederal govern-ment <sup>c</sup>	Business <sup>d</sup>						Higher education <sup>e</sup>					Other nonprofit organizations <sup>f</sup>				
	All funding sources	Total	Federal	Total	Federal	Total	Total	Own domestic	Federal	Other domestic business	Foreign business	Other	Total	Federal	Nonfederal govern-ment	Busi-ness	Higher education	ONP	Total	Federal	Busi-ness	ONP
2011	412,503	51,809	33,830	17,978	17,593	672	284,667	227,881	30,306	10,768	14,859	854	58,163	34,597	3,499	2,902	12,684	4,482	17,193	6,354	1,290	9,549
2012	412,127	49,560	32,331	17,229	16,849	632	287,271	230,646	29,103	11,048	15,871	602	57,877	33,234	3,384	3,012	13,591	4,656	16,788	5,930	1,298	9,560
2013	424,610	47,783	31,246	16,537	16,178	580	301,673	243,102	27,463	12,580	17,580	947	57,566	31,650	3,407	3,156	14,383	4,969	17,009	5,584	1,351	10,074
2014	436,844	48,411	31,961	16,451	16,101	536	313,077	254,771	24,399	12,154	20,714	1,039	57,293	30,433	3,413	3,309	14,901	5,238	17,527	5,637	1,397	10,493
2015 <sup>g</sup>	450,080	49,378	32,427	16,951	16,622	555	323,437	263,508	24,534	13,267	20,999	1,129	58,768	30,493	3,429	3,492	15,756	5,598	17,942	5,625	1,429	10,888

NA = not available.

FFRDC = federally funded research and development center; HE = higher education; ONP = other nonprofit organization.

<sup>a</sup> Includes expenditures for federal intramural R&D as well as costs associated with administering extramural R&D.

<sup>b</sup> The R&D expenditures of FFRDCs are chiefly federally funded; the small remainder (\$362 million of the \$18.6 billion total in 2015) reflects funding from state or local government, businesses, other nonprofit organizations, and other sources (see Appendix Table 4-6 for further detail on this nonfederal funding). Before 2001, the data did not distinguish federal and nonfederal funding for FFRDC R&D and are reported as all federal funding. In 1953–54, federal funding for business R&D did not separate out industry-administered FFRDCs, and the data for federal funding to business for these years includes the funding to these FFRDCs. Also in 1953–54, federal funding for other nonprofit organizations did not separate out nonprofit-administered FFRDCs, and the data for federal funding to other nonprofit organizations for these years include the funding to these FFRDCs.

<sup>c</sup> State intramural R&D performance includes state agency and department employees and also services performed by others in support of internal R&D projects. Includes funding from both federal and nonfederal government sources (see Appendix Table 4-6 for further detail). Data on state government intramural R&D became available starting in 2006.

<sup>d</sup> R&D performed in the domestic United States by all companies with five or more employees, publicly or privately held. In 2008 and later years, the data on business R&D come from the National Science Foundation's (NSF's) annual Business R&D and Innovation Survey (BRDIS). BRDIS distinguishes R&D performed and paid for by the company from R&D performed by the company but paid for by one or more others (i.e., the federal government, state or local government, domestic companies, foreign companies, foreign governments, other organizations inside or outside the United States). Before 2008, the data distinguished only federally and nonfederally funded business R&D; for these years, the own funding data column includes all nonfederal sources of funding. Business R&D performance in the United States paid for by foreign business includes funding from parent or unaffiliated businesses outside the United States (\$16.3 billion in 2015) and funding from U.S. businesses' foreign subsidiaries (\$6.8 billion in 2015). Business R&D performance funded by other sources includes U.S. state government, foreign government, and all other sources in the United States and abroad.

<sup>e</sup> Before 2003, higher education R&D covered only S&E fields; in 2003 and later years, R&D in non-S&E fields is also included. (Non-S&E R&D was \$1.4 billion in 2003 and \$3.7 billion in 2015.) In 1998 and later years, the higher education R&D data have been adjusted to eliminate double counting of R&D funds passed through from academic institutions to other academic and nonacademic (businesses, nonprofit organizations, others) subrecipients. (In FY 1998, the total of pass-through funds reported was \$994 million, with \$479 million to other academic recipients and \$337 million nonacademic recipients. In FY 2015, total pass-through was \$5.640 billion, with \$3.107 billion to other academic recipients and \$2.537 billion to nonacademic recipients.) The nonfederal government funding category includes support from state and local government. The other nonprofit funding category includes support from nonprofit organizations and other sources not elsewhere classified (in 2015, \$4.139 billion was from nonprofit organizations, and \$2.020 billion was from these unclassified other sources).

<sup>f</sup> The data on other nonprofit R&D funded by the federal government come from NSF's annual Federal Funds for R&D survey. The other nonprofit R&D funded by nonfederal government is included in the ONP category. The 1998–2015 data for other components funded by businesses and by the nonprofit sector itself are estimated, based on parameters from the 1996–97 Survey of R&D Funding and Performance by Nonprofit Organizations.

<sup>g</sup> Some data for 2015 are preliminary and may later be revised.

**Note(s)**

CHAPTER 4 | Research and Development: U.S. Trends and International Comparisons

Detail may not add to total because of rounding. Constant-dollar estimates are derived from unrounded data. For trend comparisons, use only the historical data reported in this table because some back-year data may have been revised. Except for the nonprofit sector, data are based on annual reports by performers in NSF's annual R&D expenditure surveys: Business R&D and Innovation Survey, Higher Education R&D Survey, Survey of Federal Funds for R&D, FFRDC R&D Expenditures Survey, Survey of State Government R&D. R&D expenditures by business performers—and, before 2001, also industry-administered FFRDCs—are collected on a calendar year basis. Expenditures for other performers are calendar year approximations based on fiscal year data. For federal performers in 1977 and afterwards, the approximation equals 75% of the amount reported in the same fiscal year plus 25% of the amount reported in the subsequent fiscal year. Prior to 1977, the federal fiscal year began on 1 July, not 1 October, and the approximation is 50% of the amount reported in the same fiscal year plus 50% of the amount reported in the subsequent fiscal year. The fiscal year for higher education performers and state government performers generally begins 1 July, and the calendar year approximation is 50% of the amount reported in the same fiscal year plus 50% of the amount reported in the subsequent fiscal year.

Source(s)

National Science Foundation, National Center for Science and Engineering Statistics, National Patterns of R&D Resources (annual series).

*Science and Engineering Indicators 2018*



CHAPTER 4 | Research and Development: U.S. Trends and International Comparisons

APPENDIX TABLE 4-3

U.S. basic research expenditures, by performing sector and source of funds: 1953–2015

(Millions of current and of constant 2009 dollars)

Year	All per-formers	All federal	Federal intramural <sup>a</sup>	FFRDCs <sup>b</sup>		Nonfederal govern-ment <sup>c</sup>	Business <sup>d</sup>						Higher education <sup>e</sup>					Other nonprofit organizations <sup>f</sup>				
	All funding sources	Total	Federal	Total	Federal	Total	Total	Own domestic	Federal	Other domestic business	Foreign business	Other	Total	Federal	Nonfederal government	Busi-ness	Higher ed-ucation	ONP	Total	Federal	Busi-ness	ONP
Current \$millions																						
1953	460	138	102	36	36	NA	151	132	19	NA	NA	NA	123	82	7	13	6	16	48	27	9	12
1954	509	141	96	45	45	NA	166	143	23	NA	NA	NA	148	97	10	15	8	18	55	31	11	13
1955	570	160	98	62	62	NA	169	162	7	NA	NA	NA	180	117	14	17	12	21	62	35	13	14
1956	718	203	114	89	89	NA	223	216	7	NA	NA	NA	220	143	19	20	15	24	73	41	15	17
1957	813	234	124	110	110	NA	234	230	4	NA	NA	NA	261	167	25	23	20	27	86	48	15	23
1958	943	264	149	115	115	NA	266	252	14	NA	NA	NA	312	202	31	24	24	31	102	58	16	28
1959	1,087	298	165	134	134	NA	282	248	34	NA	NA	NA	388	263	38	24	28	36	119	71	18	30
1960	1,286	334	184	150	150	NA	333	297	36	NA	NA	NA	485	341	45	25	33	41	135	84	21	30
1961	1,511	407	230	177	177	NA	344	314	30	NA	NA	NA	598	432	54	25	40	48	163	104	22	37
1962	1,824	441	252	189	189	NA	449	345	104	NA	NA	NA	737	546	64	25	48	55	198	128	24	46
1963	2,115	501	285	216	216	NA	484	375	109	NA	NA	NA	909	689	75	25	58	63	222	147	25	50
1964	2,396	584	339	245	245	NA	507	384	123	NA	NA	NA	1,071	824	84	25	70	68	235	163	25	47
1965	2,664	625	375	250	250	NA	563	406	157	NA	NA	NA	1,221	944	94	27	86	70	256	175	29	52
1966	2,930	683	410	273	273	NA	593	451	142	NA	NA	NA	1,380	1,066	104	29	106	75	274	184	32	58

CHAPTER 4 | Research and Development: U.S. Trends and International Comparisons

Year	All per-formers	All federal	Federal intramural <sup>a</sup>	FFRDCs <sup>b</sup>		Nonfederal govern-ment <sup>c</sup>	Business <sup>d</sup>						Higher education <sup>e</sup>						Other nonprofit organizations <sup>f</sup>			
	All funding sources	Total	Federal	Total	Federal	Total	Total	Own domestic	Federal	Other domestic business	Foreign business	Other	Total	Federal	Nonfederal government	Busi-ness	Higher ed-ucation	ONP	Total	Federal	Busi-ness	ONP
1967	3,168	735	434	301	301	NA	595	427	168	NA	NA	NA	1,554	1,188	114	34	136	83	285	190	34	61
1968	3,376	797	482	315	315	NA	607	462	145	NA	NA	NA	1,681	1,265	131	38	156	91	292	192	37	63
1969	3,491	858	545	313	313	NA	581	458	123	NA	NA	NA	1,754	1,288	153	40	171	103	298	188	43	67
1970	3,594	866	562	304	304	NA	566	444	122	NA	NA	NA	1,855	1,323	179	43	196	115	307	191	44	72
1971	3,720	870	581	289	289	NA	557	456	101	NA	NA	NA	1,968	1,385	194	50	214	127	326	204	45	77
1972	3,850	915	603	313	313	NA	554	463	91	NA	NA	NA	2,038	1,437	195	55	216	134	344	213	47	84
1973	4,099	1,034	652	382	382	NA	595	499	96	NA	NA	NA	2,103	1,489	196	59	223	137	368	229	49	90
1974	4,511	1,182	715	467	467	NA	650	536	114	NA	NA	NA	2,282	1,609	204	66	250	153	397	242	54	102
1975	4,875	1,292	760	533	533	NA	677	573	104	NA	NA	NA	2,480	1,768	212	72	264	164	426	251	59	116
1976	5,373	1,479	850	629	629	NA	750	634	116	NA	NA	NA	2,675	1,924	218	75	283	175	470	274	65	131
1977	6,008	1,689	943	746	746	NA	836	701	135	NA	NA	NA	2,967	2,114	232	89	334	198	517	297	72	148
1978	6,959	2,049	1,044	1,005	1,005	NA	941	785	156	NA	NA	NA	3,376	2,399	260	107	398	213	593	346	79	168
1979	7,836	2,272	1,112	1,160	1,160	NA	1,054	893	161	NA	NA	NA	3,828	2,719	286	128	466	229	683	406	87	190
1980	8,747	2,506	1,212	1,294	1,294	NA	1,205	1,035	170	NA	NA	NA	4,315	3,061	307	156	544	248	721	411	95	215
1981	9,658	2,773	1,343	1,430	1,430	NA	1,477	1,313	164	NA	NA	NA	4,737	3,331	338	183	615	269	671	324	105	243
1982	10,651	3,025	1,522	1,503	1,503	NA	1,776	1,523	253	NA	NA	NA	5,091	3,475	368	215	716	317	759	369	115	275
1983	11,880	3,393	1,733	1,661	1,661	NA	2,106	1,760	346	NA	NA	NA	5,518	3,689	396	260	816	358	863	426	127	311
1984	13,332	3,731	1,877	1,854	1,854	NA	2,472	2,132	340	NA	NA	NA	6,145	4,087	436	313	915	395	984	494	139	351

CHAPTER 4 | Research and Development: U.S. Trends and International Comparisons

Year	All per-formers	All federal	Federal intramural <sup>a</sup>	FFRDCs <sup>b</sup>		Nonfederal govern-ment <sup>c</sup>	Business <sup>d</sup>						Higher education <sup>e</sup>					Other nonprofit organizations <sup>f</sup>				
	All funding sources	Total	Federal	Total	Federal	Total	Total	Own domestic	Federal	Other domestic business	Foreign business	Other	Total	Federal	Nonfederal government	Busi-ness	Higher ed-ucation	ONP	Total	Federal	Busi-ness	ONP
1985	14,748	3,884	1,947	1,936	1,936	NA	2,731	2,373	358	NA	NA	NA	7,024	4,606	514	389	1,075	440	1,110	560	153	397
1986	17,154	4,071	2,026	2,045	2,045	NA	3,930	3,496	434	NA	NA	NA	7,943	5,122	606	466	1,262	488	1,210	594	168	449
1987	18,481	4,290	2,047	2,242	2,242	NA	4,181	3,583	598	NA	NA	NA	8,644	5,527	659	514	1,399	545	1,367	675	185	507
1988	19,787	4,749	2,116	2,633	2,633	NA	4,163	3,507	656	NA	NA	NA	9,344	5,937	705	565	1,530	607	1,531	756	203	573
1989	21,891	5,124	2,309	2,815	2,815	NA	4,818	3,832	986	NA	NA	NA	10,219	6,422	766	637	1,714	680	1,730	860	223	647
1990	23,029	5,352	2,319	3,033	3,033	NA	4,629	3,760	869	NA	NA	NA	11,126	6,889	847	705	1,929	756	1,922	947	245	730
1991	27,140	5,573	2,378	3,195	3,195	NA	7,376	6,125	1,251	NA	NA	NA	12,062	7,423	912	764	2,127	836	2,129	1,036	269	825
1992	27,604	5,826	2,419	3,408	3,408	NA	6,528	5,816	712	NA	NA	NA	12,910	8,058	941	814	2,203	893	2,340	1,114	295	931
1993	28,743	6,138	2,621	3,517	3,517	NA	6,427	5,961	466	NA	NA	NA	13,646	8,638	952	851	2,268	936	2,532	1,157	324	1,051
1994	29,651	6,058	2,547	3,512	3,512	NA	6,514	6,078	436	NA	NA	NA	14,401	9,139	992	890	2,406	974	2,678	1,137	356	1,186
1995	29,610	5,996	2,689	3,307	3,307	NA	5,569	5,379	190	NA	NA	NA	15,147	9,634	1,070	945	2,511	987	2,899	1,170	390	1,338
1996	32,799	6,073	2,680	3,393	3,393	NA	7,498	6,848	650	NA	NA	NA	16,042	10,092	1,149	1,032	2,740	1,028	3,187	1,248	428	1,510
1997	36,717	6,150	2,746	3,404	3,404	NA	9,795	8,766	1,029	NA	NA	NA	17,449	10,758	1,233	1,161	3,150	1,147	3,322	1,317	449	1,557
1998	34,842	6,444	3,003	3,441	3,441	NA	5,853	4,851	1,002	NA	NA	NA	18,891	11,567	1,292	1,278	3,495	1,259	3,654	1,461	477	1,717
1999	38,282	7,066	3,347	3,719	3,719	NA	6,645	5,537	1,108	NA	NA	NA	20,462	12,456	1,386	1,375	3,848	1,396	4,110	1,734	517	1,860
2000	42,033	7,801	3,765	4,037	4,037	NA	7,040	6,115	925	NA	NA	NA	22,290	13,469	1,501	1,453	4,314	1,553	4,902	2,099	566	2,236
2001	46,843	8,832	4,260	4,571	4,404	NA	8,053	7,299	754	NA	NA	NA	24,455	14,919	1,606	1,467	4,759	1,704	5,503	2,464	571	2,467
2002	50,789	9,737	4,511	5,227	5,029	NA	7,547	6,659	888	NA	NA	NA	27,543	17,139	1,745	1,456	5,311	1,891	5,962	2,575	554	2,833

CHAPTER 4 | Research and Development: U.S. Trends and International Comparisons

Year	All per-formers	All federal	Federal intramural <sup>a</sup>	FFRDCs <sup>b</sup>		Nonfederal govern-ment <sup>c</sup>		Business <sup>d</sup>					Higher education <sup>e</sup>					Other nonprofit organizations <sup>f</sup>				
	All funding sources	Total	Federal	Total	Federal	Total	Total	Own domestic	Federal	Other domestic business	Foreign business	Other	Total	Federal	Nonfederal government	Busi-ness	Higher ed-ucation	ONP	Total	Federal	Busi-ness	ONP
2003	54,823	9,739	4,664	5,075	4,904	NA	8,330	6,944	1,386	NA	NA	NA	30,217	19,220	1,893	1,436	5,692	1,978	6,537	2,714	567	3,256
2004	56,379	9,672	4,697	4,976	4,852	NA	7,835	6,763	1,072	NA	NA	NA	32,246	20,730	2,000	1,483	5,965	2,067	6,626	2,788	578	3,259
2005	59,904	9,907	4,770	5,136	5,000	NA	8,667	7,559	1,108	NA	NA	NA	34,248	21,786	2,068	1,600	6,568	2,226	7,082	2,903	614	3,565
2006	61,566	9,953	4,716	5,238	5,080	44	8,384	6,940	1,444	NA	NA	NA	35,944	22,270	2,191	1,765	7,288	2,431	7,240	2,849	656	3,735
2007	64,600	8,053	4,621	3,432	3,298	55	11,268	8,488	2,780	NA	NA	NA	37,568	22,546	2,400	1,956	7,932	2,733	7,656	2,829	698	4,130
2008	68,536	8,533	4,957	3,576	3,432	70	12,369	9,741	1,475	484	639	30	39,127	22,954	2,573	2,131	8,467	3,002	8,439	3,073	722	4,643
2009	72,659	10,012	5,441	4,571	4,432	86	14,784	11,999	1,340	662	736	47	38,529	22,909	2,444	1,980	8,199	2,997	9,248	3,498	698	5,051
2010	75,907	11,748	5,111	6,637	6,475	98	16,371	13,239	1,406	722	935	68	38,203	23,412	2,251	1,750	7,882	2,910	9,487	3,414	702	5,370
2011	73,019	11,522	5,047	6,475	6,333	98	13,020	10,585	677	745	954	59	39,080	23,787	2,219	1,767	8,348	2,960	9,298	3,081	740	5,477
2012	73,284	11,150	5,489	5,661	5,530	94	13,294	10,955	644	710	946	39	39,311	23,111	2,176	1,828	9,083	3,113	9,436	3,092	758	5,585
2013	78,485	9,519	5,330	4,188	4,085	88	19,508	14,986	1,196	1,446	1,771	109	39,558	22,313	2,188	1,939	9,765	3,354	9,813	3,031	802	5,980
2014	82,061	9,875	5,705	4,170	4,077	97	21,936	15,805	2,044	1,584	2,367	135	39,878	21,813	2,228	2,057	10,220	3,562	10,275	3,090	844	6,341
2015 <sup>g</sup>	83,462	10,053	5,926	4,127	4,043	100	21,792	15,933	2,038	1,565	2,123	133	40,983	21,888	2,277	2,176	10,880	3,763	10,534	3,010	873	6,651
Constant 2009 \$millions																						
1953	3,032	907	670	238	238	NA	996	871	125	NA	NA	NA	812	538	43	86	40	106	317	178	59	79
1954	3,324	919	628	291	291	NA	1,085	935	150	NA	NA	NA	964	631	62	98	55	118	356	199	72	85
1955	3,663	1,025	627	398	398	NA	1,086	1,041	45	NA	NA	NA	1,154	749	89	109	75	132	398	225	84	90
1956	4,461	1,259	705	553	553	NA	1,384	1,342	42	NA	NA	NA	1,367	886	118	121	96	146	451	252	93	106

CHAPTER 4 | Research and Development: U.S. Trends and International Comparisons

Year	All per-formers	All federal	Federal intramural <sup>a</sup>	FFRDCs <sup>b</sup>		Nonfederal govern-ment <sup>c</sup>	Business <sup>d</sup>						Higher education <sup>e</sup>					Other nonprofit organizations <sup>f</sup>				
	All funding sources	Total	Federal	Total	Federal	Total	Total	Own domestic	Federal	Other domestic business	Foreign business	Other	Total	Federal	Nonfederal government	Busi-ness	Higher ed-ucation	ONP	Total	Federal	Busi-ness	ONP
1957	4,893	1,404	746	659	659	NA	1,407	1,383	24	NA	NA	NA	1,567	1,001	149	135	119	162	514	286	90	138
1958	5,548	1,553	876	676	676	NA	1,562	1,482	80	NA	NA	NA	1,835	1,188	183	141	141	182	597	338	94	165
1959	6,305	1,729	954	774	774	NA	1,636	1,439	197	NA	NA	NA	2,251	1,523	218	139	165	206	690	412	104	174
1960	7,356	1,908	1,050	858	858	NA	1,903	1,699	204	NA	NA	NA	2,772	1,948	258	140	192	235	772	481	120	172
1961	8,552	2,301	1,299	1,002	1,002	NA	1,950	1,777	173	NA	NA	NA	3,382	2,442	304	141	225	269	920	586	125	209
1962	10,199	2,466	1,409	1,057	1,057	NA	2,512	1,929	583	NA	NA	NA	4,118	3,050	356	140	267	305	1,104	713	134	257
1963	11,694	2,767	1,573	1,194	1,194	NA	2,678	2,073	604	NA	NA	NA	5,022	3,809	414	135	318	346	1,227	813	138	276
1964	13,046	3,180	1,846	1,334	1,334	NA	2,760	2,091	670	NA	NA	NA	5,829	4,484	459	136	379	370	1,277	885	136	256
1965	14,245	3,339	2,003	1,337	1,337	NA	3,010	2,171	840	NA	NA	NA	6,526	5,045	505	142	460	374	1,369	936	155	278
1966	15,239	3,552	2,132	1,420	1,420	NA	3,084	2,346	739	NA	NA	NA	7,178	5,544	539	151	554	390	1,425	957	166	302
1967	16,009	3,712	2,191	1,521	1,521	NA	3,007	2,158	849	NA	NA	NA	7,852	6,002	575	169	686	419	1,438	958	172	308
1968	16,366	3,861	2,337	1,525	1,525	NA	2,943	2,240	703	NA	NA	NA	8,147	6,132	634	182	757	441	1,416	931	179	305
1969	16,129	3,965	2,519	1,446	1,446	NA	2,685	2,116	568	NA	NA	NA	8,102	5,949	706	183	791	474	1,377	869	199	310
1970	15,773	3,801	2,466	1,334	1,334	NA	2,484	1,949	535	NA	NA	NA	8,141	5,804	787	189	859	503	1,347	838	193	316
1971	15,538	3,632	2,427	1,205	1,205	NA	2,326	1,905	422	NA	NA	NA	8,220	5,783	809	207	893	528	1,360	850	188	322
1972	15,414	3,663	2,412	1,251	1,251	NA	2,218	1,854	364	NA	NA	NA	8,157	5,753	782	220	865	536	1,375	851	188	336
1973	15,566	3,926	2,476	1,450	1,450	NA	2,259	1,895	365	NA	NA	NA	7,985	5,652	746	222	847	518	1,395	868	186	342
1974	15,715	4,117	2,490	1,627	1,627	NA	2,265	1,867	397	NA	NA	NA	7,949	5,606	710	230	871	531	1,384	841	188	355

CHAPTER 4 | Research and Development: U.S. Trends and International Comparisons

Year	All per-formers	All federal	Federal intramural <sup>a</sup>	FFRDCs <sup>b</sup>		Nonfederal govern-ment <sup>c</sup>	Business <sup>d</sup>						Higher education <sup>e</sup>					Other nonprofit organizations <sup>f</sup>				
	All funding sources	Total	Federal	Total	Federal	Total	Total	Own domestic	Federal	Other domestic business	Foreign business	Other	Total	Federal	Nonfederal government	Busi-ness	Higher ed-ucation	ONP	Total	Federal	Busi-ness	ONP
1975	15,544	4,121	2,423	1,698	1,698	NA	2,159	1,827	332	NA	NA	NA	7,906	5,638	677	228	840	523	1,358	800	189	368
1976	16,241	4,471	2,569	1,901	1,901	NA	2,267	1,916	351	NA	NA	NA	8,084	5,816	658	227	856	527	1,419	827	197	395
1977	17,100	4,807	2,684	2,123	2,123	NA	2,379	1,995	384	NA	NA	NA	8,443	6,017	660	253	951	562	1,471	845	204	422
1978	18,506	5,450	2,777	2,673	2,673	NA	2,503	2,088	415	NA	NA	NA	8,978	6,380	691	283	1,059	565	1,576	920	210	446
1979	19,252	5,582	2,733	2,849	2,849	NA	2,589	2,194	396	NA	NA	NA	9,403	6,680	702	313	1,145	563	1,677	998	213	466
1980	19,710	5,648	2,732	2,916	2,916	NA	2,715	2,332	383	NA	NA	NA	9,723	6,897	691	351	1,226	559	1,624	925	215	484
1981	19,904	5,714	2,767	2,947	2,947	NA	3,044	2,706	338	NA	NA	NA	9,762	6,865	697	377	1,268	555	1,384	667	216	501
1982	20,668	5,869	2,953	2,917	2,917	NA	3,447	2,956	491	NA	NA	NA	9,880	6,743	714	418	1,390	615	1,473	716	224	533
1983	22,179	6,335	3,235	3,100	3,100	NA	3,932	3,286	646	NA	NA	NA	10,302	6,886	739	485	1,524	668	1,611	795	236	580
1984	24,036	6,726	3,383	3,343	3,343	NA	4,457	3,844	613	NA	NA	NA	11,078	7,368	785	564	1,649	712	1,775	891	251	633
1985	25,766	6,785	3,402	3,383	3,383	NA	4,771	4,146	625	NA	NA	NA	12,271	8,046	899	679	1,879	768	1,939	978	267	693
1986	29,375	6,971	3,469	3,503	3,503	NA	6,730	5,987	743	NA	NA	NA	13,601	8,770	1,037	798	2,161	835	2,072	1,016	288	768
1987	30,861	7,163	3,419	3,745	3,745	NA	6,982	5,983	999	NA	NA	NA	14,434	9,229	1,100	858	2,337	910	2,282	1,128	308	846
1988	31,924	7,661	3,414	4,247	4,247	NA	6,717	5,658	1,058	NA	NA	NA	15,075	9,578	1,138	911	2,468	980	2,471	1,220	327	924
1989	33,996	7,958	3,585	4,372	4,372	NA	7,482	5,951	1,531	NA	NA	NA	15,870	9,973	1,189	990	2,662	1,056	2,686	1,336	346	1,004
1990	34,488	8,015	3,473	4,543	4,543	NA	6,932	5,631	1,301	NA	NA	NA	16,662	10,316	1,268	1,056	2,889	1,132	2,878	1,418	366	1,094
1991	39,336	8,077	3,447	4,631	4,631	NA	10,691	8,877	1,813	NA	NA	NA	17,482	10,759	1,322	1,107	3,083	1,211	3,086	1,501	389	1,195
1992	39,116	8,256	3,427	4,829	4,829	NA	9,251	8,242	1,009	NA	NA	NA	18,294	11,419	1,334	1,154	3,121	1,266	3,316	1,579	418	1,319

CHAPTER 4 | Research and Development: U.S. Trends and International Comparisons

Year	All per-formers	All federal	Federal intramural <sup>a</sup>	FFRDCs <sup>b</sup>		Nonfederal govern-ment <sup>c</sup>		Business <sup>d</sup>					Higher education <sup>e</sup>					Other nonprofit organizations <sup>f</sup>				
	All funding sources	Total	Federal	Total	Federal	Total	Total	Own domestic	Federal	Other domestic business	Foreign business	Other	Total	Federal	Nonfederal government	Busi-ness	Higher ed-ucation	ONP	Total	Federal	Busi-ness	ONP
1993	39,783	8,496	3,628	4,868	4,868	NA	8,896	8,251	645	NA	NA	NA	18,888	11,956	1,318	1,178	3,140	1,296	3,504	1,601	448	1,455
1994	40,185	8,211	3,452	4,759	4,759	NA	8,828	8,237	591	NA	NA	NA	19,517	12,385	1,344	1,206	3,261	1,320	3,630	1,541	482	1,607
1995	39,311	7,961	3,570	4,390	4,390	NA	7,393	7,141	252	NA	NA	NA	20,108	12,789	1,420	1,255	3,333	1,311	3,848	1,553	518	1,777
1996	42,763	7,917	3,494	4,424	4,424	NA	9,776	8,928	847	NA	NA	NA	20,915	13,158	1,498	1,346	3,572	1,341	4,155	1,628	559	1,969
1997	47,065	7,883	3,520	4,363	4,363	NA	12,556	11,237	1,319	NA	NA	NA	22,368	13,791	1,581	1,488	4,037	1,471	4,259	1,688	576	1,995
1998	44,183	8,171	3,808	4,363	4,363	NA	7,422	6,151	1,271	NA	NA	NA	23,955	14,668	1,639	1,620	4,432	1,597	4,634	1,852	605	2,177
1999	47,814	8,825	4,180	4,645	4,645	NA	8,299	6,916	1,384	NA	NA	NA	25,556	15,558	1,731	1,718	4,807	1,743	5,133	2,166	645	2,323
2000	51,331	9,527	4,598	4,929	4,929	NA	8,597	7,468	1,130	NA	NA	NA	27,221	16,448	1,833	1,774	5,268	1,897	5,986	2,564	691	2,731
2001	55,929	10,545	5,087	5,458	5,258	NA	9,615	8,715	900	NA	NA	NA	29,199	17,813	1,917	1,752	5,682	2,035	6,570	2,942	682	2,946
2002	59,724	11,451	5,304	6,147	5,914	NA	8,875	7,831	1,044	NA	NA	NA	32,388	20,154	2,052	1,713	6,246	2,224	7,010	3,028	652	3,331
2003	63,208	11,229	5,378	5,851	5,654	NA	9,604	8,006	1,598	NA	NA	NA	34,839	22,159	2,182	1,656	6,562	2,280	7,537	3,130	653	3,754
2004	63,262	10,853	5,270	5,583	5,444	NA	8,792	7,589	1,203	NA	NA	NA	36,183	23,261	2,244	1,665	6,694	2,320	7,435	3,129	649	3,657
2005	65,122	10,770	5,186	5,584	5,435	NA	9,422	8,217	1,205	NA	NA	NA	37,231	23,683	2,248	1,740	7,140	2,420	7,699	3,155	668	3,875
2006	64,933	10,498	4,974	5,524	5,358	46	8,843	7,320	1,523	NA	NA	NA	37,911	23,488	2,311	1,861	7,687	2,564	7,636	3,005	692	3,939
2007	66,368	8,274	4,747	3,526	3,388	56	11,576	8,720	2,856	NA	NA	NA	38,595	23,163	2,466	2,010	8,149	2,808	7,866	2,907	717	4,243
2008	69,057	8,597	4,994	3,603	3,458	70	12,463	9,815	1,486	487	644	30	39,424	23,128	2,593	2,147	8,532	3,024	8,503	3,097	728	4,678
2009	72,659	10,012	5,441	4,571	4,432	86	14,784	11,999	1,340	662	736	47	38,529	22,909	2,444	1,980	8,199	2,997	9,248	3,498	698	5,051
2010	74,991	11,606	5,049	6,557	6,397	97	16,173	13,080	1,389	713	924	68	37,742	23,129	2,223	1,729	7,786	2,874	9,373	3,373	694	5,305

CHAPTER 4 | Research and Development: U.S. Trends and International Comparisons

Year	All per-formers	All federal	Federal intramural <sup>a</sup>		FFRDCs <sup>b</sup>		Nonfederal govern-ment <sup>c</sup>		Business <sup>d</sup>						Higher education <sup>e</sup>					Other nonprofit organizations <sup>f</sup>			
	All funding sources	Total	Federal	Total	Federal	Total	Total	Own domestic	Federal	Other domestic business	Foreign business	Other	Total	Federal	Nonfederal government	Busi-ness	Higher ed-ucation	ONP	Total	Federal	Busi-ness	ONP	
2011	70,679	11,153	4,885	6,268	6,130	95	12,603	10,246	655	721	924	57	37,828	23,025	2,148	1,710	8,080	2,865	9,000	2,982	716	5,302	
2012	69,652	10,597	5,217	5,381	5,256	89	12,635	10,412	612	675	900	37	37,362	21,965	2,068	1,737	8,633	2,959	8,968	2,939	721	5,308	
2013	73,410	8,903	4,986	3,918	3,821	82	18,247	14,017	1,119	1,352	1,656	102	37,000	20,870	2,046	1,813	9,134	3,137	9,179	2,835	750	5,593	
2014	75,401	9,074	5,242	3,832	3,746	89	20,156	14,522	1,878	1,456	2,175	124	36,642	20,042	2,047	1,890	9,390	3,273	9,441	2,839	775	5,826	
2015 <sup>g</sup>	75,866	9,138	5,387	3,751	3,675	91	19,809	14,483	1,853	1,423	1,929	121	37,253	19,896	2,069	1,978	9,890	3,420	9,575	2,736	793	6,046	

NA = not available.

FFRDC = federally funded research and development center; ONP = other nonprofit organization.

<sup>a</sup> See Appendix Table 4-2, footnote a.

<sup>b</sup> Type-of-R&D data for FFRDC R&D in 1953–54 includes the R&D of only university-administered FFRDCs. Starting in 2001, type-of-R&D data distinguish federally funded from nonfederally funded FFRDC R&D. (See also Appendix Table 4-2, footnote b.)

<sup>c</sup> Type-of-R&D data for state intramural R&D are not currently collected by the Survey of State Government R&D. (See also Appendix Table 4-2, footnote c.)

<sup>d</sup> Type-of-R&D data for business R&D in 1998–2007 were revised in response to data quality review considerations and are not directly comparable with the data for 1997 and earlier years. For 2008 and later years, the type-of-R&D splits for other than total, own-funded, and federally funded R&D are estimated. (See also Appendix Table 4-2, footnote d.)

<sup>e</sup> The type-of-R&D estimation procedure for higher education R&D was revised in 1998 and again in 2010; hence, these data are not directly comparable with data reported for earlier years. Type-of-R&D splits for other than total and federally funded are estimated. (See also Appendix Table 4-2, footnote e.)

<sup>f</sup> Type-of-R&D data for R&D by other nonprofit organizations in 1998 and later years are estimated, except for the R&D that is federally funded. (See also Appendix Table 4-2, footnote f.)

<sup>g</sup> Some data for 2015 are preliminary and may later be revised.

Note(s)

Detail may not add to total because of rounding. Constant-dollar estimates are derived from unrounded data. For trend comparisons, use only the historical data reported in this table because some back-year data may have been revised. Except for the nonprofit sector, data are based on annual reports by performers in the National Science Foundation's annual R&D expenditure surveys: Business R&D and Innovation Survey, Higher Education R&D Survey, Survey of Federal Funds for R&D, FFRDC R&D Expenditures Survey, and Survey of State Government R&D. R&D expenditures by business performers—and also, before 2001, industry-administered FFRDCs—are collected on a calendar year basis. Expenditures for other performers are calendar year approximations based on fiscal year data. For federal performers in 1977 and afterward, the approximation equals 75% of the amount reported in the same fiscal year plus 25% of the amount reported in the subsequent fiscal year. Before 1977, the federal fiscal year began on 1 July, not 1 October, and the approximation is 50% of the amount reported in the same fiscal year plus 50% of the amount reported in the subsequent fiscal year. The fiscal year for higher education performers and state government performers generally begins 1 July, and the calendar year approximation is 50% of the amount reported in the same fiscal year plus 50% of the amount reported in the subsequent fiscal year.

Source(s)

National Science Foundation, National Center for Science and Engineering Statistics, National Patterns of R&D Resources (annual series).





CHAPTER 4 | Research and Development: U.S. Trends and International Comparisons

*Science and Engineering Indicators 2018*

CHAPTER 4 | Research and Development: U.S. Trends and International Comparisons

APPENDIX TABLE 4-4

U.S. applied research expenditures, by performing sector and source of funds: 1953–2015

(Millions of current and of constant 2009 dollars)

Year	All per-formers	All federal	Federal intramural <sup>a</sup>	FFRDCs <sup>b</sup>		Nonfederal govern-ment <sup>c</sup>	Business <sup>d</sup>						Higher education <sup>e</sup>					Other nonprofit organizations <sup>f</sup>				
	All funding sources	Total	Federal	Total	Federal	Total	Total	Own domestic	Federal	Other domestic business	Foreign business	Other	Total	Federal	Nonfederal govern-ment	Busi-ness	Higher ed-ucation	ONP	Total	Federal	Busi-ness	ONP
Current \$millions																						
1953	1,289	395	347	48	48	NA	726	438	288	NA	NA	NA	134	59	30	7	28	10	35	14	11	10
1954	1,378	388	330	59	59	NA	814	492	322	NA	NA	NA	137	60	32	8	28	10	40	16	13	11
1955	1,502	419	333	86	86	NA	899	560	339	NA	NA	NA	142	63	32	9	27	11	43	18	14	11
1956	1,929	511	387	125	125	NA	1,224	794	430	NA	NA	NA	146	65	33	10	27	11	48	20	14	14
1957	2,413	595	446	149	149	NA	1,616	992	624	NA	NA	NA	147	63	34	12	27	11	57	23	14	20
1958	2,759	672	516	156	156	NA	1,868	1,137	731	NA	NA	NA	152	66	35	12	27	12	68	29	14	25
1959	2,940	756	577	179	179	NA	1,935	1,178	757	NA	NA	NA	167	78	37	13	28	12	82	40	15	27
1960	3,065	816	615	201	201	NA	1,965	1,196	769	NA	NA	NA	186	93	39	13	29	12	99	54	17	28
1961	3,123	908	668	240	240	NA	1,903	1,165	738	NA	NA	NA	199	104	40	13	30	13	114	62	17	35
1962	3,698	958	709	249	249	NA	2,392	1,438	954	NA	NA	NA	216	119	41	14	30	13	132	68	19	45
1963	3,864	1,084	809	275	275	NA	2,402	1,450	952	NA	NA	NA	230	128	42	14	32	14	150	82	19	49
1964	4,201	1,260	947	313	313	NA	2,538	1,560	978	NA	NA	NA	256	142	45	14	37	18	148	82	19	47
1965	4,374	1,287	994	294	294	NA	2,612	1,620	992	NA	NA	NA	304	176	46	13	42	27	171	98	21	52
1966	4,653	1,302	1,012	290	290	NA	2,790	1,804	986	NA	NA	NA	351	208	47	14	48	34	210	129	24	57



CHAPTER 4 | Research and Development: U.S. Trends and International Comparisons

Year	All per-formers	All federal	Federal intramural <sup>a</sup>	FFRDCs <sup>b</sup>		Nonfederal govern-ment <sup>c</sup>	Business <sup>d</sup>						Higher education <sup>e</sup>						Other nonprofit organizations <sup>f</sup>			
	All funding sources	Total	Federal	Total	Federal	Total	Total	Own domestic	Federal	Other domestic business	Foreign business	Other	Total	Federal	Nonfederal govern-ment	Busi-ness	Higher ed-ucation	ONP	Total	Federal	Busi-ness	ONP
1985	25,401	4,427	3,135	1,292	1,292	NA	17,625	12,908	4,717	NA	NA	NA	2,527	1,296	262	198	547	224	822	490	85	247
1986	27,240	4,462	3,204	1,258	1,258	NA	19,131	15,082	4,049	NA	NA	NA	2,780	1,393	298	229	620	240	867	506	91	270
1987	27,951	4,594	3,366	1,228	1,228	NA	19,190	15,153	4,037	NA	NA	NA	3,219	1,643	333	260	707	276	948	555	98	295
1988	29,528	4,346	3,362	984	984	NA	20,377	16,531	3,846	NA	NA	NA	3,779	1,958	377	302	818	325	1,026	599	105	322
1989	32,277	4,613	3,566	1,047	1,047	NA	22,317	17,993	4,324	NA	NA	NA	4,188	2,121	417	347	933	370	1,159	695	112	352
1990	34,897	4,808	3,652	1,156	1,156	NA	24,399	18,432	5,967	NA	NA	NA	4,406	2,140	453	377	1,031	404	1,284	780	120	384
1991	38,631	5,539	4,093	1,446	1,446	NA	27,013	21,425	5,588	NA	NA	NA	4,611	2,232	468	392	1,091	428	1,468	921	129	419
1992	37,936	5,866	4,337	1,529	1,529	NA	25,660	21,184	4,476	NA	NA	NA	4,882	2,415	479	414	1,120	454	1,528	933	138	456
1993	37,283	6,338	4,838	1,500	1,500	NA	24,251	19,956	4,295	NA	NA	NA	5,149	2,542	496	443	1,181	487	1,544	900	148	497
1994	36,618	6,581	4,985	1,596	1,596	NA	22,988	19,372	3,616	NA	NA	NA	5,390	2,644	517	464	1,256	509	1,659	960	158	541
1995	40,936	6,666	4,952	1,714	1,714	NA	26,919	23,755	3,164	NA	NA	NA	5,659	2,779	559	494	1,311	516	1,692	934	170	589
1996	43,170	6,495	4,872	1,623	1,623	NA	29,010	25,370	3,640	NA	NA	NA	5,885	2,864	584	524	1,390	522	1,781	960	182	640
1997	46,516	6,675	4,997	1,679	1,679	NA	32,430	29,782	2,648	NA	NA	NA	5,485	2,518	548	515	1,396	508	1,926	1,011	205	711
1998	46,247	6,871	5,146	1,725	1,725	NA	32,208	29,576	2,632	NA	NA	NA	5,108	2,189	515	509	1,393	502	2,061	1,060	218	784
1999	51,853	7,181	5,530	1,651	1,651	NA	36,638	33,821	2,817	NA	NA	NA	5,650	2,571	533	529	1,480	537	2,384	1,300	236	849
2000	56,503	7,856	6,105	1,750	1,750	NA	39,176	36,494	2,682	NA	NA	NA	6,361	3,081	558	540	1,604	578	3,110	1,831	258	1,021
2001	63,956	9,522	7,052	2,469	2,379	NA	44,012	40,409	3,603	NA	NA	NA	6,886	3,411	585	535	1,734	621	3,537	2,150	261	1,126
2002	50,521	10,506	7,487	3,019	2,905	NA	28,533	26,081	2,452	NA	NA	NA	7,670	3,877	636	531	1,937	689	3,812	2,267	253	1,293

CHAPTER 4 | Research and Development: U.S. Trends and International Comparisons

Year	All per-formers	All federal	Federal intramural <sup>a</sup>	FFRDCs <sup>b</sup>		Nonfederal govern-ment <sup>c</sup>		Business <sup>d</sup>					Higher education <sup>e</sup>					Other nonprofit organizations <sup>f</sup>				
	All funding sources	Total	Federal	Total	Federal	Total	Total	Own domestic	Federal	Other domestic business	Foreign business	Other	Total	Federal	Nonfederal govern-ment	Busi-ness	Higher ed-ucation	ONP	Total	Federal	Busi-ness	ONP
2003	61,059	10,933	7,672	3,262	3,152	NA	37,334	32,861	4,473	NA	NA	NA	8,560	4,450	708	537	2,127	739	4,232	2,487	259	1,486
2004	69,132	10,589	7,455	3,135	3,057	NA	45,432	40,657	4,775	NA	NA	NA	8,911	4,682	735	545	2,190	759	4,200	2,448	264	1,488
2005	69,653	10,886	7,557	3,329	3,241	NA	45,284	39,995	5,289	NA	NA	NA	9,144	4,810	719	557	2,283	774	4,339	2,432	280	1,627
2006	76,624	11,075	7,435	3,640	3,531	258	51,173	45,033	6,140	NA	NA	NA	9,522	5,080	712	573	2,368	789	4,596	2,592	300	1,705
2007	85,322	12,697	7,222	5,475	5,293	324	57,570	48,625	8,945	NA	NA	NA	9,945	5,284	745	607	2,461	848	4,786	2,583	318	1,885
2008	76,642	13,356	7,316	6,040	5,843	411	46,864	35,382	5,397	2,815	3,094	175	10,962	5,840	815	675	2,682	951	5,049	2,600	330	2,119
2009	74,236	14,063	7,874	6,189	5,979	506	41,055	29,264	7,797	1,865	1,996	134	12,938	7,263	948	764	2,942	1,021	5,673	3,049	319	2,305
2010	79,258	13,203	8,016	5,187	5,025	578	44,906	34,912	4,705	2,256	2,819	214	14,759	8,762	1,015	778	3,141	1,064	5,813	3,041	321	2,451
2011	82,147	13,251	8,024	5,227	5,057	580	47,186	37,047	4,404	2,413	3,131	191	15,599	9,290	994	796	3,416	1,104	5,531	2,693	338	2,500
2012	87,071	14,328	8,587	5,741	5,566	556	50,755	38,891	4,137	3,336	4,209	182	15,908	9,170	1,007	877	3,693	1,162	5,524	2,629	346	2,549
2013	88,336	15,132	8,309	6,823	6,639	518	51,013	37,385	6,028	3,275	4,078	247	16,112	8,876	1,063	935	3,943	1,296	5,561	2,465	366	2,730
2014	91,890	15,727	8,775	6,952	6,765	473	53,415	38,281	6,445	3,331	5,074	285	16,421	8,706	1,085	997	4,216	1,418	5,853	2,574	385	2,894
2015 <sup>g</sup>	97,150	16,551	9,200	7,351	7,182	496	56,472	43,330	6,102	2,735	4,072	233	17,466	9,094	1,092	1,107	4,567	1,608	6,165	2,731	398	3,036
Constant 2009 \$millions																						
1953	8,505	2,603	2,290	313	313	NA	4,790	2,890	1,900	NA	NA	NA	881	389	199	43	184	66	231	92	73	66
1954	9,009	2,537	2,154	382	382	NA	5,322	3,217	2,105	NA	NA	NA	892	389	206	49	183	65	258	101	85	72
1955	9,650	2,693	2,140	553	553	NA	5,775	3,599	2,176	NA	NA	NA	909	405	208	55	175	67	273	112	90	71
1956	11,986	3,176	2,402	774	774	NA	7,605	4,935	2,670	NA	NA	NA	907	404	206	62	167	68	298	124	87	87

CHAPTER 4 | Research and Development: U.S. Trends and International Comparisons

Year	All per-formers	All federal	Federal intramural <sup>a</sup>	FFRDCs <sup>b</sup>		Nonfederal govern-ment <sup>c</sup>	Business <sup>d</sup>						Higher education <sup>e</sup>						Other nonprofit organizations <sup>f</sup>			
	All funding sources	Total	Federal	Total	Federal	Total	Total	Own domestic	Federal	Other domestic business	Foreign business	Other	Total	Federal	Nonfederal govern-ment	Busi-ness	Higher ed-ucation	ONP	Total	Federal	Busi-ness	ONP
1957	14,514	3,576	2,679	896	896	NA	9,718	5,966	3,751	NA	NA	NA	881	379	204	69	163	66	340	135	84	120
1958	16,229	3,953	3,035	918	918	NA	10,988	6,688	4,299	NA	NA	NA	891	385	208	71	160	68	397	168	82	147
1959	17,053	4,383	3,344	1,038	1,038	NA	11,226	6,834	4,393	NA	NA	NA	969	450	214	73	163	70	476	232	87	157
1960	17,540	4,666	3,516	1,150	1,150	NA	11,246	6,843	4,402	NA	NA	NA	1,061	532	221	74	165	69	566	309	97	160
1961	17,675	5,136	3,781	1,355	1,355	NA	10,770	6,594	4,177	NA	NA	NA	1,123	586	226	74	167	71	645	351	96	198
1962	20,674	5,353	3,961	1,392	1,392	NA	13,375	8,040	5,335	NA	NA	NA	1,208	663	227	75	170	73	738	380	106	252
1963	21,363	5,990	4,472	1,518	1,518	NA	13,278	8,016	5,262	NA	NA	NA	1,269	705	233	77	179	75	826	451	105	271
1964	22,873	6,858	5,153	1,704	1,704	NA	13,819	8,494	5,325	NA	NA	NA	1,391	773	246	74	203	95	806	446	103	256
1965	23,386	6,882	5,312	1,569	1,569	NA	13,967	8,662	5,304	NA	NA	NA	1,623	938	248	70	225	142	914	524	112	278
1966	24,198	6,772	5,264	1,508	1,508	NA	14,511	9,383	5,128	NA	NA	NA	1,826	1,082	245	73	252	174	1,090	668	125	296
1967	24,503	7,086	5,400	1,686	1,686	NA	14,313	9,345	4,968	NA	NA	NA	1,964	1,200	231	78	272	182	1,140	710	126	303
1968	24,903	7,007	5,388	1,619	1,619	NA	14,723	10,088	4,634	NA	NA	NA	1,963	1,210	223	78	267	187	1,210	773	136	301
1969	25,202	7,230	5,680	1,550	1,550	NA	14,749	10,498	4,251	NA	NA	NA	1,927	1,185	222	74	249	196	1,296	843	148	305
1970	25,247	7,329	5,855	1,475	1,475	NA	14,615	10,437	4,178	NA	NA	NA	1,977	1,227	225	77	245	204	1,325	873	145	307
1971	24,363	6,960	5,659	1,301	1,301	NA	13,984	10,195	3,788	NA	NA	NA	2,084	1,278	253	77	280	196	1,334	883	142	309
1972	24,610	7,174	5,741	1,433	1,433	NA	13,640	10,257	3,383	NA	NA	NA	2,476	1,563	297	82	328	206	1,319	863	140	316
1973	25,271	7,068	5,799	1,268	1,268	NA	14,106	10,753	3,353	NA	NA	NA	2,751	1,707	333	99	379	234	1,346	894	137	315
1974	25,587	6,922	5,757	1,165	1,165	NA	14,521	11,368	3,153	NA	NA	NA	2,765	1,660	335	110	411	249	1,379	927	135	317

CHAPTER 4 | Research and Development: U.S. Trends and International Comparisons

Year	All per-formers	All federal	Federal intramural <sup>a</sup>	FFRDCs <sup>b</sup>		Nonfederal govern-ment <sup>c</sup>	Business <sup>d</sup>						Higher education <sup>e</sup>						Other nonprofit organizations <sup>f</sup>			
	All funding sources	Total	Federal	Total	Federal	Total	Total	Own domestic	Federal	Other domestic business	Foreign business	Other	Total	Federal	Nonfederal govern-ment	Busi-ness	Higher ed-ucation	ONP	Total	Federal	Busi-ness	ONP
1975	25,800	7,319	6,096	1,223	1,223	NA	14,129	10,969	3,160	NA	NA	NA	2,978	1,752	362	123	448	293	1,374	923	133	318
1976	27,133	7,633	6,252	1,381	1,381	NA	14,947	11,825	3,122	NA	NA	NA	3,149	1,800	385	135	500	329	1,403	937	135	331
1977	27,500	7,458	5,922	1,537	1,537	NA	15,437	12,270	3,168	NA	NA	NA	3,203	1,780	383	145	552	343	1,401	923	137	342
1978	28,468	7,548	5,962	1,587	1,587	NA	16,129	12,951	3,178	NA	NA	NA	3,316	1,797	402	161	616	339	1,474	987	137	350
1979	29,718	7,540	5,933	1,607	1,607	NA	17,135	13,929	3,206	NA	NA	NA	3,482	1,947	397	175	646	317	1,561	1,070	136	354
1980	30,938	7,425	5,737	1,688	1,688	NA	18,422	14,760	3,662	NA	NA	NA	3,656	2,055	391	199	694	316	1,436	946	134	356
1981	33,654	7,254	5,629	1,625	1,625	NA	21,436	17,227	4,208	NA	NA	NA	3,670	1,963	411	222	747	327	1,294	806	132	356
1982	35,354	7,165	5,437	1,728	1,728	NA	23,202	18,170	5,032	NA	NA	NA	3,716	1,953	403	235	780	345	1,272	772	133	367
1983	37,895	7,386	5,584	1,801	1,801	NA	25,228	19,203	6,025	NA	NA	NA	3,950	2,095	401	264	827	362	1,332	808	138	386
1984	40,477	7,458	5,338	2,120	2,120	NA	27,437	20,807	6,629	NA	NA	NA	4,204	2,211	422	303	886	382	1,378	828	143	408
1985	44,376	7,733	5,477	2,257	2,257	NA	30,791	22,551	8,241	NA	NA	NA	4,415	2,265	457	345	956	391	1,436	855	148	432
1986	46,646	7,641	5,487	2,154	2,154	NA	32,761	25,827	6,934	NA	NA	NA	4,760	2,385	510	392	1,062	411	1,484	866	156	463
1987	46,674	7,671	5,620	2,051	2,051	NA	32,045	25,304	6,741	NA	NA	NA	5,375	2,743	556	434	1,181	461	1,583	927	163	493
1988	47,640	7,011	5,424	1,587	1,587	NA	32,876	26,671	6,205	NA	NA	NA	6,098	3,159	608	487	1,319	524	1,655	966	169	520
1989	50,126	7,164	5,539	1,626	1,626	NA	34,658	27,943	6,715	NA	NA	NA	6,504	3,294	647	539	1,449	575	1,800	1,079	174	546
1990	52,261	7,201	5,469	1,731	1,731	NA	36,540	27,604	8,936	NA	NA	NA	6,598	3,206	678	565	1,544	605	1,922	1,167	180	575
1991	55,991	8,028	5,933	2,095	2,095	NA	39,152	31,053	8,099	NA	NA	NA	6,682	3,235	678	568	1,581	621	2,128	1,335	187	607
1992	53,757	8,312	6,145	2,166	2,166	NA	36,362	30,019	6,343	NA	NA	NA	6,918	3,422	678	587	1,587	644	2,165	1,323	196	646

CHAPTER 4 | Research and Development: U.S. Trends and International Comparisons

Year	All per-formers	All federal	Federal intramural <sup>a</sup>	FFRDCs <sup>b</sup>		Nonfederal govern-ment <sup>c</sup>	Business <sup>d</sup>							Higher education <sup>e</sup>					Other nonprofit organizations <sup>f</sup>			
	All funding sources	Total	Federal	Total	Federal	Total	Total	Own domestic	Federal	Other domestic business	Foreign business	Other	Total	Federal	Nonfederal govern-ment	Busi-ness	Higher ed-ucation	ONP	Total	Federal	Busi-ness	ONP
1993	51,604	8,773	6,697	2,076	2,076	NA	33,566	27,622	5,945	NA	NA	NA	7,127	3,518	686	613	1,635	675	2,138	1,245	205	688
1994	49,627	8,919	6,756	2,162	2,162	NA	31,155	26,254	4,901	NA	NA	NA	7,305	3,583	701	629	1,702	689	2,248	1,300	215	733
1995	54,347	8,850	6,575	2,275	2,275	NA	35,737	31,537	4,201	NA	NA	NA	7,513	3,689	742	656	1,741	685	2,246	1,240	225	781
1996	56,285	8,468	6,352	2,115	2,115	NA	37,823	33,077	4,746	NA	NA	NA	7,672	3,734	761	683	1,813	681	2,322	1,251	237	834
1997	59,628	8,557	6,405	2,152	2,152	NA	41,571	38,176	3,394	NA	NA	NA	7,031	3,227	703	660	1,789	652	2,469	1,296	263	911
1998	58,646	8,713	6,525	2,187	2,187	NA	40,843	37,505	3,338	NA	NA	NA	6,477	2,776	653	646	1,766	636	2,614	1,344	276	994
1999	64,764	8,968	6,907	2,062	2,062	NA	45,760	42,242	3,518	NA	NA	NA	7,057	3,211	666	661	1,849	670	2,978	1,623	295	1,060
2000	69,000	9,593	7,456	2,138	2,138	NA	47,841	44,566	3,275	NA	NA	NA	7,768	3,763	682	660	1,958	705	3,798	2,236	316	1,246
2001	76,363	11,368	8,420	2,948	2,840	NA	52,549	48,247	4,302	NA	NA	NA	8,222	4,073	699	639	2,070	741	4,223	2,567	311	1,345
2002	59,410	12,355	8,805	3,550	3,416	NA	33,553	30,669	2,883	NA	NA	NA	9,019	4,559	748	624	2,277	811	4,483	2,665	297	1,520
2003	70,397	12,606	8,845	3,761	3,634	NA	43,044	37,887	5,157	NA	NA	NA	9,869	5,130	816	619	2,452	852	4,879	2,867	298	1,713
2004	77,572	11,882	8,365	3,518	3,430	NA	50,979	45,621	5,358	NA	NA	NA	9,998	5,254	824	611	2,458	852	4,712	2,747	296	1,669
2005	75,720	11,835	8,216	3,619	3,523	NA	49,228	43,479	5,750	NA	NA	NA	9,940	5,229	782	605	2,482	842	4,717	2,643	305	1,769
2006	80,815	11,680	7,841	3,839	3,724	272	53,972	47,496	6,476	NA	NA	NA	10,043	5,358	751	604	2,497	833	4,848	2,734	316	1,798
2007	87,657	13,044	7,419	5,625	5,438	333	59,145	49,955	9,190	NA	NA	NA	10,217	5,429	765	624	2,528	871	4,917	2,653	327	1,936
2008	77,224	13,457	7,372	6,086	5,887	414	47,220	35,651	5,438	2,837	3,118	177	11,045	5,884	821	680	2,702	958	5,087	2,620	332	2,135
2009	74,236	14,063	7,874	6,189	5,979	506	41,055	29,264	7,797	1,865	1,996	134	12,938	7,263	948	764	2,942	1,021	5,673	3,049	319	2,305
2010	78,302	13,044	7,919	5,125	4,964	571	44,364	34,491	4,648	2,229	2,785	211	14,580	8,656	1,002	769	3,103	1,051	5,743	3,004	317	2,422



CHAPTER 4 | Research and Development: U.S. Trends and International Comparisons

Year	All per-formers	All federal	Federal intramurai <sup>a</sup>	FFRDCs <sup>b</sup>		Nonfederal govern-ment <sup>c</sup>	Business <sup>d</sup>						Higher education <sup>e</sup>					Other nonprofit organizations <sup>f</sup>				
	All funding sources	Total	Federal	Total	Federal	Total	Total	Own domestic	Federal	Other domestic business	Foreign business	Other	Total	Federal	Nonfederal govern-ment	Busi-ness	Higher ed-ucation	ONP	Total	Federal	Busi-ness	ONP
2011	79,514	12,826	7,767	5,059	4,895	562	45,674	35,860	4,263	2,336	3,030	185	15,099	8,992	962	770	3,307	1,068	5,354	2,607	327	2,420
2012	82,755	13,618	8,161	5,457	5,290	528	48,239	36,963	3,932	3,171	4,001	173	15,120	8,716	957	834	3,510	1,104	5,250	2,498	329	2,423
2013	82,624	14,153	7,771	6,382	6,209	485	47,714	34,968	5,638	3,063	3,814	231	15,070	8,302	994	874	3,688	1,212	5,201	2,306	342	2,553
2014	84,433	14,451	8,063	6,388	6,216	435	49,080	35,174	5,922	3,060	4,662	262	15,088	7,999	997	916	3,873	1,303	5,378	2,365	354	2,659
2015 <sup>g</sup>	88,309	15,045	8,363	6,682	6,528	451	51,332	39,386	5,547	2,486	3,702	212	15,876	8,266	993	1,006	4,151	1,461	5,604	2,483	362	2,759

NA = not available.

FFRDC = federally funded research and development center; ONP = other nonprofit organization.

<sup>a</sup> See Appendix Table 4-2, footnote a.

<sup>b</sup> Type-of-R&D data for FFRDC R&D in 1953–54 include the R&D of only university-administered FFRDCs. Starting in 2001, type-of-R&D data distinguish federally funded from nonfederally funded FFRDC R&D. (See also Appendix Table 4-2, footnote b.)

<sup>c</sup> Type-of-R&D data for state intramural R&D are not currently collected by the Survey of State Government R&D. (See also Appendix Table 4-2, footnote c.)

<sup>d</sup> Type-of-R&D data for business R&D in 1998–2007 were revised in response to data quality review considerations and are not directly comparable with the data for 1997 and earlier years. For 2008 and later years, the type-of-R&D splits for other than total, own-funded, and federally funded R&D are estimated. (See also Appendix Table 4-2, footnote d.)

<sup>e</sup> The type-of-R&D estimation procedure for higher education R&D was revised in 1998 and again in 2010; hence, these data are not directly comparable with data reported for earlier years. Type-of-R&D splits for other than total and federally funded are estimated. (See also Appendix Table 4-2, footnote e.)

<sup>f</sup> Type-of-R&D data for R&D by other nonprofit organizations in 1998 and later years are estimated, except for the R&D that is federally funded. (See also Appendix Table 4-2, footnote f.)

<sup>g</sup> Some data for 2015 are preliminary and may later be revised.

Note(s)

Detail may not add to total because of rounding. Constant-dollar estimates are derived from unrounded data. For trend comparisons, use only the historical data reported in this table because some back-year data may have been revised. Except for the nonprofit sector, data are based on annual reports by performers in the National Science Foundation's annual R&D expenditure surveys: Business R&D and Innovation Survey, Higher Education R&D Survey, Survey of Federal Funds for R&D, FFRDC R&D Expenditures Survey, and Survey of State Government R&D. R&D expenditures by business performers—and also, before 2001, industry-administered FFRDCs—are collected on a calendar year basis. Expenditures for other performers are calendar year approximations based on fiscal year data. For federal performers in 1977 and afterward, the approximation equals 75% of the amount reported in the same fiscal year plus 25% of the amount reported in the subsequent fiscal year. Before 1977, the federal fiscal year began on 1 July, not 1 October, and the approximation is 50% of the amount reported in the same fiscal year plus 50% of the amount reported in the subsequent fiscal year. The fiscal year for higher education performers and state government performers generally begins 1 July, and the calendar year approximation is 50% of the amount reported in the same fiscal year plus 50% of the amount reported in the subsequent fiscal year.

Source(s)



CHAPTER 4 | Research and Development: U.S. Trends and International Comparisons

National Science Foundation, National Center for Science and Engineering Statistics, National Patterns of R&D Resources (annual series).  
*Science and Engineering Indicators 2018*

CHAPTER 4 | Research and Development: U.S. Trends and International Comparisons

APPENDIX TABLE 4-5

U.S. development expenditures, by performing sector and source of funds: 1953–2015

(Millions of current and of constant 2009 dollars)

Year	All per-formers	All federal	Federal intramural <sup>a</sup>	FFRDCs <sup>b</sup>		Nonfederal govern-ment <sup>c</sup>	Business <sup>d</sup>						Higher education <sup>e</sup>					Other nonprofit organizations <sup>f</sup>				
	All funding sources	Total	Federal	Total	Federal	Total	Total	Own domestic	Federal	Other domestic business	Foreign business	Other	Total	Federal	Nonfederal govern-ment	Busi-ness	Higher ed-ucation	ONP	Total	Federal	Busi-ness	ONP
Current \$millions																						
1953	3,412	614	567	48	48	NA	2,753	1,630	1,123	NA	NA	NA	16	9	3	1	3	1	29	17	6	6
1954	3,734	599	537	62	62	NA	3,090	1,685	1,405	NA	NA	NA	17	9	3	1	3	1	29	15	7	7
1955	4,113	713	543	171	171	NA	3,352	1,738	1,614	NA	NA	NA	21	12	4	2	3	1	27	12	8	7
1956	5,854	978	631	348	348	NA	4,826	2,267	2,559	NA	NA	NA	25	14	4	2	4	2	26	11	8	7
1957	6,681	1,157	728	429	429	NA	5,474	2,174	3,300	NA	NA	NA	26	12	5	3	4	2	25	9	8	8
1958	7,213	1,227	842	386	386	NA	5,932	2,241	3,691	NA	NA	NA	28	13	6	3	4	2	26	9	8	9
1959	8,463	1,417	940	477	477	NA	6,983	2,557	4,426	NA	NA	NA	31	16	6	3	5	2	33	14	9	10
1960	9,360	1,562	1,003	559	559	NA	7,734	2,935	4,799	NA	NA	NA	35	19	6	3	5	2	30	10	10	10
1961	9,930	1,760	1,090	670	670	NA	8,106	3,189	4,917	NA	NA	NA	38	22	7	2	5	2	28	4	10	14
1962	10,114	1,845	1,227	618	618	NA	8,196	3,246	4,950	NA	NA	NA	40	23	8	2	6	2	34	5	11	18
1963	11,539	2,133	1,465	668	668	NA	9,330	3,535	5,795	NA	NA	NA	40	22	8	2	6	2	37	6	11	20
1964	12,506	2,419	1,680	739	739	NA	10,004	3,848	6,156	NA	NA	NA	49	30	8	2	7	3	35	6	11	18
1965	13,215	2,463	1,789	674	674	NA	10,637	4,419	6,218	NA	NA	NA	71	48	9	2	8	4	45	13	12	20
1966	14,490	2,540	1,886	654	654	NA	11,810	4,961	6,849	NA	NA	NA	87	61	9	2	10	5	53	16	14	23

CHAPTER 4 | Research and Development: U.S. Trends and International Comparisons

Year	All per-formers	All federal	Federal intramural <sup>a</sup>	FFRDCs <sup>b</sup>		Nonfederal govern-ment <sup>c</sup>	Business <sup>d</sup>						Higher education <sup>e</sup>					Other nonprofit organizations <sup>f</sup>				
	All funding sources	Total	Federal	Total	Federal	Total	Total	Own domestic	Federal	Other domestic business	Foreign business	Other	Total	Federal	Nonfederal govern-ment	Busi-ness	Higher ed-ucation	ONP	Total	Federal	Busi-ness	ONP
1967	15,332	2,649	1,943	706	706	NA	12,539	5,744	6,795	NA	NA	NA	93	66	9	3	10	7	51	12	15	24
1968	16,154	2,628	1,904	724	724	NA	13,370	6,326	7,044	NA	NA	NA	102	72	8	4	9	9	55	13	16	26
1969	17,051	2,807	2,016	792	792	NA	14,071	7,127	6,944	NA	NA	NA	110	80	7	5	8	10	63	17	18	28
1970	16,925	3,047	2,258	790	790	NA	13,698	7,466	6,232	NA	NA	NA	112	84	6	5	7	10	68	20	18	30
1971	17,399	3,313	2,473	841	841	NA	13,924	7,757	6,167	NA	NA	NA	98	69	8	4	9	9	64	12	19	33
1972	18,743	3,502	2,639	863	863	NA	15,043	8,510	6,533	NA	NA	NA	101	63	12	4	14	9	98	44	19	35
1973	20,197	3,517	2,657	860	860	NA	16,394	9,773	6,621	NA	NA	NA	126	71	18	5	20	13	160	102	20	38
1974	21,504	3,748	2,765	983	983	NA	17,421	10,868	6,553	NA	NA	NA	141	75	20	7	25	15	195	131	22	42
1975	22,706	3,993	2,890	1,103	1,103	NA	18,352	11,569	6,783	NA	NA	NA	156	83	22	8	27	16	205	135	23	47
1976	25,085	4,286	2,972	1,315	1,315	NA	20,412	12,890	7,522	NA	NA	NA	182	100	24	12	31	16	205	128	25	52
1977	27,667	4,606	3,188	1,418	1,418	NA	22,603	14,328	8,275	NA	NA	NA	254	153	28	15	40	19	204	119	27	58
1978	31,056	5,261	3,676	1,584	1,584	NA	25,216	16,460	8,756	NA	NA	NA	373	254	32	15	49	24	207	113	30	64
1979	35,445	5,697	3,944	1,753	1,753	NA	29,033	19,145	9,888	NA	NA	NA	469	336	34	16	56	28	246	143	32	71
1980	40,748	6,081	4,072	2,009	2,009	NA	33,848	22,891	10,957	NA	NA	NA	518	362	38	19	68	31	301	187	35	79
1981	46,305	6,705	4,530	2,175	2,175	NA	38,547	25,756	12,791	NA	NA	NA	568	386	44	24	80	35	485	360	37	88
1982	51,879	7,348	5,178	2,170	2,170	NA	43,434	29,219	14,215	NA	NA	NA	597	397	46	27	88	39	500	362	40	98
1983	57,771	8,491	6,106	2,385	2,385	NA	48,064	32,542	15,522	NA	NA	NA	617	399	47	31	97	43	599	447	44	109
1984	66,461	9,651	7,078	2,572	2,572	NA	55,371	37,731	17,640	NA	NA	NA	677	435	51	37	108	47	762	594	47	120

CHAPTER 4 | Research and Development: U.S. Trends and International Comparisons

Year	All per-formers	All federal	Federal intramural <sup>a</sup>	FFRDCs <sup>b</sup>		Nonfederal govern-ment <sup>c</sup>		Business <sup>d</sup>					Higher education <sup>e</sup>						Other nonprofit organizations <sup>f</sup>			
	All funding sources	Total	Federal	Total	Federal	Total	Total	Own domestic	Federal	Other domestic business	Foreign business	Other	Total	Federal	Nonfederal govern-ment	Busi-ness	Higher ed-ucation	ONP	Total	Federal	Busi-ness	ONP
1985	74,522	10,916	8,011	2,906	2,906	NA	62,020	41,762	20,258	NA	NA	NA	756	486	57	43	120	49	829	644	51	134
1986	75,855	11,376	8,275	3,101	3,101	NA	62,871	41,354	21,517	NA	NA	NA	818	513	65	50	136	53	790	587	55	149
1987	79,929	11,496	8,176	3,321	3,321	NA	66,789	42,667	24,122	NA	NA	NA	945	599	73	57	155	61	698	474	60	165
1988	84,567	12,460	8,864	3,596	3,596	NA	70,353	46,634	23,719	NA	NA	NA	1,098	698	83	66	180	71	655	407	65	183
1989	87,723	12,991	9,355	3,635	3,635	NA	72,725	51,676	21,049	NA	NA	NA	1,227	773	91	76	205	81	780	507	70	203
1990	94,067	13,363	9,700	3,663	3,663	NA	78,376	59,410	18,966	NA	NA	NA	1,407	910	99	83	226	89	920	619	75	226
1991	95,105	12,230	8,778	3,452	3,452	NA	80,286	63,030	17,256	NA	NA	NA	1,534	1,012	103	86	239	94	1,054	722	82	251
1992	99,811	12,521	9,098	3,423	3,423	NA	84,569	67,388	17,181	NA	NA	NA	1,596	1,055	105	91	246	100	1,125	758	88	279
1993	99,705	12,058	9,071	2,986	2,986	NA	84,757	68,674	16,083	NA	NA	NA	1,700	1,127	109	97	259	107	1,191	787	95	309
1994	102,938	11,970	8,823	3,147	3,147	NA	87,890	71,681	16,209	NA	NA	NA	1,816	1,213	114	102	276	112	1,261	815	103	343
1995	113,079	12,689	9,262	3,427	3,427	NA	97,342	79,518	17,824	NA	NA	NA	1,812	1,180	123	108	288	113	1,236	744	111	381
1996	121,377	12,481	9,033	3,448	3,448	NA	105,863	88,797	17,066	NA	NA	NA	1,791	1,128	128	115	305	115	1,241	698	120	423
1997	128,661	12,407	9,077	3,331	3,331	NA	113,184	95,063	18,121	NA	NA	NA	1,693	1,041	120	113	306	112	1,378	687	155	536
1998	144,669	12,528	9,214	3,314	3,314	NA	129,041	110,589	18,452	NA	NA	NA	1,584	943	113	112	306	110	1,516	760	164	592
1999	154,315	12,600	9,265	3,335	3,335	NA	138,807	122,236	16,571	NA	NA	NA	1,362	686	117	116	325	118	1,546	727	178	641
2000	169,414	12,859	9,377	3,482	3,482	NA	153,745	140,235	13,510	NA	NA	NA	1,265	545	123	119	352	127	1,545	580	195	771
2001	167,740	14,459	11,062	3,397	3,273	NA	149,952	137,410	12,542	NA	NA	NA	1,409	646	128	117	381	136	1,921	874	197	850
2002	176,601	15,238	11,800	3,438	3,308	NA	157,788	144,727	13,061	NA	NA	NA	1,472	639	140	116	425	151	2,104	937	191	976

CHAPTER 4 | Research and Development: U.S. Trends and International Comparisons

Year	All per-formers	All federal	Federal intramural <sup>a</sup>	FFRDCs <sup>b</sup>		Nonfederal govern-ment <sup>c</sup>		Business <sup>d</sup>					Higher education <sup>e</sup>						Other nonprofit organizations <sup>f</sup>			
	All funding sources	Total	Federal	Total	Federal	Total	Total	Own domestic	Federal	Other domestic business	Foreign business	Other	Total	Federal	Nonfederal govern-ment	Busi-ness	Higher ed-ucation	ONP	Total	Federal	Busi-ness	ONP
2003	175,483	16,563	12,646	3,917	3,785	NA	155,060	143,121	11,939	NA	NA	NA	1,799	897	155	118	467	162	2,060	743	195	1,122
2004	177,220	17,424	12,746	4,677	4,561	NA	155,034	140,615	14,419	NA	NA	NA	2,140	1,211	161	120	481	167	2,623	1,300	199	1,123
2005	195,731	18,775	13,994	4,781	4,654	NA	172,208	156,696	15,512	NA	NA	NA	2,098	1,146	158	122	501	170	2,651	1,211	212	1,228
2006	212,719	20,582	16,089	4,493	4,358	7	188,112	171,392	16,720	NA	NA	NA	1,902	927	156	126	520	173	2,116	603	226	1,287
2007	227,967	23,381	18,016	5,365	5,254	9	200,429	185,569	14,860	NA	NA	NA	1,917	894	163	133	540	186	2,231	568	240	1,423
2008	259,595	23,760	17,566	6,194	6,094	11	231,447	180,724	29,488	8,882	11,799	553	1,965	841	179	148	589	209	2,411	562	249	1,600
2009	256,036	23,497	17,245	6,252	6,159	13	226,554	179,841	30,435	7,041	8,732	505	3,441	1,569	288	289	915	381	2,531	550	241	1,740
2010	251,415	25,847	18,844	7,004	6,909	15	217,700	170,036	28,089	8,035	10,778	762	5,122	2,509	408	425	1,240	541	2,730	638	242	1,850
2011	270,995	28,751	21,879	6,872	6,786	15	233,886	187,794	26,228	7,966	11,266	632	5,410	2,666	402	436	1,340	567	2,933	790	255	1,887
2012	273,264	26,666	19,941	6,725	6,631	15	238,202	192,828	25,840	7,578	11,543	413	5,677	2,687	378	464	1,524	625	2,704	518	261	1,925
2013	287,144	26,436	19,767	6,668	6,572	14	252,007	207,537	22,137	8,729	12,946	658	5,877	2,650	393	502	1,670	663	2,811	474	276	2,061
2014	301,475	27,084	20,303	6,781	6,681	13	265,377	223,186	18,065	8,312	15,103	711	6,055	2,602	402	548	1,782	721	2,947	471	291	2,185
2015 <sup>g</sup>	314,532	27,718	20,547	7,171	7,062	14	277,557	230,629	18,850	10,295	16,907	876	6,204	2,565	404	560	1,888	789	3,040	447	301	2,292
Constant 2009 \$millions																						
1953	22,510	4,051	3,738	313	313	NA	18,165	10,755	7,410	NA	NA	NA	106	56	19	7	17	7	188	109	40	40
1954	24,412	3,913	3,511	402	402	NA	20,202	11,016	9,185	NA	NA	NA	111	56	23	7	20	7	186	95	46	46
1955	26,435	4,582	3,486	1,096	1,096	NA	21,544	11,169	10,375	NA	NA	NA	135	74	24	10	21	6	174	77	51	45
1956	36,384	6,078	3,919	2,160	2,160	NA	29,992	14,090	15,903	NA	NA	NA	155	84	27	12	22	9	158	65	50	44

CHAPTER 4 | Research and Development: U.S. Trends and International Comparisons

Year	All per-formers	All federal	Federal intramural <sup>a</sup>	FFRDCs <sup>b</sup>		Nonfederal govern-ment <sup>c</sup>	Business <sup>d</sup>						Higher education <sup>e</sup>						Other nonprofit organizations <sup>f</sup>			
	All funding sources	Total	Federal	Total	Federal	Total	Total	Own domestic	Federal	Other domestic business	Foreign business	Other	Total	Federal	Nonfederal govern-ment	Busi-ness	Higher ed-ucation	ONP	Total	Federal	Busi-ness	ONP
1957	40,185	6,956	4,376	2,580	2,580	NA	32,926	13,076	19,850	NA	NA	NA	156	72	32	15	25	12	147	51	48	48
1958	42,429	7,218	4,950	2,268	2,268	NA	34,897	13,182	21,715	NA	NA	NA	162	74	33	18	26	12	153	53	47	53
1959	49,092	8,217	5,453	2,764	2,764	NA	40,507	14,833	25,674	NA	NA	NA	180	90	35	17	26	12	189	78	52	58
1960	53,557	8,935	5,736	3,199	3,199	NA	44,253	16,794	27,460	NA	NA	NA	197	109	36	14	27	11	172	57	57	57
1961	56,201	9,958	6,166	3,792	3,792	NA	45,875	18,049	27,826	NA	NA	NA	212	122	39	11	29	11	156	20	57	79
1962	56,548	10,315	6,860	3,455	3,455	NA	45,821	18,148	27,673	NA	NA	NA	224	126	43	11	32	11	187	25	62	101
1963	63,794	11,792	8,099	3,693	3,693	NA	51,579	19,543	32,036	NA	NA	NA	221	122	44	11	34	11	202	30	61	111
1964	68,092	13,171	9,147	4,024	4,024	NA	54,469	20,951	33,518	NA	NA	NA	264	161	43	11	36	14	188	30	60	98
1965	70,663	13,167	9,563	3,604	3,604	NA	56,878	23,629	33,249	NA	NA	NA	377	257	46	11	42	21	241	70	64	107
1966	75,361	13,208	9,809	3,399	3,399	NA	61,425	25,803	35,622	NA	NA	NA	452	317	49	10	50	26	276	83	73	120
1967	77,488	13,386	9,820	3,566	3,566	NA	63,375	29,031	34,343	NA	NA	NA	470	331	43	13	51	33	258	61	76	121
1968	78,308	12,737	9,230	3,507	3,507	NA	64,814	30,667	34,148	NA	NA	NA	492	347	38	19	45	44	264	61	78	126
1969	78,784	12,971	9,314	3,657	3,657	NA	65,016	32,931	32,085	NA	NA	NA	506	367	33	23	37	46	291	79	83	129
1970	74,281	13,375	9,910	3,465	3,465	NA	60,119	32,767	27,352	NA	NA	NA	492	366	28	22	31	44	296	86	79	132
1971	72,669	13,838	10,327	3,511	3,511	NA	58,157	32,399	25,758	NA	NA	NA	409	288	33	17	36	36	265	48	79	138
1972	75,042	14,020	10,567	3,453	3,453	NA	60,227	34,071	26,156	NA	NA	NA	404	250	50	14	54	36	390	174	76	140
1973	76,688	13,355	10,090	3,265	3,265	NA	62,249	37,109	25,140	NA	NA	NA	477	268	66	19	76	47	608	387	76	144
1974	74,921	13,058	9,635	3,423	3,423	NA	60,695	37,864	22,831	NA	NA	NA	490	260	70	23	85	52	679	456	75	147

CHAPTER 4 | Research and Development: U.S. Trends and International Comparisons

Year	All per-formers	All federal	Federal intramural <sup>a</sup>	FFRDCs <sup>b</sup>		Nonfederal govern-ment <sup>c</sup>		Business <sup>d</sup>						Higher education <sup>e</sup>						Other nonprofit organizations <sup>f</sup>			
	All funding sources	Total	Federal	Total	Federal	Total	Total	Own domestic	Federal	Other domestic business	Foreign business	Other	Total	Federal	Nonfederal govern-ment	Busi-ness	Higher ed-ucation	ONP	Total	Federal	Busi-ness	ONP	
1975	72,402	12,732	9,215	3,517	3,517	NA	58,519	36,890	21,629	NA	NA	NA	498	263	71	26	88	51	653	429	75	149	
1976	75,825	12,956	8,983	3,973	3,973	NA	61,699	38,962	22,737	NA	NA	NA	550	301	72	35	94	48	619	385	76	157	
1977	78,745	13,110	9,073	4,037	4,037	NA	64,331	40,779	23,552	NA	NA	NA	723	435	79	41	114	53	581	339	78	165	
1978	82,591	13,990	9,777	4,214	4,214	NA	67,060	43,774	23,286	NA	NA	NA	991	675	85	39	130	62	549	300	79	171	
1979	87,078	13,995	9,688	4,306	4,306	NA	71,324	47,033	24,292	NA	NA	NA	1,153	826	84	38	137	68	605	351	79	175	
1980	91,822	13,704	9,177	4,527	4,527	NA	76,274	51,583	24,691	NA	NA	NA	1,167	815	86	44	152	69	678	421	78	179	
1981	95,433	13,820	9,337	4,483	4,483	NA	79,443	53,082	26,362	NA	NA	NA	1,170	795	90	49	164	72	1,000	741	77	181	
1982	100,677	14,259	10,048	4,211	4,211	NA	84,288	56,702	27,586	NA	NA	NA	1,158	771	88	52	171	76	971	703	78	190	
1983	107,854	15,851	11,399	4,453	4,453	NA	89,731	60,753	28,978	NA	NA	NA	1,152	745	88	58	182	80	1,119	835	82	203	
1984	119,823	17,399	12,761	4,638	4,638	NA	99,829	68,025	31,803	NA	NA	NA	1,221	784	93	66	194	84	1,374	1,072	85	217	
1985	130,191	19,071	13,995	5,076	5,076	NA	108,351	72,959	35,391	NA	NA	NA	1,321	849	100	76	210	86	1,448	1,125	89	234	
1986	129,899	19,481	14,170	5,311	5,311	NA	107,664	70,817	36,847	NA	NA	NA	1,400	879	112	86	233	90	1,354	1,004	95	254	
1987	133,470	19,198	13,652	5,545	5,545	NA	111,529	71,248	40,281	NA	NA	NA	1,577	1,000	122	95	259	101	1,166	791	100	276	
1988	136,439	20,103	14,301	5,802	5,802	NA	113,507	75,239	38,268	NA	NA	NA	1,772	1,127	133	107	290	115	1,057	657	104	296	
1989	136,234	20,174	14,529	5,645	5,645	NA	112,942	80,253	32,689	NA	NA	NA	1,906	1,201	142	118	318	126	1,212	787	108	316	
1990	140,874	20,013	14,527	5,486	5,486	NA	117,375	88,972	28,403	NA	NA	NA	2,107	1,363	149	124	339	133	1,378	927	113	338	
1991	137,842	17,726	12,722	5,004	5,004	NA	116,364	91,354	25,010	NA	NA	NA	2,223	1,466	149	125	347	136	1,528	1,047	118	364	
1992	141,438	17,743	12,892	4,851	4,851	NA	119,840	95,493	24,347	NA	NA	NA	2,262	1,495	149	129	348	141	1,594	1,074	125	395	



CHAPTER 4 | Research and Development: U.S. Trends and International Comparisons

Year	All per-formers	All federal	Federal intramural <sup>a</sup>	FFRDCs <sup>b</sup>		Nonfederal govern-ment <sup>c</sup>		Business <sup>d</sup>					Higher education <sup>e</sup>						Other nonprofit organizations <sup>f</sup>			
	All funding sources	Total	Federal	Total	Federal	Total	Total	Own domestic	Federal	Other domestic business	Foreign business	Other	Total	Federal	Nonfederal govern-ment	Busi-ness	Higher ed-ucation	ONP	Total	Federal	Busi-ness	ONP
1993	138,005	16,689	12,556	4,133	4,133	NA	117,315	95,054	22,261	NA	NA	NA	2,352	1,560	151	135	359	148	1,649	1,089	132	428
1994	139,508	16,223	11,958	4,265	4,265	NA	119,115	97,147	21,968	NA	NA	NA	2,461	1,644	154	138	374	151	1,709	1,104	139	465
1995	150,123	16,846	12,296	4,550	4,550	NA	129,230	105,567	23,663	NA	NA	NA	2,405	1,566	163	144	382	150	1,641	987	148	506
1996	158,251	16,273	11,777	4,496	4,496	NA	138,024	115,773	22,251	NA	NA	NA	2,336	1,471	167	150	398	150	1,618	910	157	552
1997	164,926	15,904	11,635	4,269	4,269	NA	145,086	121,858	23,229	NA	NA	NA	2,170	1,335	154	145	393	143	1,766	880	198	688
1998	183,453	15,887	11,684	4,203	4,203	NA	163,635	140,237	23,399	NA	NA	NA	2,009	1,196	143	142	388	140	1,922	964	208	750
1999	192,737	15,737	11,572	4,165	4,165	NA	173,367	152,670	20,697	NA	NA	NA	1,702	857	146	145	406	147	1,931	908	222	800
2000	206,886	15,703	11,451	4,252	4,252	NA	187,752	171,254	16,498	NA	NA	NA	1,544	665	150	145	430	155	1,887	708	238	941
2001	200,278	17,263	13,208	4,056	3,907	NA	179,039	164,065	14,975	NA	NA	NA	1,682	771	153	140	454	163	2,293	1,043	235	1,015
2002	207,671	17,919	13,876	4,043	3,890	NA	185,548	170,189	15,359	NA	NA	NA	1,731	752	164	137	500	178	2,474	1,101	225	1,148
2003	202,320	19,096	14,580	4,515	4,364	NA	178,774	165,009	13,765	NA	NA	NA	2,075	1,034	179	136	538	187	2,376	857	225	1,294
2004	198,856	19,551	14,302	5,248	5,118	NA	173,962	157,782	16,179	NA	NA	NA	2,401	1,359	181	134	539	187	2,943	1,459	224	1,260
2005	212,780	20,411	15,213	5,197	5,059	NA	187,208	170,345	16,863	NA	NA	NA	2,280	1,246	172	133	545	185	2,882	1,316	230	1,335
2006	224,354	21,708	16,969	4,738	4,596	7	198,401	180,767	17,635	NA	NA	NA	2,006	977	165	133	548	183	2,232	636	239	1,357
2007	234,205	24,021	18,509	5,512	5,398	9	205,913	190,646	15,267	NA	NA	NA	1,970	919	168	137	555	191	2,292	583	247	1,462
2008	261,567	23,941	17,700	6,241	6,141	11	233,205	182,097	29,712	8,950	11,889	558	1,980	848	180	149	593	210	2,429	567	251	1,612
2009	256,036	23,497	17,245	6,252	6,159	13	226,554	179,841	30,435	7,041	8,732	505	3,441	1,569	288	289	915	381	2,531	550	241	1,740
2010	248,381	25,535	18,616	6,919	6,825	15	215,073	167,984	27,750	7,938	10,648	753	5,060	2,478	403	420	1,225	534	2,697	630	239	1,828

CHAPTER 4 | Research and Development: U.S. Trends and International Comparisons

Year	All per-formers	All federal	Federal intramural <sup>a</sup>	FFRDCs <sup>b</sup>		Nonfederal govern-ment <sup>c</sup>	Business <sup>d</sup>						Higher education <sup>e</sup>					Other nonprofit organizations <sup>f</sup>				
	All funding sources	Total	Federal	Total	Federal	Total	Total	Own domestic	Federal	Other domestic business	Foreign business	Other	Total	Federal	Nonfederal govern-ment	Busi-ness	Higher ed-ucation	ONP	Total	Federal	Busi-ness	ONP
2011	262,311	27,830	21,178	6,652	6,568	15	226,391	181,776	25,387	7,711	10,905	611	5,237	2,580	389	422	1,297	549	2,839	765	247	1,827
2012	259,720	25,345	18,953	6,392	6,303	14	226,396	183,271	24,559	7,202	10,971	392	5,396	2,554	359	441	1,448	594	2,570	492	248	1,829
2013	268,577	24,726	18,489	6,237	6,147	13	235,712	194,117	20,706	8,165	12,109	616	5,497	2,479	368	469	1,562	620	2,629	443	258	1,927
2014	277,010	24,886	18,655	6,231	6,138	12	243,841	205,074	16,599	7,638	13,877	653	5,563	2,391	369	504	1,637	662	2,708	433	267	2,008
2015 <sup>g</sup>	285,906	25,195	18,677	6,519	6,419	12	252,296	209,639	17,134	9,358	15,368	796	5,639	2,331	367	509	1,716	717	2,763	406	273	2,083

NA = not available.

FFRDC = federally funded research and development center; ONP = other nonprofit organization.

<sup>a</sup> See Appendix Table 4-2, footnote a.

<sup>b</sup> Type-of-R&D data for FFRDC R&D in 1953–54 includes the R&D of only university-administered FFRDCs. Starting in 2001, type-of-R&D data distinguish federally funded from nonfederally funded FFRDC R&D. (See also Appendix Table 4-2, footnote b.)

<sup>c</sup> Type-of-R&D data for state intramural R&D are not currently collected by the Survey of State Government R&D. (See also Appendix Table 4-2, footnote c.)

<sup>d</sup> Type-of-R&D data for business R&D in 1998–2007 were revised in response to data quality review considerations and are not directly comparable with the data for 1997 and earlier years. For 2008 and later years, the type-of-R&D splits for other than total, own-funded, and federally funded R&D are estimated. (See also Appendix Table 4-2, footnote d.)

<sup>e</sup> The type-of-R&D estimation procedure for higher education R&D was revised in 1998 and again in 2010; hence, these data are not directly comparable with data reported for earlier years. Type-of-R&D splits for other than total and federally funded are estimated. (See also Appendix Table 4-2, footnote e.)

<sup>f</sup> Type-of-R&D data for R&D by other nonprofit organizations in 1998 and later years are estimated, except for the R&D that is federally funded. (See also Appendix Table 4-2, footnote f.)

<sup>g</sup> Some data for 2015 are preliminary and may later be revised.

Note(s)

Detail may not add to total because of rounding. Constant-dollar estimates are derived from unrounded data. For trend comparisons, use only the historical data reported in this table, as some back-year data may have been revised. Except for the nonprofit sector, data are based on annual reports by performers in the National Science Foundation's annual R&D expenditure surveys: Business R&D and Innovation Survey, Higher Education R&D Survey, Survey of Federal Funds for R&D, FFRDC R&D Expenditures Survey, and Survey of State Government R&D. R&D expenditures by business performers—and also, before 2001, industry-administered FFRDCs—are collected on a calendar year basis. Expenditures for other performers are calendar year approximations based on fiscal year data. For federal performers in 1977 and afterward, the approximation equals 75% of the amount reported in the same fiscal year plus 25% of the amount reported in the subsequent fiscal year. Before 1977, the federal fiscal year began on 1 July, not 1 October, and the approximation is 50% of the amount reported in the same fiscal year plus 50% of the amount reported in the subsequent fiscal year. The fiscal year for higher education performers and state government performers generally begins 1 July, and the calendar year approximation is 50% of the amount reported in the same fiscal year plus 50% of the amount reported in the subsequent fiscal year.

Source(s)

National Science Foundation, National Center for Science and Engineering Statistics, National Patterns of R&D Resources (annual series).



CHAPTER 4 | Research and Development: U.S. Trends and International Comparisons

*Science and Engineering Indicators 2018*

CHAPTER 4 | Research and Development: U.S. Trends and International Comparisons

APPENDIX TABLE 4-6

U.S. R&D expenditures, by source of funds and performing sector: 1953–2015

(Millions of current and of constant 2009 dollars)

Year	All funding sources	Federal							Nonfederal government					Business					Higher ed-ucation	Other nonprofit organizations				
	All per-formers	Total	Federal intra-mural	FFRDC	Non-federal govern-ment	Busi-ness	Higher ed-ucation	ONP	Total	FFRDC	Non-federal govern-ment	Busi-ness	Higher ed-ucation	Total	FFRDC	Busi-ness	Higher ed-ucation	ONP	Higher ed-ucation	Total	FFRDC	Busi-ness	Higher ed-ucation	ONP
Current \$millions																								
1953	5,160	2,783	1,015	131	NA	1,430	149	58	40	NA	NA	NA	40	2,247	NA	2,200	21	26	37	55	NA	NA	27	28
1954	5,621	3,102	963	165	NA	1,750	165	61	45	NA	NA	NA	45	2,375	NA	2,320	24	31	40	60	NA	NA	29	31
1955	6,185	3,507	973	319	NA	1,960	191	65	50	NA	NA	NA	50	2,522	NA	2,460	27	35	42	64	NA	NA	32	32
1956	8,501	4,979	1,131	561	NA	2,995	221	71	57	NA	NA	NA	57	3,346	NA	3,277	32	37	46	74	NA	NA	36	38
1957	9,908	6,233	1,297	688	NA	3,928	242	79	64	NA	NA	NA	64	3,470	NA	3,396	37	37	51	91	NA	NA	40	51
1958	10,915	6,974	1,507	657	NA	4,436	280	95	72	NA	NA	NA	72	3,707	NA	3,630	39	38	56	107	NA	NA	45	62
1959	12,490	8,167	1,681	789	NA	5,217	356	125	81	NA	NA	NA	81	4,065	NA	3,983	40	42	61	117	NA	NA	50	67
1960	13,711	8,915	1,801	910	NA	5,604	453	148	90	NA	NA	NA	90	4,516	NA	4,428	40	48	67	123	NA	NA	55	68
1961	14,564	9,484	1,987	1,087	NA	5,685	557	169	101	NA	NA	NA	101	4,757	NA	4,668	40	49	75	148	NA	NA	62	86
1962	15,636	10,138	2,188	1,056	NA	6,008	687	200	112	NA	NA	NA	112	5,124	NA	5,029	41	54	84	179	NA	NA	70	109
1963	17,519	11,646	2,559	1,159	NA	6,856	839	234	125	NA	NA	NA	125	5,456	NA	5,360	41	55	96	197	NA	NA	78	119
1964	19,103	12,765	2,966	1,297	NA	7,257	995	250	138	NA	NA	NA	138	5,888	NA	5,792	41	55	114	200	NA	NA	88	112
1965	20,253	13,194	3,157	1,218	NA	7,367	1,167	286	150	NA	NA	NA	150	6,549	NA	6,445	42	62	136	225	NA	NA	101	124
1966	22,072	14,165	3,308	1,217	NA	7,977	1,335	329	160	NA	NA	NA	160	7,331	NA	7,216	45	70	165	252	NA	NA	114	138



CHAPTER 4 | Research and Development: U.S. Trends and International Comparisons

Year	All funding sources	Federal							Nonfederal government					Business					Higher ed-ucation	Other nonprofit organizations				
	All per-formers	Total	Federal intra-mural	FFRDC	Non-federal govern-ment	Busi-ness	Higher ed-ucation	ONP	Total	FFRDC	Non-federal govern-ment	Busi-ness	Higher ed-ucation	Total	FFRDC	Busi-ness	Higher ed-ucation	ONP	Higher ed-ucation	Total	FFRDC	Busi-ness	Higher ed-ucation	ONP
1985	114,671	52,641	13,093	6,134	NA	25,333	6,388	1,694	834	NA	NA	NA	834	57,962	NA	57,043	630	289	1,743	1,491	NA	NA	713	778
1986	120,249	54,622	13,505	6,405	NA	26,000	7,028	1,686	969	NA	NA	NA	969	60,991	NA	59,932	745	314	2,019	1,647	NA	NA	780	867
1987	126,360	58,609	13,588	6,792	NA	28,757	7,768	1,704	1,065	NA	NA	NA	1,065	62,576	NA	61,403	831	342	2,262	1,849	NA	NA	882	967
1988	133,881	60,131	14,342	7,212	NA	28,221	8,593	1,762	1,165	NA	NA	NA	1,165	67,977	NA	66,672	933	372	2,527	2,081	NA	NA	1,003	1,078
1989	141,891	60,465	15,231	7,497	NA	26,359	9,317	2,062	1,274	NA	NA	NA	1,274	74,966	NA	73,501	1,061	405	2,852	2,333	NA	NA	1,131	1,202
1990	151,993	61,610	15,671	7,853	NA	25,802	9,939	2,346	1,399	NA	NA	NA	1,399	83,208	NA	81,602	1,166	440	3,187	2,589	NA	NA	1,249	1,340
1991	160,876	60,783	15,249	8,093	NA	24,095	10,667	2,679	1,483	NA	NA	NA	1,483	92,300	NA	90,580	1,242	479	3,458	2,852	NA	NA	1,358	1,494
1992	165,350	60,915	15,853	8,360	NA	22,369	11,528	2,806	1,525	NA	NA	NA	1,525	96,229	NA	94,388	1,320	521	3,569	3,113	NA	NA	1,448	1,666
1993	165,730	60,528	16,531	8,003	NA	20,844	12,307	2,843	1,557	NA	NA	NA	1,557	96,549	NA	94,591	1,392	567	3,709	3,388	NA	NA	1,531	1,857
1994	169,207	60,777	16,355	8,254	NA	20,261	12,996	2,911	1,623	NA	NA	NA	1,623	99,204	NA	97,131	1,456	617	3,938	3,665	NA	NA	1,595	2,071
1995	183,625	62,969	16,904	8,448	NA	21,178	13,592	2,847	1,751	NA	NA	NA	1,751	110,871	NA	108,652	1,548	671	4,110	3,925	NA	NA	1,617	2,308
1996	197,346	63,394	16,585	8,464	NA	21,356	14,084	2,906	1,861	NA	NA	NA	1,861	123,417	NA	121,015	1,672	730	4,436	4,239	NA	NA	1,666	2,574
1997	211,894	64,362	16,819	8,413	NA	21,798	14,317	3,014	1,902	NA	NA	NA	1,902	136,208	NA	133,611	1,788	809	4,852	4,571	NA	NA	1,767	2,804
1998	225,759	65,908	17,362	8,480	NA	22,086	14,699	3,281	1,920	NA	NA	NA	1,920	147,774	NA	145,016	1,898	859	5,193	4,963	NA	NA	1,871	3,092
1999	244,451	66,817	18,142	8,704	NA	20,496	15,714	3,761	2,036	NA	NA	NA	2,036	164,545	NA	161,594	2,020	931	5,654	5,399	NA	NA	2,050	3,349
2000	267,950	67,238	19,247	9,269	NA	17,117	17,095	4,510	2,182	NA	NA	NA	2,182	185,975	NA	182,844	2,112	1,020	6,270	6,285	NA	NA	2,258	4,027
2001	278,539	73,793	22,374	10,056	NA	16,899	18,976	5,488	2,341	22	NA	NA	2,319	188,408	142	185,118	2,120	1,029	6,874	7,122	218	NA	2,461	4,443
2002	277,911	78,873	23,798	11,242	NA	16,401	21,655	5,778	2,553	32	NA	NA	2,521	180,704	135	177,467	2,103	998	7,673	8,109	275	NA	2,732	5,102

CHAPTER 4 | Research and Development: U.S. Trends and International Comparisons

Year	All funding sources	Federal							Nonfederal government					Business					Higher ed-ucation	Other nonprofit organizations				
	All per-formers	Total	Federal intra-mural	FFRDC	Non-federal govern-ment	Busi-ness	Higher ed-ucation	ONP	Total	FFRDC	Non-federal govern-ment	Busi-ness	Higher ed-ucation	Total	FFRDC	Busi-ness	Higher ed-ucation	ONP	Higher ed-ucation	Total	FFRDC	Busi-ness	Higher ed-ucation	ONP
2003	291,365	85,133	24,982	11,841	NA	17,798	24,567	5,945	2,788	32	NA	NA	2,756	186,171	134	182,926	2,090	1,020	8,286	8,988	245	NA	2,879	5,864
2004	302,731	90,795	24,898	12,471	NA	20,266	26,624	6,537	2,926	31	NA	NA	2,896	191,346	122	188,035	2,148	1,041	8,637	9,028	165	NA	2,993	5,870
2005	325,288	95,413	26,322	12,894	NA	21,909	27,743	6,545	2,977	32	NA	NA	2,945	207,775	139	204,250	2,279	1,107	9,353	9,771	180	NA	3,170	6,420
2006	350,908	99,938	28,240	12,969	105	24,304	28,277	6,044	3,293	31	204	NA	3,059	227,182	171	223,365	2,464	1,182	10,176	10,320	200	NA	3,394	6,726
2007	377,890	105,128	29,859	13,845	135	26,585	28,725	5,980	3,594	32	253	NA	3,308	246,815	180	242,682	2,697	1,257	10,933	11,420	216	NA	3,767	7,438
2008	404,773	117,615	29,839	15,369	176	36,360	29,635	6,236	4,221	33	315	306	3,567	258,016	199	253,562	2,954	1,301	11,738	13,184	209	452	4,161	8,362
2009	402,931	125,765	30,560	16,571	224	39,573	31,741	7,097	4,295	40	381	195	3,679	246,610	184	242,135	3,033	1,258	12,056	14,205	218	490	4,400	9,097
2010	406,580	126,617	31,970	18,409	264	34,199	34,682	7,093	4,302	46	427	156	3,673	248,124	174	243,732	2,953	1,265	12,262	15,275	199	890	4,515	9,672
2011	426,160	127,015	34,950	18,176	273	31,309	35,742	6,564	4,386	30	421	321	3,615	266,421	189	261,901	2,999	1,333	13,104	15,235	179	561	4,630	9,865
2012	433,619	123,838	34,017	17,727	266	30,621	34,968	6,239	4,158	42	398	157	3,560	275,717	185	270,997	3,169	1,366	14,300	15,607	173	476	4,899	10,059
2013	453,964	120,130	33,406	17,296	257	29,362	33,839	5,970	4,244	45	362	194	3,643	297,167	195	292,153	3,375	1,444	15,378	17,045	144	819	5,312	10,770
2014	475,426	118,363	34,783	17,523	247	26,554	33,121	6,135	4,214	26	336	138	3,715	318,382	218	313,043	3,601	1,520	16,217	18,250	137	993	5,701	11,420
2015 <sup>a</sup>	495,144	120,933	35,673	18,287	249	26,990	33,546	6,189	4,280	19	361	127	3,772	333,207	205	327,589	3,842	1,572	17,334	19,390	138	1,115	6,159	11,978
Constant 2009 \$millions																								
1953	34,048	18,360	6,697	864	NA	9,436	983	379	261	NA	NA	NA	261	14,823	NA	14,516	135	172	241	363	NA	NA	178	185
1954	36,745	20,280	6,293	1,075	NA	11,441	1,075	396	291	NA	NA	NA	291	15,524	NA	15,167	154	203	258	392	NA	NA	190	203
1955	39,748	22,538	6,253	2,047	NA	12,596	1,227	415	321	NA	NA	NA	321	16,208	NA	15,809	174	225	270	411	NA	NA	206	206
1956	52,831	30,942	7,026	3,487	NA	18,614	1,374	441	351	NA	NA	NA	351	20,792	NA	20,367	196	230	286	460	NA	NA	224	236





CHAPTER 4 | Research and Development: U.S. Trends and International Comparisons

Year	All funding sources	Federal							Nonfederal government					Business					Higher ed-ucation	Other nonprofit organizations				
	All per-formers	Total	Federal intra-mural	FFRDC	Non-federal govern-ment	Busi-ness	Higher ed-ucation	ONP	Total	FFRDC	Non-federal govern-ment	Busi-ness	Higher ed-ucation	Total	FFRDC	Busi-ness	Higher ed-ucation	ONP	Higher ed-ucation	Total	FFRDC	Busi-ness	Higher ed-ucation	ONP
1975	113,745	59,097	17,733	6,438	NA	25,121	7,653	2,152	1,110	NA	NA	NA	1,110	50,459	NA	49,686	376	396	1,376	1,704	NA	NA	867	836
1976	119,199	61,335	17,804	7,256	NA	26,210	7,916	2,149	1,115	NA	NA	NA	1,115	53,508	NA	52,704	396	409	1,451	1,789	NA	NA	905	884
1977	123,345	62,818	17,678	7,697	NA	27,104	8,232	2,107	1,121	NA	NA	NA	1,121	55,902	NA	55,044	440	419	1,618	1,886	NA	NA	958	928
1978	129,565	64,926	18,515	8,473	NA	26,879	8,852	2,207	1,178	NA	NA	NA	1,178	59,722	NA	58,813	483	426	1,806	1,933	NA	NA	967	967
1979	136,047	66,883	18,354	8,762	NA	27,893	9,453	2,420	1,183	NA	NA	NA	1,183	64,111	NA	63,156	527	428	1,928	1,942	NA	NA	947	995
1980	142,470	67,571	17,646	9,130	NA	28,736	9,767	2,292	1,168	NA	NA	NA	1,168	69,696	NA	68,675	594	427	2,072	1,962	NA	NA	944	1,018
1981	148,990	69,534	17,733	9,054	NA	30,908	9,624	2,214	1,197	NA	NA	NA	1,197	74,087	NA	73,015	647	425	2,179	1,992	NA	NA	954	1,038
1982	156,699	72,060	18,438	8,855	NA	33,109	9,467	2,191	1,205	NA	NA	NA	1,205	78,967	NA	77,828	704	435	2,341	2,125	NA	NA	1,035	1,090
1983	167,927	77,384	20,218	9,354	NA	35,649	9,727	2,437	1,228	NA	NA	NA	1,228	84,504	NA	83,242	807	456	2,532	2,279	NA	NA	1,110	1,169
1984	184,335	83,781	21,483	10,101	NA	39,046	10,362	2,790	1,300	NA	NA	NA	1,300	94,088	NA	92,677	933	479	2,730	2,436	NA	NA	1,178	1,258
1985	200,332	91,965	22,873	10,716	NA	44,257	11,160	2,959	1,456	NA	NA	NA	1,456	101,261	NA	99,656	1,101	505	3,045	2,605	NA	NA	1,246	1,359
1986	205,920	93,538	23,126	10,968	NA	44,524	12,034	2,887	1,659	NA	NA	NA	1,659	104,445	NA	102,631	1,276	538	3,457	2,821	NA	NA	1,336	1,485
1987	211,005	97,870	22,691	11,341	NA	48,020	12,972	2,846	1,778	NA	NA	NA	1,778	104,494	NA	102,535	1,388	571	3,777	3,087	NA	NA	1,472	1,615
1988	216,002	97,015	23,139	11,637	NA	45,532	13,864	2,843	1,880	NA	NA	NA	1,880	109,673	NA	107,568	1,505	600	4,077	3,358	NA	NA	1,618	1,740
1989	220,356	93,903	23,653	11,643	NA	40,935	14,469	3,202	1,979	NA	NA	NA	1,979	116,422	NA	114,147	1,647	628	4,429	3,623	NA	NA	1,756	1,867
1990	227,623	92,267	23,469	11,760	NA	38,641	14,885	3,513	2,095	NA	NA	NA	2,095	124,611	NA	122,206	1,745	659	4,772	3,878	NA	NA	1,870	2,007
1991	233,168	88,097	22,102	11,730	NA	34,923	15,460	3,883	2,149	NA	NA	NA	2,149	133,777	NA	131,284	1,799	694	5,011	4,134	NA	NA	1,968	2,166
1992	234,312	86,320	22,465	11,846	NA	31,698	16,335	3,976	2,161	NA	NA	NA	2,161	136,362	NA	133,754	1,870	738	5,057	4,412	NA	NA	2,051	2,361



## CHAPTER 4 | Research and Development: U.S. Trends and International Comparisons

Year	All funding sources	Federal							Nonfederal government					Business					Higher ed-ucation	Other nonprofit organizations				
	All per-formers	Total	Federal intra-mural	FFRDC	Non-federal govern-ment	Busi-ness	Higher ed-ucation	ONP	Total	FFRDC	Non-federal govern-ment	Busi-ness	Higher ed-ucation	Total	FFRDC	Busi-ness	Higher ed-ucation	ONP	Higher ed-ucation	Total	FFRDC	Busi-ness	Higher ed-ucation	ONP
2011	412,503	122,944	33,830	17,593	264	30,306	34,597	6,354	4,245	29	407	311	3,499	257,883	183	253,508	2,902	1,290	12,684	14,747	173	543	4,482	9,549
2012	412,127	117,700	32,331	16,849	253	29,103	33,234	5,930	3,952	40	379	149	3,384	262,051	176	257,566	3,012	1,298	13,591	14,833	164	452	4,656	9,560
2013	424,610	112,363	31,246	16,178	241	27,463	31,650	5,584	3,970	42	339	181	3,407	277,952	183	273,262	3,156	1,351	14,383	15,943	134	766	4,969	10,074
2014	436,844	108,758	31,961	16,101	227	24,399	30,433	5,637	3,872	24	309	127	3,413	292,544	200	287,639	3,309	1,397	14,901	16,769	126	912	5,238	10,493
2015 <sup>a</sup>	450,080	109,927	32,427	16,622	226	24,534	30,493	5,625	3,890	17	328	115	3,429	302,881	186	297,774	3,492	1,429	15,756	17,625	125	1,014	5,598	10,888

NA = not available.

FFRDC = federally funded research and development center; ONP = other nonprofit organization.

<sup>a</sup> Some data for 2015 are preliminary and may later be revised.

**Note(s)**

This table reaggregates the R&D performer data in Appendix Table 4-2 according to major categories of R&D funding: federal government, nonfederal government (state and local), business, higher education, and other nonprofit organizations. Business sources of R&D funding in this table include the own funds of domestic R&D performing businesses, funds from other domestic businesses, and funds from foreign businesses. For interpretive detail on the R&D performers listed, see Appendix Table 4-2, footnotes a–f. Detail may not add to total because of rounding. Constant-dollar estimates are derived from unrounded data. For trend comparisons, use only the historical data reported in this table, as some back-year data may have been revised. Except for the nonprofit sector, data are based on annual reports by performers in the National Science Foundation's annual R&D expenditure surveys: Business R&D and Innovation Survey, Higher Education R&D Survey, Survey of Federal Funds for R&D, FFRDC R&D Expenditures Survey, and Survey of State Government R&D. R&D expenditures by business performers—and also, before 2001, industry-administered FFRDCs—are collected on a calendar year basis. Expenditures for other performers are calendar year approximations based on fiscal year data (see Appendix Table 4-2, general notes). The 1998–2015 data for ONP R&D performance funded by businesses and the nonprofit sector itself are estimated, based on parameters from the 1996–97 Survey of R&D Funding and Performance by Nonprofit Organizations.

## Source(s)

National Science Foundation, National Center for Science and Engineering Statistics, National Patterns of R&D Resources (annual series).

Science and Engineering Indicators 2018

CHAPTER 4 | Research and Development: U.S. Trends and International Comparisons

APPENDIX TABLE 4-7

U.S. basic research expenditures, by source of funds and performing sector: 1953–2015

(Millions of current and of constant 2009 dollars)

Year	All funding sources	Federal							Nonfederal government					Business					Higher ed-ucation	Other nonprofit organizations				
	All per-formers	Total	Federal intra-mural	FFRDC	Non-federal govern-ment	Busi-ness	Higher ed-ucation	ONP	Total	FFRDC	Non-federal govern-ment	Busi-ness	Higher ed-ucation	Total	FFRDC	Busi-ness	Higher ed-ucation	ONP	Higher ed-ucation	Total	FFRDC	Busi-ness	Higher ed-ucation	ONP
Current \$millions																								
1953	460	265	102	36	NA	19	82	27	7	NA	NA	NA	7	154	NA	132	13	9	6	28	NA	NA	16	12
1954	509	291	96	45	NA	23	97	31	10	NA	NA	NA	10	169	NA	143	15	11	8	31	NA	NA	18	13
1955	570	318	98	62	NA	7	117	35	14	NA	NA	NA	14	192	NA	162	17	13	12	35	NA	NA	21	14
1956	718	392	114	89	NA	7	143	41	19	NA	NA	NA	19	251	NA	216	20	15	15	41	NA	NA	24	17
1957	813	451	124	110	NA	4	167	48	25	NA	NA	NA	25	268	NA	230	23	15	20	50	NA	NA	27	23
1958	943	537	149	115	NA	14	202	58	31	NA	NA	NA	31	292	NA	252	24	16	24	59	NA	NA	31	28
1959	1,087	665	165	134	NA	34	263	71	38	NA	NA	NA	38	290	NA	248	24	18	28	66	NA	NA	36	30
1960	1,286	794	184	150	NA	36	341	84	45	NA	NA	NA	45	343	NA	297	25	21	33	71	NA	NA	41	30
1961	1,511	972	230	177	NA	30	432	104	54	NA	NA	NA	54	361	NA	314	25	22	40	85	NA	NA	48	37
1962	1,824	1,218	252	189	NA	104	546	128	64	NA	NA	NA	64	394	NA	345	25	24	48	101	NA	NA	55	46
1963	2,115	1,446	285	216	NA	109	689	147	75	NA	NA	NA	75	425	NA	375	25	25	58	113	NA	NA	63	50
1964	2,396	1,693	339	245	NA	123	824	163	84	NA	NA	NA	84	434	NA	384	25	25	70	115	NA	NA	68	47
1965	2,664	1,900	375	250	NA	157	944	175	94	NA	NA	NA	94	462	NA	406	27	29	86	122	NA	NA	70	52
1966	2,930	2,075	410	273	NA	142	1,066	184	104	NA	NA	NA	104	512	NA	451	29	32	106	133	NA	NA	75	58

CHAPTER 4 | Research and Development: U.S. Trends and International Comparisons

Year	All funding sources	Federal							Nonfederal government					Business					Higher ed-ucation	Other nonprofit organizations				
	All per-formers	Total	Federal intra-mural	FFRDC	Non-federal govern-ment	Busi-ness	Higher ed-ucation	ONP	Total	FFRDC	Non-federal govern-ment	Busi-ness	Higher ed-ucation	Total	FFRDC	Busi-ness	Higher ed-ucation	ONP	Higher ed-ucation	Total	FFRDC	Busi-ness	Higher ed-ucation	ONP
1967	3,168	2,280	434	301	NA	168	1,188	190	114	NA	NA	NA	114	495	NA	427	34	34	136	144	NA	NA	83	61
1968	3,376	2,399	482	315	NA	145	1,265	192	131	NA	NA	NA	131	537	NA	462	38	37	156	154	NA	NA	91	63
1969	3,491	2,457	545	313	NA	123	1,288	188	153	NA	NA	NA	153	541	NA	458	40	43	171	170	NA	NA	103	67
1970	3,594	2,501	562	304	NA	122	1,323	191	179	NA	NA	NA	179	531	NA	444	43	44	196	187	NA	NA	115	72
1971	3,720	2,559	581	289	NA	101	1,385	204	194	NA	NA	NA	194	551	NA	456	50	45	214	204	NA	NA	127	77
1972	3,850	2,656	603	313	NA	91	1,437	213	195	NA	NA	NA	195	565	NA	463	55	47	216	218	NA	NA	134	84
1973	4,099	2,847	652	382	NA	96	1,489	229	196	NA	NA	NA	196	607	NA	499	59	49	223	227	NA	NA	137	90
1974	4,511	3,146	715	467	NA	114	1,609	242	204	NA	NA	NA	204	656	NA	536	66	54	250	254	NA	NA	153	102
1975	4,875	3,415	760	533	NA	104	1,768	251	212	NA	NA	NA	212	704	NA	573	72	59	264	280	NA	NA	164	116
1976	5,373	3,793	850	629	NA	116	1,924	274	218	NA	NA	NA	218	774	NA	634	75	65	283	305	NA	NA	175	131
1977	6,008	4,235	943	746	NA	135	2,114	297	232	NA	NA	NA	232	862	NA	701	89	72	334	346	NA	NA	198	148
1978	6,959	4,950	1,044	1,005	NA	156	2,399	346	260	NA	NA	NA	260	970	NA	785	107	79	398	380	NA	NA	213	168
1979	7,836	5,558	1,112	1,160	NA	161	2,719	406	286	NA	NA	NA	286	1,107	NA	893	128	87	466	419	NA	NA	229	190
1980	8,747	6,147	1,212	1,294	NA	170	3,061	411	307	NA	NA	NA	307	1,286	NA	1,035	156	95	544	463	NA	NA	248	215
1981	9,658	6,591	1,343	1,430	NA	164	3,331	324	338	NA	NA	NA	338	1,600	NA	1,313	183	105	615	512	NA	NA	269	243
1982	10,651	7,121	1,522	1,503	NA	253	3,475	369	368	NA	NA	NA	368	1,854	NA	1,523	215	115	716	591	NA	NA	317	275
1983	11,880	7,853	1,733	1,661	NA	346	3,689	426	396	NA	NA	NA	396	2,146	NA	1,760	260	127	816	668	NA	NA	358	311
1984	13,332	8,651	1,877	1,854	NA	340	4,087	494	436	NA	NA	NA	436	2,584	NA	2,132	313	139	915	746	NA	NA	395	351

CHAPTER 4 | Research and Development: U.S. Trends and International Comparisons

Year	All funding sources	Federal							Nonfederal government					Business					Higher ed-ucation	Other nonprofit organizations				
	All per-formers	Total	Federal intra-mural	FFRDC	Non-federal govern-ment	Busi-ness	Higher ed-ucation	ONP	Total	FFRDC	Non-federal govern-ment	Busi-ness	Higher ed-ucation	Total	FFRDC	Busi-ness	Higher ed-ucation	ONP	Higher ed-ucation	Total	FFRDC	Busi-ness	Higher ed-ucation	ONP
1985	14,748	9,407	1,947	1,936	NA	358	4,606	560	514	NA	NA	NA	514	2,915	NA	2,373	389	153	1,075	837	NA	NA	440	397
1986	17,154	10,220	2,026	2,045	NA	434	5,122	594	606	NA	NA	NA	606	4,130	NA	3,496	466	168	1,262	936	NA	NA	488	449
1987	18,481	11,090	2,047	2,242	NA	598	5,527	675	659	NA	NA	NA	659	4,282	NA	3,583	514	185	1,399	1,052	NA	NA	545	507
1988	19,787	12,097	2,116	2,633	NA	656	5,937	756	705	NA	NA	NA	705	4,275	NA	3,507	565	203	1,530	1,180	NA	NA	607	573
1989	21,891	13,392	2,309	2,815	NA	986	6,422	860	766	NA	NA	NA	766	4,692	NA	3,832	637	223	1,714	1,327	NA	NA	680	647
1990	23,029	14,057	2,319	3,033	NA	869	6,889	947	847	NA	NA	NA	847	4,710	NA	3,760	705	245	1,929	1,486	NA	NA	756	730
1991	27,140	15,283	2,378	3,195	NA	1,251	7,423	1,036	912	NA	NA	NA	912	7,157	NA	6,125	764	269	2,127	1,660	NA	NA	836	825
1992	27,604	15,710	2,419	3,408	NA	712	8,058	1,114	941	NA	NA	NA	941	6,925	NA	5,816	814	295	2,203	1,824	NA	NA	893	931
1993	28,743	16,399	2,621	3,517	NA	466	8,638	1,157	952	NA	NA	NA	952	7,136	NA	5,961	851	324	2,268	1,987	NA	NA	936	1,051
1994	29,651	16,770	2,547	3,512	NA	436	9,139	1,137	992	NA	NA	NA	992	7,323	NA	6,078	890	356	2,406	2,160	NA	NA	974	1,186
1995	29,610	16,990	2,689	3,307	NA	190	9,634	1,170	1,070	NA	NA	NA	1,070	6,715	NA	5,379	945	390	2,511	2,326	NA	NA	987	1,338
1996	32,799	18,063	2,680	3,393	NA	650	10,092	1,248	1,149	NA	NA	NA	1,149	8,309	NA	6,848	1,032	428	2,740	2,539	NA	NA	1,028	1,510
1997	36,717	19,254	2,746	3,404	NA	1,029	10,758	1,317	1,233	NA	NA	NA	1,233	10,376	NA	8,766	1,161	449	3,150	2,704	NA	NA	1,147	1,557
1998	34,842	20,473	3,003	3,441	NA	1,002	11,567	1,461	1,292	NA	NA	NA	1,292	6,606	NA	4,851	1,278	477	3,495	2,976	NA	NA	1,259	1,717
1999	38,282	22,364	3,347	3,719	NA	1,108	12,456	1,734	1,386	NA	NA	NA	1,386	7,429	NA	5,537	1,375	517	3,848	3,255	NA	NA	1,396	1,860
2000	42,033	24,295	3,765	4,037	NA	925	13,469	2,099	1,501	NA	NA	NA	1,501	8,134	NA	6,115	1,453	566	4,314	3,790	NA	NA	1,553	2,236
2001	46,843	26,802	4,260	4,404	NA	754	14,919	2,464	1,615	10	NA	NA	1,606	9,400	62	7,299	1,467	571	4,759	4,267	95	NA	1,704	2,467
2002	50,789	30,141	4,511	5,029	NA	888	17,139	2,575	1,759	14	NA	NA	1,745	8,730	61	6,659	1,456	554	5,311	4,847	123	NA	1,891	2,833

CHAPTER 4 | Research and Development: U.S. Trends and International Comparisons

Year	All funding sources	Federal							Nonfederal government					Business					Higher ed-ucation	Other nonprofit organizations				
	All per-formers	Total	Federal intra-mural	FFRDC	Non-federal govern-ment	Busi-ness	Higher ed-ucation	ONP	Total	FFRDC	Non-federal govern-ment	Busi-ness	Higher ed-ucation	Total	FFRDC	Busi-ness	Higher ed-ucation	ONP	Higher ed-ucation	Total	FFRDC	Busi-ness	Higher ed-ucation	ONP
2003	54,823	32,889	4,664	4,904	NA	1,386	19,220	2,714	1,906	13	NA	NA	1,893	9,002	55	6,944	1,436	567	5,692	5,335	102	NA	1,978	3,256
2004	56,379	34,139	4,697	4,852	NA	1,072	20,730	2,788	2,011	12	NA	NA	2,000	8,872	48	6,763	1,483	578	5,965	5,391	64	NA	2,067	3,259
2005	59,904	35,566	4,770	5,000	NA	1,108	21,786	2,903	2,080	12	NA	NA	2,068	9,828	54	7,559	1,600	614	6,568	5,861	70	NA	2,226	3,565
2006	61,566	36,374	4,716	5,080	15	1,444	22,270	2,849	2,232	12	29	NA	2,191	9,428	67	6,940	1,765	656	7,288	6,244	78	NA	2,431	3,735
2007	64,600	36,093	4,621	3,298	19	2,780	22,546	2,829	2,446	10	36	NA	2,400	11,199	57	8,488	1,956	698	7,932	6,930	68	NA	2,733	4,130
2008	68,536	35,916	4,957	3,432	25	1,475	22,954	3,073	2,641	11	45	12	2,573	13,782	65	10,864	2,131	722	8,467	7,731	68	18	3,002	4,643
2009	72,659	37,652	5,441	4,432	32	1,340	22,909	3,498	2,524	13	54	13	2,444	16,132	58	13,397	1,980	698	8,199	8,151	69	34	2,997	5,051
2010	75,907	39,855	5,111	6,475	37	1,406	23,412	3,414	2,339	18	60	10	2,251	17,416	67	14,897	1,750	702	7,882	8,415	77	58	2,910	5,370
2011	73,019	38,963	5,047	6,333	39	677	23,787	3,081	2,311	11	60	21	2,219	14,858	67	12,284	1,767	740	8,348	8,538	64	38	2,960	5,477
2012	73,284	37,904	5,489	5,530	38	644	23,111	3,092	2,256	14	56	10	2,176	15,258	61	12,611	1,828	758	9,083	8,784	57	29	3,113	5,585
2013	78,485	35,991	5,330	4,085	36	1,196	22,313	3,031	2,272	12	51	21	2,188	20,996	53	18,203	1,939	802	9,765	9,461	39	88	3,354	5,980
2014	82,061	36,770	5,705	4,077	41	2,044	21,813	3,090	2,306	6	56	17	2,228	22,710	53	19,757	2,057	844	10,220	10,055	34	119	3,562	6,341
2015 <sup>a</sup>	83,462	36,946	5,926	4,043	41	2,038	21,888	3,010	2,354	4	60	14	2,277	22,717	47	19,621	2,176	873	10,880	10,565	32	120	3,763	6,651
Constant 2009 \$millions																								
1953	3,032	1,749	670	238	NA	125	538	178	43	NA	NA	NA	43	1,016	NA	871	86	59	40	185	NA	NA	106	79
1954	3,324	1,899	628	291	NA	150	631	199	62	NA	NA	NA	62	1,105	NA	935	98	72	55	203	NA	NA	118	85
1955	3,663	2,044	627	398	NA	45	749	225	89	NA	NA	NA	89	1,234	NA	1,041	109	84	75	222	NA	NA	132	90
1956	4,461	2,438	705	553	NA	42	886	252	118	NA	NA	NA	118	1,557	NA	1,342	121	93	96	252	NA	NA	146	106







CHAPTER 4 | Research and Development: U.S. Trends and International Comparisons

Year	All funding sources	Federal							Nonfederal government					Business					Higher ed-ucation	Other nonprofit organizations				
	All per-formers	Total	Federal intra-mural	FFRDC	Non-federal govern-ment	Busi-ness	Higher ed-ucation	ONP	Total	FFRDC	Non-federal govern-ment	Busi-ness	Higher ed-ucation	Total	FFRDC	Busi-ness	Higher ed-ucation	ONP	Higher ed-ucation	Total	FFRDC	Busi-ness	Higher ed-ucation	ONP
1993	39,783	22,698	3,628	4,868	NA	645	11,956	1,601	1,318	NA	NA	NA	1,318	9,877	NA	8,251	1,178	448	3,140	2,750	NA	NA	1,296	1,455
1994	40,185	22,727	3,452	4,759	NA	591	12,385	1,541	1,344	NA	NA	NA	1,344	9,925	NA	8,237	1,206	482	3,261	2,928	NA	NA	1,320	1,607
1995	39,311	22,555	3,570	4,390	NA	252	12,789	1,553	1,420	NA	NA	NA	1,420	8,914	NA	7,141	1,255	518	3,333	3,088	NA	NA	1,311	1,777
1996	42,763	23,550	3,494	4,424	NA	847	13,158	1,628	1,498	NA	NA	NA	1,498	10,833	NA	8,928	1,346	559	3,572	3,310	NA	NA	1,341	1,969
1997	47,065	24,680	3,520	4,363	NA	1,319	13,791	1,688	1,581	NA	NA	NA	1,581	13,301	NA	11,237	1,488	576	4,037	3,466	NA	NA	1,471	1,995
1998	44,183	25,962	3,808	4,363	NA	1,271	14,668	1,852	1,639	NA	NA	NA	1,639	8,376	NA	6,151	1,620	605	4,432	3,774	NA	NA	1,597	2,177
1999	47,814	27,932	4,180	4,645	NA	1,384	15,558	2,166	1,731	NA	NA	NA	1,731	9,279	NA	6,916	1,718	645	4,807	4,066	NA	NA	1,743	2,323
2000	51,331	29,668	4,598	4,929	NA	1,130	16,448	2,564	1,833	NA	NA	NA	1,833	9,933	NA	7,468	1,774	691	5,268	4,628	NA	NA	1,897	2,731
2001	55,929	32,001	5,087	5,258	NA	900	17,813	2,942	1,929	12	NA	NA	1,917	11,223	74	8,715	1,752	682	5,682	5,094	114	NA	2,035	2,946
2002	59,724	35,444	5,304	5,914	NA	1,044	20,154	3,028	2,069	17	NA	NA	2,052	10,266	71	7,831	1,713	652	6,246	5,700	145	NA	2,224	3,331
2003	63,208	37,918	5,378	5,654	NA	1,598	22,159	3,130	2,198	16	NA	NA	2,182	10,379	64	8,006	1,656	653	6,562	6,151	117	NA	2,280	3,754
2004	63,262	38,307	5,270	5,444	NA	1,203	23,261	3,129	2,257	13	NA	NA	2,244	9,955	53	7,589	1,665	649	6,694	6,049	72	NA	2,320	3,657
2005	65,122	38,664	5,186	5,435	NA	1,205	23,683	3,155	2,261	13	NA	NA	2,248	10,684	59	8,217	1,740	668	7,140	6,371	76	NA	2,420	3,875
2006	64,933	38,364	4,974	5,358	16	1,523	23,488	3,005	2,354	13	30	NA	2,311	9,944	71	7,320	1,861	692	7,687	6,585	82	NA	2,564	3,939
2007	66,368	37,081	4,747	3,388	20	2,856	23,163	2,907	2,513	10	37	NA	2,466	11,505	58	8,720	2,010	717	8,149	7,120	70	NA	2,808	4,243
2008	69,057	36,188	4,994	3,458	25	1,486	23,128	3,097	2,661	11	45	12	2,593	13,886	66	10,946	2,147	728	8,532	7,790	69	18	3,024	4,678
2009	72,659	37,652	5,441	4,432	32	1,340	22,909	3,498	2,524	13	54	13	2,444	16,132	58	13,397	1,980	698	8,199	8,151	69	34	2,997	5,051
2010	74,991	39,374	5,049	6,397	37	1,389	23,129	3,373	2,311	18	60	10	2,223	17,206	66	14,717	1,729	694	7,786	8,313	76	58	2,874	5,305

CHAPTER 4 | Research and Development: U.S. Trends and International Comparisons

Year	All funding sources	Federal							Nonfederal government					Business					Higher ed-ucation	Other nonprofit organizations				
	All per-formers	Total	Federal intra-mural	FFRDC	Non-federal govern-ment	Busi-ness	Higher ed-ucation	ONP	Total	FFRDC	Non-federal govern-ment	Busi-ness	Higher ed-ucation	Total	FFRDC	Busi-ness	Higher ed-ucation	ONP	Higher ed-ucation	Total	FFRDC	Busi-ness	Higher ed-ucation	ONP
2011	70,679	37,715	4,885	6,130	37	655	23,025	2,982	2,237	10	58	21	2,148	14,382	65	11,890	1,710	716	8,080	8,265	62	36	2,865	5,302
2012	69,652	36,025	5,217	5,256	36	612	21,965	2,939	2,144	13	54	9	2,068	14,502	58	11,986	1,737	721	8,633	8,348	54	28	2,959	5,308
2013	73,410	33,664	4,986	3,821	34	1,119	20,870	2,835	2,125	11	48	20	2,046	19,638	49	17,026	1,813	750	9,134	8,849	36	82	3,137	5,593
2014	75,401	33,786	5,242	3,746	38	1,878	20,042	2,839	2,119	6	51	15	2,047	20,867	49	18,153	1,890	775	9,390	9,239	31	109	3,273	5,826
2015 <sup>a</sup>	75,866	33,584	5,387	3,675	37	1,853	19,896	2,736	2,140	4	54	12	2,069	20,649	43	17,835	1,978	793	9,890	9,603	29	109	3,420	6,046

NA = not available.

FFRDC = federally funded research and development center; ONP = other nonprofit organizations.

<sup>a</sup> Some data for 2015 are preliminary and may later be revised.

Note(s)

This table reaggregates the R&D performer data in Appendix Table 4-3 according to major categories of R&D funding: federal government, nonfederal government (state and local), business, higher education, and other nonprofit organizations. Business sources of R&D funding in this table include the own funds of domestic R&D performing businesses, funds from other domestic businesses, and funds from foreign businesses. For interpretive detail on the R&D performers listed, see Appendix Table 4-2, footnotes a–f. Detail may not add to total because of rounding. Constant-dollar estimates are derived from unrounded data. For comparisons, use only the historical data reported in this table because some back-year data may have been revised. Except for the nonprofit sector, data are based on annual reports by performers in the National Science Foundation's annual R&D expenditure surveys: Business R&D and Innovation Survey, Higher Education R&D Survey, Survey of Federal Funds for R&D, FFRDC R&D Expenditures Survey, and Survey of State Government R&D. R&D expenditures by business performers—and also, before 2001, industry-administered FFRDCs—are collected on a calendar year basis. Expenditures for other performers are calendar year approximations based on fiscal year data (see Appendix Table 4-3, general notes). The 1998–2015 data for ONP R&D performance funded by businesses and the nonprofit sector itself are estimated, based on parameters from the 1996–97 Survey of R&D Funding and Performance by Nonprofit Organizations. Type-of-R&D data for business R&D in 1998–2007 were revised in response to data quality review considerations and are not directly comparable with the data for 1997 and earlier years. For 2008 and onward, the type-of-R&D splits for other than total, own-funded, and federally funded R&D are estimated (see also Appendix Table 4-2, footnote d). Type-of-R&D data for FFRDC R&D in 1953–54 includes only those of university-administered FFRDCs. Starting in 2001, type-of-R&D data distinguish federally funded from nonfederally funded FFRDC R&D (see also Appendix Table 4-2, footnote b). The type-of-R&D estimation procedure for higher education R&D was revised in 1998 and again in 2010; hence, these data are not directly comparable with data reported for earlier years. Furthermore, the type-of-R&D splits for other than total and federally funded are estimated (see also Appendix Table 4-2, footnote e). Type-of-R&D data for R&D by other nonprofit organizations in 1998 and later years are estimated, except for those that are federally funded (see also Appendix Table 4-2, footnote f). Type-of-R&D data for state intramural R&D are not currently collected by the Survey of State Government R&D (see also Appendix Table 4-2, footnote c).

Source(s)

National Science Foundation, National Center for Science and Engineering Statistics, National Patterns of R&D Resources (annual series).  
Science and Engineering Indicators 2018

CHAPTER 4 | Research and Development: U.S. Trends and International Comparisons

APPENDIX TABLE 4-8

U.S. applied research expenditures, by source of funds and performing sector: 1953–2015

(Millions of current and of constant 2009 dollars)

Year	All funding sources	Federal							Nonfederal government					Business					Higher ed-ucation	Other nonprofit organizations				
	All per-formers	Total	Federal intra-mural	FFRDC	Non-federal govern-ment	Busi-ness	Higher ed-ucation	ONP	Total	FFRDC	Non-federal govern-ment	Busi-ness	Higher ed-ucation	Total	FFRDC	Busi-ness	Higher ed-ucation	ONP	Higher ed-ucation	Total	FFRDC	Busi-ness	Higher ed-ucation	ONP
Current \$millions																								
1953	1,289	756	347	48	NA	288	59	14	30	NA	NA	NA	30	456	NA	438	7	11	28	20	NA	NA	10	10
1954	1,378	785	330	59	NA	322	60	16	32	NA	NA	NA	32	513	NA	492	8	13	28	21	NA	NA	10	11
1955	1,502	838	333	86	NA	339	63	18	32	NA	NA	NA	32	583	NA	560	9	14	27	22	NA	NA	11	11
1956	1,929	1,026	387	125	NA	430	65	20	33	NA	NA	NA	33	818	NA	794	10	14	27	25	NA	NA	11	14
1957	2,413	1,304	446	149	NA	624	63	23	34	NA	NA	NA	34	1,018	NA	992	12	14	27	31	NA	NA	11	20
1958	2,759	1,497	516	156	NA	731	66	29	35	NA	NA	NA	35	1,163	NA	1,137	12	14	27	37	NA	NA	12	25
1959	2,940	1,630	577	179	NA	757	78	40	37	NA	NA	NA	37	1,206	NA	1,178	13	15	28	39	NA	NA	12	27
1960	3,065	1,732	615	201	NA	769	93	54	39	NA	NA	NA	39	1,226	NA	1,196	13	17	29	40	NA	NA	12	28
1961	3,123	1,811	668	240	NA	738	104	62	40	NA	NA	NA	40	1,195	NA	1,165	13	17	30	48	NA	NA	13	35
1962	3,698	2,098	709	249	NA	954	119	68	41	NA	NA	NA	41	1,471	NA	1,438	14	19	30	58	NA	NA	13	45
1963	3,864	2,244	809	275	NA	952	128	82	42	NA	NA	NA	42	1,483	NA	1,450	14	19	32	63	NA	NA	14	49
1964	4,201	2,462	947	313	NA	978	142	82	45	NA	NA	NA	45	1,593	NA	1,560	14	19	37	65	NA	NA	18	47
1965	4,374	2,553	994	294	NA	992	176	98	46	NA	NA	NA	46	1,654	NA	1,620	13	21	42	79	NA	NA	27	52
1966	4,653	2,625	1,012	290	NA	986	208	129	47	NA	NA	NA	47	1,842	NA	1,804	14	24	48	91	NA	NA	34	57

CHAPTER 4 | Research and Development: U.S. Trends and International Comparisons

Year	All funding sources	Federal							Nonfederal government					Business					Higher ed-ucation	Other nonprofit organizations				
	All per-formers	Total	Federal intra-mural	FFRDC	Non-federal govern-ment	Busi-ness	Higher ed-ucation	ONP	Total	FFRDC	Non-federal govern-ment	Busi-ness	Higher ed-ucation	Total	FFRDC	Busi-ness	Higher ed-ucation	ONP	Higher ed-ucation	Total	FFRDC	Busi-ness	Higher ed-ucation	ONP
1967	4,848	2,763	1,069	334	NA	983	238	141	46	NA	NA	NA	46	1,890	NA	1,849	16	25	54	96	NA	NA	36	60
1968	5,137	2,811	1,112	334	NA	956	250	160	46	NA	NA	NA	46	2,125	NA	2,081	16	28	55	101	NA	NA	39	62
1969	5,454	2,924	1,229	336	NA	920	257	183	48	NA	NA	NA	48	2,320	NA	2,272	16	32	54	109	NA	NA	43	66
1970	5,752	3,100	1,334	336	NA	952	280	199	51	NA	NA	NA	51	2,429	NA	2,378	18	33	56	117	NA	NA	47	70
1971	5,833	3,091	1,355	312	NA	907	306	212	61	NA	NA	NA	61	2,494	NA	2,441	19	34	67	121	NA	NA	47	74
1972	6,147	3,243	1,434	358	NA	845	391	216	74	NA	NA	NA	74	2,618	NA	2,562	21	35	82	131	NA	NA	52	79
1973	6,655	3,429	1,527	334	NA	883	450	236	88	NA	NA	NA	88	2,894	NA	2,832	26	36	100	145	NA	NA	62	83
1974	7,344	3,634	1,652	335	NA	905	477	266	96	NA	NA	NA	96	3,333	NA	3,263	32	39	118	163	NA	NA	72	91
1975	8,091	4,125	1,912	384	NA	991	550	290	113	NA	NA	NA	113	3,520	NA	3,440	39	42	141	192	NA	NA	92	100
1976	8,976	4,464	2,068	457	NA	1,033	596	310	127	NA	NA	NA	127	4,001	NA	3,912	45	45	166	218	NA	NA	109	109
1977	9,662	4,683	2,081	540	NA	1,113	626	324	134	NA	NA	NA	134	4,410	NA	4,311	51	48	194	241	NA	NA	121	120
1978	10,704	5,080	2,242	597	NA	1,195	676	371	151	NA	NA	NA	151	4,982	NA	4,870	61	52	232	259	NA	NA	128	132
1979	12,097	5,602	2,415	654	NA	1,305	793	436	161	NA	NA	NA	161	5,797	NA	5,670	71	55	263	273	NA	NA	129	144
1980	13,729	6,252	2,546	749	NA	1,625	912	420	174	NA	NA	NA	174	6,698	NA	6,550	88	60	308	298	NA	NA	140	158
1981	16,329	6,905	2,731	788	NA	2,042	953	391	199	NA	NA	NA	199	8,531	NA	8,359	108	64	363	332	NA	NA	159	173
1982	18,218	7,689	2,802	890	NA	2,593	1,007	398	207	NA	NA	NA	207	9,553	NA	9,363	121	69	402	367	NA	NA	178	189
1983	20,298	8,738	2,991	965	NA	3,227	1,122	433	215	NA	NA	NA	215	10,501	NA	10,286	141	74	443	401	NA	NA	194	207
1984	22,451	9,499	2,961	1,176	NA	3,677	1,226	459	234	NA	NA	NA	234	11,788	NA	11,541	168	79	491	438	NA	NA	212	226

CHAPTER 4 | Research and Development: U.S. Trends and International Comparisons

Year	All funding sources	Federal							Nonfederal government					Business					Higher ed-ucation	Other nonprofit organizations				
	All per-formers	Total	Federal intra-mural	FFRDC	Non-federal govern-ment	Busi-ness	Higher ed-ucation	ONP	Total	FFRDC	Non-federal govern-ment	Busi-ness	Higher ed-ucation	Total	FFRDC	Busi-ness	Higher ed-ucation	ONP	Higher ed-ucation	Total	FFRDC	Busi-ness	Higher ed-ucation	ONP
1985	25,401	10,930	3,135	1,292	NA	4,717	1,296	490	262	NA	NA	NA	262	13,191	NA	12,908	198	85	547	471	NA	NA	224	247
1986	27,240	10,409	3,204	1,258	NA	4,049	1,393	506	298	NA	NA	NA	298	15,402	NA	15,082	229	91	620	510	NA	NA	240	270
1987	27,951	10,829	3,366	1,228	NA	4,037	1,643	555	333	NA	NA	NA	333	15,511	NA	15,153	260	98	707	571	NA	NA	276	295
1988	29,528	10,749	3,362	984	NA	3,846	1,958	599	377	NA	NA	NA	377	16,938	NA	16,531	302	105	818	647	NA	NA	325	322
1989	32,277	11,753	3,566	1,047	NA	4,324	2,121	695	417	NA	NA	NA	417	18,452	NA	17,993	347	112	933	722	NA	NA	370	352
1990	34,897	13,695	3,652	1,156	NA	5,967	2,140	780	453	NA	NA	NA	453	18,930	NA	18,432	377	120	1,031	788	NA	NA	404	384
1991	38,631	14,280	4,093	1,446	NA	5,588	2,232	921	468	NA	NA	NA	468	21,946	NA	21,425	392	129	1,091	847	NA	NA	428	419
1992	37,936	13,690	4,337	1,529	NA	4,476	2,415	933	479	NA	NA	NA	479	21,736	NA	21,184	414	138	1,120	911	NA	NA	454	456
1993	37,283	14,075	4,838	1,500	NA	4,295	2,542	900	496	NA	NA	NA	496	20,547	NA	19,956	443	148	1,181	984	NA	NA	487	497
1994	36,618	13,800	4,985	1,596	NA	3,616	2,644	960	517	NA	NA	NA	517	19,995	NA	19,372	464	158	1,256	1,049	NA	NA	509	541
1995	40,936	13,543	4,952	1,714	NA	3,164	2,779	934	559	NA	NA	NA	559	24,418	NA	23,755	494	170	1,311	1,104	NA	NA	516	589
1996	43,170	13,958	4,872	1,623	NA	3,640	2,864	960	584	NA	NA	NA	584	26,076	NA	25,370	524	182	1,390	1,162	NA	NA	522	640
1997	46,516	12,852	4,997	1,679	NA	2,648	2,518	1,011	548	NA	NA	NA	548	30,502	NA	29,782	515	205	1,396	1,219	NA	NA	508	711
1998	46,247	12,751	5,146	1,725	NA	2,632	2,189	1,060	515	NA	NA	NA	515	30,303	NA	29,576	509	218	1,393	1,285	NA	NA	502	784
1999	51,853	13,869	5,530	1,651	NA	2,817	2,571	1,300	533	NA	NA	NA	533	34,586	NA	33,821	529	236	1,480	1,385	NA	NA	537	849
2000	56,503	15,450	6,105	1,750	NA	2,682	3,081	1,831	558	NA	NA	NA	558	37,293	NA	36,494	540	258	1,604	1,598	NA	NA	578	1,021
2001	63,956	18,595	7,052	2,379	NA	3,603	3,411	2,150	590	5	NA	NA	585	41,238	33	40,409	535	261	1,734	1,798	52	NA	621	1,126
2002	50,521	18,987	7,487	2,905	NA	2,452	3,877	2,267	644	8	NA	NA	636	26,899	35	26,081	531	253	1,937	2,053	71	NA	689	1,293

CHAPTER 4 | Research and Development: U.S. Trends and International Comparisons

Year	All funding sources	Federal							Nonfederal government					Business					Higher ed-ucation	Other nonprofit organizations				
	All per-formers	Total	Federal intra-mural	FFRDC	Non-federal govern-ment	Busi-ness	Higher ed-ucation	ONP	Total	FFRDC	Non-federal govern-ment	Busi-ness	Higher ed-ucation	Total	FFRDC	Busi-ness	Higher ed-ucation	ONP	Higher ed-ucation	Total	FFRDC	Busi-ness	Higher ed-ucation	ONP
2003	61,059	22,234	7,672	3,152	NA	4,473	4,450	2,487	716	9	NA	NA	708	33,692	36	32,861	537	259	2,127	2,290	65	NA	739	1,486
2004	69,132	22,417	7,455	3,057	NA	4,775	4,682	2,448	742	7	NA	NA	735	41,495	30	40,657	545	264	2,190	2,287	40	NA	759	1,488
2005	69,653	23,329	7,557	3,241	NA	5,289	4,810	2,432	727	8	NA	NA	719	40,867	35	39,995	557	280	2,283	2,447	45	NA	774	1,627
2006	76,624	24,865	7,435	3,531	88	6,140	5,080	2,592	891	8	170	NA	712	45,952	47	45,033	573	300	2,368	2,549	54	NA	789	1,705
2007	85,322	29,439	7,222	5,293	113	8,945	5,284	2,583	970	14	212	NA	745	49,627	77	48,625	607	318	2,461	2,824	92	NA	848	1,885
2008	76,642	27,143	7,316	5,843	147	5,397	5,840	2,600	1,164	15	264	71	815	42,385	89	41,292	675	330	2,682	3,268	93	105	951	2,119
2009	74,236	32,150	7,874	5,979	188	7,797	7,263	3,049	1,324	19	319	38	948	34,295	88	33,124	764	319	2,942	3,526	104	96	1,021	2,305
2010	79,258	29,770	8,016	5,025	221	4,705	8,762	3,041	1,421	18	357	32	1,015	41,153	67	39,987	778	321	3,141	3,774	77	182	1,064	2,451
2011	82,147	29,696	8,024	5,057	228	4,404	9,290	2,693	1,428	13	352	70	994	43,805	81	42,591	796	338	3,416	3,802	77	122	1,104	2,500
2012	87,071	30,311	8,587	5,566	223	4,137	9,170	2,629	1,403	19	333	45	1,007	47,741	81	46,436	877	346	3,693	3,923	76	137	1,162	2,549
2013	88,336	32,532	8,309	6,639	215	6,028	8,876	2,465	1,434	22	303	47	1,063	46,133	94	44,738	935	366	3,943	4,294	69	200	1,296	2,730
2014	91,890	33,466	8,775	6,765	201	6,445	8,706	2,574	1,405	13	273	35	1,085	48,174	107	46,685	997	385	4,216	4,629	67	250	1,418	2,894
2015 <sup>a</sup>	97,150	34,511	9,200	7,182	202	6,102	9,094	2,731	1,419	9	294	24	1,092	51,738	96	50,137	1,107	398	4,567	4,917	64	209	1,608	3,036
Constant 2009 \$millions																								
1953	8,505	4,985	2,290	313	NA	1,900	389	92	199	NA	NA	NA	199	3,006	NA	2,890	43	73	184	132	NA	NA	66	66
1954	9,009	5,132	2,154	382	NA	2,105	389	101	206	NA	NA	NA	206	3,351	NA	3,217	49	85	183	137	NA	NA	65	72
1955	9,650	5,386	2,140	553	NA	2,176	405	112	208	NA	NA	NA	208	3,743	NA	3,599	55	90	175	138	NA	NA	67	71
1956	11,986	6,374	2,402	774	NA	2,670	404	124	206	NA	NA	NA	206	5,084	NA	4,935	62	87	167	155	NA	NA	68	87

CHAPTER 4 | Research and Development: U.S. Trends and International Comparisons

Year	All funding sources	Federal							Nonfederal government					Business					Higher ed-ucation	Other nonprofit organizations				
	All per-formers	Total	Federal intra-mural	FFRDC	Non-federal govern-ment	Busi-ness	Higher ed-ucation	ONP	Total	FFRDC	Non-federal govern-ment	Busi-ness	Higher ed-ucation	Total	FFRDC	Busi-ness	Higher ed-ucation	ONP	Higher ed-ucation	Total	FFRDC	Busi-ness	Higher ed-ucation	ONP
1957	14,514	7,841	2,679	896	NA	3,751	379	135	204	NA	NA	NA	204	6,120	NA	5,966	69	84	163	186	NA	NA	66	120
1958	16,229	8,805	3,035	918	NA	4,299	385	168	208	NA	NA	NA	208	6,841	NA	6,688	71	82	160	215	NA	NA	68	147
1959	17,053	9,457	3,344	1,038	NA	4,393	450	232	214	NA	NA	NA	214	6,993	NA	6,834	73	87	163	226	NA	NA	70	157
1960	17,540	9,910	3,516	1,150	NA	4,402	532	309	221	NA	NA	NA	221	7,015	NA	6,843	74	97	165	229	NA	NA	69	160
1961	17,675	10,249	3,781	1,355	NA	4,177	586	351	226	NA	NA	NA	226	6,763	NA	6,594	74	96	167	269	NA	NA	71	198
1962	20,674	11,731	3,961	1,392	NA	5,335	663	380	227	NA	NA	NA	227	8,222	NA	8,040	75	106	170	324	NA	NA	73	252
1963	21,363	12,407	4,472	1,518	NA	5,262	705	451	233	NA	NA	NA	233	8,199	NA	8,016	77	105	179	346	NA	NA	75	271
1964	22,873	13,402	5,153	1,704	NA	5,325	773	446	246	NA	NA	NA	246	8,671	NA	8,494	74	103	203	351	NA	NA	95	256
1965	23,386	13,649	5,312	1,569	NA	5,304	938	524	248	NA	NA	NA	248	8,844	NA	8,662	70	112	225	420	NA	NA	142	278
1966	24,198	13,650	5,264	1,508	NA	5,128	1,082	668	245	NA	NA	NA	245	9,580	NA	9,383	73	125	252	471	NA	NA	174	296
1967	24,503	13,965	5,400	1,686	NA	4,968	1,200	710	231	NA	NA	NA	231	9,550	NA	9,345	78	126	272	485	NA	NA	182	303
1968	24,903	13,625	5,388	1,619	NA	4,634	1,210	773	223	NA	NA	NA	223	10,301	NA	10,088	78	136	267	487	NA	NA	187	301
1969	25,202	13,509	5,680	1,550	NA	4,251	1,185	843	222	NA	NA	NA	222	10,720	NA	10,498	74	148	249	501	NA	NA	196	305
1970	25,247	13,608	5,855	1,475	NA	4,178	1,227	873	225	NA	NA	NA	225	10,658	NA	10,437	77	145	245	511	NA	NA	204	307
1971	24,363	12,910	5,659	1,301	NA	3,788	1,278	883	253	NA	NA	NA	253	10,415	NA	10,195	77	142	280	505	NA	NA	196	309
1972	24,610	12,984	5,741	1,433	NA	3,383	1,563	863	297	NA	NA	NA	297	10,480	NA	10,257	82	140	328	522	NA	NA	206	316
1973	25,271	13,021	5,799	1,268	NA	3,353	1,707	894	333	NA	NA	NA	333	10,989	NA	10,753	99	137	379	549	NA	NA	234	315
1974	25,587	12,662	5,757	1,165	NA	3,153	1,660	927	335	NA	NA	NA	335	11,613	NA	11,368	110	135	411	566	NA	NA	249	317



CHAPTER 4 | Research and Development: U.S. Trends and International Comparisons

Year	All funding sources	Federal							Nonfederal government					Business					Higher ed-ucation	Other nonprofit organizations				
	All per-formers	Total	Federal intra-mural	FFRDC	Non-federal govern-ment	Busi-ness	Higher ed-ucation	ONP	Total	FFRDC	Non-federal govern-ment	Busi-ness	Higher ed-ucation	Total	FFRDC	Busi-ness	Higher ed-ucation	ONP	Higher ed-ucation	Total	FFRDC	Busi-ness	Higher ed-ucation	ONP
1975	25,800	13,154	6,096	1,223	NA	3,160	1,752	923	362	NA	NA	NA	362	11,225	NA	10,969	123	133	448	612	NA	NA	293	318
1976	27,133	13,493	6,252	1,381	NA	3,122	1,800	937	385	NA	NA	NA	385	12,094	NA	11,825	135	135	500	660	NA	NA	329	331
1977	27,500	13,329	5,922	1,537	NA	3,168	1,780	923	383	NA	NA	NA	383	12,551	NA	12,270	145	137	552	685	NA	NA	343	342
1978	28,468	13,511	5,962	1,587	NA	3,178	1,797	987	402	NA	NA	NA	402	13,250	NA	12,951	161	137	616	689	NA	NA	339	350
1979	29,718	13,763	5,933	1,607	NA	3,206	1,947	1,070	397	NA	NA	NA	397	14,241	NA	13,929	175	136	646	671	NA	NA	317	354
1980	30,938	14,088	5,737	1,688	NA	3,662	2,055	946	391	NA	NA	NA	391	15,093	NA	14,760	199	134	694	672	NA	NA	316	356
1981	33,654	14,232	5,629	1,625	NA	4,208	1,963	806	411	NA	NA	NA	411	17,581	NA	17,227	222	132	747	683	NA	NA	327	356
1982	35,354	14,922	5,437	1,728	NA	5,032	1,953	772	403	NA	NA	NA	403	18,538	NA	18,170	235	133	780	712	NA	NA	345	367
1983	37,895	16,313	5,584	1,801	NA	6,025	2,095	808	401	NA	NA	NA	401	19,604	NA	19,203	264	138	827	749	NA	NA	362	386
1984	40,477	17,126	5,338	2,120	NA	6,629	2,211	828	422	NA	NA	NA	422	21,253	NA	20,807	303	143	886	790	NA	NA	382	408
1985	44,376	19,095	5,477	2,257	NA	8,241	2,265	855	457	NA	NA	NA	457	23,044	NA	22,551	345	148	956	824	NA	NA	391	432
1986	46,646	17,825	5,487	2,154	NA	6,934	2,385	866	510	NA	NA	NA	510	26,375	NA	25,827	392	156	1,062	873	NA	NA	411	463
1987	46,674	18,083	5,620	2,051	NA	6,741	2,743	927	556	NA	NA	NA	556	25,901	NA	25,304	434	163	1,181	954	NA	NA	461	493
1988	47,640	17,342	5,424	1,587	NA	6,205	3,159	966	608	NA	NA	NA	608	27,327	NA	26,671	487	169	1,319	1,044	NA	NA	524	520
1989	50,126	18,252	5,539	1,626	NA	6,715	3,294	1,079	647	NA	NA	NA	647	28,656	NA	27,943	539	174	1,449	1,121	NA	NA	575	546
1990	52,261	20,510	5,469	1,731	NA	8,936	3,206	1,167	678	NA	NA	NA	678	28,349	NA	27,604	565	180	1,544	1,180	NA	NA	605	575
1991	55,991	20,697	5,933	2,095	NA	8,099	3,235	1,335	678	NA	NA	NA	678	31,807	NA	31,053	568	187	1,581	1,228	NA	NA	621	607
1992	53,757	19,399	6,145	2,166	NA	6,343	3,422	1,323	678	NA	NA	NA	678	30,802	NA	30,019	587	196	1,587	1,290	NA	NA	644	646

CHAPTER 4 | Research and Development: U.S. Trends and International Comparisons

Year	All funding sources	Federal							Nonfederal government					Business					Higher ed-ucation	Other nonprofit organizations				
	All per-formers	Total	Federal intra-mural	FFRDC	Non-federal govern-ment	Busi-ness	Higher ed-ucation	ONP	Total	FFRDC	Non-federal govern-ment	Busi-ness	Higher ed-ucation	Total	FFRDC	Busi-ness	Higher ed-ucation	ONP	Higher ed-ucation	Total	FFRDC	Busi-ness	Higher ed-ucation	ONP
1993	51,604	19,481	6,697	2,076	NA	5,945	3,518	1,245	686	NA	NA	NA	686	28,440	NA	27,622	613	205	1,635	1,362	NA	NA	675	688
1994	49,627	18,703	6,756	2,162	NA	4,901	3,583	1,300	701	NA	NA	NA	701	27,098	NA	26,254	629	215	1,702	1,422	NA	NA	689	733
1995	54,347	17,980	6,575	2,275	NA	4,201	3,689	1,240	742	NA	NA	NA	742	32,418	NA	31,537	656	225	1,741	1,466	NA	NA	685	781
1996	56,285	18,198	6,352	2,115	NA	4,746	3,734	1,251	761	NA	NA	NA	761	33,997	NA	33,077	683	237	1,813	1,516	NA	NA	681	834
1997	59,628	16,475	6,405	2,152	NA	3,394	3,227	1,296	703	NA	NA	NA	703	39,099	NA	38,176	660	263	1,789	1,562	NA	NA	652	911
1998	58,646	16,170	6,525	2,187	NA	3,338	2,776	1,344	653	NA	NA	NA	653	38,427	NA	37,505	646	276	1,766	1,630	NA	NA	636	994
1999	64,764	17,322	6,907	2,062	NA	3,518	3,211	1,623	666	NA	NA	NA	666	43,197	NA	42,242	661	295	1,849	1,730	NA	NA	670	1,060
2000	69,000	18,867	7,456	2,138	NA	3,275	3,763	2,236	682	NA	NA	NA	682	45,541	NA	44,566	660	316	1,958	1,952	NA	NA	705	1,246
2001	76,363	22,203	8,420	2,840	NA	4,302	4,073	2,567	705	6	NA	NA	699	49,238	40	48,247	639	311	2,070	2,147	62	NA	741	1,345
2002	59,410	22,328	8,805	3,416	NA	2,883	4,559	2,665	758	10	NA	NA	748	31,632	41	30,669	624	297	2,277	2,415	84	NA	811	1,520
2003	70,397	25,634	8,845	3,634	NA	5,157	5,130	2,867	826	10	NA	NA	816	38,845	41	37,887	619	298	2,452	2,641	75	NA	852	1,713
2004	77,572	25,154	8,365	3,430	NA	5,358	5,254	2,747	833	8	NA	NA	824	46,561	34	45,621	611	296	2,458	2,566	45	NA	852	1,669
2005	75,720	25,361	8,216	3,523	NA	5,750	5,229	2,643	791	9	NA	NA	782	44,427	38	43,479	605	305	2,482	2,660	49	NA	842	1,769
2006	80,815	26,225	7,841	3,724	93	6,476	5,358	2,734	939	9	179	NA	751	48,466	49	47,496	604	316	2,497	2,688	57	NA	833	1,798
2007	87,657	30,245	7,419	5,438	116	9,190	5,429	2,653	997	14	218	NA	765	50,985	79	49,955	624	327	2,528	2,902	94	NA	871	1,936
2008	77,224	27,349	7,372	5,887	149	5,438	5,884	2,620	1,173	15	266	71	821	42,707	90	41,605	680	332	2,702	3,293	94	105	958	2,135
2009	74,236	32,150	7,874	5,979	188	7,797	7,263	3,049	1,324	19	319	38	948	34,295	88	33,124	764	319	2,942	3,526	104	96	1,021	2,305
2010	78,302	29,410	7,919	4,964	218	4,648	8,656	3,004	1,404	18	353	32	1,002	40,656	66	39,504	769	317	3,103	3,729	76	180	1,051	2,422

CHAPTER 4 | Research and Development: U.S. Trends and International Comparisons

Year	All funding sources	Federal							Nonfederal government					Business					Higher ed-ucation	Other nonprofit organizations				
	All per-formers	Total	Federal intra-mural	FFRDC	Non-federal govern-ment	Busi-ness	Higher ed-ucation	ONP	Total	FFRDC	Non-federal govern-ment	Busi-ness	Higher ed-ucation	Total	FFRDC	Busi-ness	Higher ed-ucation	ONP	Higher ed-ucation	Total	FFRDC	Busi-ness	Higher ed-ucation	ONP
2011	79,514	28,744	7,767	4,895	221	4,263	8,992	2,607	1,382	12	340	67	962	42,401	78	41,226	770	327	3,307	3,680	74	118	1,068	2,420
2012	82,755	28,808	8,161	5,290	212	3,932	8,716	2,498	1,334	18	317	43	957	45,374	77	44,135	834	329	3,510	3,729	72	130	1,104	2,423
2013	82,624	30,428	7,771	6,209	201	5,638	8,302	2,306	1,342	20	284	44	994	43,150	88	41,845	874	342	3,688	4,016	65	187	1,212	2,553
2014	84,433	30,751	8,063	6,216	184	5,922	7,999	2,365	1,291	12	251	32	997	44,264	98	42,897	916	354	3,873	4,254	62	230	1,303	2,659
2015 <sup>a</sup>	88,309	31,370	8,363	6,528	184	5,547	8,266	2,483	1,289	8	267	22	993	47,029	87	45,574	1,006	362	4,151	4,469	59	190	1,461	2,759

NA = not available.

FFRDC = federally funded research and development center; ONP = other nonprofit organization.

<sup>a</sup> Some data for 2015 are preliminary and may later be revised.

Note(s)

This table reaggregates the R&D performer data in Appendix Table 4-4 according to major categories of R&D funding: federal government, nonfederal government (state and local), business, higher education, and other nonprofit organizations. Business sources of R&D funding in this table include the own funds of domestic R&D performing businesses, funds from other domestic businesses, and funds from foreign businesses. For interpretive detail on the R&D performers listed, see Appendix Table 4-2, footnotes a–f. Detail may not add to total because of rounding. Constant-dollar estimates are derived from unrounded data. For comparisons, use only the historical data reported in this table because some back-year data may have been revised. Except for the nonprofit sector, data are based on annual reports by performers in the National Science Foundation's annual R&D expenditure surveys: Business R&D and Innovation Survey, Higher Education R&D Survey, Survey of Federal Funds for R&D, FFRDC R&D Expenditures Survey, and Survey of State Government R&D. R&D expenditures by business performers—and also, before 2001, industry-administered FFRDCs—are collected on a calendar year basis. Expenditures for other performers are calendar year approximations based on fiscal year data (see Appendix Table 4-4, general notes). The 1998–2015 data for ONP R&D performance funded by businesses and the nonprofit sector itself are estimated, based on parameters from the 1996–97 Survey of R&D Funding and Performance by Nonprofit Organizations. Type-of-R&D data for business R&D in 1998–2007 were revised in response to data quality review considerations and are not directly comparable with the data for 1997 and earlier years. For 2008 and onward, the type-of-R&D splits for other than total, own-funded, and federally funded R&D are estimated (see also Appendix Table 4-2, footnote d). Type-of-R&D data for FFRDC R&D in 1953–54 includes only those of university-administered FFRDCs. Starting in 2001, type-of-R&D data distinguish federally funded from nonfederally funded FFRDC R&D (see also Appendix Table 4-2, footnote b). The type-of-R&D estimation procedure for higher education R&D was revised in 1998 and again in 2010; hence, these data are not directly comparable with data reported for earlier years. Furthermore, the type-of-R&D splits for other than total and federally funded are estimated (see also Appendix Table 4-2, footnote e). Type-of-R&D data for R&D by other nonprofit organizations in 1998 and later years are estimated, except for those that are federally funded (see also Appendix Table 4-2, footnote f). Type-of-R&D data for state intramural R&D are not currently collected by the Survey of State Government R&D (see also Appendix Table 4-2, footnote c).

Source(s)

National Science Foundation, National Center for Science and Engineering Statistics, National Patterns of R&D Resources (annual series).

Science and Engineering Indicators 2018

CHAPTER 4 | Research and Development: U.S. Trends and International Comparisons

APPENDIX TABLE 4-9

U.S. development expenditures, by source of funds and performing sector: 1953–2015

(Millions of current and of constant 2009 dollars)

	All funding sources		Federal						Nonfederal government					Business					Higher ed-ucation	Other nonprofit organizations				
Year	All per-formers	Total	Federal intra-mural	FFRDC	Non-federal govern-ment	Busi-ness	Higher ed-ucation	ONP	Total	FFRDC	Non-federal govern-ment	Busi-ness	Higher ed-ucation	Total	FFRDC	Busi-ness	Higher ed-ucation	ONP	Higher ed-ucation	Total	FFRDC	Busi-ness	Higher ed-ucation	ONP
Current \$millions																								
1953	3,412	1,762	567	48	NA	1,123	9	17	3	NA	NA	NA	3	1,637	NA	1,630	1	6	3	7	NA	NA	1	6
1954	3,734	2,027	537	62	NA	1,405	9	15	3	NA	NA	NA	3	1,693	NA	1,685	1	7	3	8	NA	NA	1	7
1955	4,113	2,351	543	171	NA	1,614	12	12	4	NA	NA	NA	4	1,748	NA	1,738	2	8	3	8	NA	NA	1	7
1956	5,854	3,561	631	348	NA	2,559	14	11	4	NA	NA	NA	4	2,277	NA	2,267	2	8	4	9	NA	NA	2	7
1957	6,681	4,477	728	429	NA	3,300	12	9	5	NA	NA	NA	5	2,185	NA	2,174	3	8	4	10	NA	NA	2	8
1958	7,213	4,940	842	386	NA	3,691	13	9	6	NA	NA	NA	6	2,252	NA	2,241	3	8	4	11	NA	NA	2	9
1959	8,463	5,871	940	477	NA	4,426	16	14	6	NA	NA	NA	6	2,569	NA	2,557	3	9	5	12	NA	NA	2	10
1960	9,360	6,390	1,003	559	NA	4,799	19	10	6	NA	NA	NA	6	2,948	NA	2,935	3	10	5	12	NA	NA	2	10
1961	9,930	6,701	1,090	670	NA	4,917	22	4	7	NA	NA	NA	7	3,201	NA	3,189	2	10	5	16	NA	NA	2	14
1962	10,114	6,822	1,227	618	NA	4,950	23	5	8	NA	NA	NA	8	3,259	NA	3,246	2	11	6	20	NA	NA	2	18
1963	11,539	7,955	1,465	668	NA	5,795	22	6	8	NA	NA	NA	8	3,548	NA	3,535	2	11	6	22	NA	NA	2	20
1964	12,506	8,610	1,680	739	NA	6,156	30	6	8	NA	NA	NA	8	3,861	NA	3,848	2	11	7	21	NA	NA	3	18
1965	13,215	8,742	1,789	674	NA	6,218	48	13	9	NA	NA	NA	9	4,433	NA	4,419	2	12	8	24	NA	NA	4	20
1966	14,490	9,466	1,886	654	NA	6,849	61	16	9	NA	NA	NA	9	4,977	NA	4,961	2	14	10	28	NA	NA	5	23





CHAPTER 4 | Research and Development: U.S. Trends and International Comparisons

	All funding sources	Federal							Nonfederal government					Business					Higher ed-ucation	Other nonprofit organizations				
Year	All per-formers	Total	Federal intra-mural	FFRDC	Non-federal govern-ment	Busi-ness	Higher ed-ucation	ONP	Total	FFRDC	Non-federal govern-ment	Busi-ness	Higher ed-ucation	Total	FFRDC	Busi-ness	Higher ed-ucation	ONP	Higher ed-ucation	Total	FFRDC	Busi-ness	Higher ed-ucation	ONP
2003	175,483	30,011	12,646	3,785	NA	11,939	897	743	166	10	NA	NA	155	143,477	43	143,121	118	195	467	1,363	78	NA	162	1,122
2004	177,220	34,238	12,746	4,561	NA	14,419	1,211	1,300	172	11	NA	NA	161	140,978	45	140,615	120	199	481	1,350	60	NA	167	1,123
2005	195,731	36,517	13,994	4,654	NA	15,512	1,146	1,211	169	11	NA	NA	158	157,080	50	156,696	122	212	501	1,463	65	NA	170	1,228
2006	212,719	38,699	16,089	4,358	2	16,720	927	603	171	10	5	NA	156	171,802	58	171,392	126	226	520	1,527	67	NA	173	1,287
2007	227,967	39,595	18,016	5,254	3	14,860	894	568	177	8	6	NA	163	185,989	47	185,569	133	240	540	1,665	56	NA	186	1,423
2008	259,595	54,556	17,566	6,094	4	29,488	841	562	416	7	7	223	179	201,848	45	201,406	148	249	589	2,186	47	330	209	1,600
2009	256,036	55,963	17,245	6,159	5	30,435	1,569	550	448	8	8	144	288	196,182	39	195,614	289	241	915	2,529	46	361	381	1,740
2010	251,415	56,993	18,844	6,909	6	28,089	2,509	638	542	11	9	114	408	189,555	40	188,849	425	242	1,240	3,085	45	649	541	1,850
2011	270,995	58,355	21,879	6,786	6	26,228	2,666	790	648	6	9	230	402	207,758	41	207,026	436	255	1,340	2,895	39	402	567	1,887
2012	273,264	55,623	19,941	6,631	6	25,840	2,687	518	499	10	9	102	378	212,718	43	211,949	464	261	1,524	2,900	40	310	625	1,925
2013	287,144	51,606	19,767	6,572	6	22,137	2,650	474	538	11	8	126	393	230,039	49	229,212	502	276	1,670	3,291	36	532	663	2,061
2014	301,475	48,127	20,303	6,681	6	18,065	2,602	471	503	7	7	87	402	247,498	58	246,601	548	291	1,782	3,566	36	624	721	2,185
2015 <sup>a</sup>	314,532	49,476	20,547	7,062	6	18,850	2,565	447	507	6	8	90	404	258,753	62	257,831	560	301	1,888	3,908	42	786	789	2,292
Constant 2009 \$millions																								
1953	22,510	11,626	3,738	313	NA	7,410	56	109	19	NA	NA	NA	19	10,802	NA	10,755	7	40	17	46	NA	NA	7	40
1954	24,412	13,249	3,511	402	NA	9,185	56	95	23	NA	NA	NA	23	11,068	NA	11,016	7	46	20	52	NA	NA	7	46
1955	26,435	15,108	3,486	1,096	NA	10,375	74	77	24	NA	NA	NA	24	11,230	NA	11,169	10	51	21	51	NA	NA	6	45
1956	36,384	22,130	3,919	2,160	NA	15,903	84	65	27	NA	NA	NA	27	14,152	NA	14,090	12	50	22	53	NA	NA	9	44









CHAPTER 4 | Research and Development: U.S. Trends and International Comparisons

	All funding sources	Federal							Nonfederal government					Business					Higher ed-ucation	Other nonprofit organizations				
Year	All per-formers	Total	Federal intra-mural	FFRDC	Non-federal govern-ment	Busi-ness	Higher ed-ucation	ONP	Total	FFRDC	Non-federal govern-ment	Busi-ness	Higher ed-ucation	Total	FFRDC	Busi-ness	Higher ed-ucation	ONP	Higher ed-ucation	Total	FFRDC	Busi-ness	Higher ed-ucation	ONP
2011	262,311	56,485	21,178	6,568	6	25,387	2,580	765	627	6	9	223	389	201,100	39	200,392	422	247	1,297	2,802	37	389	549	1,827
2012	259,720	52,867	18,953	6,303	6	24,559	2,554	492	474	9	8	97	359	202,175	41	201,445	441	248	1,448	2,756	38	295	594	1,829
2013	268,577	48,269	18,489	6,147	5	20,706	2,479	443	503	11	8	118	368	215,164	46	214,391	469	258	1,562	3,078	34	498	620	1,927
2014	277,010	44,221	18,655	6,138	5	16,599	2,391	433	462	6	7	80	369	227,413	53	226,589	504	267	1,637	3,276	33	573	662	2,008
2015 <sup>a</sup>	285,906	44,973	18,677	6,419	5	17,134	2,331	406	461	5	7	81	367	235,203	56	234,365	509	273	1,716	3,553	38	715	717	2,083

NA = not available.

FFRDC = federally funded research and development center; ONP = other nonprofit organization.

<sup>a</sup> Some data for 2015 are preliminary and may later be revised.

Note(s)

This table reaggregates the R&D performer data in Appendix Table 4-5 according to major categories of R&D funding: federal government, nonfederal government (state and local), business, higher education, and other nonprofit organizations. Business sources of R&D funding in this table include the own funds of domestic R&D performing businesses, funds from other domestic businesses, and funds from foreign businesses. For interpretive detail on the R&D performers listed, see Appendix Table 4-2, footnotes a–f. Detail may not add to total because of rounding. Constant-dollar estimates are derived from unrounded data. For comparisons, use only the historical data reported in this table because some back-year data may have been revised. Except for the nonprofit sector, data are based on annual reports by performers in the National Science Foundation's annual R&D expenditure surveys: Business R&D and Innovation Survey, Higher Education R&D Survey, Survey of Federal Funds for R&D, FFRDC R&D Expenditures Survey, and Survey of State Government R&D. R&D expenditures by business performers—and also, before 2001, industry-administered FFRDCs—are collected on a calendar year basis. Expenditures for other performers are calendar year approximations based on fiscal year data (see Appendix Table 4-5, general notes). The 1998–2015 data for ONP R&D performance funded by businesses and the nonprofit sector itself are estimated, based on parameters from the 1996–97 Survey of R&D Funding and Performance by Nonprofit Organizations. Type-of-R&D data for business R&D in 1998–2007 were revised in response to data quality review considerations and are not directly comparable with the data for 1997 and earlier years. For 2008 and onward, the type-of-R&D splits for other than total, own-funded, and federally funded R&D are estimated (see also Appendix Table 4-2, footnote d). Type-of-R&D data for FFRDC R&D in 1953–54 include only those of university-administered FFRDCs. Starting in 2001, type-of-R&D data distinguish federally funded from nonfederally funded FFRDC R&D (see also Appendix Table 4-2, footnote b). The type-of-R&D estimation procedure for higher education R&D was revised in 1998 and again in 2010; hence, these data are not directly comparable with data reported for earlier years. Furthermore, the type-of-R&D splits for other than total and federally funded are estimated (see also Appendix Table 4-2, footnote e). Type-of-R&D data for R&D by other nonprofit organizations in 1998 and later years are estimated, except for those that are federally funded (see also Appendix Table 4-2, footnote f). Type-of-R&D data for state intramural R&D are not currently collected by the Survey of State Government R&D (see also Appendix Table 4-2, footnote c).

Source(s)

National Science Foundation, National Center for Science and Engineering Statistics, National Patterns of R&D Resources (annual series).

*Science and Engineering Indicators 2018*

CHAPTER 4 | Research and Development: U.S. Trends and International Comparisons

APPENDIX TABLE 4-10

U.S. R&D expenditures, by state, performing sector, and funding sector: 2015

(Millions of current dollars)

State	All R&D	R&D rank	Per-former:	Federal	FFRDCs		Business				Higher education <sup>a</sup>							Other nonprofit insti-tutions		State, in-ternal <sup>b</sup>		GDP	GDP rank	R&D intensity <sup>c</sup>	
			Source of funds:	Federal	Total	Federal	Non-federal <sup>d</sup>	Total	Own	Paid by others		Total	Federal	Other govern-ment	Busi-ness	Higher ed-ucation	Non-profit	Other	Federal <sup>f</sup>	Total	Per-cent			Rank	
				Non-federal <sup>e</sup>	Fed-eral																				
U.S. total <sup>g</sup>	495,144	na		35,673	18,649	18,287	362	355,821	289,892	38,939	26,990	64,653	33,546	3,772	3,842	17,334	4,139	2,020	6,189	610	18,120,700	na	2.73	na	
States total <sup>g</sup>	468,866	na		30,006	18,458	18,097	361	345,317	288,492	29,932	23,931	68,513	37,763	3,808	3,997	16,682	4,236	2,027	5,987	585	17,925,143	na	2.62	na	
Alabama	4,195	26		1,698	0	0	0	1,561	875	135	551	903	530	48	61	227	24	13	27	6	199,980	27	2.10	24	
Alaska	333	49		91	0	0	0	66	32	26	8	163	92	12	6	50	2	1	4	9	53,384	47	0.62	47	
Arizona	7,011	20		327	24	21	3	5,515	4,450	604	461	1,100	487	47	30	356	52	128	37	8	291,448	22	2.41	18	
Arkansas	624	41		18	0	0	0	302	271	26	6	293	99	64	13	91	2	25	10	1	118,677	35	0.53	49	
California	125,056	1		2,365	5,155	5,042	114	107,982	95,020	6,004	6,957	8,657	4,714	381	554	1,657	794	557	842	55	2,491,619	1	5.02	4	
Colorado	6,697	22		419	545	505	40	4,362	3,665	236	461	1,274	930	40	82	124	83	14	88	8	313,329	19	2.14	21	
Connecticut	9,918	14		250	0	0	0	8,533	6,441	299	1,793	1,091	625	18	54	311	70	14	21	22	256,306	23	3.87	8	
Delaware	2,887	30		4	0	0	0	2,681	2,049	621	11	192	126	11	6	42	4	3	8	2	68,864	42	4.19	7	
District of Columbia	3,567	28		2,367	9	9	0	299	198	18	83	559	305	5	11	159	67	13	332	2	121,119	34	2.95	12	
Florida	9,456	15		1,066	0	0	0	5,816	3,788	655	1,373	2,389	1,120	191	122	818	99	40	140	45	883,861	4	1.07	36	
Georgia	6,877	21		190	0	0	0	4,614	3,821	610	183	2,046	1,211	53	107	570	82	23	25	2	501,522	9	1.37	33	
Hawaii	609	42		75	0	0	0	186	123	47	17	332	214	14	7	86	10	2	14	2	80,599	39	0.76	43	

CHAPTER 4 | Research and Development: U.S. Trends and International Comparisons

State	All R&D	R&D rank	Per-former:	Federal	FFRDCs			Business				Higher education <sup>a</sup>							Other nonprofit insti-tutions		State, in-ternal <sup>b</sup>	GDP	GDP rank	R&D intensity <sup>c</sup>	
			Source of funds:	Federal	Total	Federal	Non-federal <sup>d</sup>	Total	Own	Paid by others		Total	Federal	Other govern-ment	Busi-ness	Higher ed-ucation	Non-profit	Other	Federal <sup>f</sup>	Total	Per-cent			Rank	
										Non-federal <sup>e</sup>	Fed-eral														
Idaho	2,226	34		41	476	457	19	1,554	1,304	244	6	147	81	30	3	28	2	3	1	6	65,460	43	3.40	9	
Illinois	16,502	8		285	1,039	1,008	31	12,710	11,467	1,056	187	2,391	1,379	55	130	610	189	28	75	2	772,182	5	2.14	22	
Indiana	7,663	17		85	0	0	0	6,252	5,346	830	76	1,324	542	81	70	502	104	24	2	1	333,363	16	2.30	20	
Iowa	3,407	29		56	46	45	1	2,539	1,916	D	D	759	344	54	36	292	30	3	4	4	175,809	30	1.94	28	
Kansas	2,716	31		22	0	0	0	2,126	1,515	588	23	562	234	65	51	179	30	4	4	1	151,845	31	1.79	29	
Kentucky	1,853	35		26	0	0	0	1,292	763	58	471	533	227	59	16	177	23	31	1	1	191,897	28	0.97	38	
Louisiana	1,124	38		50	0	0	0	400	325	35	40	663	266	92	36	215	36	18	1	9	238,075	24	0.47	50	
Maine	508	45		13	0	0	0	298	259	13	26	108	51	22	3	28	3	1	87	3	57,332	44	0.89	41	
Maryland	20,385	5		10,462	702	702	0	5,136	2,825	517	1,793	3,742	2,943	65	91	451	176	16	342	1	366,242	15	5.57	3	
Massachusetts	28,665	2		632	1,374	1,369	5	21,484	17,719	2,899	865	3,674	2,142	52	266	753	300	160	1,490	11	488,100	11	5.87	2	
Michigan	19,891	7		372	0	0	0	17,136	15,620	1,233	283	2,335	1,190	48	93	867	97	39	48	1	470,611	13	4.23	6	
Minnesota	8,053	16		61	0	0	0	6,820	6,290	252	278	929	494	59	26	295	13	41	240	3	326,833	17	2.46	17	
Mississippi	943	40		317	0	0	0	216	186	17	14	408	194	92	22	90	8	2	2	*	105,871	37	0.89	40	
Missouri	7,426	18		236	0	0	0	6,078	3,737	D	D	1,074	611	7	71	276	98	10	30	7	292,718	21	2.54	16	
Montana	459	47		45	0	0	0	225	200	15	10	182	107	11	3	52	3	5	4	2	45,845	49	1.00	37	
Nebraska	1,087	39		38	0	0	0	578	539	29	10	464	184	11	23	209	27	9	7	1	113,458	36	0.96	39	
Nevada	566	43		26	0	0	0	381	329	29	23	158	96	16	3	34	2	7	1	*	141,070	33	0.40	51	

CHAPTER 4 | Research and Development: U.S. Trends and International Comparisons

State	All R&D	R&D rank	Per-former:	Federal	FFRDCs			Business				Higher education <sup>a</sup>							Other nonprofit insti-tutions		State, in-ternal <sup>b</sup>	GDP	GDP rank	R&D intensity <sup>c</sup>	
			Source of funds:	Federal	Total	Federal	Non-federal <sup>d</sup>	Total	Own	Paid by others		Total	Federal	Other govern-ment	Busi-ness	Higher ed-ucation	Non-profit	Other	Federal <sup>f</sup>	Total	Per-cent			Rank	
										Non-federal <sup>e</sup>	Fed-eral														
New Hampshire	2,333	32		39	0	0	0	1,932	817	283	832	358	241	5	15	77	14	5	4	*	74,269	40	3.14	11	
New Jersey	15,865	9		541	81	81	1	14,113	11,627	2,260	226	1,106	588	93	38	294	74	20	21	2	564,360	8	2.81	13	
New Mexico	6,078	24		657	4,499	4,427	72	502	254	61	188	391	254	26	9	80	12	10	26	3	93,230	38	6.52	1	
New York	22,401	4		224	587	573	14	15,329	11,897	1,767	1,666	5,700	3,026	233	433	1,385	461	162	317	243	1,445,611	3	1.55	30	
North Carolina	11,823	12		306	0	0	0	8,572	6,428	1,972	172	2,815	1,600	148	337	540	152	38	116	14	499,741	10	2.37	19	
North Dakota	460	46		28	0	0	0	211	191	15	5	218	73	60	14	64	2	5	1	1	55,927	45	0.82	42	
Ohio	12,233	11		797	0	0	0	9,044	6,149	1,868	1,027	2,153	1,269	122	185	436	101	39	238	1	607,326	7	2.01	27	
Oklahoma	1,311	37		199	0	0	0	661	605	36	21	420	183	62	29	125	11	9	31	*	188,011	29	0.70	45	
Oregon	7,208	19		86	0	0	0	6,357	6,103	139	115	720	503	55	30	73	43	15	28	18	216,522	25	3.33	10	
Pennsylvania	14,839	10		663	131	131	0	10,354	9,022	1,168	164	3,357	2,179	80	197	603	198	100	327	7	708,402	6	2.09	25	
Rhode Island	1,427	36		165	0	0	0	751	679	23	50	453	210	11	6	205	17	5	57	*	55,650	46	2.56	15	
South Carolina	2,257	33		143	122	122	0	1,289	1,129	82	78	665	283	34	43	276	21	8	16	22	201,831	26	1.12	35	
South Dakota	271	50		14	0	0	0	139	115	12	11	103	50	19	3	22	7	2	14	*	47,073	48	0.58	48	
Tennessee	4,369	25		204	1,333	1,305	28	1,570	1,345	179	46	1,076	626	31	52	315	39	12	185	1	316,659	18	1.38	32	
Texas	23,668	3		1,076	13	11	1	17,350	14,790	1,446	1,114	5,083	2,016	814	352	1,278	373	249	144	3	1,611,189	2	1.47	31	
Utah	4,174	27		147	0	0	0	3,274	2,685	149	441	733	419	45	79	150	35	6	1	18	149,099	32	2.80	14	

CHAPTER 4 | Research and Development: U.S. Trends and International Comparisons

State	All R&D	R&D rank	Per-former:	Federal	FFRDCs		Business				Higher education <sup>a</sup>							Other nonprofit insti-tutions		State, in-ternal <sup>b</sup>	GDP	GDP rank	R&D intensity <sup>c</sup>	
			Source of funds:	Federal	Total	Federal	Non-federal <sup>d</sup>	Total	Own	Paid by others		Total	Federal	Other govern-ment	Busi-ness	Higher ed-ucation	Non-profit	Other	Federal <sup>f</sup>	Total			Per-cent	Rank
				Non-federal <sup>e</sup>	Fed-eral																			
Vermont	374	48		6	0	0	0	247	204	26	17	120	88	0.24	2	23	5	1	0.00	1	30,300	51	1.23	34
Virginia	10,107	13		2,733	1,372	1,348	24	4,486	2,719	343	1,424	1,411	738	74	62	473	53	12	90	15	481,721	12	2.10	23
Washington	20,038	6		149	951	942	9	16,940	16,313	415	212	1,549	1,058	80	57	191	114	50	439	10	446,417	14	4.49	5
West Virginia	546	44		133	0	0	0	201	158	19	23	199	87	14	13	69	4	12	11	2	73,384	41	0.74	44
Wisconsin	6,132	23		52	0	0	0	4,676	4,052	538	85	1,374	684	95	40	451	71	32	23	7	301,587	20	2.03	26
Wyoming	253	51		6	0	0	0	177	137	35	5	57	49	3	2	2	1	0	11	2	39,415	50	0.64	46
U.S. undistributed <sup>h</sup>	14,090	na		3,586	0	0	0	10,504	8,188	D	0	0	0	0	0	0	0	0	0	0	0	na	na	na
Puerto Rico <sup>i</sup>	137	na		6	0	0	0	NA	NA	NA	NA	127	88	4	4	29	1	1	*	4	103,100	na	NA	na
Other <sup>j</sup>	263	na		235	0	0	0	0	0	0	0	28	26	*	*	*	*	1	*	na	na	na	na	na

\* = < \$0.5 million; D = data withheld to avoid disclosing operations of individual companies; na = not applicable; NA = not available.

FFRDC = federally funded research and development center; GDP = gross domestic product; HE = higher education.

<sup>a</sup> State-level higher education R&D data have not been adjusted to eliminate the double counting of all pass-through funding. At the national level, funds passed through to educational subrecipients accounted for 8.2% of total R&D expenditures reported by universities and colleges in FY 2015.

<sup>b</sup> Internal performers include state agency and department employees and also services performed by others in support of an internal R&D project.

<sup>c</sup> R&D intensity is the ratio of total R&D performed in a state to its state GDP.

<sup>d</sup> Nonfederal sources of R&D expenditures reported by FFRDCs in FY 2015 included state and local governments (\$18 million), business (\$209 million), nonprofit organizations (\$28 million), and all other sources (\$106 million).

<sup>e</sup> R&D paid for by nonfederal sources includes funding from other companies located inside (\$15 billion) or outside (\$16 billion) the United States, U.S. state government agencies (\$127 million), foreign government agencies and laboratories (\$572 million), other organizations located inside (\$489 million) or outside (\$54 million) the United States.

<sup>f</sup> Other sources of support for nonprofit institutions were unavailable by state. In 2015, total nonprofit performance is estimated at \$19.7 billion. Business provided an estimated \$1.6 billion to the nonprofit sector, and nonprofit institutions provided an estimated \$12.0 billion.

<sup>g</sup> States totals differ from U.S. totals for several reasons: (1) some R&D expenditures cannot be allocated to 1 of 50 states or the District of Columbia; (2) nonfederal sources of other nonprofit R&D expenditures could not be allocated by state; (3) state-level higher education data have not been adjusted to eliminate double counting of funds passed through from one academic institution to another; and (4) state-level R&D data are not converted from fiscal years to calendar years.

CHAPTER 4 | Research and Development: U.S. Trends and International Comparisons

<sup>h</sup> Reported data that could not be assigned to 1 of the 50 states or the District of Columbia.

<sup>i</sup> Data on business R&D performance in Puerto Rico are not collected.

<sup>j</sup> Includes R&D expenditures reported for outlying areas (Guam, Virgin Islands, American Samoa) and offices abroad but excluding Puerto Rico.

**Note(s)**

Business R&D data refer to calendar years; the data for the other R&D performers refer to fiscal years but are used here as approximations to calendar-year data.

**Source(s)**

National Science Foundation, National Center for Science and Engineering Statistics, National Patterns of R&D Resources (annual series). State GDP data are from the U.S. Bureau of Economic Analysis, <http://www.bea.gov/regional/index.htm>, accessed 17 June 2017.

*Science and Engineering Indicators 2018*



## CHAPTER 4 | Research and Development: U.S. Trends and International Comparisons

APPENDIX TABLE 4-11

### U.S. R&D and gross domestic product, by state: 2015

(Millions of current dollars, R&amp;D-to-GDP ratio, and state rank)

R&D rank	State (listed by R&D rank)	R&D (current \$millions)	GDP (current \$millions)	R&D/ GDP (%)	R&D/ GDP rank	Total state R&D (%)	Cumulative (%)
-	All states	468,866	17,925,143	2.62	-	100.0	-
1	California	125,056	2,491,619	5.02	4	26.7	26.7
2	Massachusetts	28,665	488,100	5.87	2	6.1	32.8
3	Texas	23,668	1,611,189	1.47	31	5.0	37.8
4	New York	22,401	1,445,611	1.55	30	4.8	42.6
5	Maryland	20,385	366,242	5.57	3	4.3	47.0
6	Michigan	19,891	470,611	4.23	6	4.2	51.2
7	Washington	20,038	446,417	4.49	5	4.3	55.5
8	Illinois	16,502	772,182	2.14	22	3.5	59.0
9	New Jersey	15,865	564,360	2.81	13	3.4	62.4
10	Pennsylvania	14,839	708,402	2.09	25	3.2	65.5
11	Ohio	12,233	607,326	2.01	27	2.6	68.2
12	North Carolina	11,823	499,741	2.37	19	2.5	70.7
13	Virginia	10,107	481,721	2.10	23	2.2	72.8
14	Connecticut	9,918	256,306	3.87	8	2.1	74.9
15	Florida	9,456	883,861	1.07	36	2.0	77.0
16	Minnesota	8,053	326,833	2.46	17	1.7	78.7
17	Missouri	7,426	292,718	2.54	16	1.6	80.3
18	Indiana	7,663	333,363	2.30	20	1.6	81.9
19	Oregon	7,208	216,522	3.33	10	1.5	83.4
20	Arizona	7,011	291,448	2.41	18	1.5	84.9
21	Georgia	6,877	501,522	1.37	33	1.5	86.4
22	Colorado	6,697	313,329	2.14	21	1.4	87.8
23	New Mexico	6,078	93,230	6.52	1	1.3	89.1

## CHAPTER 4 | Research and Development: U.S. Trends and International Comparisons

R&D rank	State (listed by R&D rank)	R&D (current \$millions)	GDP (current \$millions)	R&D/ GDP (%)	R&D/ GDP rank	Total state R&D (%)	Cumulative (%)
24	Wisconsin	6,132	301,587	2.03	26	1.3	90.4
25	Alabama	4,195	199,980	2.10	24	0.9	91.3
26	Tennessee	4,369	316,659	1.38	32	0.9	92.3
27	District of Columbia	3,567	121,119	2.95	12	0.8	93.0
28	Utah	4,174	149,099	2.80	14	0.9	93.9
29	Iowa	3,407	175,809	1.94	28	0.7	94.6
30	Delaware	2,887	68,864	4.19	7	0.6	95.2
31	Kansas	2,716	151,845	1.79	29	0.6	95.8
32	New Hampshire	2,333	74,269	3.14	11	0.5	96.3
33	Idaho	2,226	65,460	3.40	9	0.5	96.8
34	South Carolina	2,257	201,831	1.12	35	0.5	97.3
35	Kentucky	1,853	191,897	0.97	38	0.4	97.7
36	Rhode Island	1,427	55,650	2.56	15	0.3	98.0
37	Mississippi	943	105,871	0.89	40	0.2	98.2
38	Louisiana	1,124	238,075	0.47	50	0.2	98.4
39	Oklahoma	1,311	188,011	0.70	45	0.3	98.7
40	Nebraska	1,087	113,458	0.96	39	0.2	98.9
41	Nevada	566	141,070	0.40	51	0.1	99.1
42	Hawaii	609	80,599	0.76	43	0.1	99.2
43	Arkansas	624	118,677	0.53	49	0.1	99.3
44	West Virginia	546	73,384	0.74	44	0.1	99.4
45	Maine	508	57,332	0.89	41	0.1	99.5
46	North Dakota	460	55,927	0.82	42	0.1	99.6
47	Montana	459	45,845	1.00	37	0.1	99.7
48	Vermont	374	30,300	1.23	34	0.1	99.8
49	Alaska	333	53,384	0.62	47	0.1	99.9
50	South Dakota	271	47,073	0.58	48	0.1	99.9

## CHAPTER 4 | Research and Development: U.S. Trends and International Comparisons

R&D rank	State (listed by R&D rank)	R&D (current \$millions)	GDP (current \$millions)	R&D/ GDP (%)	R&D/ GDP rank	Total state R&D (%)	Cumulative (%)
51	Wyoming	253	39,415	0.64	46	0.1	100.0

GDP = gross domestic product.

### Note(s)

U.S. total R&D expenditures for 2015 was \$495.1 billion; \$448.9 billion could be allocated to the 50 states and District of Columbia.

### Source(s)

National Science Foundation, National Center for Science and Engineering Statistics, National Patterns of R&D Resources (annual series). State GDP data are from the U.S. Bureau of Economic Analysis, <https://www.bea.gov/regional/index.htm>, accessed 17 June 2017.

*Science and Engineering Indicators 2018*

## CHAPTER 4 | Research and Development: U.S. Trends and International Comparisons

APPENDIX TABLE 4-12

### Gross expenditures on R&D and expenditures for R&D as a share of gross domestic product, for selected countries or regions: 1981–2015

(PPP in billions and in constant 2005 billions of dollars, GERD-to-GDP ratio, and annual growth rates)

Year	United States	EU <sup>a</sup>	France	Germany	United Kingdom	China	Japan	South Korea	India
GERD (PPP \$billions)									
1981	72.7	na	11.0	18.9	11.6	NA	23.7	NA	NA
1982	81.2	na	12.5	20.5	NA	NA	27.1	NA	NA
1983	90.4	na	13.4	21.8	12.5	NA	30.8	NA	NA
1984	102.9	na	14.8	23.2	NA	NA	34.5	NA	NA
1985	115.2	na	15.9	26.2	14.4	NA	40.0	NA	NA
1986	120.6	na	16.5	27.7	15.3	NA	41.5	NA	NA
1987	126.7	na	17.7	30.0	15.9	NA	45.6	NA	NA
1988	134.2	na	19.1	32.0	16.9	NA	50.9	NA	NA
1989	142.2	na	21.1	34.4	17.9	NA	57.7	NA	NA
1990	152.4	na	23.4	36.0	18.7	NA	64.9	NA	NA
1991	161.4	na	24.4	40.1	18.3	9.1	68.8	7.0	NA
1992	165.8	na	25.4	39.9	18.5	10.7	69.7	8.0	NA
1993	166.1	na	26.3	39.1	19.7	12.0	69.6	9.5	NA
1994	169.6	na	26.9	39.4	20.5	12.5	70.4	11.6	NA
1995	184.1	137.3	27.7	41.0	19.6	12.8	76.6	13.2	NA
1996	197.8	142.7	28.3	42.2	20.1	14.2	83.1	14.9	9.9
1997	212.5	149.4	28.6	44.0	20.7	17.9	87.8	16.3	11.3
1998	226.2	157.1	29.4	46.0	21.4	19.7	91.0	14.6	12.4
1999	245.0	169.0	31.0	50.5	23.3	25.0	92.8	15.8	14.1
2000	268.6	183.1	33.2	53.6	25.1	33.0	98.8	18.5	15.7
2001	279.1	195.3	36.2	56.1	26.4	38.5	103.8	21.3	16.3
2002	278.4	205.7	38.3	58.4	27.9	48.1	108.2	22.5	17.0
2003	292.2	210.1	37.1	60.8	28.6	57.1	112.2	24.1	18.5

## CHAPTER 4 | Research and Development: U.S. Trends and International Comparisons

Year	United States	EU <sup>a</sup>	France	Germany	United Kingdom	China	Japan	South Korea	India
2004	303.8	218.0	38.2	62.8	29.4	70.1	117.6	27.9	21.6
2005	326.2	226.8	39.5	63.9	30.6	86.8	128.7	30.6	26.5
2006	351.7	249.6	42.3	69.3	33.3	105.6	138.6	35.4	29.4
2007	378.5	266.6	44.2	73.3	35.2	124.2	147.6	40.6	33.5
2008	405.4	290.7	46.6	81.1	36.5	146.1	148.7	43.9	37.8
2009	404.2	297.4	49.7	82.8	36.5	185.3	137.0	46.0	40.2
2010	408.5	308.3	51.0	87.1	37.6	213.5	140.6	52.2	43.7
2011	427.1	328.5	53.6	95.8	38.8	247.8	148.4	58.4	48.1
2012	434.3	341.4	55.1	100.5	38.5	292.2	152.3	64.9	NA
2013	454.8	355.8	58.4	102.9	41.5	334.1	164.7	68.2	NA
2014	476.5	372.3	59.5	109.8	44.2	370.1	170.5	73.2	NA
2015	496.6	386.5	60.8	114.8	46.3	408.8	170.0	74.1	50.3
GERD (2009 constant PPP \$billions)									
1981	149.9	na	22.8	38.9	23.9	NA	48.9	NA	NA
1982	157.5	na	24.3	39.9	NA	NA	52.7	NA	NA
1983	168.8	na	25.1	40.6	23.4	NA	57.4	NA	NA
1984	185.5	na	26.6	41.8	NA	NA	62.3	NA	NA
1985	201.3	na	27.8	45.8	25.2	NA	69.9	NA	NA
1986	206.5	na	28.3	47.4	26.2	NA	71.0	NA	NA
1987	211.5	na	29.6	50.1	26.6	NA	76.1	NA	NA
1988	216.5	na	30.8	51.7	27.2	NA	82.2	NA	NA
1989	220.9	na	32.8	53.4	27.8	NA	89.7	NA	NA
1990	228.2	na	35.0	54.0	28.0	NA	97.2	NA	NA
1991	233.9	na	35.4	58.2	26.6	13.3	99.7	10.2	NA
1992	235.0	na	36.0	56.5	26.2	15.2	98.7	11.4	NA
1993	230.0	na	36.4	54.2	27.2	16.5	96.3	13.2	NA
1994	229.9	na	36.4	53.4	27.8	16.9	95.4	15.7	NA

## CHAPTER 4 | Research and Development: U.S. Trends and International Comparisons

Year	United States	EU <sup>a</sup>	France	Germany	United Kingdom	China	Japan	South Korea	India
1995	244.4	182.2	36.7	54.4	26.1	17.0	101.7	17.5	NA
1996	257.9	186.0	36.9	55.0	26.2	18.5	108.3	19.4	12.9
1997	272.4	191.5	36.7	56.4	26.5	22.9	112.5	20.8	14.5
1998	286.9	199.3	37.3	58.4	27.2	25.0	115.4	18.5	15.7
1999	306.0	211.0	38.7	63.1	29.1	31.2	115.9	19.7	17.6
2000	328.0	223.5	40.6	65.5	30.7	40.4	120.6	22.6	19.1
2001	333.2	233.2	43.2	66.9	31.5	46.0	124.0	25.4	19.5
2002	327.4	241.9	45.1	68.7	32.8	56.5	127.2	26.5	20.0
2003	336.8	242.2	42.8	70.1	32.9	65.9	129.4	27.8	21.3
2004	340.9	244.6	42.8	70.5	33.0	78.7	132.0	31.4	24.2
2005	354.6	246.5	43.0	69.4	33.3	94.4	139.9	33.3	28.8
2006	370.9	263.2	44.7	73.1	35.1	111.4	146.1	37.4	31.0
2007	388.9	273.9	45.4	75.3	36.2	127.6	151.6	41.8	34.4
2008	408.5	292.9	46.9	81.7	36.8	147.2	149.8	44.2	38.1
2009	404.2	297.4	49.7	82.8	36.5	185.3	137.0	46.0	40.2
2010	403.5	304.6	50.3	86.1	37.2	210.9	138.9	51.5	43.1
2011	413.4	317.9	51.9	92.7	37.5	239.9	143.6	56.5	46.5
2012	412.8	324.4	52.4	95.5	36.6	277.7	144.8	61.6	NA
2013	425.4	332.8	54.6	96.3	38.8	312.5	154.0	63.8	NA
2014	437.8	342.1	54.7	100.9	40.6	340.1	156.7	67.3	NA
2015	451.4	351.3	55.3	104.3	42.0	371.6	154.5	67.3	45.7
GERD/GDP (%)									
1981	2.27	NA	1.86	2.35	2.24	NA	2.05	NA	NA
1982	2.43	NA	1.94	2.42	NA	NA	2.14	NA	NA
1983	2.48	NA	1.98	2.43	2.06	NA	2.26	NA	NA
1984	2.55	NA	2.07	2.43	NA	NA	2.35	NA	NA
1985	2.65	NA	2.12	2.60	2.09	NA	2.48	NA	NA

## CHAPTER 4 | Research and Development: U.S. Trends and International Comparisons

Year	United States	EU <sup>a</sup>	France	Germany	United Kingdom	China	Japan	South Korea	India
1986	2.63	NA	2.11	2.63	2.10	NA	2.45	NA	NA
1987	2.60	NA	2.15	2.74	2.02	NA	2.52	NA	NA
1988	2.55	NA	2.14	2.73	1.96	NA	2.54	NA	NA
1989	2.51	NA	2.18	2.71	1.95	NA	2.63	NA	NA
1990	2.55	NA	2.26	2.61	1.95	NA	2.70	NA	NA
1991	2.61	NA	2.27	2.40	1.87	0.72	2.68	1.74	NA
1992	2.54	NA	2.27	2.28	1.84	0.73	2.63	1.83	NA
1993	2.42	NA	2.31	2.21	1.86	0.70	2.56	1.98	NA
1994	2.32	NA	2.26	2.13	1.84	0.63	2.52	2.16	NA
1995	2.40	1.59	2.23	2.13	1.68	0.57	2.61	2.20	NA
1996	2.44	1.58	2.21	2.14	1.61	0.56	2.69	2.26	0.63
1997	2.47	1.59	2.14	2.18	1.56	0.64	2.77	2.30	0.67
1998	2.49	1.60	2.08	2.21	1.58	0.65	2.87	2.16	0.69
1999	2.54	1.65	2.10	2.33	1.66	0.75	2.89	2.07	0.71
2000	2.61	1.67	2.08	2.39	1.64	0.89	2.91	2.18	0.74
2001	2.63	1.69	2.13	2.39	1.63	0.94	2.97	2.34	0.72
2002	2.54	1.70	2.17	2.42	1.64	1.06	3.01	2.27	0.71
2003	2.54	1.69	2.11	2.46	1.60	1.12	3.04	2.35	0.71
2004	2.48	1.66	2.09	2.42	1.55	1.21	3.03	2.53	0.74
2005	2.49	1.66	2.04	2.42	1.57	1.31	3.18	2.63	0.81
2006	2.54	1.68	2.05	2.46	1.59	1.37	3.28	2.83	0.80
2007	2.61	1.69	2.02	2.45	1.63	1.37	3.34	3.00	0.81
2008	2.75	1.76	2.06	2.60	1.64	1.44	3.34	3.12	0.87
2009	2.80	1.84	2.21	2.73	1.70	1.66	3.23	3.29	0.84
2010	2.73	1.84	2.18	2.71	1.68	1.71	3.14	3.47	0.82
2011	2.75	1.88	2.19	2.80	1.68	1.78	3.24	3.74	0.83
2012	2.69	1.92	2.23	2.87	1.61	1.91	3.21	4.03	NA

## CHAPTER 4 | Research and Development: U.S. Trends and International Comparisons

Year	United States	EU <sup>a</sup>	France	Germany	United Kingdom	China	Japan	South Korea	India
2013	2.72	1.93	2.24	2.82	1.66	1.99	3.31	4.15	NA
2014	2.73	1.95	2.23	2.88	1.68	2.02	3.40	4.29	NA
2015	2.74	1.96	2.22	2.93	1.70	2.07	3.29	4.23	0.63
GERD, annual growth rates, recent years, current and constant dollars (%)									
Current PPP\$									
CAGR 2000–10	4.3	5.4	4.4	5.0	4.1	20.5	3.6	10.9	10.8
CAGR 2010–15	4.0	4.6	3.6	5.7	4.2	13.9	3.9	7.3	2.9
Constant 2009 PPP\$									
CAGR 2000–10	2.1	3.1	2.2	2.8	1.9	18.0	1.4	8.6	8.5
CAGR 2010–15	2.3	2.9	1.9	3.9	2.5	12.0	2.2	5.5	1.2
GDP, annual growth rates, recent years, current and constant dollars (%)									
Current PPP\$									
CAGR 2000–10	3.8	4.4	3.9	3.7	3.9	12.9	2.8	5.9	9.7
CAGR 2010–15	3.9	3.3	3.2	4.1	3.9	9.6	2.9	3.1	8.4
Constant 2009 PPP\$									
CAGR 2000–10	1.6	2.2	1.7	1.5	1.7	10.6	0.6	3.7	7.4
CAGR 2010–15	2.2	1.6	1.5	2.4	2.2	7.8	1.2	1.4	6.6

NA = not available.

CAGR = compound average annual growth rate; EU = European Union; GDP = gross domestic product; GERD = gross domestic expenditures on R&D; PPP = purchasing power parity.

<sup>a</sup> Data include the 28 EU member countries.



## CHAPTER 4 | Research and Development: U.S. Trends and International Comparisons

### Note(s)

Top 8 R&D performing countries in 2015. Conversions of foreign currencies to U.S. dollars are calculated with each country's GDP implicit price deflator and with Organisation for Economic Co-operation and Development (OECD) PPP exchange rates. Data for the United States in this table reflect international standards for calculating GERD, which vary slightly from the National Science Foundation's protocol for tallying U.S. total R&D. Data for Japan for 1996 onward may not be consistent with earlier data because of changes in methodology. Data for Germany for 1981–90 are for West Germany.

### Source(s)

National Science Foundation, National Center for Science and Engineering Statistics, National Patterns of R&D Resources (annual series); OECD, *Main Science and Technology Indicators* (2017/1); United Nations Educational, Scientific and Cultural Organization Institute for Statistics Data Centre, <http://data.uis.unesco.org/>, accessed 13 October 2017.

*Science and Engineering Indicators 2018*

## CHAPTER 4 | Research and Development: U.S. Trends and International Comparisons

APPENDIX TABLE 4-13

## Funds spent for business R&amp;D performed in the United States, by source of funds and selected industry: 2008–14

(Millions of dollars)

Industry and NAICS code	All R&D		Paid for by the company		Paid for by others									
					Total		Federal		Companies			All other organizations <sup>b</sup>		
									Domestic		Foreign <sup>a</sup>			
2014														
All industries, 21–33, 42–81 <sup>c</sup>	340,728		282,570		58,158		26,554		13,227		17,246		1,131	
Manufacturing industries, 31–33	232,815		192,160		40,655		21,303		5,062		13,573		717	
Chemicals, 325	66,301		56,488		9,813		404		1,660		7,674		75	
Pharmaceuticals and medicines, 3254	56,612		47,646		8,966		272		1,600		7,022		72	
Other, 325	9,689		8,842		847		132		60		652		3	
Machinery, 333	12,128		11,458		670		78		199	i	385	i	8	i
Computer and electronic products, 334	73,891		64,695		9,195		4,456		1,467		3,028		244	
Electrical equipment, appliances, and components, 335	4,365		4,178		187	i	48	i	15	i	117	i	7	i
Transportation equipment, 336	46,746		27,261		19,485	i	16,153	i	1,398		1,666		268	i
Automobiles, trailers, and parts, 3361–63	18,404		15,900		2,504		254	i	625		1,619		6	
Aerospace products and parts, 3364	26,181	i	10,300		15,881	i	14,826	i	747		47		261	i
Other 336	2,161		1,061		1,100		1,073		26		0		1	
Manufacturing nec, other 31–33	29,384		28,080		1,305		164		323		703		115	

## CHAPTER 4 | Research and Development: U.S. Trends and International Comparisons

Industry and NAICS code	All R&D		Paid for by the company		Paid for by others									
					Total	Federal		Companies			All other organizations <sup>b</sup>			
								Domestic		Foreign <sup>a</sup>				
Nonmanufacturing industries, 21–23, 42–81	107,913		90,409		17,504		5,251		8,165		3,673	i	415	i
Information, 51	63,773		62,296		1,477		162		517		775		23	
Software publishers, 5112	36,052		34,781		1,270		99		463		707		1	
Other 51	27,721		27,515		207		63		54		68		22	
Finance and insurance, 52	4,122		4,090		32		0		s		0		s	
Professional, scientific, and technical services, 54	30,975	i	16,061	i	14,914		5,016		7,189		2,391	i	318	i
Computer systems design and related services, 5415	11,019	i	8,644	i	2,375	i	471	i	690	i	1,095	i	119	i
Scientific R&D services, 5417	12,807		2,668		10,139		2,954		6,105		941		139	
Other 54	7,149		4,749		2,400		1,591		394		355		60	
Nonmanufacturing nec, other 21–23, 42–81	9,043		7,962		1,081		73		s		507		s	
2013														
All industries, 21–33, 42–81 <sup>c</sup>	322,528		264,913		57,615		29,362		13,450		13,791		1,012	
Manufacturing industries, 31–33	221,476		181,170		40,306		22,958		5,174		11,427		747	
Chemicals, 325	61,664		54,285		7,379		356		1,389		5,594		40	
Pharmaceuticals and medicines, 3254	52,426		45,891		6,534		167		1,343		4,987		37	
Other 325	9,238		8,394		845		189		46		607		3	
Machinery, 333	12,650		12,092		558		128		110		309		11	

## CHAPTER 4 | Research and Development: U.S. Trends and International Comparisons

Industry and NAICS code	All R&D		Paid for by the company		Paid for by others							
					Total		Federal		Companies			All other organizations <sup>b</sup>
									Domestic		Foreign <sup>a</sup>	
Computer and electronic products, 334	67,205		57,364		9,841		4,866		1,748		s	s
Electrical equipment, appliances, and components, 335	4,136		3,660		475	i	129	i	83		s	s
Transportation equipment, 336	45,972		25,165		20,807	i	17,312		1,328		s	s
Automobiles, trailers, and parts, 3361–63	16,729		14,081		2,647		304	i	565	i	1,772	6
Aerospace products and parts, 3364	27,114		10,042		17,072	i	15,927		758		s	s
Other 336	2,129		1,042		1,088		1,081		5		s	s
Manufacturing nec, other 31–33	29,849		28,604		1,246		167		516		540	23
Nonmanufacturing industries, 21–23, 42–81	101,052		83,742		17,310		6,404		8,276		2,364	266
Information, 51	57,207		56,039		1,168		203		447		512	6
Software publishers, 5112	35,333		34,296		1,037		173		386		474	4
Other 51	21,874		21,743		131		30		61		38	2
Finance and insurance, 52	4,308		4,298		10		0		10		0	0
Professional, scientific, and technical services, 54	31,017		15,617	i	15,400		6,033		7,610		1,525	232
Computer systems design and related services, 5415	9,268		8,107	i	1,161	i	809	i	175	i	157	20
Scientific R&D services, 5417	14,201		2,838		11,363		3,288		6,841		1,127	107
Other 54	7,548		4,672		2,876		1,936		594		241	105
Nonmanufacturing nec, other 21–23, 42–81	8,520		7,788		732		168		209		327	28

## CHAPTER 4 | Research and Development: U.S. Trends and International Comparisons

Industry and NAICS code	All R&D		Paid for by the company		Paid for by others									
					Total	Federal		Companies			All other organizations <sup>b</sup>			
								Domestic		Foreign <sup>a</sup>				
2012														
All industries, 21–33, 42–81 <sup>c</sup>	302,250			247,280		54,970		30,621	i	11,624		12,093		632
Manufacturing industries, 31–33	208,415			170,197		38,218		24,059	i	4,553		9,320		286
Chemicals, 325	57,225			50,867		6,359		369	i	1,374		4,605		11
Pharmaceuticals and medicines, 3254	48,146			42,594		5,552		57		1,337		4,153		5
Other 325	9,079			8,273		807		312		37		452		6
Machinery, 333	14,254			13,294		960		385		278		192		105
Computer and electronic products, 334	65,068			56,677		8,391		4,852		1,248		2,167		124
Electrical equipment, appliances, and components, 335	3,087			2,900		187		44	i	10	i	132		1
Transportation equipment, 336	42,305			21,344		20,961	i	18,268	i	1,312		1,359		22
Automobiles, trailers, and parts, 3361–63	s			13,191		s		s		558	i	s		s
Aerospace products and parts, 3364	24,817			7,140		17,677	i	16,895	i	749		s		s
Other 336	s			1,013		s		s		5		s		s
Manufacturing nec, other 31–33	26,476			25,115		1,360		141		331		865		23
Nonmanufacturing industries, 21–23, 42–81	93,835			77,083		16,752		6,562		7,071		2,773		346
Information, 51	46,805			45,851		954		142		351		419		42
Software publishers, 5112	28,745			28,012		733		103		256		367		7

## CHAPTER 4 | Research and Development: U.S. Trends and International Comparisons

Industry and NAICS code	All R&D		Paid for by the company		Paid for by others							
					Total		Federal		Companies			All other organizations <sup>b</sup>
									Domestic		Foreign <sup>a</sup>	
Other 51	18,060		17,839		221		39		95		52	35
Finance and insurance, 52	3,519		3,507		12		0		11		2	0
Professional, scientific, and technical services, 54	34,309		20,166		14,143		5,606		6,333		1,947	257
Computer systems design and related services, 5415	11,251	i	9,163	i	2,088		1,449		435	i	180	24
Scientific R&D services, 5417	16,544		6,788		9,756		2,596		5,512		1,540	108
Other 54	6,514		4,215		2,299		1,561		386		227	125
Nonmanufacturing nec, other 21–23, 42–81	9,202		7,559		1,643		814		376		405	48
2011												
All industries, 21–33, 42–81 <sup>c</sup>	294,093		238,768		55,324		31,309	i	11,124		12,007	884
Manufacturing industries, 31–33	201,361		163,340		38,021		24,698	i	4,196		8,870	257
Chemicals, 325	55,324		49,988		5,337		110		1,320		3,867	40
Pharmaceuticals and medicines, 3254	45,949		41,111		4,838		52		1,285		3,474	27
Other 325	9,375		8,877		499		58		35		393	13
Machinery, 333	14,709		13,578		1,131		522		423		s	s
Computer and electronic products, 334	62,704		53,664		9,040		5,161		1,087		2,726	66
Electrical equipment, appliances, and components, 335	3,595		3,417		178		76		24		74	4
Transportation equipment, 336	40,880		20,275		20,605	i	s		1,086		s	s

## CHAPTER 4 | Research and Development: U.S. Trends and International Comparisons

Industry and NAICS code	All R&D	Paid for by the company	Paid for by others									
			Total		Federal		Companies				All other organizations <sup>b</sup>	
							Domestic			Foreign <sup>a</sup>		
Automobiles, trailers, and parts, 3361–63	s	11,737	s		s		s			s		
Aerospace products and parts, 3364	26,054	7,585	18,469	i	17,806	i	592			s		s
Other 336	s	s	s		s		s			s		s
Manufacturing nec, other 31–33	24,149	22,418	1,730		s		256			s		s
Nonmanufacturing industries, 21–23, 42–81	92,731	75,428	17,303		6,611		6,928			3,138		626
Information, 51	41,865	41,014	851		s		321			s		s
Software publishers, 5112	27,965	27,280	685		136		s			s		s
Other 51	13,900	13,734	166		s		s			s		s
Finance and insurance, 52	3,457	3,310	146		0		145			1		0
Professional, scientific, and technical services, 54	38,219	23,368	14,851		5,848		6,227			2,213		563
Computer systems design and related services, 5415	13,259	11,706	1,553		598		626			209		120
Scientific R&D services, 5417	15,301	6,170	9,131		3,226		3,834			1,833		238
Other 54	9,659	5,492	4,167		2,024		1,767			171		205
Nonmanufacturing nec, other 21–23, 42–81	9,190	7,736	1,455		s		235			s		s
2010												
All industries, 21–33, 42–81 <sup>c</sup>	278,977	221,706	57,271		34,199	i	11,013			11,015		1,044
Manufacturing industries, 31–33	196,712	159,579	37,133		26,739	i	3,655			6,375		364

## CHAPTER 4 | Research and Development: U.S. Trends and International Comparisons

Industry and NAICS code	All R&D		Paid for by the company		Paid for by others							
					Total		Federal		Companies			All other organizations <sup>b</sup>
									Domestic		Foreign <sup>a</sup>	
Chemicals, 325	58,038		53,555		4,483		180		s		s	s
Pharmaceuticals and medicines, 3254	49,415		45,398		4,017		99		s		s	s
Other 325	8,623		8,157		466		81		s		s	s
Machinery, 333	9,955		9,384		571		98		176		282	15
Computer and electronic products, 334	59,875		51,223		8,652		5,935	i	911		1,767	39
Electrical equipment, appliances, and components, 335	3,321		3,141		180		84		s		s	s
Transportation equipment, 336	42,913		21,076		21,837	i	20,191	i	1,016		541	89
Automobiles, trailers, and parts, 3361–63	s		10,098		s		s		s		s	s
Aerospace products and parts, 3364	29,854		10,152		19,702	i	18,921	i	635		s	s
Other 336	s		826		s		s		s		s	s
Manufacturing nec, other 31–33	22,610		21,200		1,410		251		s		s	s
Nonmanufacturing industries, 21–23, 42–81	82,265		62,127		20,138		7,460		7,358		4,532	788
Information, 51	36,853		36,085		768		152		244		s	s
Software publishers, 5112	26,982		26,387		595		140		134		s	s
Other 51	9,871		9,698		173		12		110		s	s
Finance and insurance, 52	2,109		2,109		0		0		0		0	0
Professional, scientific, and technical services, 54	33,690		15,438		18,252		6,829		6,906		3,801	716



## CHAPTER 4 | Research and Development: U.S. Trends and International Comparisons

Industry and NAICS code	All R&D		Paid for by the company		Paid for by others							
					Total		Federal		Companies			All other organizations <sup>b</sup>
									Domestic		Foreign <sup>a</sup>	
Computer systems design and related services, 5415	11,050		9,416		1,634		712		397		348	177
Scientific R&D services, 5417	12,140		2,851		11,968		3,279		5,344		3,144	201
Other 54	10,500		3,171		4,650		2,838		1,165		309	338
Nonmanufacturing nec, other 21–23, 42–81	9,613		8,495		1,118		479		208		s	s
2009												
All industries, 21–33, 42–81 <sup>c</sup>	282,393		224,920		57,473		39,573		9,567		7,647	685
Manufacturing industries, 31–33	195,144		158,225		36,920		28,825		3,345		4,532	218
Chemicals, 325	53,328		49,876		3,452		207		1,263		1,961	s
Pharmaceuticals and medicines, 3254	44,936		41,751		3,185		113		1,247		1,813	11
Other 325	8,392		8,125		267		94		16		148	s
Machinery, 333	9,138		8,782		356		150		133		67	s
Computer and electronic products, 334	56,436		48,865		7,571		5,210		738		1,578	s
Electrical equipment, appliances, and components, 335	3,334		3,105		228		70		55		66	s
Transportation equipment, 336	48,337		24,223		24,114		23,023		757		251	s
Automobiles, trailers, and parts, 3361–63	s		10,853		s		s		s		s	s
Aerospace products and parts, 3364	34,554		12,384		22,170		21,524		596		s	s
Other 336	s		986		s		s		s		s	s

## CHAPTER 4 | Research and Development: U.S. Trends and International Comparisons

Industry and NAICS code	All R&D		Paid for by the company		Paid for by others							
					Total		Federal		Companies			All other organizations <sup>b</sup>
									Domestic		Foreign <sup>a</sup>	
Manufacturing nec, other 31–33	24,570		23,374		1,199		165		399		609	s
Nonmanufacturing industries, 21–23, 42–81	87,248		66,695		20,553		10,749		6,223		3,115	467
Information, 51	33,806		32,995		811		194		349		233	34
Software publishers, 5112	26,395		25,729		666		176		267		191	32
Other 51	7,411		7,266		145		18		82		42	2
Finance and insurance, 52	1,912		1,904		8		1		6		0	0
Professional, scientific, and technical services, 54	44,946		26,031		18,915		10,461		5,531		2,505	168
Computer systems design and related services, 5415	12,560		10,742		1,818		1,240		449		122	7
Scientific R&D services, 5417	17,270		7,981		9,289		2,657		4,397		2,110	125
Other 54	15,116		7,308		7,808		6,564		685		273	36
Nonmanufacturing nec, other 21–23, 42–81	6,584		5,765		819		93		337		377	265
2008												
All industries, 21–33, 42–81 <sup>c</sup>	290,680		232,505		58,176		36,360		12,181		8,877	758
Manufacturing industries, 31–33	203,755		164,386		39,368		31,102		3,444		4,712	s
Chemicals, 325	58,250		55,042		3,207		197		814		2,182	15
Pharmaceuticals and medicines, 3254	48,131		45,169		2,962		137		796		2,017	11
Other 325	10,119		9,873		245		60		18		165	4

## CHAPTER 4 | Research and Development: U.S. Trends and International Comparisons

Industry and NAICS code	All R&D		Paid for by the company		Paid for by others							
					Total		Federal		Companies			All other organizations <sup>b</sup>
									Domestic		Foreign <sup>a</sup>	
Machinery, 333	10,104		9,846		258		62		95		97	3
Computer and electronic products, 334	60,464		42,912		7,551		4,646		1,520		1,338	47
Electrical equipment, appliances, and components, 335	3,143		2,947		196		91		34		66	5
Transportation equipment, 336	50,552		23,039		27,513		25,941		774		768	s
Automobiles, trailers, and parts, 3361–63	13,140		12,234		906		s		s		s	s
Aerospace products and parts, 3364	36,941		10,371		26,570		25,805	i	649		s	s
Other 336	471		434		37		s		s		s	s
Manufacturing nec, other 31–33	21,242		30,600		643		165		207		261	s
Nonmanufacturing industries, 21–23, 42–81	86,926		68,118		18,807		5,258		8,737		4,166	s
Information, 51	37,695		36,922		772		229		217		s	s
Software publishers, 5112	28,221		27,665		556		176		117		s	s
Other 51	9,473		9,257		216		53		100		s	s
Finance and insurance, 52	1,092		1,084		8		0		7		* i	0
Professional, scientific, and technical services, 54	37,954		20,539		17,415		4,844		8,221		3,753	s
Computer systems design and related services, 5415	12,146		8,569		3,577		784		1,183		1,490	120
Scientific R&D services, 5417	17,913		8,708		9,205		2,115		4,726		2,008	s
Other 54	7,895		3,262		4,633		1,945		2,312		255	s

CHAPTER 4 | Research and Development: U.S. Trends and International Comparisons

Industry and NAICS code	All R&D		Paid for by the company		Paid for by others							
					Total		Federal		Companies			All other organizations <sup>b</sup>
									Domestic		Foreign <sup>a</sup>	
Nonmanufacturing nec, other 21–23, 42–81	10,185		9,573		612		185		292		s	s

\* = amount less than \$500,000; i = more than 50% of value imputed; s = suppressed for reasons of reliability and/or confidentiality.

NAICS = North American Industry Classification System; nec = not elsewhere classified.

<sup>a</sup> Includes unaffiliated foreign companies foreign parent companies of U.S. subsidiaries.

<sup>b</sup> Includes U.S. state government agencies and laboratories, foreign agencies and laboratories, and all other organizations located inside and outside the United States.

<sup>c</sup> Includes companies located in the United States that performed or funded R&D.

**Note(s)**

Detail may not add to total because of rounding. Industry classification was based on the dominant business code for domestic R&D performance, where available. For companies that did not report business codes, the classification used for sampling was assigned. Excludes data for federally funded R&D centers.

**Source(s)**

National Science Foundation, National Center for Science and Engineering Statistics, Business R&D and Innovation Survey (BRDIS) (annual series).  
*Science and Engineering Indicators 2018*

## CHAPTER 4 | Research and Development: U.S. Trends and International Comparisons

APPENDIX TABLE 4-14

## Federal research and experimentation tax credit claims, by NAICS industry: 2001–13

(Tax credit claims in thousands of dollars and number of corporate returns claiming the R&amp;E tax credit)

Industry	NAICS code	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Tax credit claims (\$thousands)														
All industries	-	6,355,803	5,655,666	5,488,337	5,554,011	6,363,476	7,311,124	8,259,753	8,303,369	7,773,979	8,510,734	9,240,452	10,842,567	11,294,433
Manufacturing	31–33	4,208,607	3,787,025	3,797,439	3,845,792	4,529,302	5,242,803	5,685,322	5,758,082	5,394,673	5,554,490	5,932,503	6,594,799	6,832,297
Food	311	33,716	30,971	49,120	50,836	71,132	82,879	76,498	80,719	74,767	90,844	96,889	90,423	106,684
Beverage and tobacco products	312	12,115	19,204	3,114	5,129	9,952	8,971	25,197	12,844	11,471	12,401	15,069	14,823	21,113
Textile mills and textile product mills	313–14	6,315	11,105	10,160	9,024	5,722	6,025	5,123	5,249	4,919	5,986	9,381	9,976	10,923
Apparel	315	722	283	348	347	417	1,494	1,312	2,315	5,862	5,439	7,911	9,506	7,390
Leather and allied products	316	750	898	1,583	1,807	1,805	1,455	1,272	1,478	1,199	1,313	1,618	1,966	2,281
Wood products	321	1,974	2,073	1,735	1,736	2,163	7,113	7,997	5,016	4,814	5,947	4,079	5,947	7,280
Paper manufacturing	322	54,452	59,862	66,653	52,836	47,380	50,317	65,636	64,226	62,408	75,370	81,405	80,827	86,658
Printing and related support activities	323	5,011	4,427	2,274	2,639	2,484	3,727	2,549	4,417	5,746	6,618	7,491	7,784	9,834
Petroleum and coal products	324	34,959	36,257	39,400	21,545	28,506	25,700	92,216	99,858	160,916	114,821	98,538	79,971	81,783
Chemicals	325	999,405	949,115	1,001,644	989,278	1,147,292	1,136,754	1,492,231	1,489,383	1,439,465	1,344,341	1,305,939	1,416,598	1,507,507
Plastic and rubber products	326	18,884	24,218	21,245	22,596	24,796	23,517	30,419	31,366	27,751	33,588	36,566	55,538	64,530
Nonmetallic mineral products	327	9,735	9,516	9,670	8,587	9,770	9,051	10,285	12,283	17,022	23,802	29,616	36,037	25,220
Primary metals	331	6,010	8,096	8,077	7,756	10,282	19,989	36,863	32,098	24,947	35,312	43,194	55,332	63,233

## CHAPTER 4 | Research and Development: U.S. Trends and International Comparisons

Industry	NAICS code	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Fabricated metal products	332	24,243	27,912	59,387	66,597	66,794	72,969	83,261	74,863	65,946	80,987	78,907	98,073	99,027
Machinery	333	154,210	148,668	134,808	182,417	194,382	662,624	292,349	339,851	275,046	328,412	428,932	469,030	424,007
Computer and electronic products	334	1,677,194	1,152,788	1,168,467	1,490,633	1,647,471	1,746,744	1,889,734	1,812,225	1,584,938	1,829,303	2,024,684	2,169,806	2,058,428
Electrical equipment, appliances, and components	335	180,985	163,536	117,260	122,723	188,450	229,079	168,715	217,724	254,081	260,361	298,392	281,109	334,405
Transportation equipment	336	785,699	957,277	896,992	581,824	825,671	906,354	1,107,105	1,180,968	1,071,484	1,009,000	1,091,982	1,419,703	1,638,899
Furniture and related products	337	8,899	10,374	6,610	10,788	18,593	19,622	14,705	11,240	10,178	9,830	10,275	13,857	14,588
Miscellaneous manufacturing	339	193,330	170,444	198,891	216,693	226,240	228,420	281,857	279,958	291,715	282,906	261,637	278,494	268,509
Nonmanufacturing	-	2,147,197	1,868,640	1,690,897	1,708,219	1,834,176	2,068,322	2,574,431	2,545,288	2,379,306	2,956,242	3,307,949	4,247,768	4,462,137
Agriculture, forestry, fishing, and hunting	11	3,024	3,491	4,499	4,220	4,183	4,205	3,934	5,054	7,072	8,476	7,327	8,239	9,605
Mining	21	9,669	7,199	18,137	6,937	5,408	13,583	29,589	29,997	19,841	42,318	49,429	79,614	77,885
Utilities	22	8,546	6,307	4,496	10,241	20,454	32,508	54,410	48,855	52,168	45,659	55,251	51,640	69,471
Construction	23	9,360	11,060	11,002	4,884	3,424	7,353	15,000	10,278	11,060	11,675	18,567	24,074	28,241
Wholesale and retail trade	42, 44, 45	186,162	193,814	198,050	211,484	235,402	284,845	387,167	430,098	424,531	653,580	705,475	769,282	880,115
Transportation and warehousing	48, 49	16,186	13,722	12,681	11,515	9,040	8,473	12,334	10,593	10,838	14,757	18,175	20,444	24,539
Information	51	1,001,296	801,073	633,275	599,795	636,462	733,840	912,435	944,284	854,675	1,013,552	1,174,650	1,747,717	1,856,736
Finance and insurance	52	122,507	94,347	96,757	111,678	124,607	131,405	157,050	142,599	149,219	203,688	182,006	226,544	228,291
Real estate, rental, and leasing	53	3,518	1,903	2,750	1,120	4,445	5,666	7,819	7,453	10,312	18,577	27,423	28,087	35,832
Professional, scientific, and technical services	54	649,801	576,581	549,141	609,019	651,093	725,855	853,119	787,671	733,531	797,473	883,569	1,126,862	1,064,608
Management of companies and enterprises	55	82,295	100,337	94,894	92,007	94,833	76,846	90,557	62,091	47,877	82,301	115,558	85,180	109,077

## CHAPTER 4 | Research and Development: U.S. Trends and International Comparisons

Industry	NAICS code	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Administrative/ support and waste management services	56	26,060	25,914	30,788	18,956	11,859	12,405	13,291	22,373	26,847	32,844	37,427	44,822	33,349
Other services	61, 62, 71, 72, 81	28,773	32,892	34,427	26,363	32,966	31,338	37,728	43,942	31,335	31,342	33,092	35,263	44,388
Number of corporate returns claiming the R&E tax credit														
All industries	na	10,389	10,254	10,369	10,244	11,290	10,788	12,548	12,736	12,359	12,941	14,672	15,873	16,624
Manufacturing	31–33	4,766	4,750	4,623	4,686	4,921	5,106	5,636	5,420	5,197	5,808	6,165	6,219	6,241
Food	311	132	135	121	135	162	132	166	163	171	279	228	235	234
Beverage and tobacco products	312	10	10	10	10	10	8	12	18	17	18	23	27	22
Textile mills and textile product mills	313–14	19	17	21	23	15	15	17	22	17	44	22	51	39
Apparel	315	8	8	10	8	9	47	44	55	25	16	25	27	21
Leather and allied products	316	4	5	8	7	6	5	4	6	7	5	6	7	7
Wood products	321	31	23	16	14	15	45	40	14	14	33	32	56	51
Paper manufacturing	322	31	34	32	28	38	51	58	58	58	82	101	78	85
Printing and related support activities	323	47	63	54	57	65	64	39	38	55	74	74	44	45
Petroleum and coal products	324	30	28	29	27	19	21	33	40	43	47	46	54	54
Chemicals	325	650	634	593	600	536	648	700	701	715	722	729	703	812
Plastic and rubber products	326	118	97	116	123	168	189	183	202	233	259	317	278	243
Nonmetallic mineral products	327	27	29	42	39	58	49	54	70	59	60	68	73	74
Primary metals	331	43	43	44	37	78	79	101	116	103	125	123	144	151
Fabricated metal products	332	260	220	273	287	338	336	462	457	450	504	517	620	556

## CHAPTER 4 | Research and Development: U.S. Trends and International Comparisons

Industry	NAICS code	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Machinery	333	425	388	344	505	474	501	591	651	640	789	801	886	882
Computer and electronic products	334	1,604	1,663	1,565	1,429	1,343	1,266	1,394	1,319	1,178	1,204	1,296	1,179	1,230
Electrical equipment, appliances, and components	335	411	536	516	497	768	622	726	555	494	533	523	660	590
Transportation equipment	336	186	191	201	192	242	269	289	291	315	362	360	372	390
Furniture and related products	337	32	60	20	21	39	74	78	70	42	27	53	68	56
Miscellaneous manufacturing	339	699	566	608	645	538	685	646	575	560	626	826	660	698
Nonmanufacturing	-	5,622	5,504	5,746	5,558	6,370	5,682	6,912	7,316	7,162	7,133	8,505	9,654	10,383
Agriculture, forestry, fishing, and hunting	11	35	51	60	40	61	72	100	83	81	34	39	59	92
Mining	21	44	20	21	22	19	17	36	36	41	45	50	81	70
Utilities	22	23	18	18	17	37	47	78	129	81	62	89	67	70
Construction	23	15	31	20	21	18	29	59	56	124	96	174	240	341
Wholesale and retail trade	42, 44, 45	693	616	594	812	718	832	829	865	1,003	947	1,287	1,071	1,100
Transportation and warehousing	48, 49	19	17	17	23	43	39	33	58	56	40	81	58	77
Information	51	1,502	1,242	1,149	977	1,076	1,025	1,257	1,132	887	978	1,229	1,583	1,623
Finance and insurance	52	106	191	196	142	143	174	182	237	293	275	303	304	274
Real estate, rental, and leasing	53	18	17	10	8	14	15	45	30	57	75	60	82	68
Professional, scientific, and technical services	54	2,887	2,900	3,446	3,304	3,335	2,961	3,699	3,932	3,913	3,900	4,429	5,280	5,694
Management of companies and enterprises	55	52	55	50	70	326	137	178	276	242	268	366	403	346
Administrative/ support and waste management services	56	47	31	82	23	420	183	197	288	252	270	226	148	319



CHAPTER 4 | Research and Development: U.S. Trends and International Comparisons

Industry	NAICS code	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Other services	61, 62, 71, 72, 81	181	315	83	99	160	151	220	194	132	143	172	278	309

NAICS = North American Industry Classification System; R&E = research and experimentation.

**Note(s)**

Estimates are based on a stratified probability sample of unaudited active returns and are subject to sampling and nonsampling errors. Data are for tax years, which cover accounting periods ending any month between July of the calendar year of reference through June of the following calendar year. Data include returns of active corporations, other than forms 1120S (S corporations), 1120-REIT (Real Estate Investment Trusts), and 1120-RIC (Regulated Investment Companies). Active returns are corporate returns reporting any income or deduction items, including tax-exempt interest.

**Source(s)**

Internal Revenue Service Statistics of Income, <https://www.irs.gov/uac/SOI-Tax-Stats-Corporation-Research-Credit>, accessed 22 December 2016.  
*Science and Engineering Indicators 2018*

CHAPTER 4 | Research and Development: U.S. Trends and International Comparisons

APPENDIX TABLE 4-15

R&D performed by majority-owned affiliates of foreign companies in the United States, by region, country, or economy of ultimate beneficial owner: 1997–2014

(Millions of current U.S. dollars)

Region, country, or economy	1997	1998	1999	2000	2001	2002	2003		2004		2005		2006		2007	2008	2009	2010	2011	2012	2013	2014
Total	17,216	22,375	24,027	26,180	26,463	27,507	29,803		30,083		31,099		34,625		40,967	40,727	40,425	42,360	45,177	50,259	54,070	56,904
Canada	1,668	2,352	2,385	3,693	2,136	1,599	1,380		1,459		1,553		1,581		1,574	1,294	1,120	535	590	611	535	509
Europe	12,327	16,425	18,055	18,634	19,973	20,532	22,518		22,825		23,389		26,100		31,330	30,273	29,947	31,443	33,630	37,552	39,992	42,068
Belgium	s	s	175	167	108	87	117		137		136		288		353	506	440	279	248	388	377	406
Denmark	97	127	s	s	s	114	100		160		319		371		368	377	363	412	379	341	376	418
Finland	s	s	166	157	601	544	s		s		s		s		371	588	514	602	618	605	500	317
France	1,783	1,881	2,434	2,596	2,662	2,860	3,777		3,800		3,099		3,289		5,589	5,802	5,020	4,954	4,743	6,508	6,463	6,749
Germany	2,923	5,381	6,135	5,603	5,686	5,863	5,976		5,916		6,519		6,857		5,893	5,696	5,529	5,300	5,640	5,895	6,577	7,080
Ireland	s	56	s	s	s	369	s		266		247		207		257	324	899	1,184	2,028	2,353	2,978	3,426
Italy	s	s	294	s	s	261	225		230		262		344		358	370	386	426	1,675	2,249	s	s
Netherlands	990	964	1,296	1,421	1,660	1,696	1,612		1,319		1,470		1,678		1,729	1,821	1,774	1,892	1,854	2,016	2,385	2,362
Spain	s	s	s	s	26	s	44		s		s		s		40	67	108	112	127	s	113	125
Sweden	687	713	428	373	465	270	261		270		272		344		388	345	504	437	438	516	603	624
Switzerland	2,369	3,076	3,008	2,922	3,107	2,920	3,791		4,185		4,289		5,014		6,395	6,940	8,889	9,299	9,144	9,625	9,781	10,551
United Kingdom	2,984	3,720	3,678	4,632	4,819	5,427	5,723		5,807		5,994		6,924		9,470	7,247	5,304	6,314	6,484	6,823	7,210	7,269
Other	*	1	1	3	3	5	6		6		s		32		119	191	218	232	252	s	s	s

CHAPTER 4 | Research and Development: U.S. Trends and International Comparisons

Region, country, or economy	1997	1998	1999	2000	2001	2002	2003		2004		2005		2006		2007	2008	2009	2010	2011	2012	2013	2014
Latin America and OWH	373	396	564	735	1,126	1,066	s		s		s		s		1,666	1,773	1,656	1,594	1,015	1,046	1,640	1,695
South and Central America	s	s	92	s	112	s	s		s		s		s		s	23	119	69	40	59	68	70
Brazil	*	*	*	*	*	0	0		0		0		*	e	*	*	*	s	6	22	25	28
Mexico	s	55	s	s	s	45	14	e	17	e	18	e	16	e	6	s	5	s	s	s	s	s
Venezuela	3	0	0	0	0	0	0		*		*		0		0	0	0	0	0	0	0	0
Other	*	*	*	*	*	2	*		3		3		3		s	s	113	s	s	s	s	s
OWH	s	s	472	s	1,014	s	1,180		1,069		1,121		1,249		s	1,750	1,537	1,525	975	987	1571	1,626
Bermuda	s	s	s	s	s	s	853		873		909		950		s	1,224	s	61	81	s	s	s
United Kingdom Islands, Caribbean	1	1	1	s	s	s	s		s		s		s		s	s	s	s	s	s	703	733
Other	0	0	0	0	0	*	*	e	s		s		s		s	s	s	s	s	s	s	s
Africa	s	s	s	s	36	33	31		36		35		35		s	9	7	s	s	26	20	20
South Africa	s	s	s	s	36	33	31		36		35		35		s	9	7	s	s	26	20	20
Other	0	0	0	0	0	0	0		0		0		0		0	1	0	0	0	0	0	0
Middle East	103	132	s	s	177	175	s		s		s		s		306	358	465	537	1,005	1,467	1,590	1,676
Israel	95	117	s	102	99	89	106		123		135		147		149	204	306	s	539	s	927	981
Saudi Arabia	1	7	9	10	11	s	s		s		s		s		108	104	98	s	s	s	s	s
United Arab Emirates	*	0	0	0	0	0	0		0		0		0		0	0	9	s	s	s	s	s
Other	7	8	7	s	66	s	71	e	41		42		28		49	50	52	s	47	s	22	9.0
Asia and Pacific	2,642	2,961	2,820	2,864	2,946	3,413	3,763		3,763		4,067		4,698		5,069	5,689	6,047	7,054	8,429	9,143	9,865	10,539

CHAPTER 4 | Research and Development: U.S. Trends and International Comparisons

Region, country, or economy	1997	1998	1999	2000	2001	2002	2003		2004		2005		2006		2007	2008	2009	2010	2011	2012	2013	2014
Australia	s	s	32	34	33	36	43	e	42		90		174		170	155	65	96	149	174	186	196
China	s	9	s	s	s	18	5		14		s		s		0	17	26	165	366	421	449	496
Hong Kong	4	1	1	*	s	s	s		s		62		75		s	147	121	65	83	s	43	68
India	NA	NA	NA	NA	NA	0	*	e	0		0		0		6	23	29	40	46	67	93	96
Japan	2,036	2,584	2,535	2,644	2,719	3,159	3,470		3,414		3,576		4,056		4,416	4,781	5,124	5,924	6,852	7,110	7,856	7,865
Singapore	s	16	13	9	1	s	18		20	e	25		42	e	69	139	253	246	280	294	382	387
South Korea	s	s	s	s	s	s	s		s		s		s		215	259	280	350	388	804	710	1,278
Taiwan	78	73	68	47	43	83	102	e	102	e	122		113	e	110	118	119	134	209	159	96	98
Other	*	*	0	0	0	0	1		1		*		s		s	50	29	35	56	s	52	57
United States	s	s	55	62	69	689	s		s		692		721	e	s	1,330	1,184	s	s	414	428	397
Addenda																						
European Union <sup>a</sup>	9,902	13,326	14,980	15,659	16,787	17,554	18,676		18,570		18,991		21,041		24,854	23,210	20,921	22,008	24,330	27,840	30,136	31,442
OPEC	10	16	19	17	18	18	s		s		s		s		108	105	107	108	s	s	641	685

\* = amount ≤ \$500,000; e = > 50% of value for data cell estimated to account for data not reported by respondents; NA = not available; s = suppressed for reasons of reliability and/or confidentiality.

OPEC = Organization of the Petroleum Exporting Countries; OWH = other Western Hemisphere.

<sup>a</sup> Reflects the country composition of the European Union for the given year.

**Note(s)**

Data are for R&D performance of majority-owned (> 50%) U.S. affiliates of foreign parent companies. Data are for nonbank U.S. affiliates for 1997–2006; data are for bank and nonbank U.S. affiliates for 2007 and forward. Total R&D performed refers to R&D expenditures according to who conducts R&D activity, whether for themselves or for others under contract, and excludes R&D expenditures conducted by others under contract. The ultimate beneficial owner is the person proceeding up the U.S. affiliate's ownership chain beginning with and including a foreign parent not owned > 50% by another person. Detail may not add to total because of rounding.



CHAPTER 4 | Research and Development: U.S. Trends and International Comparisons

**Source(s)**

Bureau of Economic Analysis, Direct Investment and Multinational Enterprises (annual series), [https://www.bea.gov/iTable/index\\_MNC.cfm](https://www.bea.gov/iTable/index_MNC.cfm), accessed 26 January 2017.

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## CHAPTER 4 | Research and Development: U.S. Trends and International Comparisons

APPENDIX TABLE 4-16

### R&D performed by majority-owned affiliates of foreign companies in the United States, by NAICS industry of affiliate: 2007–14

(Millions of current U.S. dollars)

Industry	NAICS code	2007	2008	2009	2010	2011	2012	2013	2014
All industries	-	40,967	40,727	40,425	42,360	45,177	50,259	54,070	56,904
Manufacturing	31–33	30,615	28,617	28,501	30,858	31,290	35,617	39,161	41,124
Food	311	s	538	518	486	472	555	679	714
Beverage and tobacco products	312	54	47	29	27	24	44	34	44
Paper manufacturing	322	52	43	42	63	55	47	51	52
Petroleum and coal products	324	s	s	s	s	s	s	s	s
Chemicals	325	15,908	14,271	16,075	16,815	16,837	19,587	21,237	22,407
Basic chemicals	3251	603	705	626	597	686	788	728	739
Pharmaceuticals and medicines	3254	14,331	12,650	14,545	15,388	15,338	17,970	19,625	20,750
Other	-	974	916	904	830	813	828	884	917
Plastic and rubber products	326	421	417	385	395	476	501	536	470
Nonmetallic mineral products	327	277	244	223	238	255	317	313	292
Primary and fabricated metals	-	292	372	369	347	340	375	483	572
Primary metals	331	67	114	84	97	106	129	158	174
Fabricated metal products	332	225	259	284	250	234	246	325	397
Machinery	333	1,939	2,568	2,376	2,539	2,541	2,632	2,704	2,835
Computer and electronic products	334	3,838	4,240	4,353	5,210	4,275	4,383	4,862	5,000
Semiconductor and other electronic components	3344	683	802	1,134	1,583	1,188	1,256	1,845	1,791
Navigational, measuring, and other instruments	3345	351	410	1,034	1,168	1,211	1,265	1,330	1,562
Other	-	2,804	3,028	2,185	2,459	1,876	1,862	1,687	1,647
Electrical equipment, appliances, and components	335	446	487	570	627	656	772	926	1070
Transportation equipment	336	5,778	4,109	2,313	2,571	3,963	4,950	5,990	6,295

## CHAPTER 4 | Research and Development: U.S. Trends and International Comparisons

Industry	NAICS code	2007	2008	2009	2010	2011	2012	2013	2014
Motor vehicles, bodies and trailers, and parts	3361, 3362, 3363	2,441	1,509	1,596	1,519	3,032	3,983	4,891	5,127
Other	-	3,336	2,600	717	1,052	931	967	1,098	1,168
Other	-	651	s	s	s	s	s	s	s
Wholesale trade	42	6,635	7,165	6,642	6,084	7,235	7,982	8,109	8,407
Motor vehicles and motor vehicle parts and supplies	4231	464	359	363	284	362	500	506	535
Electrical goods	4236	2,146	2,293	1,593	1,336	2,226	2,517	2,329	2,513
Petroleum and petroleum products	4247	s	124	s	s	s	s	134	s
Other	-	s	4,388	s	s	s	s	5,139	s
Retail trade	44-45	s	8	11	s	9	9	9	9
Food and beverage stores	445	0	0	0	0	0	0	*	*
Other	-	s	8	11	s	9	9	9	9
Information	51	1,252	1,586	1,681	1,309	1,483	1,364	1,072	1,235
Publishing	511	907	1,332	1,475	1,007	1,080	980	713	693
Telecommunications	517	s	38	s	139	s	s	s	230
Other	-	s	216	s	162	s	s	s	312
Finance and insurance	52	10	7	28	s	67	s	72	77
Depository credit intermediation (banking)	5221	0	*	*	s	1	s	1	1
Finance (except depository institutions)	-	10	6	s	s	s	s	69	75
Insurance carriers and related activities	524	*	1	s	s	s	s	2	1
Real estate, rental, and leasing	53	s	44	s	s	s	158	152	150
Real estate	531	1	s	*	*	*	s	2	2
Rental and leasing (except real estate)	532	s	s	s	s	s	s	150	148
Professional, scientific, and technical services	54	2,021	2,872	3,051	3,486	4,112	4,135	4,508	4,905
Architectural, engineering, and related services	5413	322	261	92	86	108	141	164	109
Computer system design and related services	5415	390	346	583	989	922	1,102	1,098	1,126

## CHAPTER 4 | Research and Development: U.S. Trends and International Comparisons

Industry	NAICS code	2007	2008	2009	2010	2011	2012	2013	2014
Management, scientific, and technical consulting	5416	5	34	44	37	s	s	s	s
Other	-	1,305	2,231	2,332	2,374	s	s	s	s
Other industries	-	387	427	s	461	s	s	988	997
Mining	21	132	174	161	169	492	529	539	559
Utilities	22	1	8	14	8	18	18	19	17
Construction	23	s	18	13	15	32	35	s	s
Transportation and warehousing	48-49	s	s	s	s	s	s	30	30
Administration, support, and waste management	56	s	s	s	s	s	s	s	s
Health care and social assistance	62	s	s	s	s	s	s	s	s
Accommodation and food services	72	*	*	*	*	*	*	*	*
Miscellaneous services	-	89	90	89	108	139	51	62	62

\* = amount ≤ \$500,000; s = suppressed for reasons of reliability and/or confidentiality.

NAICS = North American Industry Classification System.

### Note(s)

Data are for R&D performance of majority-owned (> 50%) bank and nonbank U.S. affiliates of foreign parent companies. Total R&D performed refers to R&D expenditures according to who conducts R&D activity, whether for themselves or for others under contract, and excludes R&D expenditures conducted by others under contract. Industry data are classified by the U.S. Bureau of Economic Analysis using the international surveys industry classification system based on the NAICS. Data for 2007–08 are based on the 2002 NAICS. The ultimate beneficial owner is the person proceeding up the U.S. affiliate's ownership chain beginning with and including a foreign parent company not owned > 50% by another person. Detail may not add to total because of rounding. For data before 2007, see Appendix Table 4-24 in *Science and Engineering Indicators 2014*, <https://www.nsf.gov/statistics/seind14/index.cfm/appendix/tables.htm>.

### Source(s)

Bureau of Economic Analysis, Direct Investment and Multinational Enterprises (annual series), [https://www.bea.gov/iTable/index\\_MNC.cfm](https://www.bea.gov/iTable/index_MNC.cfm), accessed 27 January 2017.

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CHAPTER 4 | Research and Development: U.S. Trends and International Comparisons

APPENDIX TABLE 4-17

R&D performed abroad by majority-owned foreign affiliates of U.S. parent companies, by region, country, or economy: 1997–2014																		
(Millions of current U.S. dollars)																		
Region, country, or economy	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Total	14,593	14,664	18,144	20,457	19,702	21,063	22,793	25,840	27,653	29,583	34,446	41,699	39,205	39,887	44,684	44,983	49,221	52,174
Canada	1,823	1,750	1,681	2,332	2,131	2,274	2,444	2,729	2,433	2,439	2,712	3,194	2,920	2,765	2,964	2,864	3,160	3,418
Europe	10,003	10,387	12,217	12,870	12,060	13,453	14,890	16,874	18,805	19,326	22,730	26,503	25,044	23,902	27,396	26,742	29,835	30,774
Austria	77	85	82	s	62	52	34	131	191	313	459	488	296	278	289	257	283	314
Belgium	310	320	375	412	407	502	463	373	920	961	1,191	1,199	2,378	2,031	2,431	2,547	2,588	1,151
Czech Republic	NA	NA	6	18	3	11	18	19	65	71	59	86	81	56	60	75	63	103
Denmark	s	s	57	65	s	s	60	147	140	148	145	292	185	199	185	237	510	483
Finland	51	61	59	78	77	72	102	118	187	113	169	196	145	221	224	191	195	389
France	1,281	1,328	1,452	1,465	1,411	1,690	1,777	1,821	2,248	1,518	1,557	2,392	1,943	2,021	2,109	2,031	2,373	2,395
Germany	2,940	3,022	3,377	3,115	3,280	3,598	3,907	4,184	4,609	4,947	6,403	8,139	7,528	6,717	7,230	8,027	8,248	8,344
Greece	7	7	6	11	12	15	16	8	29	41	36	37	32	27	26	21	18	37
Hungary	NA	NA	13	35	17	19	15	38	31	36	39	49	45	65	77	75	89	101
Ireland	320	363	251	465	537	s	583	815	820	1,074	1,510	1,137	1,046	1,431	1,419	1,465	1,874	2,415
Italy	569	584	504	592	541	548	625	707	580	702	619	682	788	596	939	683	796	800
Luxembourg	s	s	s	s	s	s	91	s	s	268	304	s	s	s	s	302	s	311
Netherlands	480	384	374	369	475	419	513	442	392	536	752	1,495	1,022	1,282	1,422	1,489	1,495	1,226

## CHAPTER 4 | Research and Development: U.S. Trends and International Comparisons

Region, country, or economy	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Norway	23	18	26	19	38	35	21	32	100	41	46	51	53	136	146	299	279	296
Poland	NA	NA	34	22	13	29	37	s	54	74	73	109	140	135	197	207	201	241
Portugal	30	34	14	20	19	29	21	9	16	23	80	43	36	56	58	52	52	46
Russia	NA	NA	1	1	*	2	1	17	28	82	100	117	68	65	163	130	147	195
Spain	181	184	s	213	181	209	290	344	257	278	355	604	570	361	398	272	285	406
Sweden	405	445	1,036	1,341	813	1,317	1,398	1,451	1,652	1,524	1,584	1,654	1,133	400	544	572	644	711
Switzerland	230	223	231	286	392	392	523	760	878	947	1,162	1,143	1,436	1,588	2,306	2,364	3,749	4,140
Turkey	6	6	6	9	11	13	17	15	27	36	54	61	39	54	61	s	s	58
United Kingdom	2,843	3,065	4,000	4,111	3,642	3,856	4,368	5,361	5,406	5,551	6,000	6,173	5,792	5,788	6,604	5,206	5,364	6,306
Other	54	81	1	7	7	9	8	16	s	41	35	s	s	s	s	s	s	304
Latin America and OWH	663	748	613	663	562	785	680	726	841	1,046	1,169	1,457	1,465	2,553	2,536	2,747	2,785	2,333
South America	523	547	366	335	288	389	370	405	453	636	776	976	1,144	s	1,575	1,569	1,543	1,538
Argentina	43	56	26	38	43	24	22	25	21	31	64	87	92	117	136	161	162	133
Brazil	437	446	288	253	199	305	316	350	405	574	607	784	955	1,389	1,325	1,285	1,220	1,221
Chile	7	6	4	11	8	6	9	11	7	7	48	s	20	21	21	23	25	24
Colombia	12	11	6	10	11	10	7	5	6	7	16	18	26	s	32	37	63	59
Ecuador	1	1	*	*	*	*	*	*	1	*	3	4	1	1	2	2	1	2
Peru	11	11	2	2	2	2	2	2	4	3	s	33	22	8	8	9	30	44
Venezuela	11	14	40	22	24	42	12	12	7	12	20	19	25	27	47	48	38	54

## CHAPTER 4 | Research and Development: U.S. Trends and International Comparisons

Region, country, or economy	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Other	1	2	*	*	2	1	1	1	1	0	s	s	3	s	3	3	3	1
Central America	131	198	240	321	252	287	s	320	s	s	s	363	314	365	s	s	s	545
Costa Rica	4	6	2	s	4	7	6	8	9	8	7	s	8	20	s	s	80	40
Honduras	*	0	0	0	0	0	0	1	0	0	0	4	s	3	3	4	4	4
Mexico	126	191	238	303	248	280	s	s	s	s	303	329	281	337	332	405	418	472
Panama	1	1	*	*	*	*	*	*	*	*	s	1	2	2	2	5	s	21
Other	*	*	*	s	*	*	*	s	*	*	s	s	s	2	s	s	s	7
OWH	8	4	6	6	22	108	s	1	s	s	s	118	8	s	s	s	s	250
Barbados	0	0	*	*	0	s	s	0	0	0	*	*	*	*	1	s	s	0
Bermuda	*	*	1	1	2	2	0	0	0	2	s	s	5	s	s	s	s	9
Dominican Republic	0	*	1	1	1	s	1	*	*	*	*	1	2	2	1	1	1	1
United Kingdom Islands, Caribbean	8	3	4	4	s	s	s	0	s	s	*	1	1	2	1	*	*	s
Other	0	0	0	*	s	2	1	1	s	s	8	s	1	1	1	1	1	s
Africa	26	35	18	25	29	29	31	28	40	67	59	57	94	86	102	129	133	102
Egypt	1	2	3	3	4	5	4	2	4	4	3	5	6	6	2	2	3	17
Nigeria	*	*	0	1	*	*	0	*	0	2	3	4	*	3	3	s	s	1
South Africa	22	30	14	21	24	s	24	23	31	53	47	43	83	71	90	102	99	58
Other	2	3	1	*	1	s	3	2	4	7	5	6	5	6	7	s	s	26
Middle East	208	141	389	630	726	736	687	875	770	840	1,027	1,993	1,856	2,016	2,060	2,033	2,182	2,906

CHAPTER 4 | Research and Development: U.S. Trends and International Comparisons

Region, country, or economy	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Israel	208	141	389	630	726	736	687	872	767	839	1,025	1,988	1,845	2,000	2,045	2,012	2,148	2,695
Saudi Arabia	*	*	*	*	*	0	0	*	*	*	*	*	*	1	1	7	s	s
United Arab Emirates	*	*	0	0	0	0	*	2	3	1	2	5	11	15	13	s	s	s
Other	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	s	1.0	s
Asia and Pacific	1,869	1,603	3,226	3,936	4,194	3,786	4,062	4,608	4,764	5,864	6,750	8,494	7,826	8,564	9,626	10,470	11,128	12,639
Australia	369	290	294	349	286	310	420	474	556	718	1,072	940	751	982	1,081	1,153	1,113	1,185
China	35	52	319	506	s	645	565	575	668	759	1,173	1,671	1,579	1,535	1,653	2,012	2,201	3,036
Hong Kong	82	66	214	s	289	s	227	213	98	108	93	102	70	148	164	154	151	158
India	22	23	20	s	s	75	81	113	327	337	382	1,342	1,377	1,716	2,075	2,289	2,557	2,906
Indonesia	5	4	1	2	3	3	4	5	4	11	13	15	23	28	17	18	s	20
Japan	1,089	962	1,523	1,630	1,507	1,541	1,649	1,627	1,717	1,862	1,919	2,001	1,835	1,812	2,169	2,314	2,392	2,521
Malaysia	32	30	161	218	s	s	251	161	201	252	390	395	376	348	390	655	517	440
New Zealand	18	15	9	8	10	6	9	25	35	38	30	27	21	21	37	37	33	86
Philippines	12	10	31	40	48	50	52	44	27	22	45	56	51	54	60	67	53	72
Singapore	73	62	426	551	755	398	514	704	576	845	549	736	706	738	772	509	717	767
South Korea	41	29	101	143	157	169	202	277	456	742	928	980	746	824	854	898	912	946
Taiwan	84	55	122	143	139	69	64	365	68	123	97	128	196	278	242	274	269	387
Thailand	5	4	7	13	18	19	24	24	31	47	54	96	93	75	111	89	104	108
Other	1	1	*	*	*	1	*	*	*	1	3	4	2	2	1	2	s	6

Science and Engineering Indicators 2018

## CHAPTER 4 | Research and Development: U.S. Trends and International Comparisons

APPENDIX TABLE 4-18

### R&D performed abroad by majority-owned foreign affiliates of U.S. parent companies, by selected NAICS industry of affiliate: 2009–14

(Millions of current U.S. dollars)

Industry	NAICS code	2009	2010	2011	2012	2013	2014
All industries	na	39,205	39,887	44,684	44,983	49,221	52,174
Mining	21	119	42	119	304	378	219
Oil and gas extraction	211	s	14	23	98	100	31
Other	na	s	27	97	206	278	188
Manufacturing	31–33	27,141	27,481	30,332	30,497	31,625	32,128
Food	311	514	534	617	520	488	575
Beverage and tobacco products	312	71	86	91	90	63	85
Textile, apparel, and leather products	313–16	68	70	75	69	70	90
Wood products	321	2	2	7	8	9	46
Paper manufacturing	322	66	68	184	89	85	117
Printing and related support activities	323	9	23	14	8	11	32
Petroleum and coal products	324	s	s	s	s	s	s
Chemicals	325	8,757	8,348	9,287	9,153	9,467	8,511
Basic chemicals	3251	174	201	299	297	300	220
Resin, synthetic rubber, fiber, and filament	3252	295	290	277	369	336	376
Pharmaceuticals and medicines	3254	7,436	7,115	7,703	7,165	7,155	6,127
Soap, cleaning compound, and toilet preparation	3256	222	208	303	598	666	728
Other	na	630	534	705	724	1,010	1,059
Plastic and rubber products	326	329	386	552	530	550	542
Nonmetallic mineral products	327	93	109	121	103	62	94
Primary and fabricated metals	na	245	279	352	283	352	356
Primary metals	331	61	108	139	110	144	127
Fabricated metal products	332	184	171	214	172	208	229
Machinery	333	1,361	1,451	2,210	2,214	2,409	2,852

## CHAPTER 4 | Research and Development: U.S. Trends and International Comparisons

Industry	NAICS code	2009	2010	2011	2012	2013	2014
Agriculture, construction, and mining machinery	3331	421	477	682	709	856	866
Industrial machinery	3332	280	294	655	671	640	823
Other	na	661	681	874	835	913	1,164
Computer and electronic products	334	6,108	5,922	5,476	7,074	7,452	8,376
Computer and peripheral equipment	3341	963	827	882	850	1,068	1,320
Communication equipment	3342	s	s	968	891	s	1,339
Audio and video equipment	3343	s	s	292	314	s	324
Semiconductor and other electronic components	3344	2,590	2,797	2,478	4,033	3,977	4,158
Navigational, measuring, and other instruments	3345	870	858	856	986	1018	1,234
Magnetic and optical media	3346	*	*	*	*	1.0	*
Electrical equipment, appliances, and components	335	532	700	709	681	569	527
Transportation equipment	336	7,837	7,796	8,400	7,700	7,770	7,723
Motor vehicles, bodies and trailers, and parts	3361, 3362, 3363	7,276	7,249	7,707	7,048	6,993	6,886
Other	na	561	547	694	652	776	836
Furniture and related products	337	7	29	18	27	28	17
Miscellaneous manufacturing	339	s	s	s	s	s	s
Wholesale trade	42	2,074	1,928	2,580	2,510	4,727	4,976
Professional and commercial equipment and supplies	4234	1,165	1,247	1,322	1,254	1,745	1,524
Petroleum and petroleum products	4247	2	2	2	1	s	s
Drugs and druggists' sundries	4242	514	s	800	715	2,320	2,778
Other	na	393	s	456	539	s	s
Retail trade	44-45	s	26	33	29	30	31
General merchandise stores	452	s	1	1	1	1	0
Clothing and clothing accessories stores	448	0	0	1	2	2	*
Other	na	s	25	31	26	27	31
Information	51	1,698	2,618	3,024	3,214	3,401	3,952
Publishing	511	1,407	s	s	s	s	s

## CHAPTER 4 | Research and Development: U.S. Trends and International Comparisons

Industry	NAICS code	2009	2010	2011	2012	2013	2014
Motion picture and sound recording industries	512	0	0	0	0	1	0
Broadcasting (except Internet) and telecommunications	na	s	5	12	31	39	24
Broadcasting (except Internet)	515	*	1	1	0	0	1
Telecommunications	517	s	4	11	31	39	23
Data processing, hosting, and related services	518	s	14	27	29	34	36
Other information services	519	252	s	s	s	s	s
Finance and insurance	52	1	6	s	s	s	242
Depository credit intermediation (banking)	5221, 551111	0	*	s	s	s	s
Finance (except depository institutions)	other 522, 523, 525	1	6	6	10	17	s
Insurance carriers and related activities	524	0	0	0	0	0	0
Professional, scientific, and technical services	54	8,080	7,683	8,241	8,065	8,571	10,338
Architectural, engineering, and related services	5413	107	101	s	86	115	493
Computer systems design and related services	5415	2,270	2,049	1,937	2,122	2,365	2,555
Management, scientific, and technical consulting	5416	418	324	412	410	438	641
Advertising and related services	5418	3	1	1	1	1	1
Other	na	5,284	5,208	s	5,447	5,652	6,647
Other industries	na	s	102	s	s	s	287
Agriculture, forestry, fishing, and hunting	11	4	s	s	s	s	s
Construction	23	1	2	3	1	3	3
Utilities	22	1	5	2	12	11	25
Transportation and warehousing	48-49	3	3	2	2	2	4
Real estate, rental, and leasing	53	1	1	2	3	3	2
Management of nonbank companies and enterprises	55 (except 551111)	4	5	4	4	6	35
Administration, support, and waste management	56	23	27	30	48	68	53
Health care and social assistance	62	0	0	*	2	1	4
Accommodation and food services	72	4	s	s	s	s	7
Miscellaneous services	na	s	10	10	11	12	s



## CHAPTER 4 | Research and Development: U.S. Trends and International Comparisons

\* = amount  $\leq$  \$500,000; na = not applicable; s = suppressed for reasons of reliability and/or confidentiality.

NAICS = North American Industry Classification System.

### Note(s)

Data are for majority-owned (> 50%) foreign affiliates (bank and nonbank) of U.S. parent companies. Data include R&D expenditures performed by affiliates, whether for themselves or for others under contract. Data exclude R&D expenditures by others for affiliates under contract. Industries are classified by the U.S. Bureau of Economic Analysis using the international surveys industry classification system based on the NAICS. For data before 2009, see Appendix Table 4-27 in *Science and Engineering Indicators 2014*, <https://www.nsf.gov/statistics/seind14/index.cfm/appendix/tables.htm>.

### Source(s)

U.S. Bureau of Economic Analysis, Direct Investment and Multinational Enterprises (annual series), [https://www.bea.gov/iTable/index\\_MNC.cfm](https://www.bea.gov/iTable/index_MNC.cfm), accessed 27 January 2017.

*Science and Engineering Indicators 2018*

## CHAPTER 4 | Research and Development: U.S. Trends and International Comparisons

APPENDIX TABLE 4-19

### R&D performed in the United States by U.S. multinational company parent companies, by NAICS industry: 2009–14

(Millions of current U.S. dollars)

Industry	NAICS code	2009	2010	2011	2012	2013	2014
All industries	-	207,297	205,674	220,279	232,955	242,327	268,787
Mining	21	560	556	712	620	781	832
Oil and gas extraction	211	s	s	s	16	15	s
Other mining	na	s	s	s	604	766	s
Manufacturing	31–33	157,731	152,855	159,646	164,489	167,765	183,435
Food	311	1,927	2,196	2,565	2,623	2,546	2,527
Beverage and tobacco products	312	338	313	289	329	406	477
Textiles, apparel, and leather products	313–16	182	216	203	203	197	204
Wood products	321	80	87	47	s	34	44
Paper manufacturing	322	1,069	1,150	1,229	1,282	1,913	1,930
Printing and related support activities	323	133	74	79	77	74	67
Petroleum and coal products	324	2,924	3,249	2,967	2,988	3,113	2,866
Chemicals	325	47,244	49,878	52,480	55,088	54,374	61,542
Basic chemicals	3251	913	1,014	1,169	1,271	1,124	1,187
Resins and synthetic rubber, fiber, and filament	3252	2,721	3,233	3,428	3,780	3,849	3,744
Pharmaceuticals and medicines	3254	39,576	41,614	44,427	46,969	46,275	53,170
Soap, cleaning compound, and toilet preparation	3256	s	1,936	2,131	1,839	1,968	2,102
Other	na	s	2,081	1,325	1,229	1,159	1,338
Plastic and rubber products	326	1,109	1,249	1,154	1,255	1,018	1,372
Nonmetallic mineral products	327	388	383	429	450	446	446
Primary and fabricated metals	na	1,217	1,224	1,260	1,341	1,164	1,271
Primary metals	331	453	482	520	512	508	627
Fabricated metal products	332	764	743	740	830	656	644
Machinery	333	6,743	7,771	8,344	9,039	9,406	7,857

## CHAPTER 4 | Research and Development: U.S. Trends and International Comparisons

Industry	NAICS code	2009	2010	2011	2012	2013	2014
Agriculture, construction, and mining machinery	3331	2,330	2,912	3,531	3,722	3,808	3,954
Industrial machinery	3332	1,690	1,996	1,899	2,124	2,264	2,055
Other machinery	na	2,724	2,863	2,914	3,193	3,335	1,848
Computer and electronic products	334	35,823	34,535	42,305	44,029	44,772	51,312
Computer and peripheral equipment	3341	6,717	4,918	6,472	8,105	8,707	10,968
Communication equipment	3342	7,991	8,059	9,524	7,440	7,500	7,030
Audio and video equipment	3343	s	682	723	684	675	s
Semiconductor and other electronic components	3344	12,893	13,648	15,716	17,367	17,135	19,111
Navigational, measuring, and other instruments	3345	7,557	7,228	9,870	10,433	10,756	13,270
Magnetic and optical media	3346	s	0	0	0	0	s
Electrical equipment, appliances, and components	335	3,040	3,059	3,623	4,215	4,067	4,145
Transportation equipment	336	48,960	40,224	35,307	33,863	36,250	38,077
Motor vehicles, bodies and trailers, and parts	3361, 3362, 3363	10,316	12,387	12,433	12,705	15,124	14,794
Other	na	38,643	27,837	22,874	21,158	21,127	23,282
Furniture and related products	337	237	216	243	235	237	681
Miscellaneous manufacturing	339	6,317	7,030	7,123	s	7,749	8,618
Wholesale trade	42	6,440	6,299	6,921	8,056	8,482	9,684
Professional and commercial equipment and supplies	4234	1,173	1,638	1,915	1,936	2,086	1,913
Petroleum and petroleum products	4247	s	s	s	s	s	s
Drugs and druggists' sundries	4242	1,322	1,363	1,453	1,522	1,597	2,293
Other	na	s	s	s	s	s	s
Retail trade	44-45	s	s	s	s	s	s
General merchandise stores	452	0	0	0	0	0	0
Clothing and clothing accessories stores	448	8	s	8	s	s	25.0
Other	na	s	s	s	s	s	s
Information	51	21,035	22,577	24,996	29,013	31,593	38,655
Publishing	511	14,456	14,713	15,188	16,261	17,000	19,008

## CHAPTER 4 | Research and Development: U.S. Trends and International Comparisons

Industry	NAICS code	2009	2010	2011	2012	2013	2014
Motion picture and sound recording industries	512	s	s	s	s	s	0
Broadcasting (except Internet) and telecommunications	na	1,128	1,157	1,443	1,570	1,796	2,689
Broadcasting (except Internet)	515	s	s	70	71	96	35
Telecommunications	517	s	s	1,374	1,499	1,699	2,653
Data processing, hosting, and related services	518	750	805	930	991	1,165	1,600
Other	na	s	s	s	s	s	15,358
Finance and insurance	52	186	384	469	522	596	460
Depository credit intermediation (banking)	5221	0	s	s	s	s	s
Finance (except depository institutions)	na	s	s	s	179	203	135
Insurance carriers and related activities	524	s	71	112	s	s	s
Professional, scientific, and technical services	54	15,931	18,056	21,614	22,466	24,065	24,667
Architectural, engineering, and related services	5413	42	118	s	s	s	s
Computer systems design and related services	5415	10,134	11,135	12,737	13,358	13,650	13,152
Management, scientific, and technical consulting	5416	71	s	s	s	s	s
Advertising and related services	5418	1	s	s	s	s	s
Other	na	5,683	6,715	7,419	7,551	s	s
Other industries	na	s	s	s	s	s	s
Agriculture, forestry, fishing, and hunting	11	s	s	s	s	s	s
Construction	23	4	s	s	112	104	159
Utilities	22	6	12	15	16	29	s
Transportation and warehousing	48-49	68	55	36	72	77	55
Real estate, rental, and leasing	53	s	s	s	s	s	s
Management of nonbank companies and enterprises	55	0	*	*	0	0	0
Administration, support, and waste management	56	s	988	s	s	s	695
Health care and social assistance	62	s	s	s	s	s	s
Accommodation and food services	72	37	51	51	49	35	53
Miscellaneous services	na	344	338	372	202	213	655

## CHAPTER 4 | Research and Development: U.S. Trends and International Comparisons

\* = < \$500,000. na = not applicable; data source did not provide a classification. s = suppressed for reasons of reliability and/or confidentiality.

NAICS = North American Industry Classification System.

### Note(s)

Data are for all parent companies (bank and nonbank) of U.S. multinational companies (MNCs). (Before 2009, data were for nonbank U.S. MNC parent companies.) A U.S. MNC parent company is defined as a company that resides in the United States and owns or controls at least 10% of voting securities or the equivalent of foreign business enterprise. Industries are classified by the U.S. Bureau of Economic Analysis using the international surveys industry classification system based on the NAICS. Data are for R&D performed regardless of funding source, whether for the performer itself or others, including R&D performed for the federal government; data exclude R&D conducted by others under contract. For data before 2009, see Appendix Table 4-29 in *Science and Engineering Indicators 2014*, <https://www.nsf.gov/statistics/seind14/index.cfm/appendix/tables.htm>.

### Source(s)

U.S. Bureau of Economic Analysis, Direct Investment and Multinational Enterprises (annual series), [https://www.bea.gov/iTable/index\\_MNC.cfm](https://www.bea.gov/iTable/index_MNC.cfm), accessed 27 January 2017.

*Science and Engineering Indicators 2018*

## CHAPTER 4 | Research and Development: U.S. Trends and International Comparisons

APPENDIX TABLE 4-20

### Difference in federal R&D support, as reported by performers and federal agencies: 1985–2015

(Billions of dollars)

Year	All performers				Business performers <sup>a</sup>			
	Performer reported	Agency reported	Difference (\$billions)	Difference (%)	Performer reported	Agency reported	Difference (\$billions)	Difference (%)
1985	52.6	48.4	4.3	8.9	25.3	21.7	3.6	16.7
1986	54.6	51.4	3.2	6.2	26.0	24.2	1.8	7.4
1987	58.6	55.3	3.4	6.1	28.8	26.8	2.0	7.4
1988	60.1	56.8	3.4	5.9	28.2	26.7	1.5	5.6
1989	60.5	61.4	-0.9	-1.5	26.4	28.6	-2.2	-7.7
1990	61.6	63.6	-2.0	-3.1	25.8	29.4	-3.6	-12.1
1991	60.8	61.3	-0.5	-0.8	24.1	26.4	-2.3	-8.8
1992	60.9	65.6	-4.7	-7.1	22.4	29.8	-7.4	-24.8
1993	60.5	67.3	-6.8	-10.1	20.8	30.2	-9.4	-31.0
1994	60.8	67.2	-6.5	-9.6	20.3	30.5	-10.2	-33.5
1995	63.0	68.2	-5.2	-7.7	21.2	30.2	-9.1	-30.0
1996	63.4	67.7	-4.3	-6.3	21.4	30.4	-9.0	-29.7
1997	64.6	69.8	-5.3	-7.5	21.8	31.4	-9.6	-30.6
1998	66.4	72.1	-5.7	-7.9	22.1	32.0	-9.9	-31.0
1999	67.4	75.3	-8.0	-10.6	20.5	31.9	-11.4	-35.7
2000	67.9	75.9	-8.0	-10.6	17.1	29.4	-12.3	-41.8
2001	74.6	84.5	-9.9	-11.7	16.9	28.2	-11.3	-40.2
2002	79.9	93.7	-13.8	-14.8	16.4	34.6	-18.2	-52.6
2003	86.3	103.5	-17.2	-16.6	17.8	40.7	-22.9	-56.3
2004	92.0	112.1	-20.0	-17.9	20.3	43.8	-23.5	-53.7
2005	96.7	118.8	-22.2	-18.6	21.9	48.9	-27.0	-55.2
2006	101.3	121.7	-20.5	-16.8	24.3	52.8	-28.4	-53.9
2007	106.5	127.3	-20.7	-16.3	26.6	55.3	-28.8	-52.0

## CHAPTER 4 | Research and Development: U.S. Trends and International Comparisons

Year	All performers				Business performers <sup>a</sup>			
	Performer reported	Agency reported	Difference (\$billions)	Difference (%)	Performer reported	Agency reported	Difference (\$billions)	Difference (%)
2008	119.1	127.1	-8.0	-6.3	36.4	56.3	-20.0	-35.5
2009	127.4	141.1	-13.7	-9.7	39.6	53.3	-13.7	-25.8
2010	128.4	140.4	-11.9	-8.5	34.2	59.9	-25.7	-42.9
2011	128.9	135.5	-6.6	-4.9	31.3	55.6	-24.2	-43.6
2012	125.8	138.5	-12.7	-9.2	30.6	58.9	-28.3	-48.0
2013	122.1	125.4	-3.3	-2.6	29.4	49.5	-20.2	-40.7
2014	119.8	130.3	-10.5	-8.0	26.6	50.2	-23.7	-47.1
2015	113.1	128.6	-15.5	-12.0	19.5	47.5	-27.9	-58.9

<sup>a</sup> Excludes industry-administered federally funded R&D centers.

### Note(s)

The performer-reported data are expenditures on a calendar-year basis. The agency-reported data are obligations, as normally reported on a federal fiscal-year basis. Dollar difference is performer-reported R&D minus agency-reported R&D. Percentage difference is dollar difference divided by agency-reported R&D. A negative difference arises when agency-reported R&D is higher than performer-reported R&D.

### Source(s)

National Science Foundation, National Center for Science and Engineering Statistics, National Patterns of R&D Resources (annual series), and Survey of Federal Funds for Research and Development.

*Science and Engineering Indicators 2018*

## CHAPTER 4 | Research and Development: U.S. Trends and International Comparisons

APPENDIX TABLE 4-21

### Federal obligations for R&D and R&D plant, by type of work: FYs 1953–2016

(Millions of current and of constant 2009 dollars)

Fiscal year	Total, R&D and R&D plant	R&D				R&D plant
		All R&D	Basic	Applied	Development	
Current \$millions						
1953	2,167	1,920	116	NA	NA	248
1954	1,918	1,762	116	NA	NA	156
1955	2,252	2,045	130	NA	NA	207
1956	3,267	2,988	206	646	2,136	279
1957	4,389	3,932	262	662	3,007	457
1958	4,906	4,570	335	744	3,491	336
1959	7,123	6,694	466	874	5,353	429
1960	8,080	7,552	590	1,282	5,679	528
1961	9,607	9,059	815	1,663	6,581	548
1962	11,069	10,290	986	2,018	7,285	779
1963	13,663	12,495	1,152	2,356	8,987	1,168
1964	15,324	14,225	1,303	2,571	10,351	1,099
1965	15,746	14,614	1,435	2,812	10,367	1,132
1966	16,179	15,320	1,579	3,081	10,660	858
1967	17,149	16,529	1,846	2,786	11,898	620
1968	16,525	15,921	1,841	2,941	11,140	604
1969	16,310	15,641	1,945	2,700	10,996	669
1970	15,863	15,339	1,926	2,975	10,438	524
1971	16,154	15,543	1,980	3,143	10,419	611
1972	17,098	16,496	2,187	3,361	10,948	602
1973	17,574	16,800	2,232	3,349	11,219	774
1974	18,176	17,410	2,388	3,788	11,235	766
1975	19,860	19,039	2,588	4,141	12,309	821



## CHAPTER 4 | Research and Development: U.S. Trends and International Comparisons

Fiscal year	Total, R&D and R&D plant	R&D				R&D plant
		All R&D	Basic	Applied	Development	
1976	21,616	20,780	2,767	4,852	13,160	837
1977	24,818	23,450	3,259	5,255	14,936	1,367
1978	27,141	25,845	3,699	5,908	16,238	1,296
1979	29,621	28,145	4,193	6,342	17,610	1,475
1980	31,386	29,830	4,674	6,923	18,233	1,556
1981	34,590	33,104	5,041	7,171	20,891	1,486
1982	37,822	36,433	5,482	7,541	23,410	1,390
1983	40,009	38,712	6,260	7,993	24,458	1,297
1984	44,012	42,225	7,067	7,911	27,246	1,787
1985	50,180	48,360	7,819	8,315	32,226	1,821
1986	52,951	51,412	8,153	8,349	34,910	1,539
1987	57,100	55,254	8,942	8,998	37,313	1,846
1988	58,827	56,769	9,474	9,177	38,119	2,057
1989	63,572	61,406	10,602	10,164	40,641	2,165
1990	65,831	63,559	11,286	10,337	41,937	2,272
1991	64,148	61,295	12,171	11,798	37,327	2,853
1992	68,577	65,593	12,490	12,001	41,102	2,985
1993	70,415	67,314	13,399	13,491	40,424	3,101
1994	69,451	67,235	13,523	13,888	39,824	2,215
1995	70,443	68,187	13,877	14,557	39,752	2,256
1996	69,399	67,653	14,464	13,796	39,393	1,746
1997	71,753	69,827	14,942	14,423	40,461	1,927
1998	73,914	72,101	15,613	15,309	41,178	1,813
1999	77,386	75,341	17,444	16,084	41,813	2,046
2000	80,403	75,910	19,570	18,901	37,440	4,493
2001	88,562	84,493	21,958	22,756	39,779	4,070

## CHAPTER 4 | Research and Development: U.S. Trends and International Comparisons

Fiscal year	Total, R&D and R&D plant	R&D				R&D plant
		All R&D	Basic	Applied	Development	
2002	98,013	93,709	23,668	24,338	45,702	4,305
2003	107,794	103,527	24,751	26,320	52,455	4,267
2004	116,069	112,074	26,121	27,237	58,717	3,994
2005	122,619	118,848	27,140	26,598	65,110	3,771
2006	123,855	121,730	26,585	26,951	68,194	2,125
2007	129,431	127,263	26,866	27,228	73,169	2,168
2008	129,050	127,106	27,154	26,740	73,212	1,944
2009 <sup>a</sup>	144,758	141,090	32,879	30,813	77,398	3,668
2010 <sup>a</sup>	146,968	140,355	31,795	31,933	76,627	6,613
2011	139,662	135,491	29,314	28,710	77,467	4,171
2012	140,636	138,485	30,959	30,988	76,538	2,151
2013	127,291	125,386	29,779	29,419	66,188	1,905
2014	132,496	130,279	31,588	31,321	67,370	2,218
2015	131,398	128,573	31,527	32,118	64,928	2,825
2016 preliminary	142,555	140,070	33,227	34,533	72,309	2,485
Constant 2009 \$millions						
1953	14,335	12,695	767	NA	NA	1,640
1954	12,536	11,515	758	NA	NA	1,021
1955	14,604	13,259	844	NA	NA	1,344
1956	20,650	18,889	1,305	4,080	13,504	1,762
1957	26,747	23,961	1,599	4,035	18,327	2,786
1958	29,013	27,024	1,978	4,401	20,644	1,989
1959	41,483	38,984	2,714	5,092	31,178	2,499
1960	46,410	43,376	3,391	7,364	32,621	3,034
1961	54,431	51,324	4,615	9,425	37,284	3,107
1962	62,081	57,711	5,532	11,321	40,859	4,370

## CHAPTER 4 | Research and Development: U.S. Trends and International Comparisons

Fiscal year	Total, R&D and R&D plant	R&D				R&D plant
		All R&D	Basic	Applied	Development	
1963	75,695	69,222	6,381	13,053	49,788	6,472
1964	83,874	77,862	7,132	14,075	56,655	6,013
1965	84,701	78,613	7,722	15,125	55,767	6,087
1966	85,196	80,676	8,316	16,225	56,135	4,520
1967	87,630	84,461	9,432	14,234	60,796	3,169
1968	81,645	78,662	9,094	14,528	55,040	2,983
1969	77,043	73,882	9,186	12,754	51,941	3,160
1970	71,104	68,754	8,632	13,334	46,787	2,351
1971	68,915	66,308	8,448	13,409	44,451	2,608
1972	69,617	67,166	8,904	13,684	44,577	2,451
1973	68,597	65,574	8,712	13,073	43,789	3,022
1974	66,241	63,448	8,701	13,803	40,943	2,793
1975	65,608	62,897	8,551	13,681	40,664	2,711
1976	66,779	64,194	8,549	14,989	40,656	2,585
1977	71,520	67,580	9,391	15,145	43,044	3,940
1978	73,274	69,776	9,985	15,951	43,840	3,498
1979	74,033	70,345	10,479	15,852	44,014	3,688
1980	72,152	68,576	10,745	15,915	41,915	3,576
1981	72,439	69,328	10,558	15,019	43,751	3,111
1982	74,118	71,394	10,742	14,777	45,876	2,723
1983	75,092	72,657	11,749	15,003	45,905	2,435
1984	79,790	76,550	12,812	14,343	49,395	3,240
1985	88,051	84,856	13,719	14,590	56,547	3,195
1986	90,841	88,201	13,987	14,323	59,890	2,640
1987	95,821	92,723	15,007	15,100	62,616	3,098
1988	95,637	92,293	15,402	14,919	61,972	3,344

## CHAPTER 4 | Research and Development: U.S. Trends and International Comparisons

Fiscal year	Total, R&D and R&D plant	R&D				R&D plant
		All R&D	Basic	Applied	Development	
1989	99,393	96,008	16,576	15,890	63,541	3,385
1990	99,323	95,895	17,027	15,596	63,273	3,427
1991	93,469	89,312	17,734	17,190	54,388	4,157
1992	97,535	93,291	17,764	17,068	58,458	4,245
1993	97,825	93,518	18,615	18,743	56,159	4,308
1994	94,427	91,415	18,387	18,882	54,146	3,012
1995	93,786	90,783	18,476	19,381	52,926	3,004
1996	90,706	88,424	18,905	18,031	51,488	2,282
1997	92,157	89,682	19,191	18,525	51,967	2,475
1998	93,776	91,475	19,808	19,423	52,244	2,301
1999	96,951	94,388	21,854	20,150	52,384	2,563
2000	98,691	93,176	24,021	23,200	45,955	5,515
2001	106,164	101,286	26,322	27,278	47,685	4,879
2002	115,623	110,545	27,921	28,711	53,913	5,078
2003	124,776	119,837	28,651	30,467	60,719	4,939
2004	131,107	126,595	29,505	30,766	66,324	4,512
2005	134,289	130,159	29,723	29,129	71,306	4,130
2006	131,369	129,115	28,197	28,586	72,332	2,254
2007	133,655	131,416	27,742	28,116	75,557	2,239
2008	130,551	128,584	27,470	27,051	74,064	1,966
2009 <sup>a</sup>	144,758	141,090	32,879	30,813	77,398	3,668
2010 <sup>a</sup>	145,686	139,130	31,518	31,654	75,958	6,556
2011	135,686	131,634	28,479	27,893	75,262	4,052
2012	134,182	132,130	29,538	29,566	73,026	2,052
2013	119,399	117,612	27,933	27,595	62,084	1,787
2014	122,195	120,150	29,132	28,886	62,132	2,045

## CHAPTER 4 | Research and Development: U.S. Trends and International Comparisons

Fiscal year	Total, R&D and R&D plant	R&D				R&D plant
		All R&D	Basic	Applied	Development	
2015	119,562	116,991	28,687	29,225	59,079	2,571
2016 preliminary	127,692	125,466	29,763	30,933	64,770	2,226

NA = not available; data collected for this table were not recorded at that level in that particular fiscal year.

<sup>a</sup> Includes obligations from the additional federal R&D funding authorized by the American Recovery and Reinvestment Act of 2009.

### Note(s)

Beginning in FY 2000, the Department of the Air Force did not report Budget Activity (BA) 6.7 Operational Systems Development data because the agency misunderstood reporting requirements. During the Volume 57 data collection cycle, the Department of the Air Force edited prior-year data from FY 2000– to 207 to include BA 6.7 Operational Systems Development data. These data revisions were derived from FY 2007 distribution percentages that were then applied backward to revise FYs 2000–06 data. In FY 2000, the National Aeronautics and Space Administration (NASA) reclassified the Space Station as a physical asset, reclassified Space Station Research as equipment, and transferred funding for the program from R&D to R&D plant. In FY 2006, NASA reclassified operational costs funding for Space Operations, the Hubble Space Telescope, the Stratospheric Observatory for Infrared Astronomy, and the James Webb Space Telescope previously reported as R&D plant. In FY 2000, the National Institutes of Health reclassified all its development activities as research.

### Source(s)

National Science Foundation, National Center for Science and Engineering Statistics, Survey of Federal Funds for Research and Development.

*Science and Engineering Indicators 2018*

## CHAPTER 4 | Research and Development: U.S. Trends and International Comparisons

APPENDIX TABLE 4-22

### Federal funding for R&D and R&D plant, budget authority versus obligations: FYs 1953–2016

(Millions of current and of constant 2009 dollars)

Fiscal year	Federal budget authority			Federal obligations		
	Total, R&D and R&D plant	R&D	R&D plant	Total, R&D and R&D plant	R&D	R&D plant
Current \$millions						
1953	NA	NA	NA	2,167	1,920	248
1954	NA	NA	NA	1,918	1,762	156
1955	NA	2,533	NA	2,252	2,045	207
1956	NA	2,988	NA	3,267	2,988	279
1957	NA	3,932	NA	4,389	3,932	457
1958	NA	4,570	NA	4,906	4,570	336
1959	NA	6,694	NA	7,123	6,694	429
1960	NA	7,552	NA	8,080	7,552	528
1961	NA	9,059	NA	9,607	9,059	548
1962	NA	10,290	NA	11,069	10,290	779
1963	NA	12,495	NA	13,663	12,495	1,168
1964	NA	14,225	NA	15,324	14,225	1,099
1965	NA	14,614	NA	15,746	14,614	1,132
1966	NA	15,320	NA	16,179	15,320	858
1967	NA	16,529	NA	17,149	16,529	620
1968	NA	15,921	NA	16,525	15,921	604
1969	NA	15,641	NA	16,310	15,641	669
1970	NA	15,339	NA	15,863	15,339	524
1971	NA	15,543	NA	16,154	15,543	611
1972	NA	16,496	NA	17,098	16,496	602
1973	NA	16,800	NA	17,574	16,800	774
1974	NA	17,410	NA	18,176	17,410	766
1975	NA	19,039	NA	19,860	19,039	821

## CHAPTER 4 | Research and Development: U.S. Trends and International Comparisons

Fiscal year	Federal budget authority			Federal obligations		
	Total, R&D and R&D plant	R&D	R&D plant	Total, R&D and R&D plant	R&D	R&D plant
1976	NA	20,780	NA	21,616	20,780	837
1977	NA	23,450	NA	24,818	23,450	1,367
1978	NA	25,976	NA	27,141	25,845	1,296
1979	NA	28,208	NA	29,621	28,145	1,475
1980	NA	29,739	NA	31,386	29,830	1,556
1981	NA	33,735	NA	34,590	33,104	1,486
1982	NA	36,115	NA	37,822	36,433	1,390
1983	NA	38,768	NA	40,009	38,712	1,297
1984	NA	44,214	NA	44,012	42,225	1,787
1985	NA	49,887	NA	50,180	48,360	1,821
1986	NA	53,249	NA	52,951	51,412	1,539
1987	NA	57,069	NA	57,100	55,254	1,846
1988	NA	59,106	NA	58,827	56,769	2,057
1989	NA	62,115	NA	63,572	61,406	2,165
1990	NA	63,781	NA	65,831	63,559	2,272
1991	NA	65,898	NA	64,148	61,295	2,853
1992	NA	68,398	NA	68,577	65,593	2,985
1993	NA	69,884	NA	70,415	67,314	3,101
1994	NA	68,331	NA	69,451	67,235	2,215
1995	NA	68,791	NA	70,443	68,187	2,256
1996	NA	69,049	NA	69,399	67,653	1,746
1997	NA	71,653	NA	71,753	69,827	1,927
1998	NA	73,569	NA	73,914	72,101	1,813
1999	NA	77,637	NA	77,386	75,341	2,046
2000	83,581	78,664	4,917	80,403	75,910	4,493
2001	91,505	86,756	4,749	88,562	84,493	4,070

## CHAPTER 4 | Research and Development: U.S. Trends and International Comparisons

Fiscal year	Federal budget authority			Federal obligations		
	Total, R&D and R&D plant	R&D	R&D plant	Total, R&D and R&D plant	R&D	R&D plant
2002	103,057	97,624	5,433	98,013	93,709	4,305
2003	118,065	112,544	5,521	107,794	103,527	4,267
2004	126,270	121,867	4,403	116,069	112,074	3,994
2005	131,259	126,601	4,658	122,619	118,848	3,771
2006	136,019	131,624	4,395	123,855	121,730	2,125
2007	141,890	138,087	3,803	129,431	127,263	2,168
2008	144,391	140,113	4,278	129,050	127,106	1,944
2009 <sup>a</sup>	164,292	156,009	8,283	144,758	141,090	3,668
2010 <sup>a</sup>	148,962	146,596	2,366	146,968	140,355	6,613
2011	144,379	142,457	1,922	139,662	135,491	4,171
2012	143,737	141,450	2,287	140,636	138,485	2,151
2013	132,477	130,861	1,616	127,291	125,386	1,905
2014	136,159	133,547	2,612	132,496	130,279	2,218
2015	138,544	136,090	2,454	131,398	128,573	2,825
2016 (preliminary)	148,999	146,425	2,574	142,555	140,070	2,485
2009 constant \$millions						
1953	NA	NA	NA	14,335	12,695	1,640
1954	NA	NA	NA	12,536	11,515	1,021
1955	NA	16,427	NA	14,604	13,259	1,344
1956	NA	18,887	NA	20,650	18,889	1,762
1957	NA	23,961	NA	26,747	23,961	2,786
1958	NA	27,025	NA	29,013	27,024	1,989
1959	NA	38,987	NA	41,483	38,984	2,499
1960	NA	43,377	NA	46,410	43,376	3,034
1961	NA	51,326	NA	54,431	51,324	3,107
1962	NA	57,712	NA	62,081	57,711	4,370



## CHAPTER 4 | Research and Development: U.S. Trends and International Comparisons

Fiscal year	Federal budget authority			Federal obligations		
	Total, R&D and R&D plant	R&D	R&D plant	Total, R&D and R&D plant	R&D	R&D plant
1963	NA	69,224	NA	75,695	69,222	6,472
1964	NA	77,860	NA	83,874	77,862	6,013
1965	NA	78,612	NA	84,701	78,613	6,087
1966	NA	80,674	NA	85,196	80,676	4,520
1967	NA	84,461	NA	87,630	84,461	3,169
1968	NA	78,661	NA	81,645	78,662	2,983
1969	NA	73,883	NA	77,043	73,882	3,160
1970	NA	68,754	NA	71,104	68,754	2,351
1971	NA	66,310	NA	68,915	66,308	2,608
1972	NA	67,166	NA	69,617	67,166	2,451
1973	NA	65,574	NA	68,597	65,574	3,022
1974	NA	63,448	NA	66,241	63,448	2,793
1975	NA	62,897	NA	65,608	62,897	2,711
1976	NA	64,195	NA	66,779	64,194	2,585
1977	NA	67,579	NA	71,520	67,580	3,940
1978	NA	70,130	NA	73,274	69,776	3,498
1979	NA	70,502	NA	74,033	70,345	3,688
1980	NA	68,366	NA	72,152	68,576	3,576
1981	NA	70,649	NA	72,439	69,328	3,111
1982	NA	70,772	NA	74,118	71,394	2,723
1983	NA	72,763	NA	75,092	72,657	2,435
1984	NA	80,156	NA	79,790	76,550	3,240
1985	NA	87,536	NA	88,051	84,856	3,195
1986	NA	91,352	NA	90,841	88,201	2,640
1987	NA	95,769	NA	95,821	92,723	3,098
1988	NA	96,092	NA	95,637	92,293	3,344

## CHAPTER 4 | Research and Development: U.S. Trends and International Comparisons

Fiscal year	Federal budget authority			Federal obligations		
	Total, R&D and R&D plant	R&D	R&D plant	Total, R&D and R&D plant	R&D	R&D plant
1989	NA	97,115	NA	99,393	96,008	3,385
1990	NA	96,230	NA	99,323	95,895	3,427
1991	NA	96,019	NA	93,469	89,312	4,157
1992	NA	97,281	NA	97,535	93,291	4,245
1993	NA	97,088	NA	97,825	93,518	4,308
1994	NA	92,904	NA	94,427	91,415	3,012
1995	NA	91,587	NA	93,786	90,783	3,004
1996	NA	90,248	NA	90,706	88,424	2,282
1997	NA	92,028	NA	92,157	89,682	2,475
1998	NA	93,338	NA	93,776	91,475	2,301
1999	NA	97,265	NA	96,951	94,388	2,563
2000	102,591	96,556	6,035	98,691	93,176	5,515
2001	109,692	103,999	5,693	106,164	101,286	4,879
2002	121,572	115,163	6,409	115,623	110,545	5,078
2003	136,665	130,274	6,391	124,776	119,837	4,939
2004	142,630	137,656	4,973	131,107	126,595	4,512
2005	143,751	138,650	5,101	134,289	130,159	4,130
2006	144,271	139,610	4,662	131,369	129,115	2,254
2007	146,520	142,593	3,927	133,655	131,416	2,239
2008	146,071	141,743	4,328	130,551	128,584	1,966
2009 <sup>a</sup>	164,292	156,009	8,283	144,758	141,090	3,668
2010 <sup>a</sup>	147,663	145,317	2,345	145,686	139,130	6,556
2011	140,269	138,402	1,867	135,686	131,634	4,052
2012	137,141	134,958	2,182	134,182	132,130	2,052
2013	124,263	122,747	1,516	119,399	117,612	1,787
2014	125,573	123,164	2,409	122,195	120,150	2,045

## CHAPTER 4 | Research and Development: U.S. Trends and International Comparisons

Fiscal year	Federal budget authority			Federal obligations		
	Total, R&D and R&D plant	R&D	R&D plant	Total, R&D and R&D plant	R&D	R&D plant
2015	126,064	123,831	2,233	119,562	116,991	2,571
2016 (preliminary)	133,464	131,158	2,306	127,692	125,466	2,226

NA = not available; data collected for this table were not recorded at that level in that particular fiscal year. r = data significantly revised; replaces previously published data.

<sup>a</sup> Includes obligations from the additional federal R&D funding authorized by the American Recovery and Reinvestment Act of 2009.

### Note(s)

Beginning in FY 2000, the Department of the Air Force did not report Budget Activity (BA) 6.7 Operational Systems Development data because the agency misunderstood reporting requirements. During the Volume 57 data collection cycle, the Department of the Air Force edited prior-year data from FY 2000 to FY 2007 to include BA 6.7 Operational Systems Development data. These data revisions were derived from FY 2007 distribution percentages that were then applied backward to revise FYs 2000–06 data. In FY 2000, the National Aeronautics and Space Administration (NASA) reclassified the Space Station as a physical asset, reclassified Space Station Research as equipment, and transferred funding for the program from R&D to R&D plant. In FY 2006, NASA reclassified as operational costs funding for Space Operations, the Hubble Space Telescope, the Stratospheric Observatory for Infrared Astronomy, and the James Webb Space Telescope previously reported as R&D plant. In FY 2000, the National Institutes of Health reclassified all its development activities as research.

### Source(s)

National Science Foundation, National Center for Science and Engineering Statistics, Survey of Federal Funds for Research and Development, Federal Research and Development Funding by Budget Function

## CHAPTER 4 | Research and Development: U.S. Trends and International Comparisons

APPENDIX TABLE 4-23

## Federal obligations for R&amp;D and R&amp;D plant, by agency, performer, and type of work: FY 2015

(Millions of current dollars)

Agency	All federal obligations	Federal intramural <sup>a</sup>	Extramural performers							
			Business firms	United States and U.S. territories						Foreign
				Industry FFRDCs	Universities and colleges	University FFRDCs	Other nonprofits	Nonprofit FFRDCs	State and local governments	
Total R&D and R&D plant										
All agencies	131,398.2	36,342.2	47,730.8	4,037.5	27,706.9	4,288.1	6,287.5	3,482.0	487.1	1,036.1
Department of Agriculture	2,352.0	1,517.7	38.1	0.0	758.2	0.0	25.7	0.0	8.7	3.6
Department of Commerce	1,519.4	1,131.4	61.7	0.0	269.5	3.4	30.8	6.2	15.0	1.4
Department of Defense	61,683.0	20,327.3	35,860.9	336.4	2,429.1	337.4	521.3	1,240.3	7.9	622.5
Department of Education	251.3	10.7	6.4	0.0	178.1	0.0	56.1	0.0	0.0	0.0
Department of Energy	12,343.0	1,072.9	2,274.0	3,234.7	1,167.6	2,316.7	239.0	2,016.1	20.1	1.9
Department of Health and Human Services	30,425.5	6,789.6	1,519.0	421.7	16,875.4	21.7	4,320.9	25.1	186.0	266.2
Department of Homeland Security	1,645.2	1,247.1	190.7	30.0	71.0	8.3	5.0	81.8	0.0	11.2
Department of the Interior	808.7	692.2	25.6	0.0	59.2	0.0	5.3	0.0	26.0	0.2

## CHAPTER 4 | Research and Development: U.S. Trends and International Comparisons

Agency	All federal obligations	Federal intramural <sup>a</sup>	Extramural performers							
			Business firms	United States and U.S. territories						Foreign
				Industry FFRDCs	Universities and colleges	University FFRDCs	Other nonprofits	Nonprofit FFRDCs	State and local governments	
Department of Justice	149.7	20.4	15.8	0.0	54.6	0.0	45.5	0.0	13.4	0.0
Department of Transportation	884.5	231.1	266.2	0.2	80.4	0.0	48.1	67.2	190.4	0.9
Department of Veterans Affairs	661.6	661.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Agency for International Development	212.2	10.9	32.2	0.0	50.0	0.0	34.2	0.0	0.0	84.9
Environmental Protection Agency	520.7	260.7	190.8	0.5	68.0	0.6	0.0	0.1	0.0	0.2
National Aeronautics and Space Administration	11,413.1	1,831.6	6,784.2	1.0	979.9	1,375.5	399.0	21.6	3.8	16.5
National Science Foundation	5,989.7	115.9	412.4	0.0	4,655.0	220.5	542.9	5.1	15.8	22.1
Smithsonian Institution	229.0	229.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
All other agencies	309.7	192.2	52.9	13.1	10.9	3.9	13.5	18.6	0.0	4.6
R&D										
All agencies	128,573.2	34,925.1	47,455.2	3,935.8	27,414.7	3,911.7	6,136.2	3,271.4	487.0	1,036.0

## CHAPTER 4 | Research and Development: U.S. Trends and International Comparisons

Agency	All federal obligations	Federal intramural <sup>a</sup>	Extramural performers							
			Business firms	United States and U.S. territories						Foreign
				Industry FFRDCs	Universities and colleges	University FFRDCs	Other nonprofits	Nonprofit FFRDCs	State and local governments	
Department of Agriculture	2,341.0	1,506.7	38.1	0.0	758.2	0.0	25.7	0.0	8.7	3.6
Department of Commerce	1,331.3	994.6	61.7	0.0	218.3	3.4	30.8	6.2	15.0	1.4
Department of Defense	61,513.5	20,179.8	35,838.9	336.4	2,429.1	337.4	521.3	1,240.3	7.9	622.5
Department of Education	251.3	10.7	6.4	0.0	178.1	0.0	56.1	0.0	0.0	0.0
Department of Energy	11,391.0	1,071.7	2,088.6	3,133.0	1,077.6	1,953.7	239.0	1,805.5	20.1	1.9
Department of Health and Human Services	30,272.1	6,644.2	1,519.0	421.7	16,868.7	21.7	4,319.6	25.1	186.0	266.2
Department of Homeland Security	742.2	344.9	190.1	30.0	71.0	8.3	5.0	81.8	0.0	11.2
Department of the Interior	800.1	691.8	17.4	0.0	59.2	0.0	5.3	0.0	26.0	0.2
Department of Justice	149.7	20.4	15.8	0.0	54.6	0.0	45.5	0.0	13.4	0.0
Department of Transportation	855.6	231.1	237.8	0.2	80.4	0.0	47.6	67.2	190.4	0.9
Department of Veterans Affairs	661.6	661.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

## CHAPTER 4 | Research and Development: U.S. Trends and International Comparisons

Agency	All federal obligations	Federal intramural <sup>a</sup>	Extramural performers							
			Business firms	United States and U.S. territories						Foreign
				Industry FFRDCs	Universities and colleges	University FFRDCs	Other nonprofits	Nonprofit FFRDCs	State and local governments	
Agency for International Development	212.2	10.9	32.2	0.0	50.0	0.0	34.2	0.0	0.0	84.9
Environmental Protection Agency	515.6	260.7	185.6	0.5	68.0	0.6	0.0	0.1	0.0	0.2
National Aeronautics and Space Administration	11,360.7	1,818.3	6,758.4	1.0	979.9	1,362.3	399.0	21.6	3.8	16.5
National Science Foundation	5,669.7	89.8	412.3	0.0	4,510.7	220.5	393.5	5.1	15.8	22.0
Smithsonian Institution	195.7	195.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
All other agencies	309.7	192.2	52.9	13.1	10.9	3.9	13.5	18.6	0.0	4.6
Basic research										
All agencies	31,527.1	5,813.7	2,536.5	507.0	15,295.5	2,920.5	2,985.7	1,200.2	61.2	206.7
Department of Agriculture	924.5	635.4	0.0	0.0	274.7	0.0	11.0	0.0	1.6	1.9
Department of Commerce	232.4	192.3	12.0	0.0	24.7	0.0	3.1	0.0	0.0	0.3
Department of Defense	2,133.4	464.5	383.1	7.4	1,055.8	3.9	163.3	5.3	1.3	48.8

## CHAPTER 4 | Research and Development: U.S. Trends and International Comparisons

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## CHAPTER 4 | Research and Development: U.S. Trends and International Comparisons

Agency	All federal obligations	Federal intramural <sup>a</sup>	Extramural performers							
			Business firms	United States and U.S. territories						Foreign
				Industry FFRDCs	Universities and colleges	University FFRDCs	Other nonprofits	Nonprofit FFRDCs	State and local governments	
National Aeronautics and Space Administration	3,209.7	460.1	942.4	0.9	558.9	956.8	268.0	13.2	2.2	7.2
National Science Foundation	4,973.9	89.4	267.9	0.0	4,041.2	220.5	313.6	5.1	14.6	21.7
Smithsonian Institution	195.7	195.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
All other agencies	0.2	0.2	0.0	0.0	0.0	0.0	-0.0	0.0	-0.0	0.0
Applied research										
All agencies	32,118.2	9,192.8	5,573.8	2,591.0	10,666.6	306.3	2,724.9	416.7	359.1	287.0
Department of Agriculture	1,203.9	673.8	38.1	0.0	470.6	0.0	12.8	0.0	7.0	1.5
Department of Commerce	921.5	653.7	44.2	0.0	177.8	1.3	24.1	6.2	13.2	1.1
Department of Defense	4,558.1	1,696.0	2,022.0	58.4	506.7	72.3	130.5	31.3	0.6	40.4
Department of Education	137.4	6.0	2.4	0.0	102.0	0.0	26.9	0.0	0.0	0.0
Department of Energy	4,181.1	569.9	527.6	2,295.9	193.1	113.7	146.6	326.5	7.5	0.3
Department of Health and Human Services	15,119.9	3,400.7	832.6	202.4	8,261.2	11.0	2,116.0	14.4	140.7	140.8

## CHAPTER 4 | Research and Development: U.S. Trends and International Comparisons

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## CHAPTER 4 | Research and Development: U.S. Trends and International Comparisons

Agency	All federal obligations	Federal intramural <sup>a</sup>	Extramural performers							
			Business firms	United States and U.S. territories						Foreign
				Industry FFRDCs	Universities and colleges	University FFRDCs	Other nonprofits	Nonprofit FFRDCs	State and local governments	
All other agencies	284.2	179.1	42.7	13.1	10.9	3.9	11.3	18.6	0.0	4.6
Development										
All agencies	64,927.8	19,918.5	39,344.9	837.8	1,452.6	684.9	425.6	1,654.5	66.7	542.3
Department of Agriculture	212.7	197.5	0.0	0.0	13.0	0.0	1.8	0.0	0.0	0.3
Department of Commerce	177.4	148.5	5.5	0.0	15.8	2.1	3.6	0.0	1.8	0.0
Department of Defense	54,822.1	18,019.3	33,433.8	270.7	866.6	261.2	227.4	1,203.7	6.0	533.3
Department of Education	91.6	3.5	3.8	0.0	59.5	0.0	24.8	0.0	0.0	0.0
Department of Energy	2,749.5	217.4	1,313.7	557.9	161.2	111.4	62.2	313.1	12.6	0.0
Department of Health and Human Services	75.4	30.3	3.6	0.0	25.3	0.0	11.9	0.0	4.3	0.0
Department of Homeland Security	525.4	251.0	161.2	9.1	20.5	6.4	0.8	68.1	0.0	8.4
Department of the Interior	119.7	102.0	2.8	0.0	10.8	0.0	0.7	0.0	3.5	0.0
Department of Justice	21.3	14.6	0.0	0.0	0.0	0.0	0.0	0.0	6.7	0.0

## CHAPTER 4 | Research and Development: U.S. Trends and International Comparisons

Agency	All federal obligations	Federal intramural <sup>a</sup>	Extramural performers							
			Business firms	United States and U.S. territories						Foreign
				Industry FFRDCs	Universities and colleges	University FFRDCs	Other nonprofits	Nonprofit FFRDCs	State and local governments	
Department of Transportation	192.9	37.1	43.5	0.0	7.9	0.0	8.4	63.9	31.8	0.3
Department of Veterans Affairs	18.1	18.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Agency for International Development	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Environmental Protection Agency	75.2	38.0	37.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
National Aeronautics and Space Administration	5,821.3	828.2	4,329.6	0.1	272.0	303.9	81.7	5.8	0.0	0.0
National Science Foundation	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Smithsonian Institution	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
All other agencies	25.3	12.9	10.3	0.0	0.0	0.0	2.2	0.0	0.0	-0.0
R&D plant										
All agencies	2,825.1	1,417.2	275.6	101.7	292.2	376.3	151.3	210.6	0.0	0.1
Department of Agriculture	10.9	10.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

## CHAPTER 4 | Research and Development: U.S. Trends and International Comparisons

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## CHAPTER 4 | Research and Development: U.S. Trends and International Comparisons

Agency	All federal obligations	Federal intramural <sup>a</sup>	Extramural performers							
			Business firms	United States and U.S. territories						Foreign
				Industry FFRDCs	Universities and colleges	University FFRDCs	Other nonprofits	Nonprofit FFRDCs	State and local governments	
Environmental Protection Agency	5.1	0.0	5.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
National Aeronautics and Space Administration	52.4	13.3	25.8	0.0	0.0	13.3	0.0	0.0	0.0	0.0
National Science Foundation	320.0	26.1	0.1	0.0	144.3	0.0	149.5	0.0	0.0	0.1
Smithsonian Institution	33.2	33.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
All other agencies	0.0	0.0	-0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

FFRDC = federally funded research and development center.

<sup>a</sup> Includes costs associated with administration of intramural and extramural programs by federal personnel and actual intramural performance.

### Note(s)

Detail may not add to total because of rounding. Agencies included have total annual R&D obligations of \$100 million or more. All other agencies include Department of Housing and Urban Development, Department of Labor, Department of State, Department of the Treasury, Appalachian Regional Commission, Consumer Product Safety Commission, Federal Communications Commission, Federal Trade Commission, Library of Congress, National Archives and Records Administration, Nuclear Regulatory Commission, and Social Security Administration.

### Source(s)

National Science Foundation, National Center for Science and Engineering Statistics, Survey of Federal Funds for Research and Development, FY 2015.

*Science and Engineering Indicators 2018*

## CHAPTER 4 | Research and Development: U.S. Trends and International Comparisons

APPENDIX TABLE 4-24

### Federal obligations for research, by agency and S&E field: FY 2015

(Millions of current dollars and percent share)

Agency	All federal obligations	Computer sciences and mathematics	Environmental sciences	Life sciences	Physical sciences	Psychology	Social sciences	Other sciences nec	Engineering
Current \$millions									
All agencies	63,645	3,863	4,414	30,473	6,510	1,995	1,136	3,299	11,956
Departments									
Department of Agriculture	2,128	8	18	1,756	83	0	211	0	53
Department of Commerce	1,154	162	356	89	241	1	34	54	217
Department of Defense	6,691	1,276	177	785	788	70	19	864	2,714
Department of Education	160	0	0	0	0	0	43	117	0
Department of Energy	8,642	1,017	326	394	2,741	0	0	449	3,715
Department of Health and Human Services	30,197	191	454	25,165	109	1,769	228	792	1,489
Department of Homeland Security	217	12	13	32	24	5	16	69	46
Department of Housing and Urban Development	38	0	0	0	0	0	37	1	0
Department of the Interior	680	2	367	230	35	0	23	2	22
Department of Justice	128	5	0	2	1	0	115	0	5
Department of Labor	10	0	0	0	0	0	10	0	0

## CHAPTER 4 | Research and Development: U.S. Trends and International Comparisons

Agency	All federal obligations	Computer sciences and mathematics	Environmental sciences	Life sciences	Physical sciences	Psychology	Social sciences	Other sciences nec	Engineering
Department of State	2	0	0	0	0	0	2	0	0
Department of Transportation	663	36	35	9	12	18	26	86	441
Department of the Treasury	73	1	0	0	9	0	63	0	0
Department of Veterans Affairs	643	0	0	536	0	77	0	0	31
Other agencies									
Agency for International Development	212	0	8	188	0	0	16	0	0
Appalachian Regional Commission	0	0	0	0	0	0	0	0	0
Consumer Product Safety Commission	2	0	1	0	0	0	0	0	0
Environmental Protection Agency	440	9	182	174	11	0	3	0	62
Federal Communications Commission	5	0	0	0	1	0	2	0	2
Federal Trade Commission	2	0	0	0	0	0	2	0	0
Library of Congress	1	0	0	0	1	0	0	0	0
National Aeronautics and Space Administration	5,539	96	1,270	318	1,490	21	1	275	2,068



## CHAPTER 4 | Research and Development: U.S. Trends and International Comparisons

Agency	All federal obligations	Computer sciences and mathematics	Environmental sciences	Life sciences	Physical sciences	Psychology	Social sciences	Other sciences nec	Engineering
National Archives and Records Administration	1	1	0	0	0	0	0	0	0
National Science Foundation	5,670	1,047	1,199	702	911	34	187	591	998
Nuclear Regulatory Commission	92	0	0	0	0	0	0	0	92
Smithsonian Institution	196	0	9	93	53	0	40	1	0
Social Security Administration	59	0	0	0	0	0	59	0	0
Share by field (%)									
All agencies	100.0	6.1	6.9	47.9	10.2	3.1	1.8	5.2	18.8
Departments									
Department of Agriculture	100.0	0.4	0.8	82.5	3.9	0.0	9.9	0.0	2.5
Department of Commerce	100.0	14.0	30.8	7.7	20.9	0.1	3.0	4.6	18.8
Department of Defense	100.0	19.1	2.6	11.7	11.8	1.0	0.3	12.9	40.6
Department of Education	100.0	0.0	0.0	0.0	0.0	0.0	26.7	73.3	0.0
Department of Energy	100.0	11.8	3.8	4.6	31.7	0.0	0.0	5.2	43.0
Department of Health and Human Services	100.0	0.6	1.5	83.3	0.4	5.9	0.8	2.6	4.9
Department of Homeland Security	100.0	5.7	5.8	14.8	11.1	2.2	7.3	31.7	21.3

## CHAPTER 4 | Research and Development: U.S. Trends and International Comparisons

Agency	All federal obligations	Computer sciences and mathematics	Environmental sciences	Life sciences	Physical sciences	Psychology	Social sciences	Other sciences nec	Engineering
Department of Housing and Urban Development	100.0	0.0	0.0	0.0	0.0	0.0	96.5	2.9	0.5
Department of the Interior	100.0	0.3	54.0	33.8	5.1	0.0	3.4	0.2	3.2
Department of Justice	100.0	4.0	0.0	1.8	0.5	0.0	89.5	0.0	4.2
Department of Labor	100.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0
Department of State	100.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0
Department of Transportation	100.0	5.5	5.3	1.3	1.9	2.7	3.9	13.0	66.5
Department of the Treasury	100.0	0.8	0.0	0.0	12.3	0.0	86.9	0.0	0.0
Department of Veterans Affairs	100.0	0.0	0.0	83.3	0.0	11.9	0.0	0.0	4.8
Other agencies									
Agency for International Development	100.0	0.0	3.8	88.5	0.0	0.0	7.7	0.0	0.0
Appalachian Regional Commission	100.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0
Consumer Product Safety Commission	100.0	0.0	75.0	0.0	25.0	0.0	0.0	0.0	0.0
Environmental Protection Agency	100.0	2.1	41.2	39.5	2.4	0.0	0.6	0.0	14.2

## CHAPTER 4 | Research and Development: U.S. Trends and International Comparisons

Agency	All federal obligations	Computer sciences and mathematics	Environmental sciences	Life sciences	Physical sciences	Psychology	Social sciences	Other sciences nec	Engineering
Federal Communications Commission	100.0	3.7	0.0	0.0	15.5	0.0	44.2	0.0	36.6
Federal Trade Commission	100.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0
Library of Congress	100.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0
National Aeronautics and Space Administration	100.0	1.7	22.9	5.7	26.9	0.4	0.0	5.0	37.3
National Archives and Records Administration	100.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
National Science Foundation	100.0	18.5	21.1	12.4	16.1	0.6	3.3	10.4	17.6
Nuclear Regulatory Commission	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
Smithsonian Institution	100.0	0.0	4.8	47.3	26.9	0.0	20.3	0.6	0.0
Social Security Administration	100.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0

nec = not elsewhere classified.

### Note(s)

Research includes basic research and applied research.

### Source(s)

National Science Foundation, National Center for Science and Engineering Statistics, Survey of Federal Funds for Research and Development, FY 2015.



## CHAPTER 4 | Research and Development: U.S. Trends and International Comparisons

*Science and Engineering Indicators 2018*

## CHAPTER 4 | Research and Development: U.S. Trends and International Comparisons

APPENDIX TABLE 4-25

### Federal obligations for research, by detailed S&E field: Selected years, FYs 1990–2015

(Millions of current and of constant 2009 dollars and percent share by field)

S&E field	1990	1995	2000	2005	2010	2012	2014	2015	Average annual growth rate		
									1990–2000	2000–10	2010–15
Current \$millions									Percent		
Total, all fields	21,622.4	28,434.4	38,470.6	53,738.2	63,728.0	61,945.2	62,908.8	63,645.3	5.9	5.2	-0.0
Computer sciences and mathematics	840.7	1,579.1	2,205.6	2,983.4	3,411.8	3,527.5	3,883.2	3,862.7	10.1	4.5	2.5
Computer sciences	562.1	1,013.9	1,659.6	2,157.1	2,362.0	2,392.2	2,612.8	2,645.6	–	–	–
Mathematics	241.3	258.6	432.9	686.6	835.5	925.3	979.3	1,005.9	–	–	–
Other computer sciences and mathematics	37.3	306.6	113.1	139.7	214.4	210.1	291.0	211.2	–	–	–
Environmental sciences	2,174.1	2,854.4	3,328.8	3,502.6	3,338.9	3,884.3	4,365.8	4,413.7	4.4	0.0	5.7
Atmospheric sciences	773.4	1,135.6	1,104.3	1,185.1	953.8	1,469.2	1,567.5	1,567.9	–	–	–
Geological sciences	661.1	848.3	639.2	673.5	530.4	725.7	561.0	643.3	–	–	–
Oceanography	520.1	407.3	673.0	771.5	743.7	813.5	848.0	726.0	–	–	–
Other environmental sciences	219.5	463.3	912.2	872.5	1,111.0	875.8	1,389.3	1,476.5	–	–	–
Life sciences	8,829.8	11,811.0	17,964.7	28,127.8	33,909.1	30,965.0	30,668.2	30,473.0	7.4	6.6	-2.1
Biological and agricultural	5,178.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	–	–	–
Agricultural sciences	691.4	670.3	895.0	1,094.2	1,131.9	942.7	1,004.2	1,320.3	–	–	–
Biological sciences (excluding environmental biology)	4,144.6	4,925.4	10,740.0	13,351.6	17,213.9	15,458.3	15,310.6	14,839.7	–	–	–

## CHAPTER 4 | Research and Development: U.S. Trends and International Comparisons

S&E field	1990	1995	2000	2005	2010	2012	2014	2015	Average annual growth rate		
									1990–2000	2000–10	2010–15
Environmental biology	342.3	806.9	740.0	699.0	816.4	796.7	820.6	819.1	–	–	–
Medical sciences	3,382.4	4,972.2	4,463.8	10,862.1	11,677.0	11,037.4	11,002.7	10,934.7	–	–	–
Clinical medical	na	na	na	na	na	na	na	na	–	–	–
Other medical	na	na	na	na	na	na	na	na	–	–	–
Other life sciences	269.1	436.3	1,125.9	2,120.9	3,070.0	2,729.9	2,530.0	2,559.2	–	–	–
Physical sciences	3,808.7	4,278.3	4,788.0	5,493.7	5,870.8	6,407.5	6,483.1	6,510.3	2.3	2.1	2.1
Astronomy	597.2	764.5	880.3	884.9	559.9	1,099.4	1,191.6	1,230.2	–	–	–
Chemistry	761.7	863.5	1,225.6	1,197.5	1,310.6	1,103.0	1,012.7	967.7	–	–	–
Physics	2,254.9	2,451.2	2,405.4	3,041.3	3,470.1	3,708.3	3,565.2	3,040.2	–	–	–
Other physical sciences	195.0	199.2	276.7	370.0	530.2	496.7	713.6	1,272.2	–	–	–
Psychology	448.6	622.6	1,626.7	1,891.8	2,155.6	2,086.6	1,968.0	1,994.9	13.7	2.9	-1.5
Biological aspects	130.6	58.8	8.2	2.3	13.6	14.2	15.0	19.1	–	–	–
Social aspects	177.5	156.3	56.0	46.6	74.5	61.7	59.5	58.5	–	–	–
Other psychological sciences	140.5	407.5	1,562.5	1,842.8	2,067.4	2,010.8	1,893.5	1,917.2	–	–	–
Social sciences	630.0	678.7	1,050.4	1,097.1	1,197.3	1,124.5	1,435.1	1,136.3	5.2	1.3	-1.0
Anthropology	14.4	21.7	15.9	18.0	24.7	30.2	26.5	29.9	–	–	–
Economics	197.2	206.5	249.5	215.9	274.0	343.5	344.3	336.8	–	–	–
Political science	13.1	22.3	22.6	32.7	14.2	12.9	13.4	16.0	–	–	–

## CHAPTER 4 | Research and Development: U.S. Trends and International Comparisons

S&E field	1990	1995	2000	2005	2010	2012	2014	2015	Average annual growth rate		
									1990–2000	2000–10	2010–15
Sociology	116.2	47.8	90.6	70.2	132.3	154.7	157.7	128.2	–	–	–
Other social sciences	289.1	380.3	671.8	760.4	752.0	583.2	893.2	625.3	–	–	–
History	na	na	na	na	na	na	na	na	–	–	–
Linguistics	na	na	na	na	na	na	na	na	–	–	–
Other social sciences	na	na	na	na	na	na	na	na	–	–	–
Other sciences nec	663.7	901.8	1,160.2	2,088.9	2,763.2	2,546.3	2,217.9	3,298.8	5.7	9.1	3.6
Engineering	4,226.6	5,708.4	6,346.4	8,552.9	11,081.2	11,403.4	11,887.5	11,955.6	4.1	5.7	1.5
Aeronautical engineering	927.1	1,248.3	1,463.9	1,276.3	830.1	1,814.9	1,833.0	1,825.1	–	–	–
Astronautical engineering	580.8	546.5	515.0	494.1	389.9	690.2	668.7	660.6	–	–	–
Chemical engineering	241.9	246.1	196.5	283.8	509.7	349.6	535.4	374.6	–	–	–
Civil engineering	317.7	339.4	239.2	279.2	699.8	513.6	445.1	457.6	–	–	–
Electrical engineering	640.0	756.3	744.8	1,033.5	1,360.9	1,324.6	1,240.2	883.3	–	–	–
Mechanical engineering	268.3	412.5	289.3	323.7	363.6	372.2	502.7	309.6	–	–	–
Metallurgy and materials engineering	554.5	815.3	918.1	1,184.1	1,758.8	1,699.2	1,768.7	1,756.9	–	–	–
Other engineering	696.3	1,344.0	1,979.6	3,678.3	5,168.4	4,639.1	4,893.6	5,688.0	–	–	–
Constant 2009 \$millions									Percent		
Total, all fields	32,622.8	37,857.0	47,220.6	58,852.5	63,172.1	59,102.4	58,017.9	57,912.0	3.8	3.0	-1.7
Computer sciences and mathematics	1,268.5	2,102.4	2,707.3	3,267.3	3,382.0	3,365.6	3,581.3	3,514.7	7.9	2.3	0.8

## CHAPTER 4 | Research and Development: U.S. Trends and International Comparisons

S&E field	1990	1995	2000	2005	2010	2012	2014	2015	Average annual growth rate		
									1990–2000	2000–10	2010–15
Computer sciences	848.1	1,349.9	2,037.1	2,362.4	2,341.4	2,282.4	2,409.7	2,407.3	–	–	–
Mathematics	364.1	344.3	531.4	751.9	828.2	882.8	903.2	915.3	–	–	–
Other computer sciences and mathematics	56.2	408.2	138.8	153.0	212.5	200.5	268.4	192.2	–	–	–
Environmental sciences	3,280.2	3,800.3	4,085.9	3,835.9	3,309.8	3,706.0	4,026.4	4,016.1	2.2	-2.1	3.9
Atmospheric sciences	1,166.9	1,511.9	1,355.5	1,297.9	945.5	1,401.8	1,445.6	1,426.7	–	–	–
Geological sciences	997.5	1,129.4	784.6	737.6	525.8	692.4	517.4	585.4	–	–	–
Oceanography	784.7	542.3	826.1	844.9	737.2	776.2	782.1	660.6	–	–	–
Other environmental sciences	331.1	616.8	1,119.7	955.5	1,101.3	835.6	1,281.3	1,343.5	–	–	–
Life sciences	13,322.0	15,724.9	22,050.7	30,804.7	33,613.3	29,543.9	28,283.9	27,727.9	5.2	4.3	-3.8
Biological and agricultural	7,812.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	–	–	–
Agricultural sciences	1,043.2	892.4	1,098.6	1,198.3	1,122.0	899.4	926.1	1,201.4	–	–	–
Biological sciences (excluding environmental biology)	6,253.2	6,557.6	13,182.8	14,622.3	17,063.7	14,748.9	14,120.3	13,502.9	–	–	–
Environmental biology	516.5	1,074.3	908.3	765.5	809.3	760.1	756.8	745.3	–	–	–
Medical sciences	5,103.1	6,619.9	5,479.1	11,895.8	11,575.1	10,530.9	10,147.3	9,949.7	–	–	–
Clinical medical	na	na	na	na	na	na	na	na	–	–	–
Other medical	na	na	na	na	na	na	na	na	–	–	–
Other life sciences	406.0	580.9	1,382.0	2,322.7	3,043.2	2,604.6	2,333.3	2,328.7	–	–	–
Physical sciences	5,746.4	5,696.0	5,877.0	6,016.5	5,819.6	6,113.4	5,979.1	5,923.8	0.2	-0.1	0.4



## CHAPTER 4 | Research and Development: U.S. Trends and International Comparisons

S&E field	1990	1995	2000	2005	2010	2012	2014	2015	Average annual growth rate		
									1990–2000	2000–10	2010–15
Astronomy	901.0	1,017.8	1,080.5	969.1	555.0	1,048.9	1,099.0	1,119.4	–	–	–
Chemistry	1,149.2	1,149.6	1,504.4	1,311.5	1,299.2	1,052.4	934.0	880.5	–	–	–
Physics	3,402.1	3,263.5	2,952.5	3,330.7	3,439.8	3,538.1	3,288.0	2,766.3	–	–	–
Other physical sciences	294.1	265.2	339.6	405.2	525.6	473.9	658.1	1,157.6	–	–	–
Psychology	676.8	828.9	1,996.7	2,071.8	2,136.8	1,990.8	1,815.0	1,815.2	11.4	0.7	-3.2
Biological aspects	197.1	78.3	10.1	2.5	13.5	13.5	13.8	17.4	–	–	–
Social aspects	267.7	208.1	68.7	51.0	73.9	58.9	54.9	53.2	–	–	–
Other psychological sciences	212.0	542.5	1,917.9	2,018.2	2,049.4	1,918.5	1,746.3	1,744.5	–	–	–
Social sciences	950.5	903.6	1,289.3	1,201.5	1,186.9	1,072.9	1,323.5	1,033.9	3.1	-0.8	-2.7
Anthropology	21.7	28.9	19.5	19.7	24.5	28.8	24.4	27.2	–	–	–
Economics	297.5	274.9	306.2	236.4	271.6	327.7	317.5	306.5	–	–	–
Political science	19.8	29.7	27.7	35.8	14.1	12.3	12.4	14.6	–	–	–
Sociology	175.3	63.6	111.2	76.9	131.1	147.6	145.4	116.7	–	–	–
Other social sciences	436.2	506.3	824.6	832.8	745.4	556.4	823.8	569.0	–	–	–
History	na	na	na	na	na	na	na	na	–	–	–
Linguistics	na	na	na	na	na	na	na	na	–	–	–
Other social sciences	na	na	na	na	na	na	na	na	–	–	–
Other sciences nec	1,001.4	1,200.6	1,424.1	2,287.7	2,739.1	2,429.4	2,045.5	3,001.6	3.6	6.8	1.8

## CHAPTER 4 | Research and Development: U.S. Trends and International Comparisons

S&E field	1990	1995	2000	2005	2010	2012	2014	2015	Average annual growth rate		
									1990–2000	2000–10	2010–15
Engineering	6,376.9	7,600.1	7,789.9	9,366.9	10,984.5	10,880.1	10,963.3	10,878.6	2.0	3.5	-0.2
Aeronautical engineering	1,398.8	1,662.0	1,796.9	1,397.8	822.9	1,731.6	1,690.5	1,660.7	–	–	–
Astronautical engineering	876.3	727.6	632.1	541.1	386.5	658.5	616.7	601.1	–	–	–
Chemical engineering	364.9	327.7	241.2	310.8	505.3	333.6	493.8	340.9	–	–	–
Civil engineering	479.3	451.9	293.6	305.8	693.7	490.0	410.5	416.4	–	–	–
Electrical engineering	965.7	1,006.9	914.2	1,131.9	1,349.0	1,263.8	1,143.8	803.7	–	–	–
Mechanical engineering	404.8	549.2	355.1	354.5	360.4	355.1	463.6	281.7	–	–	–
Metallurgy and materials engineering	836.6	1,085.5	1,126.9	1,296.8	1,743.5	1,621.2	1,631.2	1,598.6	–	–	–
Other engineering	1,050.6	1,789.4	2,429.9	4,028.4	5,123.3	4,426.2	4,513.1	5,175.6	–	–	–
Share by field (%)									Percent		
Total, all fields	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	–	–	–
Computer sciences and mathematics	3.9	5.6	5.7	5.6	5.4	5.7	6.2	6.1	–	–	–
Computer sciences	2.6	3.6	4.3	4.0	3.7	3.9	4.2	4.2	–	–	–
Mathematics	1.1	0.9	1.1	1.3	1.3	1.5	1.6	1.6	–	–	–
Other computer sciences and mathematics	0.2	1.1	0.3	0.3	0.3	0.3	0.5	0.3	–	–	–
Environmental sciences	10.1	10.0	8.7	6.5	5.2	6.3	6.9	6.9	–	–	–
Atmospheric sciences	3.6	4.0	2.9	2.2	1.5	2.4	2.5	2.5	–	–	–
Geological sciences	3.1	3.0	1.7	1.3	0.8	1.2	0.9	1.0	–	–	–



## CHAPTER 4 | Research and Development: U.S. Trends and International Comparisons

S&E field	1990	1995	2000	2005	2010	2012	2014	2015	Average annual growth rate		
									1990–2000	2000–10	2010–15
Social aspects	0.8	0.5	0.1	0.1	0.1	0.1	0.1	0.1	–	–	–
Other psychological sciences	0.6	1.4	4.1	3.4	3.2	3.2	3.0	3.0	–	–	–
Social sciences	2.9	2.4	2.7	2.0	1.9	1.8	2.3	1.8	–	–	–
Anthropology	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	–	–	–
Economics	0.9	0.7	0.6	0.4	0.4	0.6	0.5	0.5	–	–	–
Political science	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	–	–	–
Sociology	0.5	0.2	0.2	0.1	0.2	0.2	0.3	0.2	–	–	–
Other social sciences	1.3	1.3	1.7	1.4	1.2	0.9	1.4	1.0	–	–	–
History	na	na	na	na	na	na	na	na	–	–	–
Linguistics	na	na	na	na	na	na	na	na	–	–	–
Other social sciences	na	na	na	na	na	na	na	na	–	–	–
Other sciences nec	3.1	3.2	3.0	3.9	4.3	4.1	3.5	5.2	–	–	–
Engineering	19.5	20.1	16.5	15.9	17.4	18.4	18.9	18.8	–	–	–
Aeronautical engineering	4.3	4.4	3.8	2.4	1.3	2.9	2.9	2.9	–	–	–
Astronautical engineering	2.7	1.9	1.3	0.9	0.6	1.1	1.1	1.0	–	–	–
Chemical engineering	1.1	0.9	0.5	0.5	0.8	0.6	0.9	0.6	–	–	–
Civil engineering	1.5	1.2	0.6	0.5	1.1	0.8	0.7	0.7	–	–	–
Electrical engineering	3.0	2.7	1.9	1.9	2.1	2.1	2.0	1.4	–	–	–

## CHAPTER 4 | Research and Development: U.S. Trends and International Comparisons

S&E field	1990	1995	2000	2005	2010	2012	2014	2015	Average annual growth rate		
									1990–2000	2000–10	2010–15
Mechanical engineering	1.2	1.5	0.8	0.6	0.6	0.6	0.8	0.5	–	–	–
Metallurgy and materials engineering	2.6	2.9	2.4	2.2	2.8	2.7	2.8	2.8	–	–	–
Other engineering	3.2	4.7	5.1	6.8	8.1	7.5	7.8	8.9	–	–	–

na = not applicable; data collected for this table were not recorded at that level in that particular fiscal year, or the agency or subagency did not exist as such or in that organization in that year.

nec = not elsewhere classified.

### Note(s)

Detail may not add to total because of rounding.

### Source(s)

National Science Foundation, National Center for Science and Engineering Statistics, Survey of Federal Funds for Research and Development.

*Science and Engineering Indicators 2018*

## CHAPTER 5

# Academic Research and Development

## List of Appendix Tables

Appendix Table 5-1	Total and federally financed higher education R&D expenditures, by type of R&D: FYs 1953–2016.....	5-4
Appendix Table 5-2	Sources of R&D funding for public and private academic institutions: Selected years, FYs 1990–2016.....	5-9
Appendix Table 5-3	Federally financed higher education R&D expenditures, by federal agency and field: FY 2016 .....	5-12
Appendix Table 5-4	Higher education R&D expenditures, by source of funds and field: FY 2016.....	5-16
Appendix Table 5-5	Higher education R&D expenditures, by field: FYs 2007–16.....	5-20
Appendix Table 5-6	Higher education R&D expenditures at top 100 R&D-performing institutions, ranked by FY 2015 R&D expenditures: FYs 2007–16 .....	5-24
Appendix Table 5-7	Expenditures for academic R&D passed through to and received by subrecipients: FYs 2012–16.....	5-32
Appendix Table 5-8	Research space at academic institutions, by S&E field: FYs 2007–15 .....	5-35
Appendix Table 5-9	Source of funds for new construction of S&E research space at academic institutions, by year of project start and type of institution: FYs 2002–15.....	5-38
Appendix Table 5-10	Costs for repair and renovation of research space at academic institutions, by S&E field and time of repair and renovation: FYs 2014–17 .....	5-41
Appendix Table 5-11	Source of funds for repair and renovation of S&E research space at academic institutions, by year of project start and type of institution: FYs 2002–15 .....	5-43
Appendix Table 5-12	Current fund expenditures for research equipment at academic institutions, by S&E field: FYs 2002–16 .....	5-46
Appendix Table 5-13	Federal share of current funding for research equipment at academic institutions, by S&E field: FYs 2002–16 .....	5-53
Appendix Table 5-14	S&E doctorate holders employed in academia, by type of position and degree field: 1973–2015.....	5-56
Appendix Table 5-15	S&E doctorate holders employed in academia, by type of position, sex, and degree field: 1973–2015 .....	5-61
Appendix Table 5-16	S&E doctorate holders employed in academia, by type of position, race, ethnicity, and degree field: 1973–2015 .....	5-70
Appendix Table 5-17	S&E doctorate holders employed in academia, by type of position, degree field, and citizenship: 2015 .....	5-78
Appendix Table 5-18	Age distribution of S&E doctorate holders in full-time faculty positions at research universities and other academic institutions: 1973–2015.....	5-81
Appendix Table 5-19	S&E doctorate holders employed in academia, by research priority, type of position, and degree field: 1973–2015 .....	5-84
Appendix Table 5-20	Early career S&E doctorate holders employed in academia, by Carnegie classification of institution, years since doctorate, and type of position: Selected years, 1997–2015 .....	5-89
Appendix Table 5-21	S&E doctorate holders employed in academia with federal support, by degree field, research activity, and type of position: 1973–2015 .....	5-92

Appendix Table 5-22	S&E doctorate holders and full-time faculty with federal support, by degree field and Carnegie classification of employer: 2015.....	5-95
Appendix Table 5-23	S&E doctorate holders with federal support, by Carnegie classification of institution, race, ethnicity, and sex: 2015.....	5-97
Appendix Table 5-24	Early career S&E doctorate holders employed in academia with federal support, by degree field, years since doctorate, and type of position: 1973–2015 .....	5-99
Appendix Table 5-25	Fields and subfields of S&E publications data.....	5-110
Appendix Table 5-26	Regions, countries, or economies in S&E publications data .....	5-118
Appendix Table 5-27	S&E articles in all fields combined, by region, country, or economy: 2003–16.....	5-122
Appendix Table 5-28	S&E articles in agricultural sciences, by region, country, or economy: 2003–16.....	5-136
Appendix Table 5-29	S&E articles in astronomy, by region, country, or economy: 2003–16 .....	5-149
Appendix Table 5-30	S&E articles in biological sciences, by region, country, or economy: 2003–16.....	5-162
Appendix Table 5-31	S&E articles in chemistry, by region, country, or economy: 2003–16.....	5-175
Appendix Table 5-32	S&E articles in computer sciences, by region, country, or economy: 2003–16.....	5-188
Appendix Table 5-33	S&E articles in engineering, by region, country, or economy: 2003–16 .....	5-201
Appendix Table 5-34	S&E articles in geosciences, by region, country, or economy: 2003–16 .....	5-214
Appendix Table 5-35	S&E articles in mathematics, by region, country, or economy: 2003–16 .....	5-227
Appendix Table 5-36	S&E articles in medical sciences, by region, country, or economy: 2003–16.....	5-240
Appendix Table 5-37	S&E articles in other life sciences, by region, country, or economy: 2003–16.....	5-253
Appendix Table 5-38	S&E articles in physics, by region, country, or economy: 2003–16 .....	5-266
Appendix Table 5-39	S&E articles in psychology, by region, country, or economy: 2003–16.....	5-279
Appendix Table 5-40	S&E articles in social sciences, by region, country, or economy: 2003–16.....	5-292
Appendix Table 5-41	U.S. S&E articles, by field and sector: 2003–16.....	5-305
Appendix Table 5-42	S&E articles in all fields combined, by coauthorship attribute and selected region, country, or economy: 2003–16 .....	5-315
Appendix Table 5-43	Indexes of internationally coauthored S&E publications, by selected region, country, or economy pairs: 2006 and 2016 .....	5-328
Appendix Table 5-44	Internationally coauthored S&E publications, by selected region, country, or economy pairs: 2003 and 2016 .....	5-336
Appendix Table 5-45	U.S. sector publications coauthored with other U.S. sectors and foreign institutions: 2006 and 2016.....	5-345
Appendix Table 5-46	U.S. S&E articles, by field and coauthorship attribute: 2003–16 .....	5-347
Appendix Table 5-47	Citations from international S&E publications, by region, country, or economy: 1996–2014 .....	5-351
Appendix Table 5-48	Share of S&E articles, by field, citation percentile, and country or economy of institutional author: 2004 and 2014 .....	5-363



Appendix Table 5-49	Average relative citations for the United States, by scientific field: 1996–2014 .....	5-370
Appendix Table 5-50	Average relative citations in the Scopus database, by region, country, or economy: 1996–2014 .....	5-372
Appendix Table 5-51	Share of S&E publications in the top 1% of most-cited articles in the Scopus database, by region, country, or economy: 1996–2014.....	5-385



## CHAPTER 5 | Academic Research and Development

APPENDIX TABLE 5-1

### Total and federally financed higher education R&D expenditures, by type of R&D: FYs 1953–2016

(Millions of dollars)

Fiscal year	Total higher education R&D expenditures					Federally financed higher education R&D expenditures				
	All R&D expenditures <sup>a</sup>	Basic research		Applied R&D		All federally financed R&D expenditures	Basic research		Applied R&D	
		Amount	Percent	Amount	Percent		Amount	Percent	Amount	Percent
Total S&E <sup>a</sup>										
1953	255	110	43.1	145	56.9	138	na	na	na	na
1954	290	136	46.9	154	53.1	160	na	na	na	na
1955	312	159	51.0	153	49.0	169	na	na	na	na
1956	372	200	53.8	172	46.2	213	na	na	na	na
1957	410	240	58.5	170	41.5	229	na	na	na	na
1958	456	281	61.6	175	38.4	254	na	na	na	na
1959	526	343	65.2	183	34.8	306	na	na	na	na
1960	646	433	67.0	213	33.0	405	na	na	na	na
1961	763	536	70.2	227	29.8	500	na	na	na	na
1962	904	659	72.9	245	27.1	613	na	na	na	na
1963	1,081	814	75.3	267	24.7	760	na	na	na	na
1964	1,275	1,003	78.7	272	21.3	917	na	na	na	na
1965	1,474	1,138	77.2	336	22.8	1,073	na	na	na	na

## CHAPTER 5 | Academic Research and Development

Fiscal year	Total higher education R&D expenditures					Federally financed higher education R&D expenditures				
	All R&D expenditures <sup>a</sup>	Basic research		Applied R&D		All federally financed R&D expenditures	Basic research		Applied R&D	
		Amount	Percent	Amount	Percent		Amount	Percent	Amount	Percent
1966	1,715	1,303	76.0	412	24.0	1,261	na	na	na	na
1967	1,921	1,457	75.8	464	24.2	1,409	na	na	na	na
1968	2,149	1,650	76.8	499	23.2	1,572	na	na	na	na
1969	2,225	1,711	76.9	514	23.1	1,600	na	na	na	na
1970	2,335	1,796	76.9	539	23.1	1,647	na	na	na	na
1971	2,500	1,914	76.6	586	23.4	1,724	na	na	na	na
1972	2,630	2,022	76.9	608	23.1	1,795	1,420	79.1	375	20.9
1973	2,884	2,053	71.2	831	28.8	1,985	1,454	73.2	531	26.8
1974	3,023	2,154	71.3	869	28.7	2,032	1,523	74.9	509	25.1
1975	3,409	2,410	70.7	999	29.3	2,288	1,695	74.1	593	25.9
1976	3,729	2,549	68.4	1,180	31.6	2,512	1,841	73.3	671	26.7
1977	4,067	2,800	68.8	1,267	31.2	2,726	2,007	73.6	720	26.4
1978 <sup>b</sup>	4,625	na	na	na	na	3,059	na	na	na	na
1979	5,366	3,619	67.4	1,747	32.6	3,598	2,577	71.6	1,022	28.4
1980	6,063	4,036	66.6	2,026	33.4	4,098	2,861	69.8	1,237	30.2
1981	6,847	4,594	67.1	2,253	32.9	4,571	3,260	71.3	1,311	28.7
1982	7,324	4,879	66.6	2,445	33.4	4,768	3,402	71.3	1,367	28.7

## CHAPTER 5 | Academic Research and Development

Fiscal year	Total higher education R&D expenditures					Federally financed higher education R&D expenditures				
	All R&D expenditures <sup>a</sup>	Basic research		Applied R&D		All federally financed R&D expenditures	Basic research		Applied R&D	
		Amount	Percent	Amount	Percent		Amount	Percent	Amount	Percent
1983	7,882	5,303	67.3	2,579	32.7	4,989	3,547	71.1	1,442	28.9
1984	8,620	5,733	66.5	2,887	33.5	5,431	3,830	70.5	1,601	29.5
1985	9,687	6,556	67.7	3,131	32.3	6,064	4,343	71.6	1,722	28.4
1986	10,928	7,492	68.6	3,435	31.4	6,712	4,868	72.5	1,844	27.5
1987	12,153	8,393	69.1	3,760	30.9	7,343	5,375	73.2	1,968	26.8
1988	13,463	8,894	66.1	4,569	33.9	8,193	5,678	69.3	2,515	30.7
1989	14,979	9,793	65.4	5,186	34.6	8,993	6,195	68.9	2,797	31.1
1990	16,290	10,645	65.3	5,645	34.7	9,640	6,649	69.0	2,991	31.0
1991	17,589	11,607	66.0	5,982	34.0	10,238	7,128	69.6	3,110	30.4
1992	18,821	12,516	66.5	6,305	33.5	11,095	7,718	69.6	3,377	30.4
1993	19,954	13,303	66.7	6,651	33.3	11,960	8,398	70.2	3,562	29.8
1994	21,035	13,989	66.5	7,046	33.5	12,654	8,878	70.2	3,775	29.8
1995	22,179	14,812	66.8	7,367	33.2	13,337	9,399	70.5	3,938	29.5
1996	23,055	15,481	67.1	7,574	32.9	13,847	9,868	71.3	3,978	28.7
1997	24,380	16,602	68.1	7,778	31.9	14,321	10,316	72.0	4,006	28.0
1998	25,867	19,058	73.7	6,810	26.3	15,159	11,862	78.2	3,298	21.8
1999	27,544	20,450	74.2	7,094	25.8	16,112	12,746	79.1	3,365	20.9

## CHAPTER 5 | Academic Research and Development

Fiscal year	Total higher education R&D expenditures					Federally financed higher education R&D expenditures				
	All R&D expenditures <sup>a</sup>	Basic research		Applied R&D		All federally financed R&D expenditures	Basic research		Applied R&D	
		Amount	Percent	Amount	Percent		Amount	Percent	Amount	Percent
2000	30,084	22,547	74.9	7,537	25.1	17,548	13,936	79.4	3,611	20.6
2001	32,801	24,392	74.4	8,409	25.6	19,227	15,038	78.2	4,188	21.8
2002	36,383	27,363	75.2	9,019	24.8	21,856	17,262	79.0	4,593	21.0
2003	40,077	30,105	75.1	9,973	24.9	24,753	19,627	79.3	5,126	20.7
2004	43,238	31,957	73.9	11,281	26.1	27,627	21,353	77.3	6,274	22.7
2005	45,774	34,353	75.0	11,421	25.0	29,187	22,885	78.4	6,302	21.6
2006	47,759	36,082	75.5	11,677	24.5	30,132	23,697	78.6	6,434	21.4
2007	49,495	37,726	76.2	11,769	23.8	30,430	24,001	78.9	6,429	21.1
2008	51,872	39,322	75.8	12,550	24.2	31,272	24,430	78.1	6,842	21.9
2009	54,863	40,913	74.6	13,950	25.4	32,576	25,025	76.8	7,551	23.2
Total S&E and non-S&E <sup>a</sup>										
2010	61,287	40,416	65.9	20,870	34.1	37,478	25,400	67.8	12,078	32.2
2011	65,274	42,809	65.6	22,465	34.4	40,768	27,331	67.0	13,437	33.0
2012	65,729	42,402	64.5	23,327	35.5	40,142	26,469	65.9	13,673	34.1
2013	67,013	43,305	64.6	23,708	35.4	39,446	26,072	66.1	13,374	33.9
2014	67,197	42,989	64.0	24,207	36.0	37,960	24,905	65.6	13,055	34.4
2015	68,567	43,866	64.0	24,701	36.0	37,849	24,945	65.9	12,903	34.1

## CHAPTER 5 | Academic Research and Development

Fiscal year	Total higher education R&D expenditures					Federally financed higher education R&D expenditures				
	All R&D expenditures <sup>a</sup>	Basic research		Applied R&D		All federally financed R&D expenditures	Basic research		Applied R&D	
		Amount	Percent	Amount	Percent		Amount	Percent	Amount	Percent
2016	71,833	45,102	62.8	26,732	37.2	38,794	24,945	64.3	13,849	35.7

na = not applicable; separate data for federally financed basic research, applied research, and development were not collected for these years.

<sup>a</sup> Totals for FYs 1953–2009 represent R&D expenditures in S&E fields only. Beginning in FY 2010, totals and type of R&D data include R&D expenditures in S&E fields and non-S&E fields.

<sup>b</sup> FY 1978 data are estimated based on data collected from doctorate-granting institutions only.

### Note(s)

The type of R&D estimation procedure was revised for FY 1998 and later years; hence, these data are not directly comparable with data for FY 1997 and earlier years. Before FY 2010, R&D expenditures by type of R&D were based on percentage estimates of basic research provided by universities and colleges. Beginning in FY 2010, institutions were asked for dollar amounts of federally funded and nonfederally funded R&D expenditures for basic research, applied research, and development. Detail may not add to total because of rounding.

### Source(s)

National Science Foundation, National Center for Science and Engineering Statistics, Higher Education Research and Development Survey (HERD). See Figure 5-2.

*Science and Engineering Indicators 2018*

## CHAPTER 5 | Academic Research and Development

APPENDIX TABLE 5-2

### Sources of R&D funding for public and private academic institutions: Selected years, FYs 1990–2016

(Millions of dollars and percent distribution)

Fiscal year and source of funds	All institutions		Public institutions		Private institutions	
	Amount (current \$millions)	Percent distribution	Amount (current \$millions)	Percent distribution	Amount (current \$millions)	Percent distribution
1990						
All sources	16,290	100.0	10,764	100.0	5,525	100.0
Federal government	9,640	59.2	5,626	52.3	4,014	72.7
State and local government	1,324	8.1	1,191	11.1	133	2.4
Business	1,127	6.9	733	6.8	394	7.1
Academic institutions <sup>a</sup>	3,006	18.5	2,508	23.3	498	9.0
Other	1,191	7.3	706	6.6	485	8.8
2000						
All sources	30,084	100.0	20,521	100.0	9,564	100.0
Federal government	17,548	58.3	10,660	51.9	6,888	72.0
State and local government	2,200	7.3	2,005	9.8	195	2.0
Business	2,156	7.2	1,440	7.0	716	7.5
Academic institutions <sup>a</sup>	5,925	19.7	4,989	24.3	936	9.8

## CHAPTER 5 | Academic Research and Development

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## CHAPTER 5 | Academic Research and Development

Fiscal year and source of funds	All institutions		Public institutions		Private institutions	
	Amount (current \$millions)	Percent distribution	Amount (current \$millions)	Percent distribution	Amount (current \$millions)	Percent distribution
All sources	71,833	100.0	47,148	100.0	24,685	100.0
Federal government	38,794	54.0	23,948	50.8	14,846	60.1
State and local government	4,025	5.6	3,691	7.8	334	1.4
Business	4,211	5.9	2,568	5.4	1,643	6.7
Academic institutions <sup>a</sup>	17,975	25.0	12,728	27.0	5,247	21.3
Other	6,829	9.5	4,214	8.9	2,615	10.6

<sup>a</sup> Academic institutions' funds exclude research funds spent from multipurpose accounts.

### Note(s)

Detail for each funding source may not add to total of all sources because of rounding. Other includes nonprofit organizations and other organizations. Totals for FYs 1990 and 2000 represent R&D expenditures in S&E fields only. Beginning in FY 2010, totals include R&D expenditures in S&E fields and non-S&E fields.

### Source(s)

National Science Foundation, National Center for Science and Engineering Statistics, Higher Education Research and Development Survey (HERD).

*Science and Engineering Indicators 2018*



## CHAPTER 5 | Academic Research and Development

APPENDIX TABLE 5-3

### Federally financed higher education R&D expenditures, by federal agency and field: FY 2016

(Thousands of dollars)

Field <sup>a</sup>	All federally financed R&D expenditures	DOD	DOE	HHS	NASA	NSF	USDA	Other <sup>b</sup>
All fields	38,793,542	5,312,956	1,770,809	20,658,827	1,491,911	5,114,206	1,208,710	3,236,123
Science	31,090,354	2,648,073	1,066,021	19,782,880	970,094	3,581,173	1,101,099	1,941,014
Computer and information sciences	1,442,771	604,318	58,150	80,198	16,327	590,084	3,496	90,198
Geosciences, atmospheric sciences, and ocean sciences	1,992,990	189,304	106,224	63,175	353,570	706,103	31,340	543,274
Atmospheric science and meteorology	513,275	37,474	26,824	1,781	136,884	92,425	3,799	214,088
Geological and earth sciences	605,706	25,904	58,235	9,169	163,906	257,077	12,633	78,782
Ocean sciences and marine sciences	665,121	106,674	6,439	9,310	36,833	292,679	1,611	211,575
Geosciences, atmospheric sciences, and ocean sciences nec	208,888	19,252	14,726	42,915	15,947	63,922	13,297	38,829
Life sciences	21,798,334	955,046	160,808	18,141,167	92,066	728,589	986,257	734,401
Agricultural sciences	976,912	13,606	28,449	65,943	9,080	85,002	624,919	149,913
Biological and biomedical sciences	7,707,943	264,868	82,039	6,428,829	38,942	512,275	186,304	194,686
Health sciences	12,098,295	594,786	16,200	11,061,478	37,114	60,005	66,019	262,693
Natural resources and conservation	315,559	53,708	18,622	6,445	5,688	45,846	96,670	88,580
Life sciences nec	699,625	28,078	15,498	578,472	1,242	25,461	12,345	38,529

## CHAPTER 5 | Academic Research and Development

Field <sup>a</sup>	All federally financed R&D expenditures	DOD	DOE	HHS	NASA	NSF	USDA	Other <sup>b</sup>
Mathematics and statistics	444,419	120,513	11,666	46,674	3,146	229,704	4,891	27,825
Physical sciences	3,286,816	525,167	701,257	518,848	468,651	979,998	6,159	86,736
Astronomy and astrophysics	418,147	9,933	9,686	620	294,358	94,380	32	9,138
Chemistry	1,097,719	150,657	130,043	447,291	13,096	331,876	3,653	21,103
Materials science	111,802	37,517	25,335	7,139	3,192	30,886	290	7,443
Physics	1,523,751	302,844	510,994	56,065	140,224	472,743	1,929	38,952
Physical sciences nec	135,397	24,216	25,199	7,733	17,781	50,113	255	10,100
Psychology	761,433	69,940	417	500,097	21,854	71,102	6,785	91,238
Social sciences	898,576	76,852	10,389	323,353	7,981	145,351	50,032	284,618
Anthropology	39,440	4,506	107	8,219	716	17,382	1,786	6,724
Economics	112,338	5,245	3,479	42,180	133	19,342	19,090	22,869
Political science and government	103,681	14,676	2,523	22,353	382	24,105	3,485	36,157
Sociology, demography, and population studies	269,371	20,424	1,431	118,689	328	33,936	11,516	83,047
Social sciences nec	373,746	32,001	2,849	131,912	6,422	50,586	14,155	135,821
Sciences nec	465,015	106,933	17,110	109,368	6,499	130,242	12,139	82,724
Engineering	6,583,476	2,607,806	697,799	656,987	512,511	1,270,147	66,402	771,824
Aerospace, aeronautical and astronautical	623,571	378,104	19,222	2,196	143,403	24,306	441	55,899
Bioengineering and biomedical	650,752	124,857	34,047	379,920	5,026	74,757	16,326	15,819

## CHAPTER 5 | Academic Research and Development

Field <sup>a</sup>	All federally financed R&D expenditures	DOD	DOE	HHS	NASA	NSF	USDA	Other <sup>b</sup>
Chemical	467,678	92,231	117,223	74,069	7,536	146,370	7,640	22,609
Civil	591,637	51,065	54,350	21,447	15,132	123,543	8,844	317,256
Electrical, electronic, and communications	1,742,632	938,617	102,036	58,233	120,942	411,522	1,163	110,119
Industrial and manufacturing	148,464	77,883	10,294	7,973	4,295	29,799	902	17,318
Mechanical	860,745	369,481	118,755	46,507	66,281	187,044	2,267	70,410
Metallurgical and materials	442,893	170,380	93,971	20,192	12,318	103,752	2,342	39,938
Engineering nec	1,055,104	405,188	147,901	46,450	137,578	169,054	26,477	122,456
Non-S&E fields <sup>a</sup>	1,119,712	57,077	6,989	218,960	9,306	262,886	41,209	523,285
Business management and business administration	71,124	13,556	2,243	2,799	963	18,236	1,285	32,042
Communications and communications technologies	36,732	2,669	42	16,052	190	7,548	1,779	8,452
Education	630,205	9,908	2,178	62,493	6,723	185,764	2,395	360,744
Humanities	54,957	6,489	599	9,079	357	14,745	184	23,504
Law	28,244	2,144	128	5,641	4	1,840	286	18,201
Social work	93,616	3,899	0	79,871	229	910	1,058	7,649
Visual and performing arts	10,342	240	370	2,738	61	2,132	211	4,590
Non-S&E nec	194,492	18,172	1,429	40,287	779	31,711	34,011	68,103

nec = not elsewhere classified.

## CHAPTER 5 | Academic Research and Development

DOD = Department of Defense; DOE = Department of Energy; HHS = Department of Health and Human Services; NASA = National Aeronautics and Space Administration; NSF = National Science Foundation; USDA = Department of Agriculture.

<sup>a</sup> As part of the reclassification of disciplines, some R&D field names have changed.

<sup>b</sup> Includes all other agencies reported.

### Source(s)

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National Science Foundation, National Center for Science and Engineering Statistics, Higher Education Research and Development Survey (HERD), FY 2016.

*Science and Engineering Indicators 2018*

## CHAPTER 5 | Academic Research and Development

APPENDIX TABLE 5-4

### Higher education R&D expenditures, by source of funds and field: FY 2016

(Thousands of dollars)

Field <sup>a</sup>	All R&D expenditures	Federal government	State and local government	Institutions <sup>b</sup>	Business	Nonprofit organizations	All other sources
All fields	71,833,308	38,793,542	4,025,280	17,974,962	4,210,563	4,614,800	2,214,161
Science	56,290,662	31,090,354	3,023,028	13,541,084	3,031,096	3,868,151	1,736,949
Computer and information sciences	2,077,884	1,442,771	49,502	399,965	90,288	59,588	35,770
Geosciences, atmospheric sciences, and ocean sciences	3,087,774	1,992,990	157,693	614,647	109,478	127,763	85,203
Atmospheric science and meteorology	626,518	513,275	18,416	68,923	6,319	7,660	11,925
Geological and earth sciences	999,351	605,706	47,334	226,541	51,237	32,557	35,976
Ocean sciences and marine sciences	1,097,864	665,121	59,874	241,440	32,896	69,841	28,692
Geosciences, atmospheric sciences, and ocean sciences nec	364,041	208,888	32,069	77,743	19,026	17,705	8,610
Life sciences	40,887,850	21,798,334	2,437,745	9,700,749	2,569,302	3,038,475	1,343,245
Agricultural sciences	3,293,092	976,912	873,403	1,031,049	166,341	134,067	111,320
Biological and biomedical sciences	13,048,981	7,707,943	554,094	2,983,417	552,727	958,620	292,180
Health sciences	22,393,716	12,098,295	813,806	5,025,036	1,802,695	1,832,951	820,933
Natural resources and conservation	689,725	315,559	115,681	193,967	14,949	30,632	18,937
Life sciences nec	1,462,336	699,625	80,761	467,280	32,590	82,205	99,875

## CHAPTER 5 | Academic Research and Development

Field <sup>a</sup>	All R&D expenditures	Federal government	State and local government	Institutions <sup>b</sup>	Business	Nonprofit organizations	All other sources
Mathematics and statistics	681,661	444,419	25,714	170,414	8,844	23,601	8,669
Physical sciences	4,893,565	3,286,816	93,518	1,044,829	139,153	200,852	128,397
Astronomy and astrophysics	622,008	418,147	1,839	122,375	4,578	34,443	40,626
Chemistry	1,775,071	1,097,719	48,331	421,143	82,673	82,956	42,249
Materials science	172,086	111,802	4,579	38,435	9,518	5,465	2,287
Physics	2,124,098	1,523,751	33,703	417,189	37,851	71,221	40,383
Physical sciences nec	200,302	135,397	5,066	45,687	4,533	6,767	2,852
Psychology	1,218,721	761,433	49,603	291,319	13,084	84,105	19,177
Social sciences	2,366,571	898,576	145,563	908,025	50,569	282,278	81,560
Anthropology	96,505	39,440	2,501	42,190	1,982	7,860	2,532
Economics	396,393	112,338	37,543	166,032	8,910	54,860	16,710
Political science and government	385,245	103,681	15,042	177,119	3,991	61,439	23,973
Sociology, demography, and population studies	504,594	269,371	27,602	135,118	8,213	52,471	11,819
Social sciences nec	983,834	373,746	62,875	387,566	27,473	105,648	26,526
Sciences nec	1,076,636	465,015	63,690	411,136	50,378	51,489	34,928
Engineering	11,381,727	6,583,476	699,032	2,335,527	1,055,444	359,441	348,807
Aerospace, aeronautical and astronautical	883,260	623,571	24,846	115,771	80,432	31,049	7,591
Bioengineering and biomedical	1,084,355	650,752	56,057	254,840	46,976	53,428	22,302

## CHAPTER 5 | Academic Research and Development

Field <sup>a</sup>	All R&D expenditures	Federal government	State and local government	Institutions <sup>b</sup>	Business	Nonprofit organizations	All other sources
Chemical	885,273	467,678	40,386	199,334	121,432	34,328	22,115
Civil	1,331,155	591,637	221,119	348,873	84,724	46,354	38,448
Electrical, electronic, and communications	2,517,147	1,742,632	51,270	416,262	167,403	55,818	83,762
Industrial and manufacturing	239,078	148,464	10,846	56,714	16,372	3,652	3,030
Mechanical	1,435,828	860,745	55,454	279,079	169,124	33,587	37,839
Metallurgical and materials	771,683	442,893	29,270	181,287	74,702	19,512	24,019
Engineering nec	2,233,948	1,055,104	209,784	483,367	294,279	81,713	109,701
Non-S&E fields <sup>a</sup>	4,160,919	1,119,712	303,220	2,098,351	124,023	387,208	128,405
Business management and business administration	649,856	71,124	24,306	424,700	51,615	44,262	33,849
Communications and communications technologies	168,861	36,732	6,316	96,493	3,544	21,318	4,458
Education	1,352,650	630,205	100,636	419,442	26,792	147,875	27,700
Humanities	435,079	54,957	11,134	294,087	3,621	52,003	19,277
Law	190,443	28,244	10,073	109,778	8,527	26,686	7,135
Social work	208,969	93,616	28,544	59,096	2,874	19,086	5,753
Visual and performing arts	142,445	10,342	16,367	99,765	2,016	8,892	5,063
Non-S&E nec	1,012,616	194,492	105,844	594,990	25,034	67,086	25,170

## CHAPTER 5 | Academic Research and Development

nec = not elsewhere classified.

<sup>a</sup> As part of the reclassification of disciplines, some R&D field names have changed.

<sup>b</sup> Academic institutions' funds exclude research funds spent from multipurpose accounts.

### Source(s)

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National Science Foundation, National Center for Science and Engineering Statistics, Higher Education Research and Development Survey (HERD), FY 2016.

*Science and Engineering Indicators 2018*



## CHAPTER 5 | Academic Research and Development

APPENDIX TABLE 5-5

### Higher education R&D expenditures, by field: FYs 2007–16

(Thousands of dollars)

Field <sup>a</sup>	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
All fields	51,590,017	54,113,750	57,288,415	61,286,610	65,274,393	65,729,007	67,013,138	67,196,537	68,566,890	71,833,308
Science	41,977,651	43,914,300	46,214,473	49,061,924	51,955,472	51,914,454	52,621,027	52,787,322	53,873,278	56,290,662
Computer and information sciences	1,430,660	1,471,454	1,600,447	1,638,047	1,742,486	1,822,319	2,068,518	1,928,474	1,962,827	2,077,884
Geosciences, atmospheric sciences, and ocean sciences	2,681,473	2,798,750	2,923,404	2,991,760	3,153,182	3,172,918	3,195,420	3,227,956	3,247,416	3,087,774
Atmospheric science and meteorology	446,184	423,055	416,826	429,354	481,275	476,729	493,460	501,639	573,932	626,518
Geological and earth sciences	910,886	950,631	1,019,429	1,083,993	1,142,644	1,168,945	1,163,783	1,159,333	1,113,619	999,351
Ocean sciences and marine sciences	992,484	1,051,136	1,077,634	1,021,856	1,049,629	1,025,396	1,051,383	1,071,419	1,050,173	1,097,864
Geosciences, atmospheric sciences, and ocean sciences nec	331,919	373,928	409,515	456,557	479,634	501,848	486,794	495,565	509,692	364,041
Life sciences	29,805,328	31,192,916	32,778,944	34,984,282	37,337,522	37,200,135	37,565,751	37,955,182	38,787,071	40,887,850
Agricultural sciences	2,913,260	2,995,518	3,055,512	3,011,149	3,116,840	3,300,098	3,352,448	3,390,039	3,480,029	3,293,092
Biological and biomedical sciences	9,207,593	9,760,099	10,146,059	10,946,424	11,855,468	11,611,632	11,681,425	11,704,653	11,702,462	13,048,981
Health sciences	16,553,616	17,254,161	18,229,453	19,268,159	20,398,377	20,330,413	20,454,602	20,710,804	21,304,898	22,393,716
Natural resources and conservation	na	na	na	na	na	na	na	na	na	689,725
Life sciences nec	1,130,859	1,183,138	1,347,920	1,758,550	1,966,837	1,957,992	2,077,276	2,149,686	2,299,682	1,462,336
Mathematics and statistics	573,070	619,854	546,915	592,184	640,460	674,445	670,802	657,927	641,083	681,661

## CHAPTER 5 | Academic Research and Development

Field <sup>a</sup>	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Physical sciences	3,863,269	3,931,833	4,282,795	4,621,772	4,768,816	4,709,977	4,646,742	4,616,378	4,659,279	4,893,565
Astronomy and astrophysics	467,604	539,112	578,406	573,229	583,847	706,544	558,781	567,101	626,652	622,008
Chemistry	1,460,415	1,486,721	1,582,562	1,748,465	1,783,604	1,748,885	1,703,899	1,724,061	1,757,423	1,775,071
Materials science	na	na	na	na	na	na	na	na	na	172,086
Physics	1,615,766	1,606,997	1,869,890	1,998,732	2,108,340	1,985,825	2,097,064	2,056,349	2,047,761	2,124,098
Physical sciences nec	319,484	299,003	251,937	301,346	293,025	268,723	286,998	268,867	227,443	200,302
Psychology	872,547	925,069	972,319	1,077,685	1,159,199	1,179,289	1,128,267	1,141,662	1,181,909	1,218,721
Social sciences	1,803,115	1,949,741	2,080,953	1,999,971	2,063,036	2,053,640	2,173,147	2,215,693	2,317,108	2,366,571
Anthropology	na	na	na	na	na	na	na	na	na	96,505
Economics	349,313	398,730	379,720	352,905	387,050	383,405	408,163	428,544	456,561	396,393
Political science and government	348,310	339,294	368,887	374,913	370,704	390,058	427,523	426,781	459,416	385,245
Sociology, demography, and population studies	397,748	403,226	408,444	419,918	433,498	461,011	482,293	505,026	524,763	504,594
Social sciences nec	707,744	808,491	923,902	852,235	871,784	819,166	855,168	855,342	876,368	983,834
Sciences nec	948,189	1,024,683	1,028,696	1,156,223	1,090,771	1,101,731	1,172,380	1,044,050	1,076,585	1,076,636
Engineering	7,517,262	7,957,504	8,648,525	9,325,722	10,032,590	10,284,111	10,733,918	10,976,774	11,072,232	11,381,727
Aerospace, aeronautical and astronautical	471,097	537,251	613,828	635,234	667,757	662,444	689,553	662,456	734,104	883,260
Bioengineering and biomedical	539,137	601,908	648,099	745,277	817,389	871,917	884,421	951,157	1,003,766	1,084,355
Chemical	598,944	655,603	695,842	821,163	913,905	903,613	910,413	907,697	915,204	885,273

## CHAPTER 5 | Academic Research and Development

Field <sup>a</sup>	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Civil	862,260	924,620	980,451	1,106,759	1,208,592	1,232,944	1,296,972	1,256,881	1,287,446	1,331,155
Electrical, electronic, and communications	1,636,983	1,704,953	1,844,482	2,050,292	2,206,894	2,311,665	2,408,824	2,479,789	2,492,317	2,517,147
Industrial and manufacturing	na	na	na	na	na	na	na	na	na	239,078
Mechanical	1,126,726	1,162,428	1,243,910	1,458,382	1,556,892	1,550,151	1,647,643	1,504,293	1,514,753	1,435,828
Metallurgical and materials	632,941	646,523	688,225	703,332	738,892	757,967	812,240	1,203,073	1,102,027	771,683
Engineering nec	1,649,174	1,724,218	1,933,688	1,805,283	1,922,269	1,993,410	2,083,852	2,011,428	2,022,615	2,233,948
Non-S&E fields <sup>b</sup>	2,095,104	2,241,946	2,425,417	2,898,964	3,286,331	3,530,442	3,658,193	3,432,441	3,621,380	4,160,919
Business management and business administration	276,280	329,931	343,916	370,005	400,371	443,084	476,106	482,937	569,811	649,856
Communications and communications technologies	90,832	89,203	107,484	130,393	153,741	159,929	148,901	166,910	168,525	168,861
Education	905,247	868,830	915,976	993,574	1,120,759	1,233,956	1,221,460	1,244,254	1,291,062	1,352,650
Humanities	241,683	246,713	255,289	260,338	313,022	339,633	386,753	402,244	430,210	435,079
Law	74,809	90,907	107,966	98,105	124,776	131,529	173,479	149,254	174,734	190,443
Social work	93,540	123,984	138,283	177,329	194,665	199,308	212,331	226,094	214,381	208,969
Visual and performing arts	46,155	59,285	72,867	68,709	77,353	84,612	87,768	95,822	100,656	142,445
Non-S&E nec	366,448	432,965	483,636	800,511	901,644	938,391	951,395	664,926	672,001	1,012,616

na = not applicable; separate data for natural resources and conservation, materials science, anthropology, and industrial and manufacturing engineering were not collected prior to FY 2016.

nec = not elsewhere classified.

## CHAPTER 5 | Academic Research and Development

<sup>a</sup> As part of the reclassification of disciplines, some R&D field names have changed.

<sup>b</sup> Before FY 2010, some institution totals for all fields of R&D expenditures may be lower-bound estimates because the National Science Foundation (NSF) did not attempt to estimate for nonresponse on non-S&E R&D expenditures before FY 2010.

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**Note(s)**

R&D expenditure amounts in various fields may show increases or decreases from amounts reported in FY 2015 because of the reclassification of disciplines.

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**Source(s)**

National Science Foundation, National Center for Science and Engineering Statistics, Higher Education Research and Development Survey (HERD).

*Science and Engineering Indicators 2018*

## CHAPTER 5 | Academic Research and Development

APPENDIX TABLE 5-6

### Higher education R&D expenditures at top 100 R&D-performing institutions, ranked by FY 2015 R&D expenditures: FYs 2007–16

(Thousands of dollars)

Rank	Institution	Institutional control	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
	All institutions		51,590,017	54,113,750	57,288,415	61,286,610	65,274,393	65,729,007	67,013,138	67,196,537	68,566,890	71,833,308
1	Johns Hopkins U. <sup>a</sup>	Private	1,566,392	1,691,469	1,866,243	2,004,482	2,145,308	2,106,185	2,168,568	2,242,478	2,305,679	2,431,180
2	U. Michigan, Ann Arbor	Public	NA	NA	NA	1184445	1,279,123	1,322,711	1,375,117	1,349,262	1,369,278	1,436,448
3	U. Pennsylvania	Private	668105	740410	758159	836322	886,036	847,077	828,422	828,350	864,068	1,296,429
4	U. California, San Francisco	Public	842,840	885,182	947,697	935,509	995,226	1,032,673	1,042,841	1,084,031	1,126,620	1,294,261
5	U. Washington, Seattle	Public	NA	NA	NA	1,022,740	1,148,533	1,109,008	1,192,513	1,176,340	1,180,563	1,277,679
6	U. Wisconsin-Madison	Public	912,219	944,626	1,013,649	1,029,295	1,111,642	1,169,779	1,123,501	1,108,564	1,069,077	1,157,680
7	U. California, San Diego	Public	801,823	844,877	883,653	943,219	1,009,378	1,073,864	1,075,554	1,067,388	1,101,466	1,087,117
8	Harvard U.	Private	493,920	505,832	525,452	583,361	649,774	799,432	1,012,766	933,975	1,013,753	1,077,253
9	Stanford U.	Private	702,497	698,883	717,022	839,839	907,971	903,238	945,450	959,247	1,022,551	1,066,269
10	Duke U.	Private	783,784	769,893	807,652	983,289	1,022,207	1,009,911	992,821	1,036,813	1,036,698	1,055,778
11	U. North Carolina, Chapel Hill	Public	484,160	530,515	651,308	755,284	869,174	884,791	973,007	989,766	966,781	1,045,338
12	U. California, Los Angeles	Public	854,497	904,840	923,916	936,995	982,357	1,003,375	966,659	948,197	1,021,227	1,037,528
13	Cornell U.	Private	645,791	655,641	672,692	749,721	781,651	802,387	845,184	883,292	954,412	974,199

## CHAPTER 5 | Academic Research and Development

Rank	Institution	Institutional control	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
14	Massachusetts Institute of Technology	Private	637621	682058	759649	677138	723,610	824,130	900,524	908,017	930,719	946,159
15	U. Minnesota, Twin Cities	Public	NA	NA	NA	786,074	847,419	826,173	858,378	876,870	880,618	910,181
16	Texas A&M U., College Station and Health Science Center	Public	565,631	604,526	651,923	689,624	705,720	693,421	820,015	854,214	866,678	892,718
17	U. Pittsburgh, Pittsburgh	Public	564,994	599,800	629,088	822,491	899,386	866,638	872,736	856,806	861,205	889,793
18	Yale U.	Private	451,318	490,913	512,997	623,510	656,967	656,555	788,784	772,840	803,004	881,765
19	U. Texas M. D. Anderson Cancer Center	Public	496,539	558,503	578,788	599,529	663,279	685,814	718,096	794,980	833,406	852,095
20	Columbia U. in the City of New York	Private	545,996	548,704	604,660	807,235	878,900	889,487	889,188	890,642	868,159	837,312
21	Pennsylvania State U., University Park and Hershey Medical Center	Public	NA	NA	NA	770,449	794,846	797,679	837,880	800,773	791,031	825,561
22	Ohio State U.	Public	737324	726302	743591	755194	832,126	766,513	793,373	815,075	817,881	818,464
23	New York U.	Private	319,728	337,093	338,839	365,944	430,752	458,645	471,909	523,623	602,041	809,739
24	U. Florida	Public	635,956	632,680	644,241	681,548	739,931	696,985	695,063	708,526	739,522	791,294
25	Georgia Institute of Technology	Public	476,138	524,888	565,487	615,833	655,375	688,905	730,488	725,550	765,370	790,706
26	U. California, Berkeley	Public	570,252	620,374	682,568	694,049	707,945	730,348	727,002	744,343	788,505	774,255

## CHAPTER 5 | Academic Research and Development

Rank	Institution	Institutional control	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
27	U. California, Davis	Public	604,512	647,691	687,690	679,915	707,896	713,292	725,734	711,721	721,077	741,892
28	Washington U., Saint Louis	Private	575,846	566,378	630,141	695,974	725,039	706,410	684,847	664,752	694,069	741,115
29	Northwestern U.	Private	473,060	518,572	555,510	575,078	618,980	631,078	639,781	645,333	656,167	713,491
30	U. Southern California	Private	528,466	540,366	556,807	592,791	603,294	623,544	645,636	687,222	691,031	702,866
31	Vanderbilt U.	Private	415,750	444,873	455,835	504,959	566,031	560,466	571,603	683,890	647,816	640,842
32	Rutgers, State U. New Jersey, New Brunswick	Public	NA	NA	NA	428,432	432,306	434,901	493,320	644,116	628,613	630,212
33	U. Illinois, Urbana-Champaign	Public	492,347	518,333	581,805	515,133	545,669	583,754	743,487	621,733	639,817	625,180
34	U. Texas, Austin	Public	502,786	553,051	566,166	589,502	632,171	621,538	634,132	585,251	604,376	621,692
35	Emory U.	Private	412,503	463,317	459,067	529,453	547,316	565,766	575,943	558,600	585,210	614,527
36	Michigan State U.	Public	395,611	392,242	405,961	431,373	454,248	507,061	515,707	526,906	558,248	613,369
37	Purdue U., West Lafayette	Public	NA	NA	NA	548,980	578,231	602,501	595,739	564,923	558,611	606,302
38	U. Arizona	Public	533,450	547,197	566,334	586,647	610,565	625,365	629,466	588,088	606,219	604,464
39	Baylor C. of Medicine	Private	438,280	449,301	449,031	447,874	466,061	474,700	508,799	496,314	520,220	572,527
40	Icahn School of Medicine at Mt. Sinai	Private	269,451	296,380	318,407	370,666	405,527	400,680	428,654	463,429	508,353	540,296
41	U. Maryland, College Park	Public	371,696	405,569	417,365	451,415	495,382	502,406	491,998	485,051	505,699	539,388
42	U. Alabama, Birmingham	Public	352,777	405,731	435,460	489,845	503,698	453,779	440,796	428,563	516,229	537,825

## CHAPTER 5 | Academic Research and Development

Rank	Institution	Institutional control	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
43	Virginia Polytechnic Institute and State U.	Public	370,805	375,773	399,433	398,169	450,058	454,417	496,169	513,149	504,282	521,773
44	Arizona State U.	Public	238,054	273,532	311,461	329,345	355,215	385,959	405,154	426,651	458,412	518,239
45	Indiana U., Bloomington	Public	NA	NA	NA	177,520	184,096	184,486	197,897	206,039	485,076	508,766
46	U. South Florida, Tampa	Public	NA	NA	NA	385,029	394,963	443,206	459,409	488,641	485,354	505,965
47	North Carolina State U.	Public	333,027	367,422	383,193	360,795	378,154	404,225	417,468	446,112	468,293	489,918
48	U. Iowa	Public	374,905	300,422	334,937	444,034	443,893	446,429	435,377	449,147	443,218	473,362
49	U. Colorado Boulder	Public	267,314	272,191	299,892	349,449	390,677	392,004	385,849	379,475	420,775	453,123
50	U. Colorado Denver and Anschutz Medical Campus	Public	264,739	269,805	364,659	389,461	417,587	431,977	409,443	411,020	410,081	443,705
51	U. Texas Southwestern Medical Center	Public	341,090	390,349	402,087	419,220	431,883	435,085	440,620	434,627	438,824	442,666
52	U. Cincinnati	Public	344,526	359,011	369,906	411,269	448,936	433,668	438,642	422,873	436,028	430,579
53	U. Chicago	Private	325,161	360,047	381,194	437,721	453,562	419,631	402,621	390,082	412,536	420,997
54	U. Georgia	Public	351,935	369,546	369,997	295,339	335,901	351,395	350,225	355,471	374,264	410,345
55	Case Western Reserve U.	Private	379,347	420,441	418,012	418,164	429,206	431,090	425,788	419,011	401,527	405,655
56	U. Virginia, Charlottesville	Public	NA	NA	NA	276,308	398,096	383,359	385,828	358,576	373,218	397,458
57	Boston U.	Private	253,899	259,045	284,507	352,817	355,916	334,496	368,281	367,328	388,336	395,921
58	U. Maryland, Baltimore	Public	358,851	379,407	359,542	374,036	409,665	433,228	429,315	411,268	397,695	393,876
59	SUNY, U. Buffalo	Public	323,417	339,575	349,423	349,670	353,172	360,226	387,863	386,562	382,935	389,569



## CHAPTER 5 | Academic Research and Development

Rank	Institution	Institutional control	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
60	California Institute of Technology	Private	287,343	274,671	345,400	362,172	377,514	379,713	347,105	367,182	374,424	371,060
61	Scripps Research Institute	Private	360,511	366,047	382,275	387,298	400,768	398,673	399,899	386,231	384,161	364,670
62	U. Miami	Private	212532	244067	250339	280671	323,486	365,301	344,757	345,805	331,036	358,441
63	U. Utah	Public	248,864	254,632	334,002	379,200	414,316	430,056	494,058	486,140	518,928	350,212
64	U. Kentucky	Public	348,835	345,355	360,254	359,944	372,932	360,776	339,764	328,239	331,705	349,661
65	Brown U.	Private	175,623	182,596	187,380	335,838	344,090	365,120	361,010	341,531	342,040	347,016
66	U. Rochester	Private	377,016	378,368	398,187	414,655	429,034	389,612	389,355	353,419	346,932	346,165
67	U. California, Irvine	Public	316,178	334,279	336,345	327,594	344,678	350,030	347,773	340,056	329,798	345,319
68	U. Illinois, Chicago	Public	344,815	339,704	347,118	362,939	380,828	388,625	367,848	347,888	354,560	337,296
69	Rockefeller U.	Private	233,917	247,505	252,478	265,750	272,491	292,896	298,474	316,368	323,932	335,136
70	Washington State U.	Public	213,262	283,086	301,080	304,352	320,510	335,930	341,082	326,414	333,134	334,082
71	Colorado State U., Fort Collins	Public	296,020	302,613	311,720	302,896	330,784	375,919	313,238	307,978	317,219	331,862
72	Oregon Health and Science U.	Public	287,430	301,396	309,675	314,990	334,324	305,530	308,767	314,802	326,915	331,524
73	Iowa State U.	Public	221,002	228,167	228,526	250,120	267,641	260,995	266,596	313,263	306,125	328,385
74	Carnegie Mellon U.	Private	198,139	210,988	217,687	222,790	242,882	255,933	271,277	251,222	242,004	319,168
75	SUNY, Polytechnic Institute	Public	na	na	na	na	na	na	na	412,851	295,313	316,680
76	Princeton U.	Private	198,945	204,489	212,510	242,570	263,335	275,666	269,908	293,274	279,851	305,147

## CHAPTER 5 | Academic Research and Development

Rank	Institution	Institutional control	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
77	U. Hawaii, Manoa	Public	266,447	271,835	290,707	303,085	318,316	312,311	326,750	324,342	316,497	304,476
78	Albert Einstein College of Medicine	Private	na	na	na	na	na	na	na	na	na	300,909
79	U. Kansas	Public	219,535	227,433	236,544	267,961	274,727	286,262	298,498	301,534	311,383	297,933
80	U. Nebraska, Lincoln	Public	229,496	244,869	251,195	224,135	235,296	253,321	266,507	278,299	284,438	294,856
81	Louisiana State U., Baton Rouge	Public	266,895	280,081	294,780	289,872	287,841	285,395	283,400	290,076	281,154	291,972
82	Florida State U.	Public	211,310	211,557	237,794	227,329	230,411	225,378	250,877	252,548	256,449	268,288
83	U. Connecticut	Public	233,774	233,246	232,944	237,908	253,792	256,854	242,251	258,056	259,397	265,522
84	Medical U. South Carolina	Public	184,624	189,369	216,778	224,632	213,346	236,586	245,451	242,594	243,534	260,098
85	U. Oklahoma, Norman and Health Sciences Center	Public	187,454	204,765	213,720	218,089	249,297	240,974	255,674	253,344	242,367	259,998
86	Uniformed Services U. of the Health Sciences	Public	71,307	106,179	192,268	134,126	175,365	143,250	164,232	262,489	361,173	256,203
87	Oregon State U.	Public	231,895	233,358	257,564	216,595	228,814	240,507	232,677	230,963	245,317	254,275
88	U. Massachusetts, Medical School	Public	157,469	178,614	204,033	232,039	262,714	256,090	245,923	241,869	250,338	253,099
89	U. Missouri, Columbia	Public	244,429	251,894	253,527	238,500	230,957	239,810	236,423	237,266	246,684	248,300
90	Temple U.	Public	90,773	99,815	111,421	124,528	134,533	138,318	224,087	224,101	227,468	246,392
91	U. Central Florida	Public	141,140	147,092	148,809	117,985	109,190	116,891	126,681	185,555	215,519	242,308

## CHAPTER 5 | Academic Research and Development

Rank	Institution	Institutional control	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
92	U. New Mexico	Public	181,734	202,694	205,831	211,771	220,565	220,360	227,703	228,849	232,271	239,550
93	Mississippi State U.	Public	211,271	219,017	225,426	231,675	226,070	233,197	206,424	209,729	226,359	239,446
94	U. Texas Health Science Center, Houston	Public	191,724	197,252	217,623	240,772	261,172	236,250	233,256	233,737	234,299	237,016
95	Dartmouth C.	Private	192,846	188,122	190,425	194,141	210,631	195,930	201,591	212,606	209,646	233,636
96	George Washington U.	Private	149,413	181,688	103,793	196,917	197,621	196,448	202,428	227,995	241,117	231,829
97	SUNY, Stony Brook U.	Public	268,541	190,712	189,299	204,728	211,356	219,744	225,712	211,631	220,580	230,621
98	U. California, Santa Barbara	Public	200,504	214,441	227,221	225,730	230,435	233,883	236,497	231,322	222,870	230,139
99	Virginia Commonwealth U.	Public	151,197	171,637	162,283	197,709	207,756	201,366	196,015	201,858	218,925	225,999
100	Wayne State U.	Public	238,738	253,604	257,207	254,492	259,895	227,070	224,331	218,435	213,878	221,537
-	All other surveyed institutions		17,095,939	17,932,937	18,999,151	14,858,610	15,776,650	15,624,191	15,391,409	14,702,790	14,564,229	15,021,976

na = not applicable; institution did not exist or did not exist as a separate entity. NA = not available; institution was not surveyed separately.

<sup>a</sup> Johns Hopkins University includes Applied Physics Laboratory, with \$1,403,733 in total R&D expenditures in FY 2016.

### Note(s)

Before FY 2010, some institution totals for all R&D expenditures may be lower-bound estimates because the National Science Foundation (NSF) did not attempt to estimate for nonresponse on non-S&E R&D expenditures before FY 2010. Institutions ranked are geographically separate campuses headed by a campus-level president or chancellor. Some campuses are part of large multicampus universities; some are part of state university systems.

### Source(s)

National Science Foundation, National Center for Science and Engineering Statistics, Higher Education Research and Development Survey (HERD).



## CHAPTER 5 | Academic Research and Development

*Science and Engineering Indicators 2018*

## CHAPTER 5 | Academic Research and Development

APPENDIX TABLE 5-7

### Expenditures for academic R&D passed through to and received by subrecipients: FYs 2012–16

(Millions of current dollars)

Source of funds	Fiscal year	All R&D expenditures	Expenditures passed through			Expenditures received		
			All passed through	To educational subrecipients	To other subrecipients	All received	From higher education pass-through entities	From other pass-through entities
All R&D	2012	65,729	5,531	3,073	2,458	6,505	2,928	3,577
	Public	44,163	3,502	1,950	1,553	4,530	1,878	2,652
	Private	21,566	2,029	1,123	906	1,976	1,050	926
	2013	67,013	5,689	3,138	2,551	6,521	3,020	3,501
	Public	44,850	3,608	1,985	1,623	4,508	1,928	2,581
	Private	22,163	2,081	1,154	927	2,013	1,092	921
	2014	67,197	5,706	3,163	2,543	6,540	2,964	3,576
	Public	44,675	3,558	2,015	1,544	4,530	1,905	2,626
	Private	22,521	2,147	1,148	1,000	2,009	1,059	950
	2015	68,567	5,638	3,104	2,534	6,651	3,031	3,619
	Public	45,429	3,542	2,002	1,540	4,592	1,934	2,657
	Private	23,138	2,096	1,102	994	2,059	1,097	962
	2016	71,833	5,734	3,150	2,584	6,925	3,107	3,818
	Public	47,148	3,556	2,019	1,537	4,735	1,976	2,760
	Private	24,685	2,178	1,130	1,047	2,190	1,131	1,059

## CHAPTER 5 | Academic Research and Development

Source of funds	Fiscal year	All R&D expenditures	Expenditures passed through			Expenditures received		
			All passed through	To educational subrecipients	To other subrecipients	All received	From higher education pass-through entities	From other pass-through entities
Federally financed R&D	2012	40,142	4,819	2,752	2,067	5,726	2,693	3,033
	Public	25,110	3,068	1,727	1,341	3,947	1,719	2,229
	Private	15,032	1,751	1,024	727	1,778	975	804
	2013	39,446	4,968	2,834	2,134	5,721	2,784	2,937
	Public	24,689	3,172	1,778	1,394	3,923	1,781	2,142
	Private	14,757	1,796	1,056	740	1,798	1,003	795
	2014	37,960	4,891	2,829	2,062	5,566	2,718	2,848
	Public	23,496	3,079	1,780	1,299	3,786	1,751	2,034
	Private	14,464	1,811	1,048	763	1,780	966	814
	2015	37,849	4,805	2,759	2,046	5,595	2,760	2,835
	Public	23,389	3,040	1,753	1,286	3,788	1,768	2,020
	Private	14,459	1,765	1,006	759	1,807	991	815
	2016	38,794	4,871	2,796	2,075	5,646	2,812	2,835
	Public	23,948	3,045	1,774	1,271	3,813	1,786	2,027
	Private	14,846	1,826	1,022	804	1,833	1,026	807

### Note(s)

Detail may not add to total because of rounding and because some institutions could not break out totals by type of entity.

## CHAPTER 5 | Academic Research and Development

### Source(s)

National Science Foundation, National Center for Science and Engineering Statistics, Higher Education Research and Development Survey (HERD).

*Science and Engineering Indicators 2018*

## CHAPTER 5 | Academic Research and Development

APPENDIX TABLE 5-8

### Research space at academic institutions, by S&E field: FYs 2007–15

(Millions of net assignable square feet and percent change)

Field	2007	2009	2011	2013	2015
Millions of net assignable square feet					
All fields	187.9	196.1	202.2	211.8	214.7
Agricultural sciences	27.9	29.5	27.6	30.5	28.1
Biological and biomedical sciences	44.8	50.3	53.7	57.2	55.9
Computer and information sciences	4.8	5.2	5.0	4.3	4.6
Engineering	28.4	30.2	31.7	33.5	34.3
Geosciences, atmospheric sciences, and ocean sciences	8.4	8.0	7.8	7.8	8.1
Health sciences	37.0	36.3	36.7	38.0	39.2
Mathematics and statistics	1.6	1.5	1.5	1.7	1.8
Natural resources and conservation	na	na	na	na	3.5
Physical sciences	20.3	20.5	21.8	22.9	22.7
Psychology	4.9	5.2	5.5	5.5	5.5
Social sciences	6.0	5.5	5.7	5.7	6.0
Other sciences	3.7	3.9	5.2	4.8	4.9
Research animal space <sup>a</sup>	17.8	18.1	18.4	18.9	19.4
Change over previous period (%)					



## CHAPTER 5 | Academic Research and Development

Field	2007	2009	2011	2013	2015
All fields	1.5	4.4	3.1	4.7	1.4
Agricultural sciences	na	5.7	-6.4	10.5	na
Biological and biomedical sciences	na	12.3	6.8	6.5	-2.3
Computer and information sciences	na	8.3	-3.8	-14.0	7.0
Engineering	na	6.3	5.0	5.7	2.4
Geosciences, atmospheric sciences, and ocean sciences	na	-4.8	-2.5	0.0	3.8
Health sciences	na	-1.9	1.1	3.5	3.2
Mathematics and statistics	na	-6.2	0.0	13.3	5.9
Natural resources and conservation	na	na	na	na	na
Physical sciences	na	-3.3	1.0	6.3	-0.9
Psychology	na	6.1	5.8	0.0	0.0
Social sciences	na	-8.3	3.6	0.0	5.3
Other sciences	na	5.4	33.3	-7.7	2.1
Research animal space <sup>a</sup>	7.9	1.7	1.7	2.7	2.6
Share of total square feet (%)					
All fields	100.0	100.0	100.0	100.0	100.0
Agricultural sciences	14.8	15.0	13.6	14.4	13.1
Biological and biomedical sciences	23.8	25.7	26.6	27.0	26.0
Computer and information sciences	2.6	2.7	2.5	2.0	2.1

## CHAPTER 5 | Academic Research and Development

Field	2007	2009	2011	2013	2015
Engineering	15.1	15.4	15.7	15.8	16.0
Geosciences, atmospheric sciences, and ocean sciences	4.5	4.1	3.9	3.7	3.8
Health sciences	19.7	18.5	18.2	17.9	18.3
Mathematics and statistics	0.9	0.8	0.7	0.8	0.8
Natural resources and conservation	na	na	na	na	1.6
Physical sciences	10.8	10.5	10.8	10.8	10.6
Psychology	2.6	2.7	2.7	2.6	2.6
Social sciences	3.2	2.8	2.8	2.7	2.8
Other sciences	2.0	2.0	2.6	2.3	2.3
Research animal space <sup>a</sup>	na	na	na	na	na

na = not applicable; see notes.

<sup>a</sup> Research animal space is listed separately and is included in individual field totals.

### Note(s)

S&E fields and their disciplines were revised in FY 2015. Specifically, "Agricultural sciences and natural resources sciences" has been split into "Agricultural sciences" and "Natural resources and conservation." Physical sciences and its subfields "Earth, atmospheric, and ocean sciences" and "Astronomy, chemistry, and physics" are now reported under "Geosciences, atmospheric sciences, and ocean sciences" and "Physical sciences," respectively. Data were not collected separately for "Natural resources and conservation" before the FY 2015 survey and are included in the "Agricultural sciences" field for earlier cycles. Detail may not add to total because of rounding.

### Source(s)

National Science Foundation, National Center for Science and Engineering Statistics, Survey of Science and Engineering Research Facilities.

*Science and Engineering Indicators 2018*

## CHAPTER 5 | Academic Research and Development

APPENDIX TABLE 5-9

### Source of funds for new construction of S&E research space at academic institutions, by year of project start and type of institution: FYs 2002–15

(Millions of current dollars)

Fiscal year of project start and type of institution	All sources	Government		Institutional funds and other sources <sup>a</sup>
		Federal	State and local	
2002–03	7,388.7	351.3	2,364.5	4,672.9
Doctorate granting	7,185.2	318.5	2,301.4	4,565.3
Public	5,213.8	278.5	2,183.6	2,751.7
Private	1,971.5	40.0	117.9	1,813.6
Nondoctorate granting	203.5	32.8	63.1	107.6
2004–05	6,030.3	450.2	1,341.6	4,238.5
Doctorate granting	5,767.3	417.1	1,204.8	4,145.5
Public	4,144.2	320.8	1,143.2	2,680.2
Private	1,623.1	96.3	61.6	1,465.2
Nondoctorate granting	263.0	33.1	136.9	93.1
2006–07	5,923.5	360.9	1,880.7	3,681.8
Doctorate granting	5,681.3	357.6	1,764.6	3,559.1
Public	3,693.8	139.4	1,619.5	1,934.8
Private	1,987.6	218.2	145.1	1,624.3
Nondoctorate granting	242.2	3.3	116.1	122.7

## CHAPTER 5 | Academic Research and Development

Fiscal year of project start and type of institution	All sources	Government		Institutional funds and other sources <sup>a</sup>
		Federal	State and local	
2008–09	7,336.0	212.0	2,679.8	4,444.1
Doctorate granting	7,012.4	201.8	2,498.5	4,312.0
Public	5,013.2	157.6	2,363.7	2,491.8
Private	1,999.2	44.2	134.8	1,820.2
Nondoctorate granting	323.6	10.2	181.3	132.1
2010–11	6,396.2	486.6	1,941.2	3,968.4
Doctorate granting	6,227.7	479.5	1,860.4	3,887.9
Public	5,495.9	395.1	1,763.3	3,337.5
Private	731.8	84.4	97.1	550.3
Nondoctorate granting	168.5	7.1	80.9	80.5
2012–13	5,432.5	313.5	1,437.8	3,681.2
Doctorate granting	5,211.1	306.8	1,328.7	3,575.6
Public	3,357.3	235.8	1,256.8	1,864.7
Private	1,853.8	71.0	72.0	1,710.8
Nondoctorate granting	221.4	6.7	109.1	105.6
2014–15	5,724.2	905.9	1,171.8	3,646.5
Doctorate granting	5,558.8	900.2	1,093.4	3,565.3
Public	3,591.7	736.6	1,059.3	1,795.8

## CHAPTER 5 | Academic Research and Development

Fiscal year of project start and type of institution	All sources	Government		Institutional funds and other sources <sup>a</sup>
		Federal	State and local	
Private	1,967.2	163.6	34.1	1,769.5
Nondoctorate granting	165.4	5.7	78.4	81.2

<sup>a</sup> Includes an institution's operating funds, endowments, private donations, tax-exempt bonds and other debt financing, and indirect costs recovered from federal and nonfederal sources.

### Note(s)

Detail may not add to total because of rounding. Only construction projects costing more than \$250,000 for a single field were reported for FYs 2002–15.

### Source(s)

National Science Foundation, National Center for Science and Engineering Statistics, Survey of Science and Engineering Research Facilities.

*Science and Engineering Indicators 2018*

## CHAPTER 5 | Academic Research and Development

APPENDIX TABLE 5-10

### Costs for repair and renovation of research space at academic institutions, by S&E field and time of repair and renovation: FYs 2014–17

(Millions of dollars)

Field	Started in FY 2014 or FY 2015	Planned to start in FY 2016 or FY 2017	Deferred projects	
			Included in institutional plan	Not included in institutional plan
All research space	4,133.4	3,902.5	4,850.1	3,966.5
Agricultural sciences	55.0	103.9	399.5	249.6
Biological and biomedical sciences	1,005.2	902.5	1,183.1	893.3
Computer and information sciences	42.5	41.5	79.1	92.2
Engineering	707.3	736.9	559.5	664.8
Geosciences, atmospheric sciences, and ocean sciences	150.4	108.6	249.2	181.0
Health sciences	1,023.9	884.7	982.9	781.1
Mathematics and statistics	52.5	22.5	58.1	62.5
Natural resources and conservation	43.0	20.5	61.2	13.1
Physical sciences	786.2	662.1	697.3	547.6
Psychology	113.1	99.6	246.0	147.8
Social sciences	134.8	187.2	262.5	269.6
Other sciences	19.4	132.4	71.7	63.6

## CHAPTER 5 | Academic Research and Development

### Note(s)

Detail may not add to total because of rounding. Deferred projects are those that (1) are not funded and (2) are not scheduled for FY 2016 or FY 2017. Projects were excluded if they were for developing new programs or expanding current programs. S&E fields and their disciplines were revised in FY 2015. Specifically, "Agricultural sciences and natural resources sciences" has been split into "Agricultural sciences" and "National resources and conservation." Physical sciences and its subfields "Earth, atmospheric, and ocean sciences" and "Astronomy, chemistry, and physics" are now reported under "Geosciences, atmospheric sciences, and ocean sciences" and "Physical sciences," respectively.

### Source(s)

National Science Foundation, National Center for Science and Engineering Statistics, Survey of Science and Engineering Research Facilities.

*Science and Engineering Indicators 2018*

## CHAPTER 5 | Academic Research and Development

APPENDIX TABLE 5-11

### Source of funds for repair and renovation of S&E research space at academic institutions, by year of project start and type of institution: FYs 2002–15

(Millions of current dollars)

Year of project start and type of institution	All sources	Government		Institutional funds and other sources <sup>a</sup>
		Federal	State and local	
FYs 2002–03	2,211.8	136.9	497.8	1,577.2
Doctorate granting	2,087.3	111.9	463.9	1,511.4
Public	1,270.6	89.0	457.5	724.1
Private	816.7	22.9	6.4	787.4
Nondoctorate granting	124.6	25.0	33.9	65.7
FYs 2004–05	2,445.9	121.5	544.9	1,779.5
Doctorate granting	2,385.1	116.5	526.8	1,741.8
Public	1,335.2	76.0	502.5	756.7
Private	1,049.9	40.5	24.3	985.1
Nondoctorate granting	60.8	5.0	18.1	37.7
FYs 2006–07	3,361.6	133.8	657.0	2,570.8
Doctorate granting	3,276.2	126.8	609.4	2,540.0
Public	1,857.5	77.1	536.8	1,243.6
Private	1,418.7	49.7	72.6	1,296.4
Nondoctorate granting	85.4	6.9	47.7	30.8



## CHAPTER 5 | Academic Research and Development

Year of project start and type of institution	All sources	Government		Institutional funds and other sources <sup>a</sup>
		Federal	State and local	
FYs 2008–09	3,015.8	74.2	746.5	2,195.1
Doctorate granting	2,920.8	68.8	717.4	2,134.6
Public	1,587.1	57.3	678.7	851.2
Private	1,333.7	11.4	38.8	1,283.5
Nondoctorate granting	95.0	5.4	29.0	60.5
FYs 2010–11	3,508.9	270.9	854.5	2,383.5
Doctorate granting	3,377.8	236.4	797.1	2,344.3
Public	1,931.7	186.4	663.0	1,082.3
Private	1,446.1	50.0	134.1	1,262.0
Nondoctorate granting	131.1	34.4	57.4	39.2
FYs 2012–13	3,746.7	264.8	566.9	2,915.0
Doctorate granting	3,559.5	254.4	461.5	2,843.6
Public	1,838.5	129.4	419.3	1,289.7
Private	1,721.0	125.0	42.2	1,553.9
Nondoctorate granting	187.1	10.4	105.4	71.4
FYs 2014–15	4,133.4	61.7	502.8	3,569.0
Doctorate granting	4,043.9	58.0	458.5	3,527.4
Public	2,178.6	53.3	442.8	1,682.5

## CHAPTER 5 | Academic Research and Development

Year of project start and type of institution	All sources	Government		Institutional funds and other sources <sup>a</sup>
		Federal	State and local	
Private	1,865.3	4.7	15.7	1,844.9
Nondoctorate granting	89.5	3.7	44.3	41.5

<sup>a</sup> Includes an institution's operating funds, endowments, private donations, tax-exempt bonds and other debt financing, and indirect costs recovered from federal and nonfederal sources.

### Note(s)

Detail may not add to total because of rounding. Only repair and renovation projects costing over \$250,000 for a single field were reported for FYs 2002–15.

### Source(s)

National Science Foundation, National Center for Science and Engineering Statistics, Survey of Science and Engineering Research Facilities.

*Science and Engineering Indicators 2018*

## CHAPTER 5 | Academic Research and Development

APPENDIX TABLE 5-12

## Current fund expenditures for research equipment at academic institutions, by S&amp;E field: FYs 2002–16

(Millions of dollars, millions of constant 2009 dollars, and percent distribution)

Field	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Current \$millions															
All fields	1,703	1,820	1,895	1,880	1,826	1,824	1,874	1,947	2,114	2,199	1,982	2,210	1,991	2,070	2,131
Science	1,340	1,435	1,501	1,441	1,383	1,395	1,439	1,472	1,603	1,627	1,430	1,547	1,337	1,505	1,520
Computer and information sciences	101	99	105	72	70	75	80	90	65	91	73	273	70	88	97
Geosciences, atmospheric sciences, and ocean sciences	132	121	126	123	123	136	144	126	151	115	121	116	116	126	111
Atmospheric science and meteorology	15	18	20	26	34	31	27	17	24	21	20	18	22	20	21
Geological and earth sciences	33	42	43	44	35	36	39	47	52	47	53	47	52	50	42
Ocean sciences and marine sciences	74	50	41	40	44	62	70	52	58	32	29	39	32	46	39
Geosciences, atmospheric sciences, and ocean sciences nec	11	11	22	13	10	7	9	11	17	15	19	12	10	11	9
Life sciences	737	819	836	826	752	737	796	786	908	928	817	747	735	819	844
Agricultural sciences	72	78	79	72	75	79	103	81	81	74	85	79	84	90	89
Biological and biomedical sciences	297	337	348	326	302	272	303	299	396	393	334	313	310	333	365
Health sciences	339	371	376	378	337	340	355	367	390	413	358	317	297	325	338
Natural resources and conservation	na	na	na	na	na	na	na	na	na	na	na	na	na	na	11
Life sciences nec	29	33	34	50	37	46	35	40	42	47	39	39	45	71	42
Mathematics and statistics	10	8	8	9	9	9	9	9	8	7	7	7	6	6	9

## CHAPTER 5 | Academic Research and Development

Field	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Physical sciences	276	298	339	325	329	310	302	333	364	380	331	329	344	398	389
Astronomy and astrophysics	19	19	25	23	20	29	27	29	24	26	28	20	26	54	36
Chemistry	123	120	118	113	122	113	114	136	162	156	133	118	119	120	125
Materials science	na	na	na	na	na	na	na	na	na	na	na	na	na	na	10
Physics	122	139	160	159	153	143	136	149	154	180	156	166	185	206	203
Physical sciences nec	12	20	36	30	34	25	25	20	24	18	14	25	14	17	16
Psychology	19	23	18	15	18	14	15	24	17	17	21	14	16	14	15
Social sciences	18	19	16	19	14	20	22	26	15	16	11	12	11	10	12
Anthropology	na	na	na	na	na	na	na	na	na	na	na	na	na	na	1
Economics	2	3	2	2	2	2	2	1	1	2	1	3	2	2	4
Political science and government	2	2	2	2	1	1	1	2	1	1	1	1	0	1	1
Sociology, demography, and population studies	4	3	2	3	2	3	2	5	2	2	1	2	2	3	2
Social sciences nec	9	10	9	12	8	15	16	18	10	10	7	7	7	4	4
Sciences nec	47	49	54	53	67	95	71	76	76	74	50	49	39	45	42
Engineering	363	385	394	439	443	428	435	475	511	572	552	663	654	564	611
Aerospace, aeronautical, and astronautical	24	22	21	20	22	22	34	27	35	34	33	35	29	35	44
Bioengineering and biomedical	18	20	19	29	25	27	28	32	40	53	45	47	37	44	53
Chemical	30	32	55	37	39	37	39	48	53	56	54	59	47	46	46
Civil	43	31	34	29	27	29	32	35	38	51	42	61	33	31	31

## CHAPTER 5 | Academic Research and Development

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## CHAPTER 5 | Academic Research and Development

Field	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Life sciences nec	35	38	38	54	39	47	35	40	42	46	37	36	41	65	38
Mathematics and statistics	12	9	9	10	9	9	9	9	8	7	6	6	6	5	8
Physical sciences	324	344	380	353	348	319	304	333	360	368	315	308	316	361	349
Astronomy and astrophysics	23	22	28	25	21	30	27	29	24	25	27	18	24	49	32
Chemistry	144	138	132	123	128	116	115	136	160	151	127	110	109	109	112
Materials science	na	na	na	na	na	na	na	na	na	na	na	na	na	na	9
Physics	143	160	179	173	162	147	137	149	152	174	148	156	170	188	182
Physical sciences nec	15	23	41	33	36	26	25	20	24	18	13	24	13	15	14
Psychology	22	26	20	16	19	15	15	24	16	16	20	13	14	13	13
Social sciences	21	21	17	20	14	20	22	26	14	15	10	12	10	9	11
Anthropology	na	na	na	na	na	na	na	na	na	na	na	na	na	na	1
Economics	3	3	2	2	2	2	2	1	1	2	1	3	2	2	3
Political science and government	2	3	2	2	1	1	1	2	1	1	1	1	0	1	1
Sociology, demography, and population studies	4	4	3	3	2	3	2	5	2	2	1	2	2	3	2
Social sciences nec	11	12	11	13	9	15	16	18	10	10	7	6	6	4	4
Sciences nec	56	57	60	58	71	97	71	76	75	71	47	45	36	41	38
Engineering	427	444	442	477	468	440	439	475	505	553	525	620	601	513	548
Aerospace, aeronautical, and astronautical	28	26	24	22	23	23	35	27	35	33	32	33	27	32	39
Bioengineering and biomedical	21	23	21	32	26	28	29	32	39	51	43	44	34	40	47

## CHAPTER 5 | Academic Research and Development

Field	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Chemical	35	37	61	40	41	38	39	48	52	55	51	55	44	42	42
Civil	50	35	38	32	29	29	32	35	37	49	40	57	30	28	28
Electrical, electronic, and communications	93	99	91	99	99	95	89	98	113	135	130	150	104	109	101
Industrial and manufacturing	na	na	na	na	na	na	na	na	na	na	na	na	na	na	6
Mechanical	63	64	62	83	88	77	76	77	98	82	79	103	69	70	65
Metallurgical and materials	48	70	43	55	57	56	52	58	50	51	57	59	222	105	45
Engineering nec	88	89	102	115	104	94	86	101	80	98	93	120	71	87	175
Percent distribution															
All fields	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Science	78.7	78.9	79.2	76.6	75.7	76.5	76.8	75.6	75.8	74.0	72.1	70.0	67.1	72.7	71.3
Computer and information sciences	5.9	5.4	5.5	3.8	3.9	4.1	4.3	4.6	3.1	4.1	3.7	12.4	3.5	4.2	4.5
Geosciences, atmospheric sciences, and ocean sciences	7.7	6.7	6.6	6.5	6.8	7.4	7.7	6.5	7.2	5.2	6.1	5.3	5.8	6.1	5.2
Atmospheric science and meteorology	0.9	1.0	1.1	1.4	1.9	1.7	1.4	0.9	1.1	0.9	1.0	0.8	1.1	1.0	1.0
Geological and earth sciences	1.9	2.3	2.3	2.4	1.9	2.0	2.1	2.4	2.5	2.1	2.7	2.1	2.6	2.4	2.0
Ocean sciences and marine sciences	4.3	2.8	2.2	2.1	2.4	3.4	3.7	2.7	2.7	1.5	1.5	1.8	1.6	2.2	1.8
Geosciences, atmospheric sciences, and ocean sciences nec	0.6	0.6	1.1	0.7	0.5	0.4	0.5	0.6	0.8	0.7	1.0	0.6	0.5	0.5	0.4
Life sciences	43.3	45.0	44.1	43.9	41.2	40.4	42.5	40.4	43.0	42.2	41.2	33.8	36.9	39.6	39.6
Agricultural sciences	4.2	4.3	4.2	3.8	4.1	4.3	5.5	4.2	3.8	3.4	4.3	3.6	4.2	4.4	4.2
Biological and biomedical sciences	17.4	18.5	18.4	17.4	16.5	14.9	16.2	15.4	18.7	17.9	16.9	14.1	15.6	16.1	17.1

## CHAPTER 5 | Academic Research and Development

Field	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Health sciences	19.9	20.4	19.8	20.1	18.5	18.6	19.0	18.8	18.4	18.8	18.1	14.3	14.9	15.7	15.8
Natural resources and conservation	na	na	na	na	na	na	na	na	na	na	na	na	na	na	0.5
Life sciences nec	1.7	1.8	1.8	2.6	2.0	2.5	1.8	2.0	2.0	2.1	2.0	1.7	2.3	3.4	2.0
Mathematics and statistics	0.6	0.4	0.4	0.5	0.5	0.5	0.5	0.5	0.4	0.3	0.3	0.3	0.3	0.3	0.4
Physical sciences	16.2	16.4	17.9	17.3	18.0	17.0	16.1	17.1	17.2	17.3	16.7	14.9	17.3	19.2	18.3
Astronomy and astrophysics	1.1	1.0	1.3	1.2	1.1	1.6	1.4	1.5	1.1	1.2	1.4	0.9	1.3	2.6	1.7
Chemistry	7.2	6.6	6.2	6.0	6.7	6.2	6.1	7.0	7.7	7.1	6.7	5.3	6.0	5.8	5.8
Materials science	na	na	na	na	na	na	na	na	na	na	na	na	na	na	0.5
Physics	7.1	7.6	8.4	8.5	8.4	7.8	7.3	7.6	7.3	8.2	7.9	7.5	9.3	10.0	9.5
Physical sciences nec	0.7	1.1	1.9	1.6	1.9	1.4	1.3	1.0	1.1	0.8	0.7	1.1	0.7	0.8	0.7
Psychology	1.1	1.2	0.9	0.8	1.0	0.8	0.8	1.3	0.8	0.8	1.0	0.6	0.8	0.7	0.7
Social sciences	1.0	1.0	0.8	1.0	0.7	1.1	1.2	1.3	0.7	0.7	0.5	0.6	0.5	0.5	0.6
Anthropology	na	na	na	na	na	na	na	na	na	na	na	na	na	na	0.1
Economics	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.1	0.1	0.1	0.2
Political science and government	0.1	0.1	0.1	0.1	0.1	0.0	0.1	0.1	0.1	0.0	0.1	0.0	0.0	0.0	0.0
Sociology, demography, and population studies	0.2	0.2	0.1	0.1	0.1	0.2	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Social sciences nec	0.6	0.6	0.5	0.6	0.5	0.8	0.9	0.9	0.5	0.5	0.4	0.3	0.3	0.2	0.2
Sciences nec	2.8	2.7	2.8	2.8	3.7	5.2	3.8	3.9	3.6	3.3	2.5	2.2	1.9	2.2	2.0
Engineering	21.3	21.1	20.8	23.4	24.3	23.5	23.2	24.4	24.2	26.0	27.9	30.0	32.9	27.3	28.7



## CHAPTER 5 | Academic Research and Development

Field	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Aerospace, aeronautical, and astronautical	1.4	1.2	1.1	1.1	1.2	1.2	1.8	1.4	1.7	1.6	1.7	1.6	1.5	1.7	2.0
Bioengineering and biomedical	1.1	1.1	1.0	1.6	1.4	1.5	1.5	1.6	1.9	2.4	2.3	2.1	1.9	2.1	2.5
Chemical	1.8	1.8	2.9	2.0	2.1	2.0	2.1	2.5	2.5	2.6	2.7	2.7	2.4	2.2	2.2
Civil	2.5	1.7	1.8	1.5	1.5	1.6	1.7	1.8	1.8	2.3	2.1	2.8	1.6	1.5	1.5
Electrical, electronic, and communications	4.7	4.7	4.3	4.8	5.2	5.1	4.7	5.0	5.4	6.3	6.9	7.3	5.7	5.8	5.3
Industrial and manufacturing	na	na	na	na	na	na	na	na	na	na	na	na	na	na	0.3
Mechanical	3.2	3.0	2.9	4.1	4.6	4.1	4.0	4.0	4.7	3.9	4.2	5.0	3.8	3.7	3.4
Metallurgical and materials	2.4	3.4	2.0	2.7	3.0	3.0	2.8	3.0	2.4	2.4	3.0	2.9	12.2	5.6	2.4
Engineering nec	4.4	4.3	4.8	5.6	5.4	5.0	4.6	5.2	3.8	4.6	4.9	5.8	3.9	4.6	9.2

na = not applicable; separate data for natural resources and conservation, materials science, anthropology, and industrial and manufacturing engineering were not collected prior to FY 2016.

nec = not elsewhere classified.

### Note(s)

Gross domestic product deflators come from the U.S. Bureau of Economic Analysis and are available at <https://www.bea.gov/national>, accessed February 2016. Because of rising capitalization thresholds, the dollar threshold for inclusion in the equipment category has changed over time. Generally, university equipment that costs less than \$5,000 would be classified under the cost category of "supplies." Detail may not add to total because of rounding.

### Source(s)

National Science Foundation, National Center for Science and Engineering Statistics, Survey of Research and Development Expenditures at Universities and Colleges, and Higher Education Research and Development Survey (HERD).

*Science and Engineering Indicators 2018*

## CHAPTER 5 | Academic Research and Development

APPENDIX TABLE 5-13

## Federal share of current funding for research equipment at academic institutions, by S&amp;E field: FYs 2002–16

(Percent)

Field	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
All S&E fields	59.0	63.3	61.9	62.6	59.6	58.0	56.4	54.4	63.5	63.4	56.8	55.5	45.0	47.2	44.9
Science	59.1	64.0	63.4	64.1	60.2	58.1	56.3	54.1	65.2	65.9	58.3	59.7	49.2	48.6	46.3
Computer and information sciences	73.8	83.3	80.5	79.3	72.5	70.1	78.2	76.3	71.0	73.4	67.6	86.4	68.8	75.1	54.1
Geosciences, atmospheric sciences, and ocean sciences	61.5	73.1	74.3	77.0	73.3	74.3	69.8	65.3	76.7	69.9	70.1	66.2	65.2	65.6	61.7
Atmospheric science and meteorology	75.9	80.5	80.1	88.3	87.7	87.7	84.6	75.0	82.7	79.0	83.6	83.9	79.6	80.9	85.2
Geological and earth sciences	58.2	61.8	67.1	67.6	64.1	64.4	53.6	61.2	68.3	66.4	68.2	63.3	60.2	56.4	49.0
Ocean sciences and marine sciences	61.5	81.2	79.5	79.0	68.4	74.8	74.7	66.6	80.2	66.2	60.4	63.3	66.2	74.0	67.1
Geosciences, atmospheric sciences, and ocean sciences nec	51.5	67.2	73.2	80.4	78.5	61.6	57.4	61.4	82.3	76.4	75.5	60.3	55.2	44.9	43.5
Life sciences	55.5	59.9	60.7	61.7	56.5	53.1	48.6	47.7	62.7	63.2	50.3	46.6	37.4	36.3	36.2
Agricultural sciences	29.8	40.4	39.5	42.5	36.1	30.1	27.4	27.8	30.8	38.5	34.0	31.1	24.0	25.9	23.3
Biological and biomedical sciences	59.5	63.8	63.2	62.5	59.5	56.0	53.7	56.4	70.9	67.8	54.1	52.6	43.0	40.5	41.1
Health sciences	58.3	61.2	62.7	66.4	58.2	53.7	49.6	44.9	61.7	62.9	50.0	44.7	36.9	38.1	35.6
Natural resources and conservation	na	na	na	na	na	na	na	na	na	na	na	na	na	na	35.7
Life sciences nec	45.5	51.3	60.9	47.9	58.1	71.0	56.2	48.5	56.4	66.2	57.2	45.8	28.0	21.7	25.3
Mathematics and statistics	66.6	71.4	72.9	75.4	69.2	74.8	68.7	63.4	66.5	64.7	68.7	68.7	51.1	55.3	50.7
Physical sciences	70.1	73.0	68.1	69.5	67.1	69.4	70.0	63.9	75.6	77.2	75.9	70.3	67.6	66.1	64.7

## CHAPTER 5 | Academic Research and Development

Field	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Astronomy and astrophysics	80.6	74.4	79.5	77.3	82.0	83.5	77.6	69.7	78.5	78.3	83.4	76.4	59.3	45.2	55.6
Chemistry	61.8	64.8	66.0	70.9	65.0	64.5	62.5	60.2	69.5	72.7	68.5	58.8	51.3	56.0	54.7
Materials science	na	na	na	na	na	na	na	na	na	na	na	na	na	na	45.2
Physics	76.5	78.7	71.4	73.1	73.0	76.2	78.8	66.1	81.6	81.6	80.9	77.7	79.8	78.0	73.6
Physical sciences nec	72.8	81.3	52.6	39.2	40.1	37.2	47.6	64.4	74.4	69.7	75.8	70.5	60.2	60.9	62.3
Psychology	70.7	74.1	71.7	63.1	68.5	61.1	58.6	60.4	70.6	73.5	69.1	38.7	46.8	57.1	51.3
Social sciences	35.3	42.9	41.1	35.3	34.1	54.5	57.9	66.9	45.8	48.9	46.1	41.5	29.6	25.4	23.3
Anthropology	na	na	na	na	na	na	na	na	na	na	na	na	na	na	43.9
Economics	36.7	56.2	34.5	39.7	29.7	39.9	37.7	22.5	44.9	31.7	49.3	71.4	28.7	7.7	8.4
Political science and government	21.4	51.0	71.8	56.9	54.2	49.2	30.9	41.3	50.9	41.2	46.5	40.7	37.0	24.1	13.0
Sociology, demography, and population studies	43.0	49.0	48.2	37.7	29.1	52.7	58.1	75.2	56.1	56.6	42.6	28.6	25.7	37.9	27.9
Social sciences nec	34.9	35.3	34.7	31.0	34.0	56.7	62.8	70.2	43.6	52.2	46.3	34.0	30.8	26.5	29.9
Sciences nec	18.1	19.5	20.1	25.6	32.5	25.9	30.3	24.6	20.2	28.3	27.2	32.2	33.3	18.9	25.8
Engineering	58.5	60.4	56.4	57.6	57.7	57.5	56.5	55.2	58.0	56.1	52.8	45.7	36.5	43.7	41.3
Aerospace, aeronautical, and astronautical	79.0	83.5	71.9	67.5	62.7	65.9	72.1	62.3	53.2	56.6	56.3	40.3	40.4	48.1	60.2
Bioengineering and biomedical	52.7	57.8	53.0	43.5	46.1	50.2	53.1	53.7	61.0	53.7	43.5	41.9	50.2	43.9	41.8
Chemical	55.2	55.7	32.4	53.9	57.7	50.9	46.6	44.6	50.0	55.0	45.8	31.1	41.3	45.8	44.7
Civil	59.1	60.7	60.9	58.0	46.1	47.7	49.5	40.8	43.2	39.0	37.1	29.4	36.1	41.3	35.4
Electrical, electronic, and communications	59.9	67.7	69.1	66.7	66.5	66.4	63.4	59.3	67.1	63.8	64.5	57.9	61.6	62.5	59.2

## CHAPTER 5 | Academic Research and Development

Field	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Industrial and manufacturing	na	na	na	na	na	na	na	na	na	na	na	na	na	na	69.2
Mechanical	63.5	69.1	65.9	69.7	77.8	72.3	61.9	64.8	55.9	61.5	58.1	53.5	51.6	53.5	45.2
Metallurgical and materials	53.2	45.8	65.1	66.1	58.3	65.2	61.7	54.8	58.8	55.7	52.1	45.1	13.8	20.1	49.0
Engineering nec	51.9	53.8	45.2	40.3	36.9	37.7	43.5	52.8	60.2	51.3	46.4	41.6	45.5	38.8	22.2

na = not applicable; separate data for natural resources and conservation, materials science, anthropology, and industrial and manufacturing engineering were not collected prior to FY 2016.

nec = not elsewhere classified.

### Note(s)

Because of rising capitalization thresholds, the dollar threshold for inclusion in the equipment category has changed over time. Generally, university equipment that costs less than \$5,000 would be classified under the cost category of "supplies."

### Source(s)

National Science Foundation, National Center for Science and Engineering Statistics, Survey of Research and Development Expenditures at Universities and Colleges, and Higher Education Research and Development Survey (HERD).

*Science and Engineering Indicators 2018*

CHAPTER 5 | Academic Research and Development

APPENDIX TABLE 5-14

S&E doctorate holders employed in academia, by type of position and degree field: 1973–2015																			
(Thousands)																			
Position and field	1973	1977	1981	1983	1985	1987	1989	1991	1993	1995	1997	1999	2001	2003	2006	2008	2010	2013	2015
All positions																			
All fields	118.0	145.4	167.1	176.1	190.2	195.9	206.6	210.6	213.8	217.5	232.5	240.2	245.5	259.5	272.8	276.5	294.8	309.0	329.3
Physical sciences	25.5	29.2	30.0	29.9	32.2	32.8	33.6	33.7	35.0	35.7	37.5	38.7	38.6	39.9	39.6	39.9	43.7	44.9	48.4
Mathematics and statistics	9.7	11.7	12.4	12.9	13.6	13.8	14.5	15.2	15.5	14.6	15.6	15.2	14.9	16.7	17.4	18.0	18.7	19.0	20.9
Computer and information sciences	NA	NA	0.3	0.5	0.8	1.1	1.5	2.0	2.5	3.1	3.3	3.7	3.8	5.2	5.8	6.9	7.3	8.4	9.1
Life sciences	34.9	42.6	51.3	54.9	58.7	61.3	64.8	66.9	68.2	71.6	77.3	81.9	84.3	90.0	95.5	94.2	102.0	109.8	112.7
Psychology	12.2	16.2	20.1	21.0	23.1	23.7	25.0	25.2	25.0	26.1	27.3	29.0	30.4	31.8	35.0	34.5	35.4	36.3	38.7
Social sciences	23.4	31.1	36.9	38.9	42.0	42.2	44.5	44.8	44.4	42.5	44.9	46.2	46.9	48.1	50.0	52.5	54.9	55.9	59.7
Engineering	12.4	14.8	16.1	18.1	19.9	21.2	22.9	22.8	23.1	23.8	26.6	25.5	26.6	27.8	29.6	30.4	32.8	34.7	39.7
All full-time faculty																			
All fields	103.3	125.6	141.9	148.4	156.9	164.4	169.8	173.1	172.4	171.4	174.1	179.8	182.4	190.6	193.1	199.1	206.8	214.4	227.7
Physical sciences	20.8	23.6	24.3	24.2	25.4	26.4	26.2	26.2	25.8	25.6	25.6	26.7	26.4	27.6	26.9	27.6	29.3	29.5	31.2
Mathematics and statistics	9.3	10.9	11.7	12.3	12.7	12.9	13.5	14.2	14.7	13.0	13.4	12.9	12.3	14.0	14.0	14.8	15.1	15.5	16.7
Computer and information sciences	NA	NA	0.3	0.4	0.7	0.9	1.3	1.8	2.3	2.8	2.9	3.2	3.3	4.2	4.9	5.7	5.8	6.4	7.1
Life sciences	29.5	34.9	40.9	43.5	45.6	48.1	49.3	51.1	50.8	52.8	53.5	56.1	58.3	61.7	62.8	63.5	66.7	70.6	70.8
Psychology	10.8	13.9	16.4	17.3	18.5	19.2	20.2	20.7	19.5	20.1	19.6	21.0	21.7	21.4	23.2	23.1	23.3	24.1	25.9

## CHAPTER 5 | Academic Research and Development

Position and field	1973	1977	1981	1983	1985	1987	1989	1991	1993	1995	1997	1999	2001	2003	2006	2008	2010	2013	2015
Social sciences	21.6	28.8	33.7	34.4	36.1	37.7	39.0	39.0	39.2	37.1	37.3	38.7	38.7	39.6	39.2	42.1	43.1	43.5	46.6
Engineering	11.3	13.5	14.7	16.4	17.9	19.3	20.2	20.1	20.1	20.0	21.2	20.9	21.6	21.9	22.1	22.7	23.4	25.0	29.2
Full-time professors																			
All fields	42.6	51.0	64.4	69.9	72.8	79.1	83.1	82.5	80.0	77.7	80.9	83.1	84.8	87.7	85.3	90.5	93.6	95.3	98.9
Physical sciences	9.0	10.8	13.1	13.9	14.6	15.5	15.5	14.8	14.2	13.9	13.8	14.2	14.0	14.3	13.3	14.0	15.0	14.6	15.0
Mathematics and statistics	3.2	3.9	5.0	5.6	6.1	6.5	6.9	6.7	7.1	6.6	6.9	6.6	6.6	7.2	6.9	7.3	7.3	7.3	7.9
Computer and information sciences	NA	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.2	0.3	0.3	0.7	0.8	1.2	1.6	1.9	2.2	2.6	2.6
Life sciences	12.3	13.9	17.0	19.3	19.6	21.7	22.5	22.9	21.2	22.5	22.5	23.3	24.5	25.7	25.6	26.6	28.1	29.5	28.3
Psychology	3.9	4.8	6.5	7.0	7.6	8.3	9.1	9.5	8.7	8.7	9.5	9.4	9.9	9.8	9.8	10.0	9.9	10.4	10.9
Social sciences	9.4	11.3	14.7	15.1	15.9	16.8	18.5	18.6	18.4	16.6	17.1	18.2	18.2	18.6	17.5	19.2	19.6	19.2	20.6
Engineering	4.7	6.4	8.0	9.0	9.2	10.4	10.6	9.9	10.3	9.1	10.7	10.6	10.7	10.9	10.6	11.7	11.5	11.7	13.5
Full-time associate professors																			
All fields	31.4	39.7	42.9	45.7	46.9	48.2	47.9	50.5	48.6	49.6	51.0	53.6	52.2	54.3	54.1	57.0	59.1	62.7	69.3
Physical sciences	6.2	7.2	6.6	6.3	6.3	6.1	5.8	6.3	6.4	6.1	6.5	6.6	6.7	6.9	6.9	7.0	7.4	7.6	8.3
Mathematics and statistics	2.8	3.7	4.0	4.1	4.0	4.1	4.0	5.1	4.4	4.0	3.9	4.1	3.6	4.0	3.8	4.3	4.2	4.4	5.1
Computer and information sciences	NA	0.0	0.0	0.1	0.1	0.3	0.4	0.8	0.7	1.4	1.4	1.4	1.6	1.7	1.6	1.9	2.1	2.3	2.6
Life sciences	8.6	10.7	12.5	13.4	14.1	14.1	14.0	14.6	14.6	14.7	15.8	17.3	16.7	17.7	18.1	18.2	19.1	20.3	21.4
Psychology	3.3	4.3	5.2	5.9	5.9	6.0	5.9	5.9	5.6	5.8	5.8	6.2	6.0	5.9	6.3	7.0	7.0	7.6	8.2
Social sciences	6.5	9.4	10.2	11.2	11.8	12.7	12.6	12.0	11.6	11.5	11.7	11.9	11.4	12.1	11.8	12.8	13.1	13.8	15.3

## CHAPTER 5 | Academic Research and Development

Position and field	1973	1977	1981	1983	1985	1987	1989	1991	1993	1995	1997	1999	2001	2003	2006	2008	2010	2013	2015
Engineering	4.0	4.4	4.4	4.7	4.7	4.9	5.3	5.9	5.3	6.2	5.8	6.0	6.1	5.9	5.6	5.9	6.2	6.8	8.3
Full-time junior faculty <sup>a</sup>																			
All fields	29.3	34.9	34.6	32.8	37.2	37.2	38.7	40.1	43.8	44.0	42.2	43.1	45.4	48.6	53.7	51.6	54.1	56.4	59.5
Physical sciences	5.6	5.7	4.6	4.0	4.6	4.7	4.8	5.0	5.2	5.6	5.3	5.9	5.7	6.4	6.7	6.6	6.9	7.3	7.9
Mathematics and statistics	3.3	3.3	2.6	2.5	2.7	2.4	2.6	2.4	3.2	2.4	2.6	2.2	2.1	2.8	3.3	3.2	3.6	3.8	3.7
Computer and information sciences	NA	NA	0.2	0.3	0.6	0.6	0.9	1.0	1.4	1.2	1.2	1.1	0.9	1.3	1.7	1.9	1.5	1.5	1.9
Life sciences	8.5	10.3	11.3	10.8	11.9	12.3	12.8	13.7	15.0	15.6	15.2	15.5	17.1	18.3	19.1	18.7	19.5	20.8	21.1
Psychology	3.6	4.8	4.8	4.5	5.0	4.9	5.2	5.4	5.2	5.5	4.3	5.4	5.8	5.7	7.1	6.1	6.4	6.1	6.8
Social sciences	5.7	8.2	8.8	8.1	8.4	8.2	7.9	8.4	9.3	9.0	8.5	8.6	9.1	8.9	9.9	10.1	10.4	10.5	10.7
Engineering	2.6	2.7	2.3	2.7	4.0	4.0	4.3	4.3	4.5	4.8	4.7	4.3	4.8	5.1	5.9	5.1	5.7	6.5	7.4
Other full-time positions <sup>b</sup>																			
All fields	7.6	8.8	12.6	13.4	18.1	16.4	19.2	20.2	22.2	23.9	29.1	31.9	34.8	39.9	40.6	43.9	48.2	55.8	62.6
Physical sciences	2.2	2.4	2.9	3.0	3.7	3.4	4.0	4.1	4.8	4.9	6.6	7.3	7.7	8.4	7.2	7.4	7.9	8.8	11.1
Mathematics and statistics	0.2	0.4	0.4	0.3	0.5	0.4	0.5	0.6	0.5	0.6	1.0	0.8	1.1	1.4	1.3	1.7	1.8	2.1	2.5
Computer and information sciences	NA	NA	0.0	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.3	0.3	0.6	0.6	0.9	1.0	1.5	1.4
Life sciences	2.5	2.8	4.0	4.6	6.2	6.0	6.7	7.2	7.7	8.4	9.8	11.2	12.3	14.2	15.5	16.2	18.4	22.2	25.0
Psychology	0.8	1.2	2.2	2.2	2.9	2.8	2.9	2.8	3.9	3.9	4.3	4.6	4.9	6.3	6.5	6.8	7.1	6.9	7.9
Social sciences	1.0	1.2	2.0	2.2	3.2	2.6	3.5	3.5	3.7	3.6	4.0	4.4	4.7	5.0	6.1	6.2	6.9	7.7	8.3
Engineering	0.8	0.8	1.1	1.1	1.5	1.1	1.5	1.8	1.5	2.1	3.2	3.0	3.6	3.9	3.3	4.7	5.1	6.3	6.5

## CHAPTER 5 | Academic Research and Development

Position and field	1973	1977	1981	1983	1985	1987	1989	1991	1993	1995	1997	1999	2001	2003	2006	2008	2010	2013	2015
Postdocs																			
All fields	4.2	7.6	8.5	8.3	8.7	9.3	11.5	9.9	13.3	16.8	18.9	18.5	17.5	15.7	23.3	17.8	22.8	20.2	19.2
Physical sciences	1.8	2.4	2.1	1.6	2.1	2.3	2.7	2.2	3.5	4.4	3.8	3.4	3.0	2.6	3.9	3.3	4.6	4.0	3.3
Mathematics and statistics	0.0	0.1	0.1	0.1	0.1	0.3	0.2	0.1	0.0	0.5	0.5	0.6	0.8	0.5	1.0	0.5	0.7	0.4	0.5
Computer and information sciences	NA	NA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.0	0.1	0.1	0.2	0.3	0.2	0.3
Life sciences	1.9	4.0	5.2	5.1	5.2	5.6	6.8	6.4	8.2	9.2	10.8	11.7	11.0	10.0	12.8	10.3	12.2	11.9	11.7
Psychology	0.2	0.5	0.6	0.6	0.7	0.7	0.8	0.5	0.4	1.1	1.3	1.2	1.2	0.9	1.7	1.0	1.1	1.0	0.8
Social sciences	0.1	0.3	0.3	0.6	0.3	0.1	0.4	0.3	0.2	0.4	0.7	0.5	0.6	0.5	0.9	0.3	0.8	0.4	0.4
Engineering	0.2	0.4	0.2	0.3	0.2	0.5	0.6	0.5	1.0	1.2	1.7	1.1	0.9	1.1	3.0	2.1	3.1	2.4	2.2
Part-time positions <sup>c</sup>																			
All fields	2.9	3.4	4.0	6.0	6.5	5.7	6.2	7.4	5.9	5.5	8.9	8.2	9.0	13.3	15.7	15.6	17.0	18.5	19.8
Physical sciences	0.7	0.7	0.7	1.1	1.1	0.8	0.7	1.2	1.0	0.9	1.2	1.0	1.0	1.1	1.5	1.6	2.0	2.5	2.8
Mathematics and statistics	0.1	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.5	0.7	0.7	0.6	0.9	1.2	1.0	1.1	1.1	1.2
Computer and information sciences	NA	NA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.2	0.1	0.1	0.3	0.3	0.3
Life sciences	0.9	1.0	1.2	1.7	1.7	1.6	1.9	2.3	1.6	1.2	2.9	2.6	2.4	4.0	4.4	4.3	4.6	5.2	5.2
Psychology	0.4	0.6	0.8	1.0	1.0	1.0	1.0	1.2	1.2	1.1	1.1	1.3	1.8	3.2	3.6	3.7	3.8	4.2	4.1
Social sciences	0.7	0.8	1.0	1.6	2.2	1.8	1.7	2.0	1.3	1.3	2.6	2.2	2.7	3.1	3.7	4.0	4.0	4.2	4.4
Engineering	0.1	0.1	0.2	0.4	0.3	0.3	0.5	0.5	0.5	0.4	0.3	0.4	0.4	0.8	1.1	0.9	1.2	1.1	1.8





CHAPTER 5 | Academic Research and Development

NA = not available.

<sup>a</sup> Full-time junior faculty includes assistant professors and instructors from 1973 to 1995; from 1997 to 2015, full-time junior faculty includes assistant professors.

<sup>b</sup> Other full-time positions include those such as research associates, adjunct positions, lecturers, and administrative positions from 1973 to 1995; from 1997 to 2015, other full-time positions also include instructors.

<sup>c</sup> Part-time positions exclude those employed part time because they are students or retired.

**Note(s)**

Detail may not add to total because of rounding. Academic employment is limited to U.S. doctorate holders employed at 2- or 4-year colleges or universities, medical schools, and university research institutes. Physical sciences include earth, atmospheric, and ocean sciences; life sciences include biological, agricultural, environmental, and health sciences. Numbers are rounded to the nearest 100.

**Source(s)**

National Science Foundation, National Center for Science and Engineering Statistics, special tabulations (2017) of the 1973–2015 Survey of Doctorate Recipients (SDR).

*Science and Engineering Indicators 2018*

## CHAPTER 5 | Academic Research and Development

APPENDIX TABLE 5-15

## S&amp;E doctorate holders employed in academia, by type of position, sex, and degree field: 1973–2015

(Thousands)

Position, sex, and field	1973	1977	1981	1983	1985	1987	1989	1991	1993	1995	1997	1999	2001	2003	2006	2008	2010	2013	2015
All positions																			
Both sexes, all fields	118.0	145.5	167.1	176.1	190.2	195.9	206.6	210.6	213.8	217.5	232.5	240.2	245.5	259.5	272.8	276.5	294.8	309.0	329.3
Physical sciences	25.5	29.2	30.0	29.9	32.2	32.8	33.6	33.7	35.0	35.7	37.5	38.7	38.6	39.9	39.6	39.9	43.7	44.9	48.4
Mathematics and statistics	9.7	11.7	12.4	12.9	13.6	13.8	14.5	15.2	15.5	14.6	15.6	15.2	14.9	16.7	17.4	18.0	18.7	19.0	20.9
Computer and information sciences	NA	NA	0.3	0.5	0.8	1.1	1.5	2.0	2.5	3.1	3.3	3.7	3.8	5.2	5.8	6.9	7.3	8.4	9.1
Life sciences	34.9	42.6	51.3	54.9	58.7	61.3	64.8	66.9	68.2	71.6	77.3	81.9	84.3	90.0	95.5	94.2	102.0	109.8	112.7
Psychology	12.2	16.2	20.1	21.0	23.1	23.7	25.0	25.2	25.0	26.1	27.3	29.0	30.4	31.8	35.0	34.5	35.4	36.3	38.7
Social sciences	23.4	31.1	36.9	38.9	42.0	42.2	44.5	44.8	44.4	42.5	44.9	46.2	46.9	48.1	50.0	52.5	54.9	55.9	59.7
Engineering	12.4	14.8	16.1	18.1	19.9	21.2	22.9	22.8	23.1	23.8	26.6	25.5	26.6	27.8	29.6	30.4	32.8	34.7	39.7
Male, all fields	107.2	129.0	144.0	149.8	159.2	162.0	168.0	168.7	166.9	165.1	173.3	175.8	175.0	180.7	182.7	182.3	189.6	195.0	206.0
Physical sciences	24.0	27.4	27.8	27.7	29.8	30.0	30.5	30.8	31.4	31.4	32.4	33.4	32.8	33.7	32.3	32.1	34.4	34.5	36.9
Mathematics and statistics	9.0	10.8	11.3	11.8	12.3	12.5	13.0	13.9	13.7	12.8	13.5	12.9	12.6	13.8	14.1	14.1	14.4	14.6	15.7
Computer and information sciences	NA	NA	0.3	0.4	0.7	0.9	1.3	1.6	2.1	2.5	2.6	2.9	2.9	4.3	4.5	5.5	5.8	6.7	7.2
Life sciences	30.8	36.6	42.9	44.5	46.7	47.9	49.5	50.1	49.4	50.1	52.6	55.1	54.9	56.6	57.9	55.5	58.7	61.8	60.7
Psychology	10.0	12.6	14.9	15.1	16.0	16.2	16.5	16.0	14.7	14.7	15.4	15.6	15.7	15.6	16.0	15.6	15.6	15.2	16.4
Social sciences	21.0	26.9	30.9	32.3	34.3	33.9	35.1	34.6	33.4	31.3	31.9	32.4	31.7	32.0	31.9	33.1	33.4	33.3	36.4

## CHAPTER 5 | Academic Research and Development

Position, sex, and field	1973	1977	1981	1983	1985	1987	1989	1991	1993	1995	1997	1999	2001	2003	2006	2008	2010	2013	2015
Engineering	12.3	14.7	15.9	17.8	19.5	20.6	22.2	21.8	22.1	22.3	24.8	23.4	24.3	24.8	26.0	26.3	27.3	28.9	32.8
Female, all fields	10.7	16.5	23.1	26.5	31.1	34.0	38.7	41.9	46.9	52.4	59.2	64.4	70.5	78.7	90.1	94.2	105.2	114.0	123.3
Physical sciences	1.4	1.7	2.1	2.2	2.5	2.8	3.1	3.0	3.6	4.4	5.1	5.3	5.8	6.1	7.3	7.8	9.3	10.4	11.5
Mathematics and statistics	0.6	0.9	1.1	1.1	1.3	1.4	1.5	1.4	1.7	1.8	2.1	2.2	2.3	2.9	3.3	3.9	4.3	4.5	5.2
Computer and information sciences	NA	NA	0.0	0.1	0.1	0.1	0.2	0.4	0.5	0.6	0.7	0.8	0.8	1.0	1.2	1.4	1.5	1.8	1.9
Life sciences	4.0	6.0	8.4	10.3	12.1	13.3	15.3	16.8	18.8	21.5	24.7	26.7	29.4	33.4	37.6	38.7	43.3	48.0	52.0
Psychology	2.2	3.6	5.2	5.9	7.1	7.6	8.5	9.2	10.3	11.5	11.9	13.4	14.7	16.2	19.0	18.9	19.8	21.1	22.3
Social sciences	2.4	4.2	6.0	6.5	7.7	8.3	9.4	10.2	10.9	11.2	13.0	13.8	15.2	16.2	18.2	19.5	21.5	22.6	23.4
Engineering	0.1	0.1	0.2	0.3	0.4	0.6	0.7	1.0	1.1	1.5	1.7	2.1	2.3	3.0	3.6	4.1	5.5	5.7	7.0
Full-time senior faculty <sup>a</sup>																			
Both sexes, all fields	74.0	90.7	107.3	115.6	119.7	127.3	131.0	133.0	128.6	127.3	131.9	136.7	136.9	142.0	139.4	147.5	152.8	158.0	168.2
Physical sciences	15.2	18.0	19.7	20.2	20.8	21.5	21.4	21.2	20.6	20.0	20.5	20.7	20.7	21.3	20.2	20.9	22.4	22.2	23.2
Mathematics and statistics	5.9	7.6	9.1	9.7	10.0	10.5	10.9	11.8	11.5	10.6	10.8	10.8	10.2	11.2	10.7	11.6	11.5	11.7	13.1
Computer and information sciences	NA	NA	0.0	0.1	0.1	0.3	0.4	0.9	0.9	1.7	1.7	2.1	2.4	2.9	3.2	3.8	4.2	4.9	5.3
Life sciences	21.0	24.6	29.6	32.6	33.7	35.8	36.4	37.4	35.8	37.2	38.3	40.6	41.2	43.4	43.7	44.8	47.2	49.8	49.7
Psychology	7.3	9.1	11.7	12.8	13.5	14.3	15.0	15.3	14.3	14.5	15.3	15.6	15.9	15.8	16.1	17.0	17.0	18.0	19.1
Social sciences	15.9	20.7	24.9	26.3	27.7	29.5	31.1	30.6	29.9	28.1	28.8	30.1	29.6	30.7	29.3	32.0	32.8	33.0	35.9
Engineering	8.7	10.7	12.4	13.7	13.9	15.3	15.9	15.8	15.7	15.3	16.6	16.6	16.8	16.8	16.2	17.6	17.7	18.5	21.8
Male, all fields	69.7	84.7	98.7	104.9	107.4	113.2	115.2	115.5	110.3	107.0	109.4	110.6	108.3	109.7	104.6	108.1	109.9	111.4	116.1

## CHAPTER 5 | Academic Research and Development

Position, sex, and field	1973	1977	1981	1983	1985	1987	1989	1991	1993	1995	1997	1999	2001	2003	2006	2008	2010	2013	2015
Physical sciences	14.7	17.4	19.0	19.4	20.0	20.6	20.3	20.3	19.5	18.8	18.9	19.0	18.6	18.9	17.6	17.9	18.9	18.2	18.6
Mathematics and statistics	5.6	7.2	8.6	9.1	9.3	9.8	10.0	10.8	10.5	9.8	10.0	9.7	9.1	9.9	9.2	9.6	9.4	9.9	10.4
Computer and information sciences	NA	NA	0.0	0.1	0.1	0.3	0.4	0.8	0.8	1.4	1.3	1.6	2.0	2.4	2.6	3.1	3.5	3.9	4.3
Life sciences	19.5	22.7	26.9	29.1	29.4	31.0	31.0	31.4	29.3	29.3	30.0	31.1	30.4	30.9	30.4	30.2	31.0	32.2	30.4
Psychology	6.4	7.8	9.7	10.5	10.8	11.2	11.5	11.3	10.2	10.1	10.7	10.3	10.3	9.5	9.1	9.3	9.3	9.2	9.9
Social sciences	14.7	18.8	22.3	23.2	24.1	25.3	26.4	25.5	24.7	22.8	22.4	23.2	21.9	22.4	20.7	21.7	21.9	21.5	23.8
Engineering	8.7	10.7	12.2	13.6	13.7	15.1	15.7	15.4	15.3	14.8	16.1	15.8	15.9	15.7	15.0	16.3	16.0	16.5	18.8
Female, all fields	4.3	6.0	8.6	10.7	12.4	14.0	15.8	17.6	18.3	20.3	22.5	26.1	28.6	32.3	34.8	39.4	42.8	46.6	52.0
Physical sciences	0.5	0.6	0.7	0.8	0.9	1.0	1.1	0.9	1.1	1.2	1.5	1.9	2.1	2.4	2.7	3.1	3.6	4.0	4.6
Mathematics and statistics	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0	1.0	0.8	0.8	1.1	1.1	1.3	1.4	1.9	2.1	1.8	2.7
Computer and information sciences	NA	NA	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.3	0.3	0.5	0.4	0.5	0.6	0.6	0.7	0.9	1.0
Life sciences	1.5	1.9	2.7	3.5	4.3	4.8	5.4	6.1	6.5	7.8	8.3	9.5	10.8	12.5	13.3	14.6	16.2	17.5	19.3
Psychology	0.8	1.2	2.0	2.4	2.7	3.1	3.5	4.0	4.1	4.4	4.6	5.4	5.6	6.3	7.0	7.7	7.6	8.7	9.2
Social sciences	1.1	1.8	2.6	3.1	3.6	4.1	4.7	5.1	5.2	5.3	6.4	7.0	7.7	8.3	8.7	10.2	10.9	11.6	12.2
Engineering	0.0	0.0	0.1	0.2	0.2	0.2	0.2	0.4	0.3	0.5	0.5	0.8	0.9	1.1	1.2	1.3	1.7	2.0	3.0
Full-time junior faculty <sup>b</sup>																			
Both sexes, all fields	29.3	34.9	34.6	32.8	37.2	37.2	38.7	40.1	43.8	44.0	42.2	43.1	45.4	48.6	53.7	51.6	54.1	56.4	59.5
Physical sciences	5.6	5.7	4.6	4.0	4.6	4.7	4.8	5.0	5.2	5.6	5.3	5.9	5.7	6.4	6.7	6.6	6.9	7.3	7.9
Mathematics and statistics	3.3	3.3	2.6	2.5	2.7	2.4	2.6	2.4	3.2	2.4	2.6	2.2	2.1	2.8	3.3	3.2	3.6	3.8	3.7

## CHAPTER 5 | Academic Research and Development

Position, sex, and field	1973	1977	1981	1983	1985	1987	1989	1991	1993	1995	1997	1999	2001	2003	2006	2008	2010	2013	2015
Computer and information sciences	NA	NA	0.2	0.3	0.6	0.6	0.9	1.0	1.4	1.2	1.2	1.1	0.9	1.3	1.7	1.9	1.5	1.5	1.9
Life sciences	8.5	10.3	11.3	10.8	11.9	12.3	12.8	13.7	15.0	15.6	15.2	15.5	17.1	18.3	19.1	18.7	19.5	20.8	21.1
Psychology	3.6	4.8	4.8	4.5	5.0	4.9	5.2	5.4	5.2	5.5	4.7	5.4	5.8	5.7	7.1	6.1	6.4	6.1	6.8
Social sciences	5.7	8.2	8.8	8.1	8.4	8.2	7.9	8.4	9.3	9.0	8.5	8.6	9.1	8.9	9.9	10.1	10.4	10.5	10.7
Engineering	2.6	2.7	2.3	2.7	4.0	4.0	4.3	4.3	4.5	4.8	4.7	4.3	4.8	5.1	5.9	5.1	5.7	6.5	7.4
Male, all fields	26.0	28.9	27.1	25.2	27.8	27.2	27.6	28.1	29.7	28.5	27.0	27.5	28.2	29.2	31.1	30.1	30.1	31.1	34.2
Physical sciences	5.2	5.2	4.1	3.5	3.9	4.1	4.1	4.1	4.2	4.1	3.9	4.5	4.2	4.9	4.9	4.8	4.9	5.3	5.6
Mathematics and statistics	3.1	2.9	2.2	2.2	2.3	2.0	2.2	2.2	2.7	2.0	2.0	1.6	1.5	2.0	2.3	2.3	2.5	2.4	2.3
Computer and information sciences	NA	NA	0.2	0.3	0.5	0.5	0.8	0.8	1.1	1.0	1.0	0.9	0.7	1.0	1.2	1.4	1.1	1.1	1.4
Life sciences	7.5	8.4	8.9	8.1	8.5	8.5	8.4	8.8	9.5	9.5	8.9	9.3	10.2	10.3	10.4	9.8	9.7	10.2	10.6
Psychology	2.7	3.3	3.0	2.6	2.7	2.7	2.9	3.0	2.3	2.4	1.8	2.4	2.3	2.3	2.6	2.4	2.2	2.0	2.5
Social sciences	5.0	6.5	6.5	5.9	6.0	5.6	5.2	5.3	5.9	5.5	5.3	5.1	5.2	4.5	5.0	5.6	5.7	5.4	5.9
Engineering	2.6	2.7	2.2	2.6	3.8	3.8	4.0	3.9	4.0	4.1	4.2	3.8	4.1	4.3	4.6	3.8	3.9	4.8	5.8
Female, all fields	3.3	6.0	7.5	7.7	9.4	10.0	11.2	12.0	14.1	15.6	15.2	15.6	17.2	19.3	22.6	21.5	23.9	25.3	25.3
Physical sciences	0.3	0.5	0.5	0.5	0.6	0.7	0.7	0.9	1.1	1.5	1.4	1.4	1.5	1.5	1.8	1.8	2.0	2.1	2.3
Mathematics and statistics	0.2	0.4	0.4	0.3	0.4	0.4	0.4	0.3	0.5	0.5	0.6	0.7	0.5	0.8	1.0	1.0	1.1	1.4	1.3
Computer and information sciences	NA	NA	0.0	0.0	0.1	0.1	0.1	0.2	0.3	0.2	0.3	0.2	0.2	0.3	0.4	0.5	0.4	0.3	0.5
Life sciences	1.1	1.9	2.4	2.7	3.4	3.8	4.5	4.9	5.5	6.1	6.3	6.2	6.9	8.0	8.7	8.9	9.8	10.6	10.5
Psychology	0.9	1.5	1.8	1.9	2.3	2.2	2.3	2.4	2.9	3.1	2.9	3.0	3.5	3.4	4.5	3.7	4.2	4.1	4.4

## CHAPTER 5 | Academic Research and Development

Position, sex, and field	1973	1977	1981	1983	1985	1987	1989	1991	1993	1995	1997	1999	2001	2003	2006	2008	2010	2013	2015
Social sciences	0.8	1.7	2.3	2.1	2.4	2.6	2.7	3.0	3.4	3.5	3.2	3.5	3.9	4.4	4.9	4.4	4.7	5.2	4.8
Engineering	0.0	0.0	0.1	0.1	0.2	0.2	0.3	0.4	0.5	0.7	0.6	0.5	0.7	0.8	1.3	1.3	1.8	1.6	1.6
Other full-time positions <sup>c</sup>																			
Both sexes, all fields	7.6	8.8	12.6	13.4	18.1	16.4	19.2	20.2	22.2	23.9	29.1	31.9	34.8	39.9	40.6	43.9	48.2	55.8	62.6
Physical sciences	2.2	2.4	2.9	3.0	3.7	3.4	4.0	4.1	4.8	4.9	6.6	7.3	7.7	8.4	7.2	7.4	7.9	8.8	11.2
Mathematics and statistics	0.2	0.4	0.4	0.3	0.5	0.4	0.5	0.7	0.5	0.6	1.0	0.8	1.1	1.4	1.3	1.7	1.8	2.1	2.4
Computer and information sciences	NA	NA	0.0	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.3	0.3	0.7	0.6	0.9	1.0	1.5	1.3
Life sciences	2.5	2.8	4.0	4.6	6.2	6.0	6.7	7.2	7.7	8.4	9.8	11.2	12.3	14.2	15.5	16.2	18.4	22.2	25.0
Psychology	0.8	1.2	2.2	2.2	2.9	2.8	2.9	2.8	3.9	3.9	4.3	4.6	4.9	6.3	6.5	6.8	7.1	6.9	7.9
Social sciences	1.0	1.2	2.0	2.2	3.2	2.6	3.5	3.5	3.7	3.6	4.0	4.4	4.7	5.0	6.1	6.2	6.9	7.7	8.3
Engineering	0.8	0.8	1.1	1.1	1.5	1.1	1.5	1.8	1.5	2.1	3.2	3.0	3.6	3.9	3.3	4.7	5.1	6.3	6.5
Male, all fields	6.5	7.4	10.0	10.3	14.3	12.0	13.9	14.4	15.4	16.1	19.5	22.4	23.1	26.0	25.6	26.2	28.1	32.3	35.2
Physical sciences	2.1	2.2	2.6	2.7	3.4	2.9	3.5	3.6	4.2	4.1	5.6	6.4	6.6	7.1	5.9	5.6	5.9	6.5	8.5
Mathematics and statistics	0.1	0.4	0.3	0.2	0.4	0.5	0.4	0.5	0.4	0.4	0.8	0.7	0.9	1.0	0.9	1.2	1.1	1.3	1.8
Computer and information sciences	NA	NA	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.2	0.2	0.6	0.6	0.7	0.9	1.1	1.0
Life sciences	2.0	2.2	3.0	3.2	4.6	4.1	4.6	4.9	5.1	5.6	6.0	7.2	7.3	8.3	9.0	8.6	9.5	11.1	12.3
Psychology	0.7	0.9	1.4	1.4	1.8	1.6	1.5	1.2	1.9	1.7	1.9	2.2	2.1	2.6	2.8	2.6	2.7	2.5	2.4
Social sciences	0.8	0.9	1.6	1.7	2.5	1.8	2.4	2.4	2.2	2.1	2.2	2.7	2.7	3.1	3.5	3.3	3.7	4.3	4.1
Engineering	0.8	0.8	1.1	1.0	1.5	1.0	1.4	1.7	1.5	2.0	2.9	2.7	3.2	3.3	2.8	3.9	4.3	5.2	5.2

## CHAPTER 5 | Academic Research and Development

Position, sex, and field	1973	1977	1981	1983	1985	1987	1989	1991	1993	1995	1997	1999	2001	2003	2006	2008	2010	2013	2015
Female, all fields	1.1	1.4	2.6	3.1	3.8	4.5	5.3	5.8	6.7	7.7	9.4	9.6	11.6	13.9	15.0	17.7	20.1	23.5	27.5
Physical sciences	0.1	0.2	0.3	0.3	0.3	0.5	0.5	0.5	0.6	0.8	1.0	0.8	1.1	1.3	1.4	1.6	2.0	2.3	2.6
Mathematics and statistics	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.1	0.2	0.1	0.2	0.3	0.3	0.5	0.7	0.7	0.7
Computer and information sciences	NA	NA	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2
Life sciences	0.6	0.6	1.0	1.3	1.6	1.8	2.1	2.4	2.6	2.8	3.7	4.1	5.0	5.9	6.5	7.6	8.9	11.0	12.9
Psychology	0.2	0.3	0.8	0.8	1.1	1.3	1.4	1.6	2.0	2.2	2.4	2.5	2.8	3.5	3.7	4.2	4.4	4.4	5.4
Social sciences	0.2	0.2	0.4	0.5	0.7	0.8	1.1	1.1	1.5	1.5	1.8	1.7	1.9	1.9	2.6	2.9	3.2	3.3	4.2
Engineering	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.3	0.3	0.4	0.6	0.5	0.8	0.7	0.9	1.5
Postdoctorates																			
Both sexes, all fields	4.2	7.6	8.5	8.3	8.7	9.3	11.5	9.9	13.3	16.8	18.9	18.5	17.5	15.7	23.3	17.8	22.8	20.2	19.2
Physical sciences	1.8	2.4	2.1	1.6	2.1	2.3	2.7	2.2	3.5	4.4	3.8	3.4	3.0	2.6	3.9	3.3	4.6	4.0	3.3
Mathematics and statistics	0.0	0.1	0.1	0.1	0.1	0.3	0.2	0.1	0.0	0.5	0.5	0.6	0.8	0.5	1.0	0.5	0.7	0.4	0.5
Computer and information sciences	NA	NA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.0	0.1	0.1	0.2	0.3	0.2	0.3
Life sciences	1.9	3.9	5.2	5.1	5.3	5.4	6.8	6.3	8.2	9.1	10.8	11.6	11.0	10.0	12.8	10.3	12.2	11.9	11.7
Psychology	0.2	0.5	0.6	0.6	0.7	0.7	0.8	0.5	0.4	1.1	1.3	1.2	1.2	0.9	1.7	1.0	1.1	1.0	0.8
Social sciences	0.1	0.3	0.3	0.6	0.3	0.1	0.4	0.3	0.2	0.4	0.7	0.5	0.6	0.5	0.9	0.3	0.8	0.4	0.4
Engineering	0.2	0.4	0.2	0.3	0.2	0.5	0.6	0.5	1.0	1.2	1.7	1.1	0.9	1.1	3.0	2.1	3.1	2.4	2.2
Male, all fields	3.5	6.1	6.3	5.8	6.0	6.8	8.2	6.8	9.2	11.1	12.1	11.2	10.5	9.8	13.8	10.8	13.8	12.0	11.0
Physical sciences	1.6	2.1	1.8	1.4	1.7	1.9	2.2	1.8	2.9	3.7	3.0	2.7	2.3	2.1	2.9	2.5	3.4	2.8	2.3

## CHAPTER 5 | Academic Research and Development

Position, sex, and field	1973	1977	1981	1983	1985	1987	1989	1991	1993	1995	1997	1999	2001	2003	2006	2008	2010	2013	2015
Mathematics and statistics	0.0	0.1	0.1	0.1	0.1	0.2	0.2	0.0	0.0	0.3	0.3	0.5	0.6	0.3	0.8	0.4	0.6	0.3	0.4
Computer and information sciences	NA	NA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.1	0.1	0.2	0.2	0.2	0.3
Life sciences	1.5	2.9	3.6	3.3	3.4	3.8	4.7	4.1	5.2	5.5	6.2	6.6	6.2	5.7	6.7	5.5	6.6	6.6	5.8
Psychology	0.1	0.4	0.5	0.3	0.4	0.3	0.4	0.3	0.1	0.3	0.6	0.2	0.4	0.4	0.5	0.4	0.4	0.2	0.3
Social sciences	0.1	0.2	0.1	0.4	0.2	0.1	0.2	0.2	0.1	0.2	0.5	0.3	0.3	0.3	0.4	0.1	0.4	0.2	0.2
Engineering	0.2	0.4	0.2	0.3	0.2	0.5	0.5	0.4	0.9	1.0	1.4	0.9	0.7	0.9	2.4	1.7	2.2	1.8	1.7
Female, all fields	0.6	1.6	2.2	2.5	2.6	2.6	3.3	3.0	4.1	5.7	6.8	7.3	6.9	6.0	9.5	7.0	8.9	8.2	8.2
Physical sciences	0.2	0.3	0.2	0.2	0.3	0.3	0.4	0.3	0.7	0.7	0.7	0.8	0.7	0.5	1.0	0.8	1.2	1.2	1.0
Mathematics and statistics	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.1	0.2	0.2	0.2	0.1	0.1	0.1	0.1
Computer and information sciences	NA	NA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	s	0.1	s	0.1
Life sciences	0.4	1.1	1.6	1.8	1.8	1.8	2.2	2.3	3.0	3.7	4.6	5.1	4.7	4.3	6.1	4.8	5.6	5.2	5.8
Psychology	0.0	0.1	0.2	0.2	0.3	0.4	0.5	0.3	0.3	0.7	0.8	0.9	0.8	0.5	1.1	0.6	0.7	0.8	0.5
Social sciences	0.0	0.1	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.3	0.2	0.5	0.2	0.5	0.2	0.2
Engineering	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.2	0.2	0.2	0.2	0.6	0.4	0.8	0.6	0.5
Part-time positions <sup>d</sup>																			
Both sexes, all fields	2.9	3.4	4.0	6.0	6.5	5.7	6.2	7.4	5.9	5.5	8.9	8.2	9.0	13.3	15.7	15.6	17.0	18.5	19.8
Physical sciences	0.7	0.7	0.7	1.1	1.1	0.8	0.7	1.2	1.0	0.9	1.2	1.0	1.0	1.1	1.5	1.6	2.0	2.5	2.8
Mathematics and statistics	0.1	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.5	0.7	0.7	0.6	0.9	1.2	1.0	1.1	1.1	1.2
Computer and information sciences	NA	NA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.2	0.1	0.1	0.3	0.3	0.3



## CHAPTER 5 | Academic Research and Development

Position, sex, and field	1973	1977	1981	1983	1985	1987	1989	1991	1993	1995	1997	1999	2001	2003	2006	2008	2010	2013	2015
Life sciences	0.9	1.0	1.2	1.7	1.7	1.6	1.9	2.3	1.6	1.2	2.9	2.6	2.4	4.0	4.4	4.3	4.6	5.2	5.2
Psychology	0.4	0.6	0.8	1.0	1.0	1.0	1.0	1.2	1.2	1.1	1.1	1.3	1.8	3.2	3.6	3.7	3.8	4.2	4.1
Social sciences	0.7	0.8	1.0	1.6	2.2	1.8	1.7	2.0	1.3	1.3	2.6	2.2	2.7	3.1	3.7	4.0	4.0	4.2	4.4
Engineering	0.1	0.1	0.2	0.4	0.3	0.3	0.5	0.5	0.5	0.4	0.3	0.4	0.4	0.8	1.1	0.9	1.2	1.1	1.8
Male, all fields	1.5	1.8	1.9	3.5	3.6	2.7	3.1	3.8	2.3	2.4	4.4	3.4	3.8	6.1	7.6	7	7.6	8.0	9.5
Physical sciences	0.4	0.5	0.4	0.9	0.7	0.5	0.4	0.8	0.7	0.7	0.8	0.7	0.6	0.7	1.1	1.1	1.3	1.7	1.9
Mathematics and statistics	0.1	0.2	0.1	0.1	0.1	0.1	0.2	0.2	0.1	0.3	0.3	0.4	0.3	0.6	0.9	0.6	0.7	0.7	0.8
Computer and information sciences	NA	NA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.1	s	0.2	s	0.2
Life sciences	0.4	0.4	0.4	0.7	0.7	0.5	0.8	1.0	0.4	0.3	1.3	0.8	0.7	1.3	1.5	1.4	1.8	1.6	1.6
Psychology	0.1	0.2	0.3	0.4	0.4	0.4	0.3	0.2	0.1	0.1	0.3	0.3	0.3	0.8	0.9	1.0	1.0	1.2	1.3
Social sciences	0.4	0.4	0.5	1.1	1.4	1.0	0.8	1.2	0.5	0.7	1.4	1.0	1.4	1.7	2.2	2.3	1.8	2.0	2.4
Engineering	0.1	0.1	0.2	0.3	0.3	0.3	0.5	0.5	0.4	0.3	0.2	0.2	0.4	0.7	1.0	0.6	0.8	0.6	1.3
Female, all fields	1.4	1.6	2.1	2.5	2.9	3.0	3.1	3.5	3.6	3.1	4.5	4.9	5.1	7.3	8.1	8.6	9.4	10.5	10.3
Physical sciences	0.3	0.2	0.3	0.3	0.4	0.4	0.3	0.4	0.3	0.2	0.4	0.4	0.3	0.4	0.5	0.5	0.7	0.8	1.0
Mathematics and statistics	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.4	0.3	0.3	0.2	0.3	0.4	0.4	0.4	0.4
Computer and information sciences	NA	NA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	s	0.1	0.1	0.1
Life sciences	0.5	0.6	0.7	0.9	1.0	1.1	1.1	1.3	1.2	0.9	1.6	1.8	1.7	2.7	3.0	2.9	2.9	3.6	3.5
Psychology	0.3	0.4	0.5	0.6	0.7	0.7	0.7	0.9	1.1	1.0	0.8	1.0	1.5	2.4	2.8	2.7	2.8	3.0	2.8
Social sciences	0.3	0.3	0.5	0.5	0.9	0.8	0.8	0.8	0.8	0.7	1.2	1.2	1.3	1.4	1.5	1.7	2.2	2.2	2.0



CHAPTER 5 | Academic Research and Development

Position, sex, and field	1973	1977	1981	1983	1985	1987	1989	1991	1993	1995	1997	1999	2001	2003	2006	2008	2010	2013	2015
Engineering	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.3	0.3	0.5	0.4

NA = not available; s = suppressed for reasons of confidentiality and/or reliability.

<sup>a</sup> Full-time senior faculty includes full professors and associate professors.

<sup>b</sup> Full-time junior faculty includes assistant professors and instructors from 1973 to 1995; from 1997 to 2015, full-time junior faculty includes assistant professors.

<sup>c</sup> Other full-time positions include those such as research associates, adjunct positions, lecturers, and administrative positions from 1973 to 1995; from 1997 to 2015, other full-time positions also include instructors.

<sup>d</sup> Part-time positions exclude those employed part time because they are students or retired.

**Note(s)**

Detail may not add to total because of rounding. Academic employment is limited to U.S. doctorate holders employed at 2- or 4-year colleges or universities, medical schools, and university research institutes. Physical sciences include earth, atmospheric, and ocean sciences; life sciences include biological, agricultural, environmental, and health sciences. Numbers are rounded to the nearest 100.

**Source(s)**

National Science Foundation, National Center for Science and Engineering Statistics, special tabulations (2017) of the 1973–2015 Survey of Doctorate Recipients (SDR).

*Science and Engineering Indicators 2018*

CHAPTER 5 | Academic Research and Development

APPENDIX TABLE 5-16

S&E doctorate holders employed in academia, by type of position, race, ethnicity, and degree field: 1973–2015																			
(Thousands)																			
Position, race, ethnicity, and field	1973	1977	1981	1983	1985	1987	1989	1991	1993	1995	1997	1999	2001	2003	2006	2008	2010	2013	2015
All positions																			
All races and ethnicities, all fields	118.0	145.4	167.1	176.1	190.2	195.9	206.6	210.6	213.8	217.5	232.5	240.2	245.5	259.5	272.8	276.5	294.8	309.0	329.3
Physical sciences	25.5	29.2	29.9	29.9	32.2	32.8	33.6	33.8	35.0	35.8	37.5	38.7	38.6	39.9	39.6	39.9	43.7	44.9	48.4
Mathematics and statistics	9.7	11.7	12.4	12.9	13.6	13.8	14.5	15.2	15.5	14.6	15.6	15.2	14.9	16.7	17.3	18.0	18.7	19.0	20.9
Computer and information sciences	NA	NA	0.3	0.5	0.8	1.1	1.5	2.0	2.5	3.1	3.3	3.7	3.8	5.2	5.8	6.9	7.3	8.4	9.1
Life sciences	34.9	42.6	51.3	54.8	58.7	61.2	64.8	66.9	68.2	71.6	77.3	81.9	84.3	90.0	95.5	94.2	102.0	109.8	112.7
Psychology	12.2	16.2	20.1	21.0	23.1	23.7	25.0	25.2	25.0	26.1	27.3	29.0	30.4	31.8	35.0	34.5	35.4	36.3	38.7
Social sciences	23.4	31.1	36.9	38.8	41.9	42.1	44.5	44.8	44.4	42.5	44.9	46.2	46.9	48.1	50.1	52.5	54.9	55.9	59.7
Engineering	12.4	14.8	16.1	18.1	19.9	21.2	22.8	22.8	23.1	23.8	26.6	25.5	26.6	27.8	29.6	30.4	32.8	34.7	39.7
White, all fields	107.7	131.4	149.9	157.2	168.4	172.8	181.0	183.5	181.8	182.6	193.2	198.2	201.0	204.3	212.2	211.8	219.7	225.8	237.0
Physical sciences	23.0	26.1	26.6	26.4	28.3	28.5	29.2	29.5	29.3	29.5	31.0	32.3	32.0	32.1	31.4	31.5	33.5	33.8	35.6
Mathematics and statistics	8.8	10.6	11.0	11.5	11.9	12.2	12.6	13.0	12.9	12.0	12.6	12.3	12.1	13.0	13.1	13.6	13.7	13.6	15.1
Computer and information sciences	NA	NA	0.2	0.4	0.6	0.9	1.1	1.4	1.6	2.1	2.2	2.7	2.7	3.4	3.7	4.0	4.1	4.8	5.4
Life sciences	32.1	38.8	46.1	49.3	52.7	54.6	57.6	59.2	59.1	61.3	64.9	67.2	68.4	70.4	74.2	72.5	76.9	81.1	81.6
Psychology	11.6	15.2	18.8	19.6	21.3	22.0	23.2	23.2	22.9	23.6	24.4	25.5	26.6	27.1	29.5	28.7	28.6	28.9	30.6
Social sciences	21.4	28.2	33.1	34.7	37.2	37.5	39.4	39.1	38.6	36.5	38.0	38.9	39.0	39.1	40.7	41.7	43.0	42.6	45.8

## CHAPTER 5 | Academic Research and Development

Position, race, ethnicity, and field	1973	1977	1981	1983	1985	1987	1989	1991	1993	1995	1997	1999	2001	2003	2006	2008	2010	2013	2015
Engineering	10.8	12.6	14.0	15.2	16.4	17.2	18.1	18.2	17.5	17.6	20.2	19.4	20.2	19.2	19.5	19.7	20.0	21.1	22.9
Asian or Pacific Islander, all fields	5.0	6.7	10.8	11.8	14.0	15.0	16.3	16.8	20.9	22.4	25.4	26.3	27.6	34.7	37.4	39.7	46.9	52.1	59.0
Physical sciences	1.2	1.5	2.1	2.4	2.9	3.1	3.1	2.8	4.2	4.6	4.6	4.6	4.5	5.5	5.6	5.7	7.0	7.6	9.3
Mathematics and statistics	0.4	0.5	0.9	1.0	1.1	1.1	1.3	1.6	1.9	1.8	2.2	2.1	2.0	2.8	3.0	3.2	3.7	4.0	4.4
Computer and information sciences	NA	NA	0.1	0.1	0.1	0.1	0.3	0.5	0.7	0.9	0.9	0.9	0.9	1.5	1.7	2.5	2.7	3.0	3.0
Life sciences	1.3	2.0	3.6	3.6	4.0	4.4	4.7	5.1	6.3	6.8	8.5	9.9	11.0	13.3	14.0	13.9	16.2	18.4	20.6
Psychology	0.1	0.2	0.4	0.4	0.4	0.5	0.5	0.5	0.5	0.6	0.7	0.8	0.9	1.1	1.4	1.6	2.0	2.2	2.8
Social sciences	1.0	1.2	2.0	2.0	2.5	2.2	2.4	2.6	2.7	2.8	3.2	3.5	3.6	4.1	3.9	4.5	5.2	6.1	6.1
Engineering	1.1	1.3	1.8	2.4	3.0	3.5	4.1	3.7	4.7	4.9	5.2	4.6	4.8	6.4	7.8	8.2	10.1	10.7	12.9
Underrepresented minority, all fields <sup>a</sup>	2.4	3.7	5.8	6.5	7.2	7.8	9.0	9.9	10.7	12.4	13.7	15.6	16.8	20.4	20.4	21.8	24.4	27.2	29.4
Physical sciences	0.5	0.6	1.0	1.0	1.0	1.1	1.2	1.3	1.5	1.6	1.9	1.8	2.0	2.3	2.2	2.3	2.7	3.0	2.9
Mathematics and statistics	0.2	0.3	0.4	0.4	0.5	0.5	0.6	0.5	0.7	0.8	0.7	0.8	0.8	1.0	1.0	1.1	1.2	1.4	1.4
Computer and information sciences	NA	NA	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.2	0.1	0.2	0.2	0.3	0.3	0.3	0.4	0.5	0.6
Life sciences	0.8	1.2	1.5	1.7	1.8	2.1	2.4	2.6	2.7	3.5	3.9	4.7	4.9	6.2	6.4	6.6	7.6	8.7	9.4
Psychology	0.3	0.6	0.8	1.0	1.2	1.2	1.3	1.5	1.6	2.0	2.3	2.7	2.9	3.6	3.6	3.7	4.3	4.5	4.6
Social sciences	0.5	0.8	1.8	2.0	2.1	2.3	2.8	3.0	3.1	3.2	3.6	3.9	4.3	4.9	4.9	5.6	5.8	6.5	7.0
Engineering	0.2	0.3	0.3	0.5	0.5	0.5	0.7	0.9	0.9	1.2	1.2	1.5	1.6	2.1	2.0	2.1	2.4	2.6	3.6
Full-time faculty <sup>b</sup>																			
All races and ethnicities, all fields	103.3	125.6	141.9	148.4	156.9	164.4	169.8	173.1	172.4	171.4	172.9	178.2	180.9	190.6	193.1	199.1	206.9	214.4	227.7

## CHAPTER 5 | Academic Research and Development

Position, race, ethnicity, and field	1973	1977	1981	1983	1985	1987	1989	1991	1993	1995	1997	1999	2001	2003	2006	2008	2010	2013	2015
Physical sciences	20.8	23.6	24.3	24.2	25.4	26.4	26.2	26.2	25.8	25.6	25.5	26.3	26.1	27.7	26.9	27.5	29.3	29.5	31.1
Mathematics and statistics	9.3	10.9	11.7	12.3	12.7	12.9	13.5	14.2	14.7	13.0	13.6	12.9	12.4	14.0	14.0	14.8	15.1	15.5	16.8
Computer and information sciences	NA	NA	0.3	0.4	0.7	0.9	1.3	1.8	2.3	2.8	2.9	3.2	3.3	4.2	4.9	5.6	5.7	6.4	7.1
Life sciences	29.5	34.9	40.9	43.5	45.6	48.1	49.3	51.1	50.8	52.8	53.6	56.1	58.3	61.7	62.8	63.5	66.7	70.6	70.8
Psychology	10.8	13.9	16.4	17.3	18.5	19.2	20.2	20.7	19.5	20.1	19.4	20.6	21.2	21.5	23.2	23.0	23.4	24.1	26.0
Social sciences	21.6	28.8	33.7	34.4	36.1	37.6	39.0	39.0	39.2	37.1	36.9	38.2	38.3	39.6	39.2	42.0	43.2	43.5	46.7
Engineering	11.3	13.5	14.7	16.4	17.9	19.3	20.2	20.1	20.1	20.0	21.2	20.7	21.5	21.9	22.1	22.7	23.4	25.0	29.2
White, all fields	94.9	114.3	128.1	133.4	139.7	146.2	149.8	151.8	148.7	147.1	146.8	150.8	151.1	153.5	155.3	156.5	158.7	161.5	168.9
Physical sciences	19.0	21.5	22.1	21.6	22.8	23.4	23.3	23.2	22.2	22.1	21.8	22.5	22.0	23.2	22.6	22.4	23.4	23.1	24.2
Mathematics and statistics	8.5	9.9	10.3	10.9	11.1	11.4	11.7	12.2	12.3	10.7	11.0	10.6	10.0	10.9	10.8	11.3	11.4	11.3	12.2
Computer and information sciences	NA	NA	0.2	0.3	0.5	0.7	1.0	1.3	1.5	1.9	2.0	2.3	2.2	2.6	2.9	3.2	3.2	3.5	4.3
Life sciences	27.5	32.1	37.2	39.7	41.3	43.3	44.4	46.0	45.1	46.7	47.1	48.8	49.9	50.5	51.5	51.0	52.6	54.7	54.5
Psychology	10.3	13.0	15.4	16.2	17.1	17.9	18.8	19.2	18.0	18.4	17.6	18.4	18.8	18.6	19.9	19.5	19.2	19.7	20.8
Social sciences	19.7	26.1	30.1	30.7	32.2	33.5	34.4	33.8	34.1	31.9	31.1	32.2	32.0	32.3	32.3	33.5	33.8	33.4	36.2
Engineering	10.0	11.6	12.7	14.0	14.8	15.9	16.2	16.2	15.6	15.3	16.4	15.8	16.2	15.2	15.3	15.4	15.0	15.8	16.7
Asian or Pacific Islander, all fields	4.0	5.0	8.4	9.1	10.9	11.7	12.3	12.6	14.8	14.5	15.8	16.3	17.7	21.4	21.8	25.0	28.5	32.4	36.8
Physical sciences	0.7	1.0	1.3	1.6	1.7	2.0	1.9	1.8	2.4	2.3	2.2	2.4	2.5	2.7	2.7	3.1	3.8	4.1	4.6
Mathematics and statistics	0.4	0.5	0.9	1.0	1.1	1.1	1.3	1.5	1.7	1.6	1.9	1.7	1.7	2.2	2.3	2.5	2.6	2.9	3.5
Computer and information sciences	NA	NA	0.0	0.1	0.1	0.1	0.3	0.5	0.7	0.8	0.8	0.7	0.8	1.3	1.5	2.0	2.2	2.3	2.4

## CHAPTER 5 | Academic Research and Development

Position, race, ethnicity, and field	1973	1977	1981	1983	1985	1987	1989	1991	1993	1995	1997	1999	2001	2003	2006	2008	2010	2013	2015
Life sciences	0.9	1.2	2.3	2.4	2.8	3.1	3.0	3.0	3.7	3.5	3.7	4.4	5.3	6.5	6.5	7.3	8.4	9.6	10.0
Psychology	0.1	0.1	0.3	0.3	0.3	0.4	0.4	0.4	0.4	0.4	0.5	0.4	0.5	0.7	0.8	1.0	1.2	1.4	1.9
Social sciences	0.9	1.1	1.9	1.9	2.1	2.1	2.1	2.4	2.3	2.4	2.8	2.8	3.0	3.1	2.9	3.6	4.0	4.8	4.8
Engineering	0.9	1.1	1.7	1.9	2.7	3.0	3.4	3.1	3.7	3.6	3.8	3.7	3.9	4.9	5.0	5.5	6.4	7.2	9.5
Underrepresented minority, all fields <sup>a</sup>	2.0	3.2	5.0	5.4	5.8	6.3	7.4	8.4	8.6	9.8	10.3	11.1	12.0	13.4	13.9	15.3	17.2	17.9	19.6
Physical sciences	0.4	0.4	0.9	0.9	0.8	0.9	0.9	1.1	1.2	1.1	1.4	1.4	1.6	1.5	1.5	1.7	2.0	2.0	1.9
Mathematics and statistics	0.2	0.2	0.4	0.4	0.4	0.5	0.5	0.5	0.6	0.7	0.6	0.7	0.7	0.7	0.8	0.9	1.0	1.0	1.0
Computer and information sciences	NA	NA	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.0	0.1	0.1	0.2	0.3	0.3	0.3	0.4	0.4
Life sciences	0.7	1.0	1.3	1.3	1.4	1.6	1.8	2.0	2.0	2.6	2.8	2.9	3.2	3.9	4.0	4.3	5.0	5.2	5.6
Psychology	0.2	0.5	0.6	0.7	0.9	0.9	1.0	1.1	1.1	1.3	1.3	1.7	1.8	1.8	2.1	2.2	2.5	2.6	2.8
Social sciences	0.4	0.8	1.6	1.7	1.8	2.0	2.5	2.8	2.8	2.8	3.0	3.1	3.2	3.6	3.6	4.3	4.7	4.9	5.1
Engineering	0.1	0.3	0.3	0.4	0.4	0.5	0.6	0.8	0.8	1.1	1.1	1.2	1.4	1.6	1.6	1.5	1.7	1.7	2.8
Postdocs																			
All races and ethnicities, all fields	4.2	7.6	8.5	8.3	8.7	9.3	11.5	9.9	13.3	16.8	18.9	18.5	17.5	15.7	23.3	17.8	22.8	20.2	19.2
Physical sciences	1.8	2.4	2.1	1.6	2.1	2.3	2.7	2.2	3.5	4.4	3.8	3.4	3.0	2.6	3.9	3.3	4.6	4.0	3.3
Mathematics and statistics	0.0	0.1	0.1	0.1	0.1	0.3	0.2	0.1	0.0	0.5	0.5	0.6	0.8	0.5	1.0	0.5	0.7	0.4	0.5
Computer and information sciences	NA	NA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.0	0.1	0.1	0.2	0.3	0.2	0.3
Life sciences	1.9	4.0	5.2	5.1	5.2	5.6	6.8	6.4	8.2	9.2	10.8	11.7	11.0	10.0	12.8	10.3	12.2	11.9	11.7
Psychology	0.2	0.5	0.6	0.6	0.7	0.7	0.8	0.5	0.4	1.1	1.3	1.2	1.2	0.9	1.7	1.0	1.1	1.0	0.8

## CHAPTER 5 | Academic Research and Development

Position, race, ethnicity, and field	1973	1977	1981	1983	1985	1987	1989	1991	1993	1995	1997	1999	2001	2003	2006	2008	2010	2013	2015
Social sciences	0.1	0.3	0.3	0.6	0.3	0.1	0.4	0.3	0.2	0.4	0.7	0.5	0.6	0.5	0.9	0.3	0.8	0.4	0.4
Engineering	0.2	0.4	0.2	0.3	0.2	0.5	0.6	0.5	1.0	1.2	1.7	1.1	0.9	1.1	3.0	2.1	3.1	2.4	2.2
White, all fields	3.6	6.2	6.9	6.8	7.1	7.4	9.0	7.1	9.1	11.2	12.5	11.9	11.4	9.9	13.4	10.3	12.5	10.6	10.1
Physical sciences	1.5	1.8	1.5	1.4	1.4	1.5	1.8	1.4	2.4	2.6	2.5	2.3	2.2	1.5	2.4	1.9	2.7	2.2	1.7
Mathematics and statistics	0.0	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.0	0.3	0.3	0.5	0.7	0.4	0.6	0.4	0.3	0.2	0.3
Computer and information sciences	NA	NA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.1	s	s	0.1	s	0.1
Life sciences	1.7	3.3	4.4	4.3	4.5	4.7	5.6	4.8	5.9	6.5	7.0	7.2	6.7	6.4	7.3	6.3	7.0	6.4	6.2
Psychology	0.1	0.4	0.6	0.5	0.7	0.6	0.8	0.4	0.3	0.9	1.1	0.9	1.0	0.7	1.3	0.8	0.7	0.7	0.5
Social sciences	0.1	0.3	0.3	0.5	0.3	0.1	0.3	0.2	0.1	0.3	0.6	0.3	0.4	0.3	0.6	0.2	0.6	0.2	0.2
Engineering	0.1	0.2	0.1	0.1	0.1	0.2	0.3	0.2	0.3	0.5	0.9	0.7	0.6	0.5	1.1	0.7	1.0	0.6	1.1
Asian or Pacific Islander, all fields	0.5	1.1	1.4	1.1	1.1	1.6	1.9	2.3	3.6	4.7	5.3	5.2	4.9	4.8	8.1	6.1	8.3	7.4	7.0
Physical sciences	0.2	0.4	0.6	0.2	0.5	0.6	0.7	0.7	1.0	1.5	1.2	1.1	0.8	0.9	1.3	1.2	1.7	1.4	1.3
Mathematics and statistics	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.3	0.1	0.3	0.1	0.2
Computer and information sciences	NA	NA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	s	0.2	0.2	s	0.2
Life sciences	0.2	0.5	0.8	0.6	0.6	0.6	0.9	1.3	1.9	2.2	3.2	3.6	3.6	3.0	4.4	3.0	4.0	4.0	4.1
Psychology	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.2	0.2	0.1
Social sciences	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.1	0.1	0.2	0.1	0.1
Engineering	0.0	0.1	0.1	0.2	0.1	0.2	0.3	0.3	0.7	0.7	0.7	0.2	0.3	0.5	1.7	1.3	1.8	1.5	1.0
Underrepresented minority, all fields <sup>a</sup>	0.1	0.2	0.2	0.4	0.4	0.4	0.6	0.4	0.6	0.9	1.1	1.5	1.1	1.1	1.7	1.3	1.6	2.1	1.7

## CHAPTER 5 | Academic Research and Development

Position, race, ethnicity, and field	1973	1977	1981	1983	1985	1987	1989	1991	1993	1995	1997	1999	2001	2003	2006	2008	2010	2013	2015
Physical sciences	0.0	0.0	0.1	0.0	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.3	0.2
Mathematics and statistics	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.1	s	s	0.1	s
Computer and information sciences	NA	NA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	s	s	s	s	S
Life sciences	0.0	0.1	0.1	0.2	0.2	0.2	0.3	0.2	0.4	0.5	0.6	0.8	0.6	0.6	1.0	0.8	0.9	1.3	1.2
Psychology	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.2	0.2	0.1	0.1	0.1	0.1	0.2	0.1	0.1
Social sciences	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.2	0.1	0.1	0.0	0.1	s	*
Engineering	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.0	0.1	0.1	0.2	0.2	0.2	0.1
Other positions <sup>c</sup>																			
All races and ethnicities, all fields	10.5	12.2	16.6	19.4	24.6	22.1	25.4	27.6	28.1	29.4	41.1	43.5	47.3	53.2	56.4	59.5	65.1	74.4	82.4
Physical sciences	2.9	3.1	3.6	4.2	4.8	4.2	4.7	5.4	5.8	5.8	8.0	8.6	9.0	9.5	8.8	9.1	9.8	11.4	14.0
Mathematics and statistics	0.4	0.7	0.6	0.5	0.7	0.6	0.8	0.9	0.8	1.1	1.7	1.8	1.8	2.2	2.4	2.7	2.9	3.1	3.6
Computer and information sciences	NA	NA	0.0	0.1	0.1	0.2	0.1	0.1	0.2	0.2	0.3	0.4	0.5	1.0	0.8	1.0	1.3	1.8	1.7
Life sciences	3.4	3.7	5.2	6.3	7.8	7.6	8.7	9.5	9.2	9.6	13.2	14.5	15.5	18.3	19.9	20.5	23.1	27.3	30.2
Psychology	1.2	1.8	3.0	3.1	3.9	3.8	4.0	4.0	5.1	5.0	6.7	7.2	8.0	9.4	10.1	10.5	10.9	11.2	11.9
Social sciences	1.6	1.9	2.9	3.8	5.5	4.3	5.1	5.5	5.0	5.0	7.3	7.4	8.0	8.0	9.9	10.2	10.9	12	12.6
Engineering	0.9	0.9	1.3	1.4	1.8	1.4	2.0	2.2	2.0	2.5	3.7	3.7	4.3	4.8	4.5	5.6	6.3	7.3	8.3
White, all fields	9.3	10.9	15.0	17.0	21.6	19.3	22.2	24.6	24.0	24.3	34.2	35.6	38.5	41.3	43.5	45.0	48.5	53.7	58.0
Physical sciences	2.5	2.8	3.2	3.6	4.1	3.6	4.0	4.8	4.8	4.8	6.4	7.1	7.5	7.5	6.4	7.2	7.4	8.5	9.7
Mathematics and statistics	0.3	0.6	0.6	0.5	0.7	0.6	0.7	0.8	0.6	0.9	1.4	1.3	1.5	1.7	1.8	1.9	2.0	2.1	2.6



## CHAPTER 5 | Academic Research and Development

Position, race, ethnicity, and field	1973	1977	1981	1983	1985	1987	1989	1991	1993	1995	1997	1999	2001	2003	2006	2008	2010	2013	2015
Computer and information sciences	NA	NA	0.0	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.3	0.4	0.5	0.8	0.8	0.8	0.8	1.3	1.0
Life sciences	3.0	3.3	4.5	5.3	6.9	6.6	7.5	8.4	8.1	8.1	11.1	11.6	12.1	13.6	15.4	15.2	17.3	20.0	20.9
Psychology	1.1	1.7	2.8	2.9	3.5	3.5	3.6	3.6	4.5	4.3	5.7	6.2	6.8	7.9	8.3	8.4	8.7	8.5	9.3
Social sciences	1.5	1.7	2.7	3.5	4.7	3.9	4.7	5.1	4.4	4.3	6.3	6.3	6.6	6.5	7.8	8.0	8.6	9.0	9.4
Engineering	0.7	0.8	1.2	1.1	1.6	1.1	1.6	1.8	1.6	1.8	2.9	2.9	3.4	3.4	3.0	3.6	4.0	4.7	5.1
Asian or Pacific Islander, all fields	0.6	0.6	1.0	1.6	2.0	1.8	2.0	1.9	2.5	3.2	4.4	4.9	5.0	7.2	7.5	8.6	10.1	12.3	15.2
Physical sciences	0.2	0.1	0.2	0.5	0.6	0.6	0.5	0.4	0.8	0.8	1.3	1.1	1.1	1.4	1.6	1.4	1.5	2.1	3.4
Mathematics and statistics	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.4	0.3	0.3	0.5	0.5	0.7	0.8	1.0	0.7
Computer and information sciences	NA	NA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.2	0.1	0.2	0.2	0.2	0.3	0.7	0.4
Life sciences	0.2	0.3	0.6	0.7	0.7	0.7	0.9	0.8	0.8	1.1	1.6	1.9	2.1	3.4	3.1	3.5	3.8	4.8	6.5
Psychology	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.3	0.3	0.3	0.4	0.5	0.6	0.6	0.8
Social sciences	0.0	0.1	0.1	0.1	0.4	0.2	0.2	0.2	0.3	0.3	0.4	0.6	0.5	0.8	0.8	0.8	1.0	1.2	1.2
Engineering	0.1	0.1	0.0	0.2	0.2	0.3	0.4	0.3	0.3	0.6	0.7	0.7	0.6	0.9	1.1	1.5	1.9	2.0	2.4
Underrepresented minority, all fields <sup>a</sup>	0.3	0.3	0.5	0.8	1.0	1.1	1.1	1.1	1.5	1.8	2.5	2.9	3.7	3.9	4.8	5.3	5.6	7.2	8.1
Physical sciences	0.1	0.1	0.1	0.1	0.0	0.1	0.1	0.1	0.2	0.2	0.4	0.4	0.3	0.5	0.5	0.4	0.5	0.7	0.8
Mathematics and statistics	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.3	0.4
Computer and information sciences	NA	NA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.0	s	0.1	0.1	0.2
Life sciences	0.1	0.1	0.1	0.2	0.2	0.3	0.3	0.3	0.3	0.4	0.5	0.9	1.1	1.1	1.4	1.5	1.7	2.2	2.6
Psychology	0.0	0.1	0.2	0.2	0.3	0.3	0.3	0.3	0.4	0.6	0.8	0.7	1.0	1.3	1.4	1.4	1.6	1.8	1.7



CHAPTER 5 | Academic Research and Development

Position, race, ethnicity, and field	1973	1977	1981	1983	1985	1987	1989	1991	1993	1995	1997	1999	2001	2003	2006	2008	2010	2013	2015
Social sciences	0.0	0.1	0.1	0.2	0.3	0.3	0.3	0.2	0.3	0.3	0.5	0.6	0.9	0.8	1.2	1.3	1.0	1.6	1.9
Engineering	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.1	0.2	0.2	0.3	0.4	0.5	0.7	0.7

\* = amount less than 0.05; NA = not available; s = suppressed for reasons of confidentiality and/or reliability.

<sup>a</sup> Underrepresented minority includes blacks or African Americans, Hispanics or Latinos, and American Indians or Alaska Natives. Total includes individuals reporting more than one race, who are not shown separately. Because of changes in the survey questionnaire, data on underrepresented minorities from 2003 to 2015 are not directly comparable with earlier years' data.

<sup>b</sup> Full-time faculty includes full professors, associate professors, assistant professors, and instructors from 1973 to 1995; from 1997 to 2015, full-time faculty includes full professors, associate professors, and assistant professors.

<sup>c</sup> Other positions include full-time positions such as research associates, adjunct positions, lecturers, and administrative positions, as well as part-time positions of all kinds. From 1997 to 2015, other positions also include instructors. Part-time positions exclude those employed part time because they are students or retired.

**Note(s)**

Detail may not add to total because of rounding. Academic employment is limited to U.S. doctorate holders employed at 2- or 4-year colleges or universities, medical schools, and university research institutes. Physical sciences include earth, atmospheric, and ocean sciences; life sciences include biological, agricultural, environmental, and health sciences. Numbers are rounded to the nearest 100.

**Source(s)**

National Science Foundation, National Center for Science and Engineering Statistics, special tabulations (2017) of the 1973–2015 Survey of Doctorate Recipients (SDR).

*Science and Engineering Indicators 2018*

## CHAPTER 5 | Academic Research and Development

APPENDIX TABLE 5-17

### S&E doctorate holders employed in academia, by type of position, degree field, and citizenship: 2015

(Thousands)

Position and field	All doctorate holders	Native-born U.S. citizens	Foreign born	
			Naturalized U.S. citizens	Noncitizens
All positions	329.3	232.0	53.7	43.6
Physical sciences	48.4	33.0	7.9	7.4
Mathematics and statistics	20.9	12.5	4.8	3.7
Computer and information sciences	9.1	4.4	2.1	2.6
Life sciences	112.7	83.5	14.8	14.4
Psychology	38.7	34.0	3.3	1.5
Social sciences	59.7	45.8	8.6	5.3
Engineering	39.7	18.7	12.3	8.7
Full-time faculty <sup>a</sup>	227.7	163.7	39.5	24.5
Physical sciences	31.1	22.4	5.1	3.5
Mathematics and statistics	16.8	10.0	3.9	2.8
Computer and information sciences	7.1	3.4	1.8	2.0
Life sciences	70.8	55.9	9.4	5.6
Psychology	26.0	22.8	2.3	0.9
Social sciences	46.7	35.8	6.8	4.1

## CHAPTER 5 | Academic Research and Development

Position and field	All doctorate holders	Native-born U.S. citizens	Foreign born	
			Naturalized U.S. citizens	Noncitizens
Engineering	29.2	13.4	10.3	5.5
Postdocs	19.2	9.4	1.7	8.0
Physical sciences	3.3	1.5	0.2	1.6
Mathematics and statistics	0.5	0.2	s	0.3
Computer and information sciences	0.3	*	s	0.2
Life sciences	11.7	6.1	1.1	4.4
Psychology	0.8	0.6	s	0.1
Social sciences	0.4	0.2	0.1	0.1
Engineering	2.2	0.7	0.2	1.4
Other positions <sup>b</sup>	82.4	58.9	12.5	11.1
Physical sciences	14.0	9.1	2.6	2.3
Mathematics and statistics	3.6	2.3	0.9	0.6
Computer and information sciences	1.7	1.0	0.3	0.4
Life sciences	30.2	21.5	4.3	4.4
Psychology	11.9	10.6	1.0	0.5
Social sciences	12.6	9.8	1.7	1.1
Engineering	8.3	4.6	1.8	1.8

## CHAPTER 5 | Academic Research and Development

\* = amount less than 50; s = suppressed for reasons of confidentiality and/or reliability.

<sup>a</sup> Full-time faculty includes assistant professors, associate professors, and full professors.

<sup>b</sup> Other positions include full-time positions such as instructors, research associates, adjunct positions, lecturers, and administrative positions, as well as part-time positions of all kinds. Part-time positions exclude those employed part time because they are students or retired.

### Note(s)

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Detail may not add to total because of rounding. Academic employment is limited to U.S. doctorate holders employed at 2- or 4-year colleges or universities, medical centers, and university research institutes. Physical sciences include earth, atmospheric, and ocean sciences; life sciences include biological, agricultural, environmental, and health sciences. Numbers are rounded to the nearest 100.

### Source(s)

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National Science Foundation, National Center for Science and Engineering Statistics, special tabulations (2017) of the 2015 Survey of Doctorate Recipients (SDR).

*Science and Engineering Indicators 2018*

## CHAPTER 5 | Academic Research and Development

APPENDIX TABLE 5-18 

Age distribution of S&E doctorate holders in full-time faculty positions at research universities and other academic institutions: 1973–2015

(Thousands and percent distribution)

[illegible]

CHAPTER 5 | Academic Research and Development

Age and institution type	1973	1975	1977	1979	1981	1983	1985	1987	1989	1991	1993	1995	1997	1999	2001	2003	2006	2008	2010	2013	2015
Younger than 30	3.4	3.0	2.5	2.2	2.1	1.4	1.2	1.0	0.6	0.8	1.2	0.9	0.9	0.7	0.9	0.7	0.8	0.9	0.6	0.4	0.3
30–34	20.6	18.8	16.4	14.9	14.1	11.2	11.4	9.8	9.3	9.1	9.4	7.8	7.2	6.6	6.9	6.3	7.8	7.4	7.7	7.0	6.8
35–39	19.3	20.3	21.0	21.7	19.8	18.0	17.9	16.6	17.1	16.6	16.6	16.5	14.3	13.9	12.5	12.4	13.0	12.6	12.8	12.2	12.5
40–44	16.4	16.3	16.2	17.2	18.8	20.2	20.0	18.7	17.2	17.5	17.6	18.1	17.7	17.6	17.0	16.1	14.5	14.5	12.9	14.5	14.7
45–49	14.3	14.2	14.7	13.9	12.6	14.9	15.4	17.8	18.4	17.8	16.9	17.0	16.6	16.6	16.5	17.0	15.5	14.2	13.5	12.8	12.9
50–54	11.4	12.2	12.3	12.1	12.1	12.1	12.0	12.9	13.8	15.6	16.0	16.5	17.3	16.0	16.5	15.4	15.4	15.8	15.7	14.1	13.1
55–59	7.7	8.3	9.3	10.0	10.4	10.8	9.8	10.3	10.9	10.7	11.0	11.7	12.9	14.5	13.8	14.4	14.9	14.1	14.2	14.3	14.0
60–64	4.8	5.0	5.4	5.8	6.8	8.0	8.2	8.5	8.0	7.7	7.8	7.3	8.1	9.1	10.4	11.1	10.4	11.6	12.4	12.8	13.9
65–75	2.1	1.9	2.2	2.3	3.2	3.5	4.1	4.3	4.8	4.2	3.7	4.0	4.8	5.2	5.6	6.7	7.8	9.1	10.3	12.1	12.0
Other universities and colleges, all ages (years)	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Younger than 30	3.8	2.8	2.1	1.2	0.9	0.8	0.8	0.4	0.4	0.8	0.9	0.7	0.7	0.9	0.9	0.5	0.9	0.7	0.6	0.4	0.4
30–34	23.6	21.4	17.5	14.1	12.2	9.4	8.2	7.1	6.3	7.1	7.3	7.4	7.5	6.3	6.7	7.3	7.0	6.5	6.6	6.9	6.9
35–39	20.7	23.0	26.5	25.1	21.6	19.1	18.5	15.2	13.1	13.1	14.1	13.9	12.5	12.5	12.0	12.1	12.6	12.8	12.2	12.3	13.4
40–44	16.8	17.0	16.6	18.4	22.3	24.9	22.8	21.3	20.1	18.1	16.7	16.0	16.1	15.4	14.9	13.7	14.3	13.5	13.4	14.5	14.4
45–49	12.8	13.3	13.9	14.3	15.0	15.2	18.8	22.5	23.4	20.9	19.9	18.6	17.1	16.7	16.7	16.6	14.9	13.8	13.7	13.2	13.9
50–54	10.5	10.3	10.4	11.6	11.8	12.7	12.0	13.4	15.4	19.2	20.8	20.6	19.1	17.0	17.7	15.8	15.8	15.5	15.2	13.9	13.4
55–59	6.2	6.5	7.5	8.5	8.4	9.8	9.6	10.8	11.2	11.3	10.2	12.8	15.5	18.2	16.7	16.2	15.4	16.0	15.5	15.1	13.2
60–64	3.6	4.2	4.2	5.1	5.8	5.9	6.3	6.6	7.4	6.8	7.1	7.0	7.8	9.2	10.6	13.0	12.4	12.9	13.2	12.8	13.2
65–75	1.8	1.6	1.2	1.7	2.0	2.2	2.9	2.6	2.7	2.7	3.0	3.2	3.7	3.7	3.8	4.8	6.9	8.5	9.4	11.0	11.3



CHAPTER 5 | Academic Research and Development

<sup>a</sup> Research universities are 1994 Carnegie classification research I universities from 1973 to 2003. Research universities are 2005 Carnegie classification very high research activity universities from 2006 to 2015.

**Note(s)**

Full-time faculty includes full professors, associate professors, assistant professors, and instructors from 1973 to 1995; from 1997 to 2015, full-time faculty includes full professors, associate professors, and assistant professors. Detail may not add to total because of rounding. Numbers are rounded to the nearest 100.

**Source(s)**

National Science Foundation, National Center for Science and Engineering Statistics, special tabulations (2017) of the 1973–2015 Survey of Doctorate Recipients (SDR).

*Science and Engineering Indicators 2018*



CHAPTER 5 | Academic Research and Development

APPENDIX TABLE 5-19

S&E doctorate holders employed in academia, by research priority, type of position, and degree field: 1973–2015																				
(Thousands)																				
Research priority, position, and field	1973	1977	1979	1981	1983	1985	1987	1989	1991	1993	1995	1997	1999	2001	2003	2006	2008	2010	2013	2015
All positions	118.0	145.4	155.3	167.1	176.1	190.2	195.9	206.6	210.6	213.8	217.5	232.5	240.2	245.5	259.5	272.8	276.5	294.8	309.0	329.3
Physical sciences	25.5	29.2	28.8	29.9	29.9	32.2	32.8	33.6	33.8	35.0	35.8	37.5	38.7	38.6	39.9	39.6	39.9	43.7	44.9	48.4
Mathematics and statistics	9.7	11.7	12.2	12.4	12.9	13.6	13.8	14.5	15.2	15.5	14.6	15.6	15.2	14.9	16.7	17.4	18.0	18.7	19.0	20.9
Computer and information sciences	NA	NA	0.1	0.3	0.5	0.8	1.1	1.5	2.0	2.5	3.1	3.3	3.7	3.8	5.2	5.8	6.9	7.3	8.4	9.1
Life sciences	34.9	42.6	47.0	51.3	54.8	58.7	61.2	64.8	66.9	68.2	71.6	77.3	81.9	84.3	90.0	95.5	94.2	102.0	109.8	112.7
Psychology	12.2	16.2	17.7	20.1	21.0	23.1	23.7	25.0	25.2	25.0	26.1	27.3	29.0	30.4	31.8	35.0	34.5	35.4	36.3	38.7
Social sciences	23.4	31.1	33.6	36.9	38.8	41.9	42.1	44.5	44.8	44.4	42.5	44.9	46.2	46.9	48.1	50.0	52.5	54.9	55.9	59.7
Engineering	12.4	14.8	15.8	16.1	18.1	19.9	21.2	22.8	22.8	23.1	23.8	26.6	25.5	26.6	27.8	29.6	30.4	32.8	34.7	39.7
Full-time faculty	103.3	125.6	131.2	141.9	148.4	156.9	164.4	169.8	173.1	172.4	171.4	172.9	178.2	180.9	190.6	193.1	199.1	206.9	214.4	227.7
Physical sciences	20.8	23.6	23.5	24.3	24.2	25.4	26.4	26.2	26.2	25.8	25.6	25.5	26.3	26.1	27.7	26.9	27.5	29.3	29.5	31.1
Mathematics and statistics	9.3	10.9	11.4	11.7	12.3	12.7	12.9	13.5	14.2	14.7	13.0	13.6	12.9	12.4	14.0	14.0	14.8	15.1	15.5	16.8
Computer and information sciences	NA	NA	0.1	0.3	0.4	0.7	0.9	1.3	1.8	2.3	2.8	2.9	3.2	3.3	4.2	4.9	5.6	5.7	6.4	7.1
Life sciences	29.5	34.9	37.3	40.9	43.5	45.6	48.1	49.3	51.1	50.8	52.8	53.6	56.1	58.3	61.7	62.8	63.5	66.7	70.5	70.8
Psychology	10.8	13.9	14.3	16.4	17.3	18.5	19.2	20.2	20.7	19.5	20.1	19.4	20.6	21.2	21.5	23.2	23.0	23.4	24.1	26.0
Social sciences	21.6	28.8	30.3	33.7	34.4	36.1	37.6	39.0	39.0	39.2	37.1	36.9	38.2	38.3	39.6	39.2	42.0	43.2	43.6	46.7
Engineering	11.3	13.5	14.3	14.7	16.4	17.9	19.3	20.2	20.1	20.1	20.0	21.2	20.7	21.5	21.9	22.1	22.7	23.4	25.0	29.2

## CHAPTER 5 | Academic Research and Development

Research priority, position, and field	1973	1977	1979	1981	1983	1985	1987	1989	1991	1993	1995	1997	1999	2001	2003	2006	2008	2010	2013	2015
Research as primary or secondary activity																				
All positions	82.3	85.0	90.0	100.7	104.7	115.2	144.0	151.6	156.6	150.1	153.5	164.7	168.1	172.5	179.3	183.7	187.1	198.2	201.7	220.8
Physical sciences	18.8	19.2	18.2	19.5	19.3	21.4	24.9	25.7	25.9	25.0	25.8	27.4	27.2	27.3	28.2	26.9	26.8	28.9	29.5	32.8
Mathematics and statistics	6.8	6.8	6.9	6.8	7.2	7.6	9.7	10.2	10.7	9.5	9.4	10.1	9.9	9.8	10.7	11.4	11.7	12.3	11.8	13.4
Computer and information sciences	NA	NA	0.1	0.3	0.4	0.6	1.0	1.3	1.7	2.0	2.4	2.4	2.6	2.6	3.9	4.1	4.8	5.1	5.7	6.4
Life sciences	26.0	28.7	32.1	37.1	38.3	41.4	48.8	51.8	53.3	51.8	53.8	57.9	60.8	63.1	65.6	66.7	66.4	71.4	74.2	78.3
Psychology	7.3	7.7	8.3	9.9	10.5	10.7	14.3	14.3	15.7	14.9	15.6	16.1	17.2	18.2	19.1	20.5	21.3	21.2	20.2	21.1
Social sciences	14.3	13.8	14.7	17.6	17.8	20.9	28.5	30.5	31.1	29.3	28.1	29.8	30.9	31.4	31.5	32.7	33.8	35.2	34.7	38.2
Engineering	9.0	8.9	9.8	9.5	11.2	12.5	16.8	17.6	18.2	17.5	18.5	20.9	19.4	20.2	20.3	21.4	22.3	24.1	25.6	30.5
Full-time faculty	72.0	71.6	74.1	83.8	86.9	95.1	121.4	125.8	131.4	121.7	121.6	124.8	126.3	130.4	135.2	133.7	138.6	142.6	144.4	159.6
Physical sciences	15.1	14.8	13.9	15.1	15.1	16.3	19.7	19.9	20.1	18.0	17.9	18.4	18.3	18.6	19.9	18.2	18.7	19.6	19.7	21.9
Mathematics and statistics	6.6	6.4	6.4	6.5	6.9	7.3	9.1	9.8	10.2	9.1	8.4	9.0	8.4	8.2	9.2	9.6	10.1	10.4	10.0	11.4
Computer and information sciences	NA	NA	s	0.2	0.3	0.5	0.8	1.2	1.6	1.8	2.2	2.3	2.3	2.3	3.3	3.6	4.1	4.1	4.5	5.3
Life sciences	21.8	22.9	24.7	28.7	29.6	31.9	38.3	39.0	41.0	38.4	39.5	40.3	41.4	43.5	45.1	44.3	44.5	46.1	47.8	49.9
Psychology	6.6	6.7	6.6	8.0	8.8	9.0	12.1	12.2	13.9	12.5	12.9	12.9	13.4	14.1	14.4	14.9	15.9	16.1	15.3	16.4
Social sciences	13.6	12.9	13.5	16.5	16.0	18.8	26.1	27.9	28.3	26.7	25.3	25.3	26.7	27.4	27.0	27.2	29	29.6	28.9	31.9
Engineering	8.2	8.0	8.9	8.8	10.2	11.4	15.2	15.7	16.2	15.1	15.5	16.5	15.6	16.5	16.2	15.8	16.4	16.9	18.1	22.9
Research as primary activity																				
All positions	27.8	37.0	41.3	46.5	48.9	55.9	66.5	72.2	73.9	80.2	83.0	88.6	91.4	93.8	102.9	108.2	107.9	117.5	120.7	133.7

## CHAPTER 5 | Academic Research and Development

Research priority, position, and field	1973	1977	1979	1981	1983	1985	1987	1989	1991	1993	1995	1997	1999	2001	2003	2006	2008	2010	2013	2015
Physical sciences	6.6	8.9	8.5	9.4	9.2	11.0	12.3	13.3	13.1	14.7	15.2	15.6	15.1	15.0	16.2	16.3	15.7	17.5	18.2	20.8
Mathematics and statistics	1.5	1.8	2.1	1.9	2.0	2.7	3.2	3.5	3.5	3.4	3.3	3.5	2.9	3.3	3.8	5.0	5.6	5.7	5.6	6.4
Computer and information sciences	NA	NA	0.0	0.1	0.2	0.4	0.7	0.8	1.1	0.9	1.0	1.1	1.1	1.3	1.9	2.0	2.6	2.8	3.1	3.9
Life sciences	12.8	16.6	19.7	23.2	24.3	27.1	31.5	33.8	34.5	36.0	37.7	40.5	43.2	43.7	46.4	47.0	45.3	49.7	51.0	54.4
Psychology	2.0	2.8	3.4	4.1	4.4	4.6	5.2	5.9	6.2	6.7	7.4	8.0	8.6	8.7	10.0	11.2	11.1	11.4	10.9	11.3
Social sciences	2.8	4.1	4.2	4.5	4.9	5.7	7.5	8.2	8.4	10.7	9.8	9.8	11.1	11.7	13.0	13.6	14.0	15.6	15.9	17.3
Engineering	2.1	2.9	3.4	3.3	3.9	4.4	6.2	6.9	7.2	7.9	8.7	10.1	9.4	10.1	11.6	13.1	13.6	15.0	16.0	19.6
Full-time faculty	19.8	25.8	28.1	31.8	33.6	39.5	48.6	51.6	53.8	56.8	56.6	56.9	58.9	61.2	70.4	70.2	71.7	75.0	77.4	88.7
Physical sciences	3.5	5.0	5.0	5.4	5.4	6.5	7.8	8.0	8.2	8.7	8.4	8.1	8.0	8.0	9.7	9.3	9.4	9.8	10.4	12.1
Mathematics and statistics	1.4	1.6	1.8	1.8	1.8	2.5	2.7	3.2	3.2	3.1	2.7	2.9	2.3	2.3	3.4	3.9	4.6	4.6	4.5	5.4
Computer and information sciences	NA	NA	0.0	0.1	0.1	0.3	0.5	0.7	1.0	0.7	0.9	0.9	0.9	1.1	1.6	1.7	2.1	2.1	2.4	3.1
Life sciences	9.3	11.4	13.1	15.5	16.5	18.6	22.3	22.6	23.8	24.1	24.7	25.1	26.1	26.9	29.4	27.8	27.1	28.2	29.1	31.0
Psychology	1.6	2.0	2.2	2.5	2.9	3.3	3.9	4.5	5.0	5.3	5.4	5.7	5.9	6.1	7.0	7.8	7.8	8.0	7.9	8.6
Social sciences	2.5	3.6	3.4	3.8	3.8	4.6	6.3	7.1	7.1	8.9	8.3	7.4	9.0	9.5	10.7	11.3	11.8	12.9	13.0	14.7
Engineering	1.5	2.3	2.6	2.7	3.0	3.7	5.0	5.4	5.5	6.0	6.3	6.6	6.6	7.4	8.6	8.5	8.9	9.4	10.1	13.8
Teaching as primary activity																				
All positions	73.3	82.2	83.8	95.9	97.7	101.0	99.3	100.9	103.4	98.3	100.2	105.4	108.6	109.0	105.9	109.4	114.0	120.6	124.8	133.7
Physical sciences	16.3	16.5	15.9	17.5	16.8	17.4	16.9	16.7	16.8	15.7	15.9	16.7	17.8	17.9	17.0	16.9	17.5	18.8	18.7	19.7
Mathematics and statistics	7.4	8.5	8.6	9.1	9.4	9.3	9.2	9.5	10.1	10.3	9.8	10.2	10.5	10.2	9.4	9.9	10.3	10.7	11.3	12.2

## CHAPTER 5 | Academic Research and Development

Research priority, position, and field	1973	1977	1979	1981	1983	1985	1987	1989	1991	1993	1995	1997	1999	2001	2003	2006	2008	2010	2013	2015
Computer and information sciences	NA	NA	0.1	0.2	0.3	0.3	0.3	0.6	0.7	1.4	1.8	1.8	2.1	1.9	2.5	3.0	3.2	3.8	4.0	3.6
Life sciences	16.6	18.1	18.1	20.5	21.1	20.9	20.1	20.3	20.9	20.2	21.8	23.4	25.1	25.7	25.2	27.6	28.2	30.6	33.9	35.0
Psychology	7.7	9.4	9.5	11.7	11.6	12.3	13.0	12.8	12.8	11.6	11.9	12.4	13.0	13.3	13.3	14.3	14.4	15.0	14.9	16.3
Social sciences	16.9	21.0	22.6	26.8	27.7	29.1	28.5	28.8	29.8	27.6	26.9	28.3	28.0	28.0	27.3	27.5	29.6	29.8	30.0	33.4
Engineering	8.4	8.7	9.1	10.1	10.8	11.7	11.3	12.2	12.2	11.6	12.1	12.6	12.1	11.9	11.2	10.2	10.8	11.9	11.9	13.5
Full-time faculty	69.9	78.4	79.7	92.1	91.9	94.9	93.6	93.9	96.7	91.4	91.9	92.1	95.0	93.8	89.9	88.4	93.5	96.7	98.2	101.9
Physical sciences	15.5	15.7	15.1	16.9	15.8	16.5	16.2	15.6	15.6	14.3	14.4	14.4	15.4	15.1	14.3	13.8	14.2	15.1	14.5	14.6
Mathematics and statistics	7.2	8.1	8.3	8.8	9.0	8.9	9.0	9.0	9.6	10.0	9.0	9.1	9.2	8.9	8.5	8.2	8.6	8.8	9.3	9.5
Computer and information sciences	NA	NA	0.1	0.2	0.3	0.3	0.3	0.5	0.7	1.3	1.7	1.6	2.0	1.7	2.2	2.5	2.8	3.2	3.4	3.0
Life sciences	15.7	17.1	17.1	19.6	19.6	19.5	18.7	18.7	19.1	18.4	19.8	20.0	21.6	21.8	21.0	21.8	23.1	24.4	26.1	26.3
Psychology	7.3	8.9	8.9	11.0	10.9	11.6	12.1	11.9	12.2	10.5	10.9	10.6	11.3	11.1	10.8	11.1	11.1	11.3	11.0	11.8
Social sciences	16.1	20.1	21.4	25.7	25.9	26.8	26.5	26.4	27.6	25.9	24.6	24.6	24.2	24.1	23.1	21.9	24.3	23.9	23.8	25.7
Engineering	8.1	8.5	8.9	10.0	10.4	11.2	11.0	11.7	11.8	11.0	11.5	11.7	11.4	10.8	9.9	8.9	9.4	10.0	10.1	11.1
Other primary activity																				
All positions	16.9	26.2	30.2	24.7	29.6	33.3	30.1	33.5	33.2	35.2	34.3	38.6	40.2	42.8	49.5	55.2	54.6	56.6	63.5	61.9
Physical sciences	2.6	3.8	4.4	3.0	3.8	3.8	3.5	3.6	3.8	4.6	4.6	5.2	5.8	5.8	7.2	6.5	6.7	7.4	8.0	7.9
Mathematics and statistics	0.8	1.4	1.6	1.3	1.6	1.6	1.4	1.5	1.6	1.8	1.5	1.8	1.7	1.4	2.2	2.5	2.1	2.3	2.1	2.3
Computer and information sciences	NA	NA	0.0	0.0	0.0	0.1	0.1	0.1	0.2	0.2	0.3	0.5	0.5	0.5	0.8	0.8	1.1	0.8	1.4	1.5
Life sciences	5.5	8.0	9.3	7.6	9.4	10.6	9.7	10.7	11.5	12.0	12.2	13.4	13.6	14.8	17.6	20.9	20.8	21.6	24.9	23.3

## CHAPTER 5 | Academic Research and Development

Research priority, position, and field	1973	1977	1979	1981	1983	1985	1987	1989	1991	1993	1995	1997	1999	2001	2003	2006	2008	2010	2013	2015
Psychology	2.5	4.0	4.8	4.4	5.0	6.2	5.6	6.3	6.2	6.7	6.9	7.0	7.3	8.4	8.1	9.5	9.0	9.1	10.4	11.1
Social sciences	3.7	6.0	6.8	5.6	6.1	7.1	6.1	7.6	6.6	6.1	5.8	6.8	7.2	7.2	8.2	8.8	8.9	9.5	9.9	9.1
Engineering	1.9	3.1	3.3	2.7	3.5	3.8	3.7	3.7	3.4	3.7	3.0	3.8	4.0	4.7	5.5	6.2	5.9	6.0	6.8	6.7
Full-time faculty	13.6	21.3	23.4	18.0	22.9	22.5	22.2	24.2	22.6	24.1	22.9	23.9	24.2	26.0	30.3	34.6	33.9	35.1	38.8	37.1
Physical sciences	1.8	2.9	3.3	2.0	3.0	2.4	2.4	2.5	2.3	2.7	2.7	2.9	2.8	3.0	3.6	3.8	3.9	4.4	4.6	4.4
Mathematics and statistics	0.7	1.2	1.3	1.1	1.4	1.3	1.2	1.3	1.4	1.6	1.3	1.5	1.4	1.0	1.9	1.9	1.6	1.7	1.6	1.9
Computer and information sciences	NA	NA	0.0	0.0	0.0	0.1	0.0	0.1	0.1	0.2	0.2	0.3	0.3	0.4	0.3	0.5	0.7	0.4	0.6	1.1
Life sciences	4.5	6.4	7.1	5.8	7.4	7.4	7.2	7.9	8.2	8.3	8.3	8.5	8.5	9.6	11.3	13.2	13.3	14.0	15.3	13.5
Psychology	2.0	3.0	3.2	2.9	3.5	3.6	3.3	3.8	3.6	3.7	3.8	3.0	3.4	3.9	3.7	4.4	4.1	4.1	5.1	5.6
Social sciences	3.0	5.2	5.5	4.2	4.7	4.7	4.8	5.4	4.3	4.5	4.2	4.8	5.0	4.7	5.8	6.0	5.9	6.5	6.8	6.3
Engineering	1.6	2.7	2.8	2.0	2.9	2.9	3.3	3.1	2.7	3.1	2.2	2.8	2.7	3.3	3.5	4.7	4.4	3.9	4.7	4.3

NA = not available; s = suppressed for reasons of confidentiality and/or reliability.

### Note(s)

Detail may not add to total because of rounding. Academic employment is limited to U.S. doctorate holders employed at 2- or 4-year colleges or universities, medical schools, and university research institutes, excluding those employed part time because they are students or retired. Full-time faculty includes full professors, associate professors, assistant professors, and instructors from 1973 to 1995; from 1997 to 2015, full-time faculty includes full professors, associate professors, and assistant professors. Research includes basic or applied research, development, or design. Physical sciences include earth, atmospheric, and ocean sciences; life sciences include biological, agricultural, environmental, and health sciences. Numbers are rounded to the nearest 100.

### Source(s)

National Science Foundation, National Center for Science and Engineering Statistics, special tabulations (2017) of the 1973–2015 Survey of Doctorate Recipients (SDR).

*Science and Engineering Indicators 2018*

## CHAPTER 5 | Academic Research and Development

APPENDIX TABLE 5-20

### Early career S&E doctorate holders employed in academia, by Carnegie classification of institution, years since doctorate, and type of position: Selected years, 1997–2015

(Percent distribution)

Carnegie classification of institution	Year	1–3 years since doctorate				4–7 years since doctorate			
		Total	Full-time faculty	Postdocs	Other positions	Total	Full-time faculty	Postdocs	Other positions
All universities and colleges	1997	100.0	37.6	41.0	21.4	100.0	62.8	14.8	22.4
	1999	100.0	34.8	43.1	22.1	100.0	61.5	14.1	24.5
	2001	100.0	40.1	39.0	20.9	100.0	58.9	13.3	27.9
	2003	100.0	42.1	33.3	24.6	100.0	61.6	9.6	28.7
	2006	100.0	35.5	45.3	19.2	100.0	58.7	15.5	25.8
	2008	100.0	40.4	35.8	23.8	100.0	61.8	11.4	27.0
	2010	100.0	35.1	41.2	23.7	100.0	60.3	12.5	27.2
	2013	100.0	29.0	42.4	28.6	100.0	52.9	17.1	30.0
	2015	100.0	36.3	35.0	28.7	100.0	51.6	15.5	32.9
Very high research universities	1997	100.0	21.3	58.9	19.9	100.0	48.4	23.2	28.4
	1999	100.0	18.6	62.1	19.3	100.0	47.8	23.3	28.9
	2001	100.0	23.2	55.6	21.1	100.0	43.5	23.6	32.9
	2003	100.0	24.0	50.6	25.3	100.0	47.8	17.4	34.8
	2006	100.0	19.0	64.7	16.3	100.0	44.3	25.3	30.4

## CHAPTER 5 | Academic Research and Development

Carnegie classification of institution	Year	1–3 years since doctorate				4–7 years since doctorate			
		Total	Full-time faculty	Postdocs	Other positions	Total	Full-time faculty	Postdocs	Other positions
	2008	100.0	24.0	54.5	21.6	100.0	46.9	20.0	33.1
	2010	100.0	20.7	61.1	18.2	100.0	49.0	20.0	31.0
	2013	100.0	15.5	63.6	20.9	100.0	36.7	31.4	31.9
	2015	100.0	20.9	57.3	21.8	100.0	37.1	29.6	33.3
Other universities and colleges	1997	100.0	55.6	20.7	23.7	100.0	75.8	6.3	17.9
	1999	100.0	55.8	19.2	25.0	100.0	74.1	5.0	20.9
	2001	100.0	61.9	17.5	20.6	100.0	72.2	3.5	24.2
	2003	100.0	63.3	12.9	23.7	100.0	73.5	2.7	23.7
	2006	100.0	58.4	17.5	24.1	100.0	74.1	4.2	21.7
	2008	100.0	60.8	12.8	25.7	100.0	74.4	3.5	22.0
	2010	100.0	55.4	14.0	30.6	100.0	72.2	4.6	23.2
	2013	100.0	44.7	17.5	37.9	100.0	66.0	4.1	29.9
	2015	100.0	48.8	15.7	35.4	100.0	60.5	6.6	32.9

Note(s)

## CHAPTER 5 | Academic Research and Development

Detail may not add to total because of rounding. Academic employment is limited to U.S. doctorate holders employed at 2- or 4-year colleges or universities, medical schools, or university research institutes, excluding those employed part time because they are students or retired. Full-time faculty includes full professors, associate professors, and assistant professors. Other positions include full-time positions such as research associates, adjunct positions, instructors, lecturers, administrative positions, and part-time positions of all kinds. Institutions are designated by the 2005 Carnegie classification code. For information on these institutional categories, see the Carnegie Classification of Institutions of Higher Education, <http://carnegieclassifications.iu.edu/downloads.php>, accessed 13 February 2017.

### Source(s)

National Science Foundation, National Center for Science and Engineering Statistics, special tabulations (2017) of the 1997–2015 Survey of Doctorate Recipients (SDR).

*Science and Engineering Indicators 2018*



## CHAPTER 5 | Academic Research and Development

APPENDIX TABLE 5-21

## S&amp;E doctorate holders employed in academia with federal support, by degree field, research activity, and type of position: 1973–2015

(Percent)

Field, research activity, and position	1973	1975	1977	1979	1981	1983	1985	1987	1989	1991	1993	1995	1997	1999	2001	2003	2006	2008	2010	2013	2015
All fields	44.5	40.5	39.7	38.2	35.5	39.8	31.4	46.5	47.9	48.5	36.1	39.4	38.6	45.7	45.1	45.9	46.9	44.5	45.1	44.2	41.0
Research as primary or secondary activity	51.9	48.9	52.3	51.8	50.8	55.9	44.5	56.1	58.1	57.8	46.4	50.0	48.2	56.6	56.4	56.7	58.1	55.5	56.2	56.5	52.0
Full-time faculty	42.0	39.6	38.2	36.2	38.8	41.7	34.3	45.6	46.6	48.0	32.9	35.7	34.9	43.2	43.6	44.9	46.5	43.7	44.7	43.5	40.3
Other full-time positions	60.2	58.8	68.1	58.3	58.5	59.4	49.8	60.6	60.9	58.8	42.5	43.1	46.7	48.9	47.2	46.3	43.6	43.5	41.9	42.8	41.9
Postdoctorates	87.7	86.3	86.0	82.1	86.3	82.2	78.5	82.1	83.5	84.5	83.1	80.1	74.1	80.3	74.3	78.1	70.7	71.9	73.2	77.7	70.3
Physical sciences	47.3	44.0	43.8	42.8	42.1	46.5	38.2	54.1	57.9	57.0	45.7	49.3	48.6	57.0	55.3	56.5	56.4	53.6	53.9	53.0	51.9
Research as primary or secondary activity	56.2	54.1	56.2	57.0	59.0	63.3	52.5	66.2	69.6	68.9	58.6	62.3	59.6	70.1	68.3	69.2	70.0	67.2	67.0	68.8	65.9
Full-time faculty	42.2	38.7	38.3	37.4	37.1	42.6	33.2	49.5	53.7	53.5	38.7	42.9	42.1	53.2	51.7	55.0	55.1	54.2	52.8	52.2	51.7
Other full-time positions	67.0	61.4	62.8	68.3	59.1	64.8	58.1	71.2	70.1	69.1	60.6	57.0	63.6	65.8	59.7	58.8	58.2	51.4	50.7	51.8	53.8
Postdoctorates	90.3	87.4	86.3	81.9	82.5	81.9	75.4	87.9	84.6	81.2	82.0	85.3	81.2	81.3	83.0	78.8	75.7	66.7	78.3	80.0	72.7
Mathematics and statistics	26.9	19.1	19.0	21.7	21.3	30.1	21.5	31.1	33.5	34.5	18.8	22.3	20.9	29.1	31.9	31.1	34.8	31.7	34.1	30.5	26.8
Research as primary or secondary activity	32.4	23.6	25.0	27.0	27.0	41.3	26.4	36.9	40.8	40.6	24.8	27.0	26.9	35.3	41.7	38.6	43.4	38.5	42.2	40.7	36.6
Full-time faculty	26.8	18.8	18.0	20.4	21.0	29.9	21.4	30.4	32.8	34.0	18.3	21.1	19.3	27.7	30.1	31.9	34.8	31.8	35.3	30.8	28.1
Other full-time positions	33.6	33.5	46.9	54.6	30.1	43.4	29.1	47.8	52.8	67.2	40.6	34.6	40.0	37.5	54.5	23.1	25.0	29.4	25.0	25.0	23.8
Postdoctorates	48.8	35.8	55.1	43.2	56.3	66.3	48.5	34.4	53.4	80.4	s	45.3	35.6	54.7	61.9	65.9	64.2	60.0	57.1	75.0	60.0
Computer and information sciences	NA	NA	NA	34.8	29.7	44.6	45.0	61.7	52.4	49.4	39.9	43.2	41.1	55.6	47.2	48.9	44.0	43.5	50.7	51.2	45.1

CHAPTER 5 | Academic Research and Development

Field, research activity, and position	1973	1975	1977	1979	1981	1983	1985	1987	1989	1991	1993	1995	1997	1999	2001	2003	2006	2008	2010	2013	2015
Research as primary or secondary activity	NA	NA	NA	34.8	26.9	44.9	36.1	55.6	52.8	54.3	41.1	46.0	46.3	59.3	57.9	54.9	53.8	54.2	61.4	59.6	54.7
Full-time faculty	NA	NA	NA	25.0	26.6	38.1	38.0	58.1	52.8	48.2	37.7	40.7	37.9	54.5	48.5	50.0	44.9	44.6	51.7	51.5	46.6
Other full-time positions	NA	NA	NA	s	25.0	67.9	80.6	79.7	47.1	67.7	59.1	62.9	50.0	66.7	33.3	50.0	42.9	44.4	50.0	42.9	36.4
Postdoctorates	NA	NA	NA	57.1	100.0	100.0	s	88.2	100.0	s	100.0	78.0	97.2	100.0	100.0	95.8	97.9	50.0	66.7	50.0	66.7
Life sciences	59.3	58.9	58.1	55.3	59.6	60.0	53.5	65.3	65.1	65.5	52.2	52.5	51.0	57.9	56.6	57.2	58.0	56.6	56.6	54.9	51.1
Research as primary or secondary activity	65.8	64.2	66.8	65.2	63.3	68.3	57.8	72.3	73.1	72.0	62.7	63.6	61.6	69.5	67.9	68.0	69.4	69.3	68.7	68.7	63.6
Full-time faculty	57.1	56.4	54.9	51.4	55.6	57.8	50.5	63.4	62.1	63.7	48.6	49.0	47.8	55.2	56.3	57.0	58.4	56.1	56.1	54.5	50.5
Other full-time positions	68.1	70.9	72.1	64.8	68.5	68.5	58.4	71.0	74.1	67.2	45.8	46.3	47.4	50.0	46.3	46.9	50.0	51.2	50.3	49.5	47.1
Postdoctorates	88.8	87.7	88.4	84.6	86.0	82.6	78.3	82.1	86.8	84.4	84.1	81.9	77.7	82.6	77.6	81.3	71.5	77.7	78.7	80.7	75.2
Psychology	37.5	36.1	33.2	32.6	32.7	30.1	25.9	31.2	35.5	34.7	25.7	27.6	27.4	32.9	34.3	34.7	36.5	31.9	33.3	31.7	27.1
Research as primary or secondary activity	45.4	41.7	41.9	42.7	41.9	42.6	36.6	39.8	46.6	43.5	37.0	39.5	40.5	46.5	48.1	48.2	52.2	43.2	46.6	44.6	39.3
Full-time faculty	36.4	34.1	30.6	28.3	27.5	27.3	23.6	28.3	34.0	32.9	25.2	25.1	25.3	31.6	33.6	34.5	37.5	33.9	36.5	34.8	27.8
Other full-time positions	48.1	41.6	65.4	46.3	52.3	40.3	32.7	37.1	39.6	36.3	23.8	30.7	30.2	32.6	38.8	35.2	29.8	25.0	23.0	22.2	25.0
Postdoctorates	84.9	86.4	82.5	86.8	92.0	84.2	70.8	88.1	66.3	95.8	71.7	71.4	71.8	71.8	59.2	69.0	69.4	60.0	81.8	80.0	62.5
Social sciences	25.5	23.7	23.3	20.4	21.8	23.7	17.2	27.2	27.7	28.4	14.2	16.1	15.2	22.9	21.5	21.8	23.1	20.6	19.7	19.7	17.3
Research as primary or secondary activity	29.5	26.8	30.6	29.4	25.5	31.4	20.4	30.0	31.1	31.2	17.3	20.9	17.7	27.2	26.5	27.1	28.9	25.7	24.4	24.2	20.9
Full-time faculty	25.2	23.7	22.6	19.0	21.2	22.5	16.2	27.1	27.4	27.8	13.4	15.4	14.6	22.5	21.1	22.1	23.9	20.0	20.6	20.0	17.2
Other full-time positions	36.3	31.6	35.3	37.3	32.7	34.0	26.6	36.2	33.8	32.7	22.1	22.6	22.5	27.3	26.1	25.6	24.5	22.6	20.3	21.9	20.5
Postdoctorates	57.6	54.6	54.7	84.9	47.9	64.6	54.7	27.4	57.6	52.5	88.1	68.5	33.9	65.0	35.8	42.9	22.9	33.3	25.0	50.0	50.0

CHAPTER 5 | Academic Research and Development

Field, research activity, and position	1973	1975	1977	1979	1981	1983	1985	1987	1989	1991	1993	1995	1997	1999	2001	2003	2006	2008	2010	2013	2015
Engineering	53.5	50.6	51.1	49.1	51.0	54.7	43.0	57.1	56.3	63.2	42.6	49.9	49.7	56.9	56.8	57.4	58.7	58.6	58.2	57.6	54.7
Research as primary or secondary activity	58.4	57.3	60.5	57.5	59.2	61.5	45.0	63.1	63.8	68.3	49.5	57.9	55.4	62.5	64.1	64.7	67.3	67.3	66.7	66.8	62.0
Full-time faculty	52.5	49.9	49.3	49.5	49.8	54.7	42.2	56.0	55.2	62.9	40.9	48.4	47.2	55.1	56.7	56.8	58.6	57.7	59.5	57.3	56.5
Other full-time positions	65.5	67.3	86.6	53.0	60.7	63.1	44.3	76.4	71.2	66.8	59.5	56.7	65.6	63.3	58.3	62.2	51.9	61.7	55.8	59.6	54.2
Postdoctorates	84.7	84.3	74.7	51.1	98.9	82.7	91.4	74.8	76.0	90.0	65.7	72.7	62.1	80.4	56.8	73.8	76.8	71.4	61.3	66.7	54.5

NA = not available; s = suppressed for reasons of confidentiality and/or reliability.

Note(s)

Data for 1985 and 1993–97 are not comparable with data for other years and understate the degree of federal support. In 1985 and 1993–97, the federal support question asked whether work performed during the week of 15 April was supported by the government; in other years, the question pertained to work conducted over the course of an entire year. Academic employment is limited to U.S. doctorate holders employed at 2- or 4-year colleges or universities, medical schools, or university research institutes. Full-time faculty includes full professors, associate professors, assistant professors, and instructors from 1973 to 1995; from 1997 to 2015, full-time faculty includes full professors, associate professors, and assistant professors. Research includes basic or applied research, development, and design. Total includes part-time employment not shown separately but excludes those employed part time because they are students or retired. Physical sciences include earth, atmospheric, and ocean sciences; life sciences include biological, agricultural, environmental, and health sciences.

Source(s)

National Science Foundation, National Center for Science and Engineering Statistics, special tabulations (2017) of the 1973–2015 Survey of Doctorate Recipients (SDR).

*Science and Engineering Indicators 2018*

## CHAPTER 5 | Academic Research and Development

APPENDIX TABLE 5-22

## S&amp;E doctorate holders and full-time faculty with federal support, by degree field and Carnegie classification of employer: 2015

(Percent)

Position and field	All academic institutions	Research universities (very high research activity)	Research universities (high research activity)	Doctoral/ research universities	Master's-granting universities	Baccalaureate colleges	Medical schools	Other universities and colleges
All S&E doctorate holders employed in academic institutions	41.0	60.2	41.4	22.5	16.0	16.6	61.9	32.8
Physical sciences	51.9	73.5	66.0	41.7	26.9	22.0	66.7	38.0
Mathematics and statistics	26.8	50.8	26.9	14.3	9.3	16.0	100.0	15.6
Computer and information sciences	45.1	70.6	33.3	20.0	20.0	25.0	s	35.0
Life sciences	51.1	67.2	51.0	28.6	21.3	22.6	63.1	41.3
Psychology	27.1	50.0	33.3	12.0	9.2	15.6	38.5	18.2
Social sciences	17.3	28.3	19.7	10.3	7.8	6.7	50.0	14.4
Engineering	54.7	69.1	47.3	40.0	26.8	21.4	71.4	49.4
Full-time faculty <sup>a</sup>	40.3	61.5	42.1	24.0	16.3	16.8	60.7	35.4
Physical sciences	51.7	78.8	67.5	44.4	26.8	22.2	75.0	40.5
Mathematics and statistics	28.1	54.3	27.3	14.3	7.7	17.4	100.0	21.2

## CHAPTER 5 | Academic Research and Development

Position and field	All academic institutions	Research universities (very high research activity)	Research universities (high research activity)	Doctoral/ research universities	Master's-granting universities	Baccalaureate colleges	Medical schools	Other universities and colleges
Computer and information sciences	46.6	76.0	36.4	25.0	21.4	33.3	s	40.0
Life sciences	50.5	69.5	52.6	31.8	21.4	22.7	61.5	44.0
Psychology	27.8	52.8	33.3	16.7	9.7	11.5	44.4	20.4
Social sciences	17.2	28.4	19.4	12.5	6.9	7.7	66.7	14.4
Engineering	56.5	73.3	50.0	41.7	28.6	25.0	80.0	54.5

s = suppressed for reasons of confidentiality and/or reliability.

<sup>a</sup> Full-time faculty includes professors, associate professors, and assistant professors, excluding adjuncts.

### Note(s)

Academic employment is limited to U.S. doctorate holders employed at 2- or 4-year colleges or universities, medical schools, or university research institutes, excluding those employed part time because they are students or retired. Physical sciences include earth, atmospheric, and ocean sciences; life sciences include biological, agricultural, environmental, and health sciences. Institutions are designated by the 2005 Carnegie classification code. For information on these institutional categories, see the Carnegie Classification of Institutions of Higher Education, <http://carnegieclassifications.iu.edu/>, accessed 17 February 2017.

### Source(s)

National Science Foundation, National Center for Science and Engineering Statistics, special tabulations (2017) of the 2015 Survey of Doctorate Recipients (SDR).

*Science and Engineering Indicators 2018*

## CHAPTER 5 | Academic Research and Development

APPENDIX TABLE 5-23

### S&E doctorate holders with federal support, by Carnegie classification of institution, race, ethnicity, and sex: 2015

(Percent)

All S&E doctorate holders with federal support	Research universities (very high research activity)	Research universities (high research activity)	Doctoral/ research universities	Master's-granting universities	Baccalaureate colleges	Medical schools
Asian or Pacific Islander						
Males	64.6	46.8	35.3	15.0	8.3	77.8
Females	55.0	36.8	20.0	16.7	28.6	64.7
Underrepresented minority <sup>a</sup>						
Males	51.0	42.1	28.6	21.4	23.1	50.0
Females	47.2	33.3	14.3	20.8	20.0	44.4
White						
Males	64.0	43.8	25.0	16.4	16.5	62.5
Females	55.3	36.7	14.7	13.8	15.7	57.9

<sup>a</sup> Underrepresented minority includes blacks or African Americans, Hispanics or Latinos, and American Indians or Alaska Natives.

#### Note(s)

Academic employment is limited to U.S. doctorate holders employed at 2- or 4-year colleges or universities, medical schools, or university research institutes, excluding those employed part time because they are students or retired. Institutions are designated by the 2005 Carnegie classification code. For information on these institutional categories, see the Carnegie Classification of Institutions of Higher Education, <http://carnegieclassifications.iu.edu/>, accessed 17 February 2017.

#### Source(s)

National Science Foundation, National Center for Science and Engineering Statistics, special tabulations (2017) of the 2015 Survey of Doctorate Recipients (SDR).



## CHAPTER 5 | Academic Research and Development

*Science and Engineering Indicators 2018*

## CHAPTER 5 | Academic Research and Development

APPENDIX TABLE 5-24

### Early career S&E doctorate holders employed in academia with federal support, by degree field, years since doctorate, and type of position: 1973–2015

(Percent)

Field and year	1–3 years since doctorate				4–7 years since doctorate			
	All positions	Full-time faculty	Other full-time positions	Postdocs	All positions	Full-time faculty	Other full-time positions	Postdocs
All fields								
1973	44.1	32.9	72.5	87.1	47.1	42.3	55.3	80.8
1975	44.2	31.1	58.3	87.8	42.5	40.0	66.2	83.2
1977	44.5	28.8	61.2	87.0	42.2	37.8	71.6	85.3
1979	47.2	29.6	58.9	86.6	43.0	37.4	67.3	83.1
1981	51.0	30.8	63.1	87.9	46.5	41.2	64.8	86.9
1983	50.2	33.7	59.0	86.1	50.1	45.3	68.1	84.8
1985	43.2	23.9	59.3	79.1	42.4	36.2	63.3	81.0
1987	53.3	36.7	56.1	82.0	54.8	49.7	71.6	84.2
1989	57.2	38.7	58.7	84.7	57.8	53.5	70.0	89.1
1991	53.6	38.3	56.6	83.8	57.4	53.4	66.6	88.7
1993	43.5	20.8	43.7	80.7	41.1	34.0	46.8	87.3
1995	47.0	23.2	40.1	78.5	43.9	36.1	52.0	86.0
1997	45.2	20.2	39.5	74.8	41.9	33.7	49.6	78.5
1999	52.5	28.1	45.7	79.0	47.4	41.4	46.6	83.3



## CHAPTER 5 | Academic Research and Development

Field and year	1–3 years since doctorate				4–7 years since doctorate			
	All positions	Full-time faculty	Other full-time positions	Postdocs	All positions	Full-time faculty	Other full-time positions	Postdocs
2001	48.2	29.2	43.2	73.6	46.1	39.8	50.7	78.6
2003	48.2	31.3	43.4	77.7	47.5	42.3	55.3	81.1
2006	49.1	30.1	46.8	68.6	47.2	41.7	46.5	76.0
2008	46.4	26.9	48.3	70.6	43.1	37.9	44.3	75.0
2010	47.6	27.5	41.0	72.3	46.0	41.8	47.3	77.6
2013	48.2	22.4	36.7	76.8	46.5	38.8	47.9	78.5
2015	43.5	23.5	40.4	72.3	42.2	34.8	45.0	71.8
Physical sciences								
1973	58.4	31.2	78.3	88.5	44.8	39.5	72.1	98.5
1975	64.1	27.9	60.7	93.2	43.8	36.6	77.3	85.1
1977	63.2	28.9	95.7	88.5	51.6	40.5	77.5	92.4
1979	59.1	25.5	73.7	84.7	52.0	39.0	72.1	91.7
1981	69.3	25.2	94.3	88.1	57.9	49.4	84.5	97.9
1983	70.4	33.8	82.7	88.2	66.2	56.3	85.3	84.8
1985	64.3	18.7	86.6	84.6	50.8	35.7	78.7	91.4
1987	80.9	66.7	69.9	90.2	68.7	56.0	97.1	93.1
1989	77.9	49.2	82.1	88.0	72.4	61.9	89.0	90.6
1991	69.9	44.1	78.8	87.2	67.2	55.1	88.5	100.0

## CHAPTER 5 | Academic Research and Development

Field and year	1–3 years since doctorate				4–7 years since doctorate			
	All positions	Full-time faculty	Other full-time positions	Postdocs	All positions	Full-time faculty	Other full-time positions	Postdocs
1993	63.1	21.3	64.9	84.5	58.2	43.9	70.0	94.5
1995	62.8	21.0	41.9	84.1	53.9	37.8	60.2	86.7
1997	65.1	37.5	66.7	77.8	53.4	41.2	67.9	96.5
1999	67.5	44.4	60.0	83.3	57.0	46.7	65.5	89.4
2001	64.9	40.0	57.1	80.0	54.1	39.4	73.9	83.7
2003	62.5	40.0	66.7	78.9	54.8	50.6	63.1	70.2
2006	66.7	40.0	50.0	78.6	57.6	52.8	64.2	72.2
2008	56.8	36.4	62.5	65.2	52.8	48.4	58.3	75.0
2010	59.3	27.3	37.5	76.5	53.3	41.7	66.7	80.0
2013	59.4	s	37.5	80.0	51.4	37.5	56.3	83.3
2015	53.3	33.3	50.0	68.8	50.0	41.2	54.5	71.4
Mathematics and statistics								
1973	17.5	16.3	58.5	38.7	29.0	29.4	15.4	100.0
1975	14.5	13.0	37.6	28.3	18.9	18.5	31.8	57.9
1977	16.2	12.2	45.9	56.4	19.2	17.6	44.0	52.2
1979	24.8	22.5	52.9	42.5	32.3	30.2	64.9	46.9
1981	10.8	9.5	s	44.1	29.7	27.6	62.7	81.5
1983	31.8	29.8	s	73.4	39.8	39.8	51.3	100.0

## CHAPTER 5 | Academic Research and Development

Field and year	1–3 years since doctorate				4–7 years since doctorate			
	All positions	Full-time faculty	Other full-time positions	Postdocs	All positions	Full-time faculty	Other full-time positions	Postdocs
1985	14.7	14.1	s	34.6	27.0	26.8	s	100.0
1987	15.6	7.4	s	37.6	34.9	35.5	7.3	s
1989	29.1	24.9	s	52.4	39.0	39.1	s	100.0
1991	39.8	35.8	54.9	80.4	28.3	28.6	s	s
1993	15.7	14.8	0.0	100.0	15.2	14.0	100.0	s
1995	17.7	13.4	0.0	40.0	25.6	19.6	s	70.6
1997	12.5	s	s	33.3	15.0	12.5	s	s
1999	33.3	16.7	s	75.0	33.3	31.3	s	s
2001	37.5	12.5	s	50.0	41.2	38.5	50.0	s
2003	33.3	20.0	s	66.7	34.8	36.8	s	s
2006	33.3	25.0	s	62.5	30.4	27.8	s	50.0
2008	26.3	18.2	25.0	50.0	28.6	29.4	100.0	s
2010	35.0	25.0	s	60.0	40.0	45.0	s	s
2013	38.5	16.7	66.7	66.7	34.5	33.3	33.3	100.0
2015	26.7	14.3	25.0	66.7	27.6	25.0	40.0	s
Computer and information sciences								
1973	NA	NA	NA	NA	NA	NA	NA	NA
1975	NA	NA	NA	NA	NA	NA	NA	NA

## CHAPTER 5 | Academic Research and Development

Field and year	1–3 years since doctorate				4–7 years since doctorate			
	All positions	Full-time faculty	Other full-time positions	Postdocs	All positions	Full-time faculty	Other full-time positions	Postdocs
1977	NA	NA	NA	NA	NA	NA	NA	NA
1979	34.8	25.0	s	57.1	s	s	s	s
1981	27.7	24.1	25.0	100.0	52.4	52.4	s	s
1983	45.7	35.1	60.0	100.0	43.5	40.4	92.3	s
1985	54.1	46.4	77.2	s	36.7	31.0	100.0	s
1987	47.2	46.3	42.0	100.0	73.2	66.3	100.0	s
1989	33.0	29.3	50.0	100.0	70.8	78.0	35.7	100.0
1991	23.1	23.1	25.1	s	66.2	63.9	100.0	100.0
1993	44.7	39.5	100.0	100.0	30.7	30.9	27.3	100.0
1995	38.2	31.4	61.1	75.9	38.1	38.3	23.9	s
1997	37.5	40.0	s	100.0	36.4	40.0	s	s
1999	50.0	50.0	s	s	58.3	54.5	s	s
2001	33.3	25.0	s	s	50.0	57.1	s	s
2003	44.4	28.6	s	s	42.9	40.0	66.7	s
2006	33.3	33.3	s	100.0	42.9	45.5	50.0	s
2008	38.5	33.3	100.0	50.0	50.0	45.5	33.3	s
2010	30.8	12.5	s	66.7	62.5	58.3	66.7	s
2013	37.5	s	s	s	55.6	58.3	100.0	s

## CHAPTER 5 | Academic Research and Development

Field and year	1–3 years since doctorate				4–7 years since doctorate			
	All positions	Full-time faculty	Other full-time positions	Postdocs	All positions	Full-time faculty	Other full-time positions	Postdocs
2015	40.0	28.6	50.0	100.0	55.6	66.7	25.0	s
Life sciences								
1973	60.8	48.3	77.0	89.0	59.7	57.3	75.1	89.2
1975	61.8	46.4	72.5	87.6	60.1	57.6	76.2	87.5
1977	61.6	38.1	70.4	88.9	59.6	56.6	73.3	90.2
1979	65.9	40.6	75.8	85.9	57.3	51.4	76.5	84.2
1981	71.8	51.7	76.5	88.1	64.0	58.8	70.8	85.7
1983	68.2	52.8	65.1	84.7	67.1	64.5	72.6	83.7
1985	59.6	34.1	67.2	78.9	61.1	55.6	72.3	81.7
1987	70.2	53.5	73.8	82.1	71.4	68.3	81.0	83.0
1989	74.5	50.2	79.3	89.1	71.9	67.5	79.1	89.3
1991	68.1	49.9	60.0	83.0	70.6	66.8	79.2	86.3
1993	61.2	32.2	44.8	81.9	55.7	46.4	52.0	86.7
1995	58.5	30.3	35.3	80.3	54.0	43.9	47.4	87.4
1997	58.3	24.0	42.9	78.5	52.3	42.4	48.4	78.8
1999	64.7	32.0	50.0	81.4	57.2	47.2	49.3	83.0
2001	59.3	35.7	37.5	76.9	56.4	48.9	49.5	78.8
2003	62.7	39.4	45.0	81.7	57.3	50.3	56.9	83.0

## CHAPTER 5 | Academic Research and Development

Field and year	1–3 years since doctorate				4–7 years since doctorate			
	All positions	Full-time faculty	Other full-time positions	Postdocs	All positions	Full-time faculty	Other full-time positions	Postdocs
2006	55.6	32.3	52.9	67.1	57.5	49.7	49.6	77.0
2008	60.0	33.3	54.5	75.8	54.4	44.2	57.6	82.8
2010	60.6	37.1	48.0	76.6	54.5	47.1	51.4	78.4
2013	62.4	31.3	43.8	80.4	57.2	45.5	54.9	82.8
2015	57.8	35.0	45.5	81.4	51.2	36.7	49.2	75.4
Psychology								
1973	34.3	28.5	59.7	95.3	37.8	36.9	52.1	71.4
1975	35.0	25.5	53.7	88.5	35.3	34.9	32.8	71.2
1977	35.3	26.8	71.7	86.0	31.5	27.9	60.5	73.0
1979	35.2	22.5	22.2	95.5	39.3	31.4	76.5	87.6
1981	46.5	33.2	41.6	93.4	34.7	28.6	54.5	88.2
1983	31.2	19.8	34.2	89.3	32.3	28.2	37.1	87.2
1985	30.6	15.6	44.5	70.1	29.2	26.2	38.7	72.5
1987	37.5	28.5	28.8	82.7	33.2	25.6	40.3	97.9
1989	41.7	34.6	36.1	64.9	36.1	36.7	33.1	63.1
1991	35.9	23.9	24.3	100.0	38.8	38.6	24.8	86.9
1993	21.6	12.0	27.5	61.6	23.2	24.6	15.5	48.2
1995	33.5	17.5	40.6	63.5	26.1	21.8	36.0	82.1

## CHAPTER 5 | Academic Research and Development

Field and year	1–3 years since doctorate				4–7 years since doctorate			
	All positions	Full-time faculty	Other full-time positions	Postdocs	All positions	Full-time faculty	Other full-time positions	Postdocs
1997	35.3	21.4	25.0	75.0	30.2	22.2	37.5	75.0
1999	32.4	20.0	25.0	62.5	35.4	35.7	27.3	100.0
2001	35.1	22.2	33.3	66.7	34.7	31.0	54.5	s
2003	30.8	26.7	36.4	57.1	37.0	34.3	41.7	100.0
2006	45.2	37.5	33.3	64.3	35.5	36.1	23.1	66.7
2008	35.0	29.4	27.3	62.5	26.8	27.3	20.0	50.0
2010	37.8	35.3	22.2	85.7	33.3	33.3	28.6	66.7
2013	36.8	14.3	25.0	66.7	29.3	33.3	25.0	100.0
2015	29.2	10.0	33.3	80.0	30.5	32.4	29.4	50.0
Social sciences								
1973	24.7	23.7	53.7	23.9	29.0	28.7	34.1	93.1
1975	23.1	22.5	29.0	61.7	26.2	26.2	42.4	39.2
1977	24.8	24.2	12.3	61.4	24.6	23.2	56.3	48.0
1979	26.6	22.8	37.6	97.5	20.8	19.2	52.2	70.8
1981	20.4	16.3	48.7	56.0	24.3	24.3	25.2	60.0
1983	28.2	23.6	49.0	77.9	28.1	23.6	57.5	93.8
1985	15.6	12.3	27.8	44.4	19.3	15.7	51.0	41.0
1987	22.5	20.9	34.5	21.4	29.9	27.7	54.0	s

## CHAPTER 5 | Academic Research and Development

Field and year	1–3 years since doctorate				4–7 years since doctorate			
	All positions	Full-time faculty	Other full-time positions	Postdocs	All positions	Full-time faculty	Other full-time positions	Postdocs
1989	25.6	24.7	24.3	41.9	33.2	31.6	51.4	83.9
1991	21.7	19.5	38.8	31.7	36.6	33.8	44.2	100.0
1993	11.2	7.2	25.4	88.2	14.9	14.4	21.9	100.0
1995	15.9	10.7	28.8	80.8	17.8	16.0	41.8	49.8
1997	14.0	12.1	28.6	25.0	16.9	15.2	28.6	s
1999	22.0	15.4	25.0	66.7	22.4	22.6	25.0	s
2001	19.6	19.4	20.0	33.3	21.1	20.4	27.3	s
2003	18.9	15.8	28.6	33.3	22.2	23.6	22.2	s
2006	18.9	15.6	28.6	33.3	21.6	22.8	20.0	s
2008	17.3	13.2	28.6	50.0	20.0	20.3	21.4	s
2010	15.3	12.8	14.3	33.3	18.8	18.3	25.0	s
2013	13.5	13.6	12.5	50.0	17.4	18.6	18.2	s
2015	18.4	12.0	28.6	33.3	15.9	14.8	21.4	s
Engineering								
1973	50.8	45.2	74.2	87.1	50.7	49.9	78.6	s
1975	53.7	48.9	65.8	83.8	54.4	53.1	82.3	s
1977	55.2	47.2	84.8	72.9	52.9	52.3	64.8	64.9
1979	55.5	48.5	71.9	99.4	55.1	58.8	33.8	16.9



## CHAPTER 5 | Academic Research and Development

Field and year	1–3 years since doctorate				4–7 years since doctorate			
	All positions	Full-time faculty	Other full-time positions	Postdocs	All positions	Full-time faculty	Other full-time positions	Postdocs
1981	54.4	43.2	100.0	100.0	65.6	61.9	83.9	s
1983	47.1	36.7	58.2	98.3	64.3	62.2	99.0	s
1985	43.9	37.8	66.1	94.5	47.6	46.3	66.4	s
1987	53.3	43.7	79.2	75.7	65.5	64.2	97.6	100.0
1989	56.0	48.9	71.9	73.3	70.8	68.6	91.8	100.0
1991	66.6	62.1	67.7	89.9	73.2	73.0	79.7	s
1993	43.4	32.1	65.1	68.7	51.2	49.4	65.9	70.3
1995	51.1	38.5	50.3	72.6	62.1	60.3	72.5	86.5
1997	51.6	37.5	60.0	63.6	52.3	48.5	50.0	66.7
1999	59.3	36.4	80.0	77.8	53.8	56.7	50.0	100.0
2001	55.6	50.0	80.0	57.1	57.9	57.1	44.4	s
2003	55.9	47.1	66.7	77.8	63.6	61.3	63.6	100.0
2006	59.6	42.1	50.0	75.0	64.4	62.1	57.1	83.3
2008	56.4	37.5	71.4	71.4	60.8	57.6	66.7	66.7
2010	52.9	41.2	62.5	62.5	64.3	67.6	63.6	80.0
2013	48.4	25.0	42.9	64.3	61.4	60.5	62.5	75.0
2015	44.8	40.0	50.0	50.0	51.4	50.0	56.3	55.6

## CHAPTER 5 | Academic Research and Development

NA = not available; s = suppressed for reasons of confidentiality and/or reliability.

### Note(s)

Data for 1985 and 1993–97 are not comparable with other years and understate the degree of federal support. In 1985 and 1993–97, the federal support question asked whether work performed during the week of 15 April was supported by the government; in other years, the question pertained to work conducted over the course of an entire year. Because of larger sample sizes, estimates of federal support are more accurate for life sciences than for other fields, especially mathematics and statistics and computer and information sciences. Academic employment is limited to U.S. doctorate holders employed at 2- or 4-year colleges or universities, medical schools, and university research institutes. Full-time faculty includes full professors, associate professors, assistant professors, and instructors from 1973 to 1995; from 1997 to 2015, full-time faculty includes full professors, associate professors, and assistant professors. Other full-time positions include those such as research associates, adjunct positions, lecturers, and administrative positions. Total excludes those employed part time because they are students or retired. Physical sciences include earth, atmospheric, and ocean sciences; life sciences include biological, agricultural, environmental, and health sciences.

### Source(s)

National Science Foundation, National Center for Science and Engineering Statistics, special tabulations (2017) of the 1973–2015 Survey of Doctorate Recipients (SDR).

*Science and Engineering Indicators 2018*

## CHAPTER 5 | Academic Research and Development

APPENDIX TABLE 5-25

### Fields and subfields of S&E publications data

(List)

Fields and subfields
Engineering
Aerospace engineering
Biomedical engineering
Chemical engineering
Civil engineering
Electrical engineering
General engineering
Industrial engineering
Materials engineering
Mechanical engineering
Metals and metallurgy
Nuclear technology
Operations research and management
Miscellaneous engineering and technology
Astronomy
Chemistry

## CHAPTER 5 | Academic Research and Development

### Fields and subfields

Analytical chemistry

Applied chemistry

General chemistry

Inorganic and nuclear chemistry

Organic chemistry

Physical chemistry

Polymers

Physics

Acoustics

Applied physics

Chemical physics

Fluids and plasmas

General physics

Nuclear and particle physics

Optics

Solid state physics

Miscellaneous physics

Geosciences

Earth and planetary sciences

## CHAPTER 5 | Academic Research and Development

### Fields and subfields

Environmental sciences

Geology

Marine biology and hydrobiology

Meteorology and atmospheric sciences

Oceanography and limnology

Mathematics

Applied mathematics

General mathematics

Probability and statistics

Miscellaneous mathematics

Computer sciences

Agricultural sciences

Agricultural and food sciences

Dairy and animal sciences

Biological sciences

Anatomy and morphology

Biochemistry and molecular biology

Biophysics

Botany

## CHAPTER 5 | Academic Research and Development

### Fields and subfields

Cell biology, cytology, and histology

Ecology

Entomology

General biology

General biomedical research

General zoology

Genetics and heredity

Immunology

Microbiology

Nutrition and dietetics

Parasitology

Pathology

Pharmacology

Physiology

Virology

Miscellaneous biology

Miscellaneous biomedical research

Miscellaneous zoology

Medical sciences

## CHAPTER 5 | Academic Research and Development

### Fields and subfields

Addictive diseases

Allergy

Anesthesiology

Arthritis and rheumatism

Cancer

Cardiovascular system

Dentistry

Dermatology and venereal disease

Embryology

Endocrinology

Environmental and occupational health

Fertility

Gastroenterology

General and internal medicine

Geriatrics

Hematology

Microscopy

Nephrology

Neurology and neurosurgery

## CHAPTER 5 | Academic Research and Development

### Fields and subfields

Obstetrics and gynecology

Ophthalmology

Orthopedics

Otorhinolaryngology

Pediatrics

Pharmacy

Psychiatry

Public health

Radiology and nuclear medicine

Respiratory system

Surgery

Tropical medicine

Urology

Veterinary medicine

Miscellaneous clinical medicine

Other life sciences

Health policy and services

Nursing

Rehabilitation



## CHAPTER 5 | Academic Research and Development

### Fields and subfields

Speech and language pathology and audiology

### Psychology

Behavioral and comparative psychology

Clinical psychology

Developmental and child psychology

Experimental psychology

General psychology

Human factors

Psychoanalysis

Social psychology

Miscellaneous psychology

### Social sciences

Anthropology and archaeology

Area studies

Criminology

Demography

Economics

General social sciences

Geography and regional sciences

## CHAPTER 5 | Academic Research and Development

### Fields and subfields

Gerontology and aging

International relations

Planning and urban studies

Political science and public administration

Science studies

Social studies of medicine

Sociology

Miscellaneous social sciences

### Source(s)

SRI International; Science-Metrix; National Science Foundation, National Center for Science and Engineering Statistics, Integrated Science and Engineering Resources Data System (WebCASPAR), <https://ncsesdata.nsf.gov/webcaspar/>.

*Science and Engineering Indicators 2018*

## CHAPTER 5 | Academic Research and Development

APPENDIX TABLE 5-26

### Regions, countries, or economies in S&E publications data

(Regions, countries, or economies)

North America	Central America and Caribbean	South America	EU	Other Europe	Middle East	Africa	Asia
Canada	Antigua and Barbuda	Argentina	Austria	Albania	Armenia	Algeria	Afghanistan
Greenland	Bahamas, The	Bolivia	Belgium	Andorra	Azerbaijan	Angola	Bangladesh
Mexico	Barbados	Brazil	Bulgaria	Belarus	Bahrain	Benin	Bhutan
Puerto Rico	Belize	Chile	Croatia	Bosnia and Herzegovina	Gaza Strip	Botswana	Brunei
United States	Costa Rica	Colombia	Cyprus	Holy See (Vatican City)	Georgia	Burkina Faso	Burma
	Cuba	Ecuador	Czech Republic	Iceland	Iran	Burundi	Cambodia
	Dominica	Guyana	Denmark	Kosovo	Iraq	Cameroon	China
	Dominican Republic	Paraguay	Estonia	Liechtenstein	Israel	Cape Verde	India
	El Salvador	Peru	Finland	Macedonia	Jordan	Central African Republic	Indonesia
	Grenada	Suriname	France	Moldova	Kuwait	Chad	Japan
	Guatemala	Uruguay	Germany	Monaco	Lebanon	Comoros	Kazakhstan
	Haiti	Venezuela	Greece	Montenegro <sup>a</sup>	Oman	Congo, Democratic Republic of the	Kyrgyzstan
	Honduras		Hungary	Norway	Qatar	Congo, Republic of the	Laos
	Jamaica		Ireland	Russia	Saudi Arabia	Côte d'Ivoire	Malaysia
	Nicaragua		Italy	San Marino	Syria	Djibouti	Maldives

## CHAPTER 5 | Academic Research and Development

North America	Central America and Caribbean	South America	EU	Other Europe	Middle East	Africa	Asia
	Panama		Latvia	Serbia <sup>a</sup>	United Arab Emirates	Egypt	Mongolia
	Saint Kitts and Nevis		Lithuania	Serbia and Montenegro <sup>b</sup>	West Bank	Equatorial Guinea	Nepal
	Saint Lucia		Luxembourg	Switzerland	Yemen	Eritrea	North Korea
	Saint Vincent and the Grenadines		Malta	Turkey		Ethiopia	Pakistan
	Trinidad and Tobago		Netherlands	Ukraine		Gabon	Papua New Guinea
			Poland			Gambia, The	Philippines
			Portugal			Ghana	Singapore
			Romania			Guinea	South Korea
			Slovakia			Guinea-Bissau	Sri Lanka
			Slovenia			Kenya	Taiwan
			Spain			Lesotho	Tajikistan
			Sweden			Liberia	Thailand
			United Kingdom			Libya	Timor-Leste
						Madagascar	Turkmenistan
						Malawi	Uzbekistan
						Mali	Vietnam
						Mauritania	

## CHAPTER 5 | Academic Research and Development

North America	Central America and Caribbean	South America	EU	Other Europe	Middle East	Africa	Asia
						Mauritius	
						Morocco	
						Mozambique	
						Namibia	
						Niger	
						Nigeria	
						Rwanda	
						São Tomé and Príncipe	
						Senegal	
						Seychelles	
						Sierra Leone	
						Somalia	
						South Africa	
						South Sudan	
						Sudan	
						Swaziland	
						Tanzania	
						Togo	
						Tunisia	

## CHAPTER 5 | Academic Research and Development

North America	Central America and Caribbean	South America	EU	Other Europe	Middle East	Africa	Asia
						Uganda	
						Western Sahara	
						Zambia	
						Zimbabwe	

EU = European Union.

<sup>a</sup> Beginning in 2006, Serbia and Montenegro represented individual countries.

<sup>b</sup> Serbia and Montenegro represented a single country for data purposes from 1992 to 2006.

### Source(s)

National Science Foundation, National Center for Science and Engineering Statistics; SRI International; Science-Metrix; Elsevier, Scopus abstract and citation database, accessed July 2017.

*Science and Engineering Indicators 2018*

## CHAPTER 5 | Academic Research and Development

APPENDIX TABLE 5-27

### S&E articles in all fields combined, by region, country, or economy: 2003–16

(Number)

Region, country, or economy	Region, country, or economy economic status	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
World	-	1,192,446.0	1,309,104.0	1,481,643.0	1,567,422.0	1,661,634.0	1,752,431.0	1,861,148.0	1,958,948.0	2,070,735.0	2,137,315.0	2,217,046.0	2,300,684.0	2,305,909.0	2,295,608.0
North America	-	366,071.7	396,720.5	435,091.4	441,710.1	451,285.7	455,841.9	465,172.7	478,045.1	494,841.5	505,215.2	509,326.6	516,379.8	504,153.0	480,895.9
Canada	Developed	37,695.5	41,624.3	47,087.7	49,258.8	52,326.3	53,416.3	55,541.0	56,734.1	57,925.7	60,130.9	60,611.1	61,539.4	60,496.4	57,355.8
Greenland	Developed	8.8	23.5	16.4	14.4	15.5	15.9	12.8	21.4	18.8	26.3	33.8	22.9	32.2	25.5
Mexico	Developing	6,601.5	7,198.8	8,286.0	9,322.0	9,492.1	10,476.3	10,747.8	11,436.3	11,959.0	12,746.5	13,469.6	14,587.8	14,485.4	14,529.4
United States	Developed	321,765.9	347,873.9	379,701.3	383,114.9	389,451.8	391,933.4	398,871.1	409,853.3	424,938.0	432,311.5	435,212.0	440,229.7	429,139.0	408,985.3
Central America and Caribbean	-	1,883.4	2,009.3	2,262.5	2,690.2	2,649.7	2,815.5	3,070.9	3,041.7	3,323.4	3,384.6	3,309.9	3,398.5	3,102.1	2,855.0
Antigua and Barbuda	Developing	1.8	0.7	1.8	1.6	4.3	6.3	3.8	2.2	0.8	2.5	1.9	2.5	3.9	7.8
Bahamas, The	Developing	5.2	3.0	7.4	5.9	11.1	6.0	9.7	8.8	10.9	7.9	16.9	12.3	12.3	14.4
Barbados	Developing	41.0	48.4	37.1	44.3	46.5	45.9	34.2	27.7	35.4	47.6	43.5	40.7	49.6	48.4
Belize	Developing	4.8	4.5	5.8	4.9	2.4	3.6	9.3	11.0	3.4	9.0	9.6	5.2	7.0	5.5
Costa Rica	Developing	152.4	219.1	219.1	222.4	228.7	249.5	260.7	261.2	270.3	315.9	285.8	365.8	354.5	376.7
Cuba	Developing	767.1	803.4	938.5	1,228.5	1,130.0	1,174.7	1,397.1	1,315.9	1,588.8	1,539.7	1,571.1	1,482.9	1,341.0	1,044.7
Dominica	Developing	4.6	2.4	5.3	4.2	2.9	5.2	5.0	8.5	6.9	10.8	11.3	10.1	9.5	7.7

## CHAPTER 5 | Academic Research and Development

Region, country, or economy	Region, country, or economy economic status	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Dominican Republic	Developing	13.5	14.0	16.9	16.9	18.2	18.2	15.5	18.1	20.5	25.9	38.9	40.6	35.3	30.1
El Salvador	Developing	5.4	18.0	14.7	18.2	14.5	20.9	16.0	18.7	17.8	19.4	14.7	19.9	21.8	28.5
Grenada	Developing	5.7	5.6	5.7	14.1	20.4	23.8	19.5	15.6	26.7	28.1	35.8	55.5	31.5	34.3
Guatemala	Developing	26.6	28.7	50.9	38.1	36.9	38.7	64.7	54.8	48.4	74.6	84.2	72.5	86.0	85.1
Haiti	Developing	5.8	7.5	7.2	15.1	10.8	7.3	11.8	13.3	17.1	16.5	29.0	38.3	33.8	30.1
Honduras	Developing	10.8	14.3	15.2	13.4	12.0	16.7	16.4	24.1	18.9	25.6	19.8	27.7	31.4	33.0
Jamaica	Developing	142.1	156.7	135.8	141.2	173.4	208.6	204.8	187.8	215.5	223.8	195.9	160.1	144.5	134.8
Nicaragua	Developing	13.8	17.2	20.4	32.1	22.6	32.7	29.1	33.5	32.9	34.4	28.6	37.0	26.6	35.6
Panama	Developing	62.9	68.8	79.1	83.1	101.2	115.6	119.3	119.8	131.8	155.1	160.2	170.6	161.5	159.3
Puerto Rico	Developing	496.7	462.4	527.9	662.6	639.6	671.2	639.7	705.2	631.2	624.3	577.6	621.3	585.8	566.0
Saint Kitts and Nevis	Developing	0.2	0.7	2.0	1.9	2.0	4.2	2.8	4.7	4.3	9.3	13.1	13.2	15.3	20.8
Saint Lucia	Developing	0.8	0.6	2.4	3.4	2.0	0.7	0.0	2.8	5.0	1.3	2.7	0.2	2.8	4.7
Saint Vincent and the Grenadines	Developing	1.8	0.4	1.3	0.7	1.5	0.0	1.1	0.5	0.1	1.4	2.2	0.7	0.8	2.3
Trinidad and Tobago	Developing	120.5	133.0	168.1	137.6	168.5	165.8	210.4	207.5	236.8	211.3	167.0	221.5	147.2	185.2
South America	-	25,875.0	28,943.9	32,447.4	40,482.9	44,184.6	50,940.4	55,308.1	59,510.5	63,517.4	69,790.8	72,401.5	77,457.7	77,750.4	79,115.1
Argentina	Developing	4,588.4	4,700.7	5,009.2	5,599.8	5,755.0	6,356.5	7,017.4	7,472.5	7,961.9	8,205.1	8,268.5	8,955.3	8,719.7	8,648.2
Bolivia	Developing	49.4	44.1	58.4	68.8	82.0	95.2	85.1	78.1	86.8	86.8	92.1	94.5	85.3	95.1



## CHAPTER 5 | Academic Research and Development

Region, country, or economy	Region, country, or economy economic status	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Brazil	Developing	16,752.4	19,375.9	21,869.7	28,159.8	31,066.2	35,532.3	38,547.2	41,754.9	44,585.8	49,184.2	51,136.2	53,667.3	53,492.3	53,606.6
Chile	Developing	2,063.5	2,284.4	2,513.5	3,122.3	3,401.0	3,909.1	4,162.5	4,314.1	4,718.3	5,256.0	5,358.3	6,182.4	6,515.1	6,745.9
Colombia	Developing	676.4	810.6	964.8	1,367.8	1,571.5	2,378.6	2,684.1	3,141.0	3,461.3	4,136.7	4,662.6	5,292.6	5,520.5	6,120.5
Ecuador	Developing	96.1	91.5	126.2	123.4	140.9	152.0	181.9	190.0	168.6	253.5	270.2	409.1	666.0	1,096.1
Guyana	Developing	7.1	11.5	18.2	10.1	13.0	12.1	10.2	20.6	9.7	12.4	11.7	12.1	8.8	13.7
Paraguay	Developing	14.8	27.3	28.8	29.1	31.1	32.3	35.1	36.2	56.2	57.9	61.0	67.7	97.5	96.4
Peru	Developing	204.0	207.9	235.2	294.4	315.9	365.1	420.4	474.7	572.3	602.3	681.9	761.0	910.2	1,007.6
Suriname	Developing	3.4	5.3	5.8	5.2	5.8	5.1	4.5	6.7	4.2	9.5	15.8	5.9	13.5	21.3
Uruguay	Developing	281.5	306.3	351.4	358.9	382.7	446.1	487.6	522.6	598.6	596.2	600.3	761.6	696.3	809.0
Venezuela	Developing	1,137.9	1,078.4	1,266.1	1,343.2	1,419.5	1,656.0	1,672.0	1,499.2	1,293.6	1,390.3	1,242.8	1,248.0	1,025.2	854.9
Europe	-	461,282.3	492,030.1	543,427.2	563,060.5	594,234.5	619,480.3	649,812.5	668,896.5	700,312.6	731,643.3	751,859.2	772,862.0	769,694.4	754,696.6
EU	-	388,657.0	414,985.2	459,901.2	480,818.3	506,962.8	528,948.9	553,592.6	568,066.4	593,001.6	619,018.4	632,208.9	646,622.7	635,063.2	613,774.4
Austria	Developed	7,749.6	8,065.7	8,903.4	9,155.2	9,882.7	10,334.3	10,941.2	11,214.8	11,824.8	12,358.5	12,557.6	12,900.5	12,936.7	12,366.4
Belgium	Developed	10,811.8	11,552.8	12,871.1	13,035.8	13,798.4	14,481.3	15,055.4	15,409.4	16,087.9	16,971.3	17,225.6	17,499.2	16,851.8	16,393.7
Bulgaria	Developed	1,688.9	1,794.9	2,020.2	1,928.2	2,483.3	2,356.5	2,552.0	2,599.1	2,554.0	2,733.0	2,753.4	2,744.4	2,605.3	2,558.7
Croatia	Developed	2,464.9	2,577.3	3,160.0	3,124.0	3,758.0	3,976.4	4,410.3	4,421.2	4,965.7	4,813.5	4,701.8	4,473.8	4,398.1	4,056.0
Cyprus	Developed	154.3	217.7	275.3	316.3	373.5	463.4	575.6	633.6	677.6	758.8	934.7	867.9	891.8	972.9
Czech Republic	Developed	6,374.8	7,000.4	8,016.2	8,838.7	9,988.0	10,649.1	11,197.6	12,673.8	13,544.7	13,948.9	14,401.9	15,675.0	16,873.4	15,963.1

## CHAPTER 5 | Academic Research and Development

Region, country, or economy	Region, country, or economy economic status	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Denmark	Developed	7,279.6	7,751.3	8,312.6	8,536.3	9,023.1	9,283.4	9,843.7	10,395.9	11,590.0	12,675.1	13,053.1	14,022.0	14,052.6	13,470.7
Estonia	Developed	555.3	625.1	715.5	853.7	1,014.9	1,118.0	1,128.0	1,407.1	1,381.7	1,475.0	1,506.4	1,675.2	1,604.2	1,481.7
Finland	Developed	7,792.3	8,500.7	9,037.7	9,204.0	9,413.7	9,579.8	9,921.3	9,976.6	10,345.3	10,488.1	10,824.1	11,220.0	10,752.7	10,545.1
France	Developed	51,757.8	54,775.8	59,581.4	62,448.0	64,476.8	67,209.2	69,380.8	70,177.1	72,035.5	74,413.7	75,266.0	75,017.4	72,224.4	69,430.8
Germany	Developed	70,447.7	74,144.7	82,968.9	84,434.4	88,424.9	91,159.6	95,033.3	97,179.4	100,879.4	105,373.5	105,377.5	109,262.0	105,754.9	103,121.9
Greece	Developed	6,680.5	7,780.4	9,248.9	10,684.0	11,041.0	11,774.1	12,118.0	11,954.3	11,967.4	11,980.5	11,923.4	11,752.7	11,195.8	10,725.4
Hungary	Developed	4,500.2	4,796.0	5,542.0	5,530.3	5,884.6	6,408.5	6,029.9	5,870.6	6,419.3	6,570.6	6,468.0	6,858.9	6,566.3	6,207.6
Ireland	Developed	3,069.3	3,824.8	4,742.8	4,857.3	5,520.7	5,786.7	6,437.4	7,035.7	7,433.1	7,182.9	7,261.8	7,374.5	6,852.3	6,834.4
Italy	Developed	41,207.1	43,636.6	47,357.3	50,159.4	53,837.1	55,940.8	58,398.7	58,805.7	60,842.3	65,276.2	68,768.3	70,780.7	70,814.2	69,125.2
Latvia	Developed	258.4	281.0	435.3	366.5	474.3	585.3	681.7	767.1	1,274.3	1,194.4	1,235.3	1,162.3	1,476.1	1,256.8
Lithuania	Developed	826.5	1,182.9	1,476.8	1,676.7	1,578.5	2,493.0	2,264.8	2,345.5	2,456.6	2,310.5	2,319.2	2,471.7	2,460.5	2,181.2
Luxembourg	Developed	86.7	141.7	142.2	198.4	211.1	309.7	389.0	461.3	586.8	595.6	772.2	865.7	797.9	817.9
Malta	Developed	77.9	62.9	77.1	81.5	109.4	177.0	157.7	184.5	201.5	250.5	265.3	297.3	302.2	320.4
Netherlands	Developed	19,565.0	21,238.1	23,860.9	24,460.6	25,627.5	26,534.5	28,684.2	29,226.9	30,227.6	31,501.2	32,017.2	32,354.9	31,068.9	29,949.0
Poland	Developed	15,948.1	17,967.9	19,830.2	21,267.4	21,568.8	23,376.1	23,470.8	24,551.5	25,857.5	28,115.0	30,064.1	31,779.4	32,766.5	32,977.9
Portugal	Developed	4,507.6	5,109.3	5,887.8	7,136.2	7,623.6	8,655.6	9,573.0	10,625.1	11,989.2	13,102.6	14,112.4	14,666.0	14,581.9	13,773.2
Romania	Developed	2,601.4	2,730.1	3,460.7	3,522.9	5,170.0	7,367.8	9,550.1	11,010.2	10,906.2	11,061.6	11,177.0	10,800.6	11,527.3	10,193.5
Slovakia	Developed	2,136.1	2,303.5	2,548.8	2,644.4	2,800.2	3,332.5	3,164.3	3,638.3	3,899.5	4,261.9	4,616.6	5,135.9	5,205.7	5,359.4

## CHAPTER 5 | Academic Research and Development

Region, country, or economy	Region, country, or economy economic status	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Slovenia	Developed	2,074.4	1,894.4	2,334.9	2,392.7	2,754.2	3,006.9	3,221.1	3,246.6	3,780.4	3,707.9	3,726.1	3,788.5	3,631.6	3,406.7
Spain	Developed	28,887.2	31,479.4	35,673.9	39,270.5	42,014.7	43,958.6	47,326.9	49,035.6	52,355.1	55,108.1	55,736.4	57,075.8	54,794.2	52,820.7
Sweden	Developed	14,553.8	15,235.3	16,426.1	16,633.8	16,757.4	16,630.1	17,328.3	17,730.5	18,438.5	19,422.4	20,092.6	21,130.1	20,668.9	19,937.1
United Kingdom	Developed	74,599.8	78,314.4	84,993.1	88,060.9	91,352.4	92,000.6	94,757.4	95,488.8	98,479.6	101,367.0	103,051.0	102,970.6	101,407.0	97,526.9
Other Europe	-	72,625.3	77,044.9	83,526.0	82,242.2	87,271.7	90,531.4	96,219.9	100,830.1	107,311.0	112,624.9	119,650.3	126,239.2	134,631.2	140,922.2
Albania	Developing	23.9	22.0	26.2	32.6	40.3	51.9	76.8	140.8	165.2	214.1	359.5	360.7	269.0	191.4
Andorra	Developing	4.1	1.3	4.8	5.0	6.2	1.7	2.6	1.2	1.0	3.6	5.9	5.4	7.4	7.9
Belarus	Developing	1,177.7	1,196.1	1,291.6	1,159.5	1,293.3	1,037.8	1,171.7	1,056.6	1,099.4	1,015.2	1,040.6	1,053.0	970.4	936.7
Bosnia and Herzegovina	Developing	123.7	175.6	250.6	223.2	243.1	372.6	406.9	494.5	542.6	572.9	494.5	477.8	524.6	508.5
Holy See (Vatican City)	Developed	0.0	2.4	0.5	0.3	0.4	1.5	2.1	2.3	1.8	2.7	2.9	3.1	4.1	1.7
Iceland	Developed	258.5	300.0	354.7	361.6	364.4	431.3	497.1	567.5	553.3	636.3	594.7	589.5	611.7	651.8
Kosovo	Developing	0.0	0.0	0.0	0.0	0.0	52.1	95.0	120.0	106.5	116.6	127.6	125.6	133.3	189.0
Liechtenstein	Developed	14.5	23.8	33.6	34.4	24.6	39.0	25.2	40.2	41.2	34.1	31.3	38.9	30.3	35.4
Macedonia	Developing	144.3	226.7	238.9	219.9	284.2	293.9	355.9	346.1	434.3	496.1	505.6	556.7	576.4	483.1
Moldova	Developing	155.1	121.9	203.7	143.5	147.0	164.8	199.3	172.3	203.2	231.0	231.0	239.3	193.6	295.4
Monaco	Developing	25.7	37.8	36.5	34.3	30.1	35.4	41.8	40.9	49.0	30.4	36.5	40.2	41.1	39.7
Montenegro <sup>a</sup>	Developing	na	na	na	na	64.0	66.0	67.3	106.8	133.7	162.1	198.8	219.3	206.0	257.8

## CHAPTER 5 | Academic Research and Development

Region, country, or economy	Region, country, or economy economic status	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Norway	Developed	5,118.6	5,608.6	6,655.6	7,093.3	7,674.3	7,948.0	8,751.0	9,056.1	9,759.8	10,357.5	10,352.6	10,703.8	10,471.1	10,725.7
Russia	Developing	32,329.5	32,149.9	33,091.8	29,368.9	30,319.7	31,854.4	32,620.2	33,960.8	36,157.3	36,252.6	39,714.7	44,994.7	53,060.6	59,133.5
San Marino	Developing	0.2	0.6	1.3	0.7	2.9	4.8	1.2	1.3	2.3	5.9	7.0	5.1	7.5	7.5
Serbia <sup>a</sup>	Developing	na	na	na	na	2,843.1	3,096.6	3,710.7	4,120.9	4,919.6	6,076.6	5,472.3	5,233.2	5,072.3	5,052.4
Serbia and Montenegro <sup>b</sup>	Developing	1,433.8	1,719.4	2,189.9	2,336.5	na	na	na	na	na	na	na	na	na	na
Switzerland	Developed	12,848.2	13,992.8	15,384.7	16,385.4	16,922.5	17,438.0	18,094.8	18,944.0	19,932.9	21,200.9	21,877.8	22,502.0	21,884.1	21,127.6
Turkey	Developing	13,353.6	15,830.5	17,840.9	19,546.7	21,523.0	21,735.0	24,447.0	25,584.0	26,808.3	28,500.5	31,146.9	31,673.7	33,113.0	33,902.2
Ukraine	Developing	5,614.0	5,635.6	5,920.7	5,296.3	5,488.6	5,906.6	5,653.3	6,073.7	6,399.5	6,715.9	7,449.9	7,417.1	7,454.8	7,374.7
Middle East	-	18,966.3	21,161.3	24,085.8	28,304.2	32,173.4	36,813.8	41,760.8	47,676.3	56,608.5	59,561.4	62,891.4	67,288.0	68,844.3	73,817.0
Armenia	Developing	311.9	342.2	390.0	360.3	400.5	394.5	446.5	494.3	618.6	550.5	552.0	559.1	531.4	521.0
Azerbaijan	Developing	266.1	350.5	351.0	288.4	417.9	475.0	616.2	605.3	645.9	684.0	481.1	399.6	420.9	480.3
Bahrain	Developing	126.5	136.7	159.0	185.2	172.2	165.6	186.6	205.0	185.2	160.3	236.1	223.6	172.6	210.6
Gaza Strip	Developing	36.7	47.9	40.8	47.8	69.7	62.0	70.3	60.4	88.0	85.6	97.3	97.5	81.1	69.0
Georgia	Developing	216.6	269.2	377.0	357.5	307.4	350.1	406.6	346.4	463.2	441.4	473.4	486.1	492.0	579.4
Iran	Developing	3,768.4	5,017.1	7,102.8	10,072.5	13,202.9	16,841.7	20,594.4	25,208.6	31,419.4	32,195.1	33,761.3	36,310.9	36,748.6	40,974.5
Iraq	Developing	116.0	90.7	139.5	244.5	231.7	304.3	361.8	554.8	653.7	843.3	853.4	865.5	897.3	1,227.3
Israel	Developed	9,676.4	10,237.0	10,398.4	11,040.4	11,238.9	11,366.8	11,270.8	11,014.4	11,414.9	11,916.3	11,749.8	12,265.8	12,216.4	11,892.7

## CHAPTER 5 | Academic Research and Development

Region, country, or economy	Region, country, or economy economic status	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Jordan	Developing	657.9	740.9	794.5	954.3	1,086.1	1,224.8	1,294.1	1,452.8	1,464.7	1,444.9	1,520.6	1,471.8	1,509.8	1,651.8
Kuwait	Developing	512.7	544.5	620.5	646.4	711.4	756.8	776.5	748.6	800.2	830.6	878.7	794.4	874.0	738.6
Lebanon	Developing	459.9	481.9	552.6	635.0	652.5	717.7	762.6	790.4	888.0	1,023.3	1,096.3	1,219.5	1,278.1	1,397.9
Oman	Developing	288.2	300.5	317.3	332.1	392.7	383.4	426.2	477.3	598.8	587.5	667.3	705.8	774.1	795.0
Qatar	Developing	105.9	135.3	168.8	184.4	244.1	279.8	330.3	408.7	471.1	623.9	808.2	1,106.6	1,180.1	1,310.7
Saudi Arabia	Developing	1,719.2	1,710.7	1,734.0	1,898.0	2,011.6	2,222.4	2,836.4	3,621.3	4,957.5	5,982.5	7,410.5	8,410.8	8,885.0	9,231.9
Syria	Developing	101.2	129.2	140.9	128.9	153.8	200.1	162.2	228.4	268.9	302.8	265.9	245.1	270.3	273.2
United Arab Emirates	Developing	522.6	537.8	698.1	810.4	756.1	917.8	1,024.7	1,229.3	1,427.8	1,645.5	1,775.6	1,819.0	2,261.6	2,180.9
West Bank	Developing	48.4	48.3	55.1	64.3	79.0	92.9	113.5	130.2	132.9	131.8	134.1	158.9	144.9	171.1
Yemen	Developing	31.8	40.9	45.3	53.9	45.0	58.0	81.1	99.9	109.8	112.1	129.9	148.1	106.1	111.2
Africa	-	14,043.3	15,807.4	17,089.9	19,435.1	21,506.0	23,547.8	27,717.6	30,363.7	33,719.9	36,978.7	40,459.0	44,664.9	45,367.0	48,919.8
Algeria	Developing	629.8	836.9	932.6	1,287.5	1,405.7	1,742.0	2,126.3	2,137.4	2,461.0	3,063.4	3,538.9	3,679.5	4,102.8	4,447.1
Angola	Developing	4.3	8.2	9.9	13.3	9.9	9.9	14.0	15.2	17.8	22.4	24.1	35.7	32.9	39.1
Benin	Developing	47.2	61.1	55.6	75.0	87.1	92.4	122.0	108.9	132.8	146.1	181.3	181.6	189.2	167.3
Botswana	Developing	114.1	121.2	115.3	178.6	139.2	151.0	134.9	154.2	160.5	156.6	180.9	200.0	167.4	226.6
Burkina Faso	Developing	76.6	72.1	69.6	101.0	112.9	120.4	136.8	130.9	153.3	209.3	183.5	201.9	219.8	221.8
Burundi	Developing	4.5	5.0	2.8	4.6	5.5	2.5	3.8	12.5	8.5	10.7	16.3	14.9	12.2	10.7
Cameroon	Developing	196.9	216.8	275.9	314.6	343.5	328.5	359.4	377.6	438.0	459.4	526.5	618.4	635.3	670.1

## CHAPTER 5 | Academic Research and Development

Region, country, or economy	Region, country, or economy economic status	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Cape Verde	Developing	2.4	1.6	0.4	4.1	2.7	2.1	4.9	3.6	2.4	4.0	9.2	8.2	9.6	8.1
Central African Republic	Developing	9.2	8.6	9.6	13.4	8.3	9.5	10.1	14.3	13.3	10.5	11.8	18.7	13.6	28.9
Chad	Developing	5.0	8.7	7.6	10.7	5.2	6.9	9.3	6.0	8.4	6.2	7.3	8.7	12.4	11.5
Comoros	Developing	0.3	1.2	0.9	0.2	2.6	0.7	0.8	2.2	3.9	1.6	13.9	1.5	2.5	4.6
Congo, Democratic Republic of the	Developing	16.8	15.5	26.8	25.6	36.0	39.1	42.9	54.9	50.0	78.9	84.3	120.0	131.3	112.8
Congo, Republic of the	Developing	32.4	35.3	42.1	42.3	41.8	45.3	38.8	47.6	49.6	54.9	60.7	76.2	65.9	77.8
Côte d'Ivoire	Developing	92.1	108.8	101.7	99.4	129.2	170.6	155.3	155.8	183.8	192.0	164.8	186.5	194.2	177.5
Djibouti	Developing	1.3	1.9	2.7	1.9	2.3	2.8	8.1	6.9	4.2	6.6	7.8	7.5	5.8	4.1
Egypt	Developing	3,296.1	3,549.3	3,600.0	3,958.3	4,512.1	4,918.8	6,105.2	6,665.5	7,426.6	8,514.4	8,949.2	9,311.2	9,830.6	10,807.0
Equatorial Guinea	Developing	1.2	4.1	1.5	3.7	3.8	2.4	4.8	4.0	2.2	2.8	2.3	2.2	5.1	7.4
Eritrea	Developing	15.2	11.7	12.8	17.4	16.5	10.0	7.0	11.7	13.3	5.2	10.6	7.5	9.7	8.5
Ethiopia	Developing	209.6	202.5	220.5	272.0	309.1	342.9	413.0	451.1	513.5	710.6	842.4	1,025.0	1,020.8	1,121.0
Gabon	Developing	28.6	33.3	43.1	42.6	34.1	42.9	50.4	43.7	57.3	52.0	50.6	60.1	60.3	59.2
Gambia, The	Developing	30.7	37.4	36.0	46.1	36.2	41.7	40.2	44.7	33.8	37.3	45.1	49.2	42.7	46.5
Ghana	Developing	145.9	175.3	191.1	195.1	249.0	269.2	336.2	367.3	439.3	549.5	603.7	662.2	794.8	982.1
Guinea	Developing	5.1	10.6	7.0	18.9	15.1	11.8	12.0	11.4	11.2	11.6	11.3	23.8	27.3	38.0
Guinea-Bissau	Developing	8.0	9.6	9.4	5.7	12.1	7.3	8.3	5.8	10.4	12.8	12.0	17.9	10.3	11.5

## CHAPTER 5 | Academic Research and Development

Region, country, or economy	Region, country, or economy economic status	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Kenya	Developing	409.2	439.3	456.3	490.4	566.0	592.6	678.8	701.2	805.0	804.1	919.6	978.2	950.8	987.1
Lesotho	Developing	5.4	5.9	4.7	10.8	9.6	11.1	8.1	8.1	8.3	18.3	14.0	8.9	19.1	22.8
Liberia	Developing	1.3	0.6	1.3	4.7	2.8	2.4	4.7	3.4	8.3	9.8	9.0	11.8	16.6	16.6
Libya	Developing	55.3	62.2	76.6	92.0	109.9	129.0	229.4	301.9	126.9	158.5	218.5	199.0	172.0	138.7
Madagascar	Developing	65.2	50.0	56.2	62.4	104.2	81.5	86.2	81.2	98.0	93.2	118.0	122.0	120.4	102.8
Malawi	Developing	77.8	77.2	81.9	85.0	130.1	136.2	111.9	142.3	166.8	171.6	159.7	186.9	197.0	203.1
Mali	Developing	36.9	33.7	39.7	63.6	67.8	67.5	73.0	79.0	88.1	87.2	65.1	73.6	70.2	87.3
Mauritania	Developing	4.9	6.4	10.5	7.3	9.0	5.0	7.3	6.6	13.3	12.7	16.2	12.8	13.8	19.7
Mauritius	Developing	47.4	55.7	66.8	61.0	59.1	70.2	79.4	87.8	63.5	108.4	120.3	122.6	121.5	156.0
Morocco	Developing	921.3	951.6	917.1	983.5	1,043.4	1,214.3	1,470.0	1,659.5	2,007.5	2,298.1	2,506.2	3,175.5	3,156.6	4,062.5
Mozambique	Developing	24.9	30.4	35.8	43.3	40.5	49.0	58.0	45.8	73.9	60.6	67.9	85.3	102.6	100.6
Namibia	Developing	39.9	31.0	50.3	34.7	38.3	36.0	33.2	39.0	46.9	66.0	86.1	94.8	99.4	107.7
Niger	Developing	22.1	22.5	22.2	29.8	29.2	26.9	55.5	66.1	31.9	32.0	32.7	49.6	56.1	56.1
Nigeria	Developing	1,222.5	1,456.7	1,660.5	2,049.7	2,297.2	2,328.3	3,001.9	3,458.1	3,783.5	3,582.1	3,809.3	3,994.7	3,742.8	3,821.6
Rwanda	Developing	4.7	9.1	7.3	18.0	19.7	25.8	33.6	55.6	53.2	58.1	87.9	88.2	105.2	115.3
São Tomé and Príncipe	Developing	1.9	0.6	0.3	1.0	1.3	0.0	1.3	2.2	0.0	0.5	1.2	0.7	1.4	0.9
Senegal	Developing	198.8	173.4	207.4	171.6	207.6	208.1	188.0	203.4	284.3	287.3	299.0	332.9	371.2	353.0
Seychelles	Developing	9.6	5.0	4.9	9.0	12.3	10.7	6.6	11.8	9.9	9.8	15.9	9.6	19.0	12.4

## CHAPTER 5 | Academic Research and Development

Region, country, or economy	Region, country, or economy economic status	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Sierra Leone	Developing	2.8	5.4	6.0	5.1	5.0	7.9	9.1	12.2	11.1	14.8	15.0	21.7	34.3	48.2
Somalia	Developing	1.8	1.1	0.0	1.0	0.0	1.1	2.8	3.2	2.9	1.4	6.3	6.2	4.5	3.3
South Africa	Developing	4,226.6	4,809.3	5,146.4	5,636.5	5,907.4	6,403.7	7,062.6	7,651.6	8,533.0	9,341.5	10,251.0	11,991.5	11,417.8	11,881.2
South Sudan	Developing	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.6	2.4	9.8	5.8	5.1	2.5
Sudan	Developing	85.6	104.3	100.9	108.3	140.6	169.5	227.4	258.1	298.4	270.4	359.2	242.5	255.2	368.8
Swaziland	Developing	11.7	12.7	19.1	16.9	11.4	19.1	28.2	37.2	31.5	30.4	33.2	33.8	35.0	31.0
Tanzania	Developing	161.6	182.4	210.6	266.6	287.6	281.3	302.6	368.7	415.3	396.4	407.7	548.0	547.0	539.2
Togo	Developing	26.2	22.1	26.0	28.9	32.2	42.3	42.4	48.4	48.9	47.5	64.2	81.3	78.0	76.3
Tunisia	Developing	1,066.0	1,355.6	1,701.4	1,980.2	2,345.8	2,790.6	3,277.7	3,552.9	3,824.9	3,924.2	4,387.6	4,697.4	5,025.9	5,265.6
Uganda	Developing	127.6	194.0	215.1	208.4	272.6	250.6	306.0	400.9	432.6	464.0	496.0	536.7	607.2	572.9
Western Sahara	Developing	0.0	1.0	0.0	0.0	0.0	1.0	1.5	0.3	0.0	0.3	0.0	0.0	2.0	0.0
Zambia	Developing	46.9	43.8	60.8	69.2	66.9	93.5	75.6	89.2	104.3	110.3	120.8	139.2	154.3	179.3
Zimbabwe	Developing	164.0	127.6	129.0	163.9	168.7	122.0	110.4	154.8	151.1	197.7	223.2	295.4	268.4	298.0
Asia	-	263,943.5	312,074.1	381,321.8	423,173.5	462,541.8	509,132.0	564,669.3	612,546.3	655,450.8	664,609.3	708,248.7	753,224.1	773,830.8	793,150.1
Afghanistan	Developing	7.3	5.8	9.4	10.2	14.5	12.5	23.3	33.9	42.7	35.0	27.3	33.3	23.5	80.4
Bangladesh	Developing	573.5	532.1	610.8	719.4	1,005.8	1,119.3	1,248.3	1,497.8	1,521.5	2,052.9	2,019.4	2,361.5	2,194.9	2,546.1
Bhutan	Developing	3.7	8.4	5.5	15.9	8.1	6.1	12.1	17.2	17.3	18.0	29.3	27.8	23.9	40.2
Brunei	Developing	34.8	29.3	30.3	33.9	42.6	42.4	46.3	47.7	79.4	107.3	126.1	185.9	177.5	216.9



## CHAPTER 5 | Academic Research and Development

Region, country, or economy	Region, country, or economy economic status	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Burma	Developing	12.5	14.4	51.1	29.7	38.2	58.4	87.6	56.0	96.4	42.9	36.7	46.6	76.4	110.8
Cambodia	Developing	25.3	35.7	36.6	47.5	50.7	54.7	61.6	58.9	72.0	75.8	85.7	94.3	111.4	116.9
China	Developing	86,621.4	119,754.6	164,747.4	189,759.8	215,700.4	249,972.9	290,330.2	316,915.3	334,045.0	332,082.1	362,972.9	393,962.7	411,268.1	426,165.3
India	Developing	26,797.1	28,930.1	33,215.8	38,590.3	43,624.9	48,794.2	54,667.1	62,790.2	75,337.3	82,182.2	88,942.4	100,574.8	106,663.4	110,319.6
Indonesia	Developing	359.7	447.4	545.3	619.0	613.8	678.0	1,014.0	1,344.6	1,821.4	2,027.8	2,776.3	3,465.2	5,071.5	7,728.7
Japan	Developed	97,235.2	100,403.7	109,662.2	110,502.8	108,760.8	106,897.5	108,237.4	108,292.4	110,570.0	109,424.5	109,257.9	106,154.6	99,812.4	96,536.2
Kazakhstan	Developing	238.8	228.9	241.2	215.1	213.8	226.8	270.4	324.4	382.7	478.9	1,014.9	1,065.5	1,259.3	1,563.8
Kyrgyzstan	Developing	20.2	30.2	43.1	50.0	37.4	51.4	33.8	34.2	49.9	49.2	62.7	55.9	50.9	100.8
Laos	Developing	17.7	37.0	23.3	40.0	27.5	35.0	40.7	44.5	48.0	59.9	72.3	55.7	68.6	85.1
Malaysia	Developing	1,741.1	2,019.1	2,433.6	3,229.9	3,903.0	6,108.1	8,035.2	11,056.8	14,003.8	14,742.2	16,291.1	17,348.9	19,088.7	20,331.5
Maldives	Developing	2.4	1.3	3.2	4.1	4.8	0.9	3.0	2.8	6.7	8.9	5.0	8.9	6.2	4.9
Mongolia	Developing	34.2	31.8	37.4	49.2	111.9	89.0	102.1	93.4	104.9	132.2	169.2	122.2	103.5	112.3
Nepal	Developing	191.3	208.6	285.1	331.4	364.8	333.1	396.6	394.3	398.0	456.5	484.5	526.9	521.1	549.3
North Korea	Developing	5.1	54.8	52.3	60.0	41.7	27.9	53.8	12.6	7.5	18.3	13.1	20.8	47.3	43.8
Pakistan	Developing	1,420.7	1,685.0	2,321.6	2,809.3	3,363.3	4,044.7	4,917.3	5,661.2	6,444.9	7,078.5	8,078.1	8,065.2	8,337.2	9,180.6
Papua New Guinea	Developing	52.6	37.0	33.4	38.2	55.7	59.1	42.9	53.3	47.5	62.6	54.3	64.3	59.7	54.0
Philippines	Developing	361.9	346.4	424.2	410.3	467.8	528.6	588.4	684.3	882.0	854.0	961.8	1,045.0	1,384.7	1,568.7
Singapore	Developed	6,037.0	7,401.0	7,959.6	8,204.6	8,251.5	8,688.5	8,919.5	9,853.9	10,098.5	10,809.3	10,979.5	11,145.3	11,220.9	11,253.8

## CHAPTER 5 | Academic Research and Development

Region, country, or economy	Region, country, or economy economic status	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
South Korea	Developed	23,201.1	27,398.8	31,646.6	36,746.8	41,521.7	44,300.9	46,020.6	50,935.1	54,716.8	57,373.7	59,205.9	62,691.2	64,523.1	63,063.0
Sri Lanka	Developing	247.2	244.0	332.3	369.5	420.6	469.6	475.8	501.8	578.4	617.7	743.6	704.8	756.7	1,032.9
Taiwan	Developed	15,807.3	18,752.9	22,382.5	25,246.2	28,182.9	29,894.6	31,869.8	33,495.9	35,088.9	34,091.5	33,634.7	32,516.0	29,656.6	27,385.1
Tajikistan	Developing	32.2	38.6	30.8	26.3	32.5	30.0	23.3	40.6	42.8	47.5	62.0	37.8	54.0	47.5
Thailand	Developing	2,260.3	2,714.3	3,433.8	4,270.0	4,812.3	5,527.5	5,940.0	6,811.2	7,336.1	7,768.1	7,917.3	8,476.1	8,675.4	9,581.5
Timor-Leste	Developing	1.3	0.0	1.5	3.5	3.3	1.3	2.6	1.1	3.1	6.0	6.3	10.6	7.8	8.3
Turkmenistan	Developing	4.0	4.5	3.2	3.1	4.9	2.6	5.0	5.3	12.2	13.3	6.9	20.1	6.0	3.5
Uzbekistan	Developing	277.7	355.0	322.6	291.4	346.9	300.5	336.3	388.9	379.2	325.3	353.0	332.2	287.8	357.4
Vietnam	Developing	319.0	323.4	396.3	446.2	513.7	775.9	864.3	1,096.5	1,215.6	1,567.1	1,858.4	2,003.9	2,292.1	2,961.3
Australia and Oceania	-	29,318.0	31,819.2	36,400.6	38,821.6	41,915.2	43,182.3	45,669.3	48,510.3	51,894.2	54,158.4	57,636.8	60,640.9	59,779.0	58,734.1
Australia	Developed	24,849.7	26,946.4	31,031.7	33,100.4	35,798.6	36,822.3	38,996.2	41,564.9	44,378.3	46,386.8	49,921.9	52,643.6	52,147.9	51,068.2
Cook Islands	Developing	0.0	0.0	0.3	0.7	0.4	0.0	0.6	0.5	1.8	2.7	1.7	2.0	1.5	1.2
Fiji	Developing	47.1	64.4	58.8	75.0	85.8	63.3	68.0	62.6	62.1	67.6	89.5	123.2	99.4	154.9
Kiribati	Developing	0.1	0.0	0.0	2.4	1.8	0.0	0.3	0.3	0.0	1.0	1.1	1.9	1.4	2.2
Marshall Islands	Developing	3.8	1.0	1.8	3.8	1.1	1.6	1.7	1.5	1.5	1.5	1.3	1.2	2.6	1.3
Micronesia, Federated States of	Developing	2.3	2.4	6.0	2.0	7.1	4.3	2.9	8.2	4.9	4.5	5.9	3.2	4.3	2.7
Nauru	Developing	0.0	0.2	0.5	0.3	0.0	0.0	0.7	0.0	0.7	0.5	0.3	0.4	0.3	0.7

## CHAPTER 5 | Academic Research and Development

Region, country, or economy	Region, country, or economy economic status	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
New Zealand	Developed	4,395.8	4,783.1	5,279.3	5,607.4	6,000.4	6,277.4	6,578.6	6,844.5	7,419.6	7,675.9	7,593.9	7,834.7	7,481.3	7,464.7
Niue	Developing	0.0	0.0	0.1	1.0	1.6	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.1
Palau	Developing	1.8	2.4	7.0	3.3	4.8	2.7	2.7	5.2	1.8	2.2	3.5	4.7	6.4	3.1
Samoa	Developing	3.8	4.8	5.1	9.9	4.1	2.6	5.4	6.1	6.1	2.5	4.5	7.5	8.2	5.3
Solomon Islands	Developing	4.9	2.6	2.6	6.6	4.3	2.9	3.4	7.9	7.5	5.0	4.3	6.6	10.9	14.0
Tonga	Developing	1.6	3.4	0.7	2.7	2.3	0.5	2.9	1.4	1.9	1.8	1.3	1.0	2.7	1.8
Tuvalu	Developing	0.6	0.6	0.0	1.3	0.4	0.3	0.3	1.0	0.0	0.0	0.3	1.1	1.1	0.4
Vanuatu	Developing	6.5	7.8	6.8	5.0	2.6	4.4	5.6	6.3	7.9	6.4	7.3	9.7	10.9	13.5
Unassigned	-	11,062.5	8,538.1	9,516.4	9,743.9	11,143.2	10,677.0	7,966.8	10,357.8	11,066.8	11,973.4	10,913.0	4,768.1	3,388.0	3,424.4

na = not applicable; country data do not exist.

EU = European Union.

<sup>a</sup> Beginning in 2006, Serbia and Montenegro represented individual countries.

<sup>b</sup> Serbia and Montenegro represented a single country for data purposes from 1992 to 2006.

### Note(s)

Article counts refer to publications from a selection of journals, books, and conference proceedings in S&E from Scopus. Articles are classified by their year of publication and are assigned to a region, country, or economy on the basis of the institutional address(es) listed in the article. Articles are credited on a fractional-count basis. The sum of the regions, countries, or economies may not add to the world total because of rounding. Some publications have incomplete address information for coauthored publications in the Scopus database. The unassigned category count is the sum of fractional counts for publications that cannot be assigned to a region, country, or economy.

### Source(s)



**CHAPTER 5 | Academic Research and Development**

National Science Foundation, National Center for Science and Engineering Statistics; SRI International; Science-Metrix; Elsevier, Scopus abstract and citation database, accessed July 2017. For more information on the International Monetary Fund economic classification of countries, see <https://www.imf.org/external/pubs/ft/weo/2016/01/weodata/groups.htm>, accessed December 2016.

*Science and Engineering Indicators 2018*

## CHAPTER 5 | Academic Research and Development

### APPENDIX TABLE 5-28

#### S&E articles in agricultural sciences, by region, country, or economy: 2003–16

(Number)

Region, country, or economy	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
World	21,125.0	23,059.0	24,831.0	29,010.0	33,991.0	36,553.0	38,397.0	39,896.0	42,454.0	43,885.0	48,152.0	49,469.0	51,085.0	51,140.0
North America	5,414.4	6,190.1	6,004.7	6,277.5	6,880.4	6,753.0	6,728.2	6,778.5	6,743.8	6,796.3	6,624.5	6,826.5	7,071.4	6,781.1
Canada	903.5	1,010.8	900.3	1,071.9	1,128.3	1,074.5	1,131.8	1,142.8	1,119.2	1,155.1	1,080.8	1,259.2	1,146.0	1,104.9
Greenland	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.1	0.1	0.1	0.0
Mexico	167.6	203.6	227.8	247.5	310.0	359.3	405.5	457.1	604.0	534.3	567.4	604.7	582.7	591.0
United States	4,343.4	4,975.8	4,876.6	4,958.2	5,442.0	5,319.2	5,190.9	5,178.5	5,020.7	5,106.9	4,976.2	4,962.6	5,342.6	5,085.2
Central America and Caribbean	106.4	87.9	147.0	137.5	133.6	159.5	111.4	119.7	161.6	145.0	131.0	151.8	138.7	123.6
Antigua and Barbuda	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bahamas, The	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0
Barbados	0.0	4.0	0.6	0.0	0.3	0.5	0.0	0.0	1.0	1.0	0.0	0.0	0.0	1.0
Belize	0.0	0.0	0.3	0.0	0.0	0.1	1.8	2.8	0.0	0.0	0.0	0.1	1.1	0.0
Costa Rica	4.0	6.2	13.8	9.1	8.7	13.5	9.1	8.3	9.4	16.6	8.5	14.9	10.0	17.4
Cuba	65.3	54.6	78.8	71.6	71.8	95.7	74.0	47.8	86.2	82.4	79.9	73.6	78.7	64.3
Dominica	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.0	0.0	0.0	0.0	0.0	0.7
Dominican Republic	0.4	0.2	0.1	0.1	0.0	1.0	0.5	0.9	1.7	0.6	1.3	1.7	1.5	1.5
El Salvador	0.8	0.0	0.3	0.0	0.0	0.0	0.0	0.4	0.0	0.0	0.0	0.0	2.0	0.0

## CHAPTER 5 | Academic Research and Development

Region, country, or economy	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Grenada	0.0	0.0	0.0	0.0	0.0	0.3	0.5	0.0	2.0	0.0	0.7	1.3	0.0	1.3
Guatemala	0.3	2.6	1.1	2.9	0.4	0.2	1.0	2.2	1.0	0.9	1.7	2.4	2.6	2.0
Haiti	0.0	0.3	0.1	0.0	0.0	0.3	0.0	0.0	0.2	0.4	0.0	0.6	0.2	1.6
Honduras	3.2	1.1	0.9	1.9	0.5	2.5	0.7	2.1	0.7	0.5	0.3	1.1	1.6	0.2
Jamaica	2.7	3.3	4.4	3.7	5.0	7.3	3.6	1.9	5.5	5.2	2.1	6.5	1.9	2.1
Nicaragua	0.3	1.3	2.1	1.2	0.5	1.3	1.3	1.0	2.1	1.5	1.3	1.6	2.2	0.8
Panama	0.3	0.0	3.0	1.7	0.8	1.2	2.9	3.9	3.2	1.7	3.3	5.5	3.1	2.7
Puerto Rico	22.0	10.0	23.7	30.3	27.2	27.0	6.2	38.6	33.0	16.4	23.3	24.1	21.1	20.0
Saint Kitts and Nevis	0.0	0.0	0.0	0.0	0.8	0.0	0.0	0.0	0.2	0.1	0.0	0.1	0.2	0.3
Saint Lucia	0.0	0.3	0.3	0.0	0.8	0.0	0.0	0.0	1.3	0.8	0.0	0.1	0.0	0.0
Saint Vincent and the Grenadines	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0
Trinidad and Tobago	7.1	4.0	17.5	14.9	16.8	8.7	9.8	9.3	13.9	16.7	8.6	18.2	12.5	7.7
South America	1,194.6	1,389.6	1,522.3	2,780.2	3,234.4	4,325.2	4,850.5	5,157.2	5,480.9	5,774.4	5,923.2	6,211.9	6,200.1	6,319.8
Argentina	181.8	213.7	219.1	277.7	327.4	358.1	344.9	431.8	420.1	429.7	447.5	463.1	488.4	509.2
Bolivia	6.4	1.9	2.9	4.3	4.5	5.3	4.0	3.2	3.5	3.8	2.9	1.7	3.9	1.9
Brazil	838.7	985.6	1,094.9	2,221.7	2,560.6	3,509.9	3,885.4	4,143.7	4,453.5	4,633.7	4,810.2	4,955.3	4,992.1	4,921.3
Chile	40.7	57.2	63.4	95.4	127.6	110.0	178.3	163.3	191.1	195.0	185.6	195.5	208.2	227.4
Colombia	20.4	27.2	41.6	51.8	50.8	165.3	241.4	214.4	263.8	335.1	287.7	332.5	326.4	485.0
Ecuador	2.5	1.7	1.2	2.3	2.7	6.0	5.1	1.9	3.7	4.6	6.3	16.8	25.5	37.8

## CHAPTER 5 | Academic Research and Development

Region, country, or economy	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Guyana	0.5	2.0	0.0	2.2	2.3	0.5	0.0	0.0	0.0	1.0	0.1	1.0	0.0	0.0
Paraguay	0.0	0.3	1.3	0.4	0.8	1.0	4.4	2.4	1.7	0.8	0.5	3.5	2.0	2.8
Peru	14.3	3.7	6.7	9.1	13.8	17.3	22.8	14.1	15.5	19.1	30.5	14.5	25.3	20.0
Suriname	0.0	0.0	0.5	0.5	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.0	0.0	0.0
Uruguay	15.2	21.4	14.9	27.5	20.8	31.4	33.9	50.0	39.6	49.8	53.2	65.0	53.9	62.0
Venezuela	74.3	74.9	76.1	87.2	123.2	120.4	130.3	132.6	88.4	101.5	98.7	163.1	74.4	52.7
Europe	7,499.8	7,930.2	8,765.1	9,639.1	10,950.0	11,656.1	12,407.3	12,217.8	12,997.4	13,759.2	14,658.8	14,314.5	14,950.6	14,786.4
EU	6,652.4	6,882.2	7,667.4	8,232.2	9,529.1	10,215.8	10,846.9	10,631.6	11,226.2	11,694.3	12,729.4	12,400.4	12,824.5	12,523.3
Austria	96.9	73.9	90.5	119.7	104.5	116.1	128.0	152.4	164.0	171.6	163.7	169.4	193.7	174.7
Belgium	228.2	253.9	285.7	297.4	344.2	320.7	324.5	333.5	313.8	348.9	400.2	426.8	427.1	409.4
Bulgaria	14.4	15.4	19.0	23.9	42.7	91.9	72.6	97.5	70.9	101.5	192.9	139.2	150.8	114.5
Croatia	44.3	51.3	95.5	61.8	150.3	180.8	223.8	125.6	200.7	192.7	148.9	171.6	176.7	151.0
Cyprus	1.8	3.6	1.7	4.0	3.4	2.1	9.4	8.7	7.4	10.5	8.5	13.8	13.2	15.4
Czech Republic	155.5	168.7	161.5	224.9	475.2	522.3	547.5	624.0	632.0	649.1	787.8	590.1	694.4	671.4
Denmark	280.3	318.5	291.0	294.7	332.0	306.0	266.7	326.2	307.1	363.0	330.4	318.4	349.0	363.4
Estonia	3.8	9.4	10.5	21.2	19.5	29.1	33.7	22.7	59.8	60.0	54.5	74.2	60.3	65.8
Finland	206.9	257.4	190.8	263.5	206.7	194.0	258.9	208.8	205.3	185.8	193.6	178.4	183.4	156.0
France	701.3	764.6	760.7	905.8	935.2	952.6	929.9	958.8	938.6	953.1	931.5	984.9	1,002.2	961.7
Germany	893.0	919.2	1,145.6	1,150.3	1,150.1	1,218.2	1,174.1	1,178.2	1,268.1	1,387.2	1,340.5	1,414.1	1,411.0	1,294.9

## CHAPTER 5 | Academic Research and Development

Region, country, or economy	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Greece	178.4	166.5	230.1	275.9	297.3	296.5	286.2	283.9	248.1	282.8	267.3	276.0	258.9	241.3
Hungary	131.2	109.1	147.1	136.4	103.4	139.0	192.1	142.7	183.8	182.1	177.1	198.9	172.4	183.3
Ireland	158.8	182.9	193.2	240.9	192.5	267.9	289.2	301.8	271.0	281.4	304.9	289.7	262.2	271.2
Italy	815.2	744.8	899.3	791.0	1,332.9	1,334.8	1,518.4	1,308.3	1,332.8	1,289.4	1,817.5	1,588.1	1,749.0	1,736.0
Latvia	1.0	2.6	38.0	43.0	4.2	18.1	82.3	107.7	213.7	167.6	210.0	173.8	222.3	220.7
Lithuania	15.6	16.2	21.6	34.7	17.7	132.0	138.7	127.7	144.8	161.1	171.5	133.7	122.9	152.0
Luxembourg	0.7	0.6	0.0	0.4	1.5	1.5	3.0	5.9	7.2	8.8	11.6	9.3	5.5	10.8
Malta	0.0	0.7	0.0	0.2	0.0	0.0	0.0	0.2	0.4	0.3	1.3	1.5	4.1	4.8
Netherlands	363.6	352.4	361.1	404.6	455.3	411.4	397.4	405.1	417.5	409.5	440.3	504.3	475.1	508.1
Poland	241.2	297.9	369.3	331.0	414.7	525.2	677.4	682.6	718.8	804.9	906.6	1,051.3	1,131.9	1,164.1
Portugal	92.8	105.2	119.8	188.6	213.3	223.9	250.3	299.0	329.2	346.7	361.4	339.3	398.1	410.3
Romania	5.1	6.3	7.5	6.0	17.5	45.8	82.7	73.1	92.3	174.0	154.3	133.2	130.2	117.4
Slovakia	35.2	44.2	48.9	75.4	98.0	114.6	106.4	99.4	104.4	95.3	237.3	197.6	212.9	268.4
Slovenia	29.8	24.3	37.3	34.5	67.1	136.6	124.6	109.9	147.1	134.9	97.9	102.5	101.7	97.8
Spain	892.4	947.4	1,105.7	1,272.0	1,456.9	1,589.1	1,767.5	1,697.0	1,902.7	1,984.1	2,047.9	2,011.9	1,986.2	1,808.1
Sweden	201.6	215.4	228.8	194.1	220.9	198.3	196.0	183.6	208.1	219.3	212.7	201.7	215.9	200.4
United Kingdom	863.7	830.0	807.0	836.3	872.2	846.9	765.5	767.3	736.6	728.5	757.3	706.7	713.4	750.1
Other Europe	847.4	1,048.0	1,097.7	1,406.9	1,420.9	1,440.4	1,560.5	1,586.1	1,771.2	2,064.9	1,929.4	1,914.1	2,126.2	2,263.2
Albania	1.0	0.6	0.5	0.3	0.6	0.8	5.2	2.9	7.2	8.5	14.3	9.0	6.7	4.7



## CHAPTER 5 | Academic Research and Development

Region, country, or economy	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Andorra	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Belarus	7.6	3.3	2.4	2.0	4.7	7.7	2.2	2.8	4.0	0.3	4.9	4.8	2.9	5.3
Bosnia and Herzegovina	0.2	0.5	1.1	0.6	4.1	9.6	11.7	4.0	11.7	21.2	8.9	9.2	11.5	10.2
Holy See (Vatican City)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Iceland	3.4	8.6	5.6	8.6	8.5	8.5	6.7	17.0	17.9	11.6	8.4	9.0	6.3	12.0
Kosovo	0.0	0.0	0.0	0.0	0.0	0.5	2.1	2.0	0.5	1.8	1.4	1.8	2.8	6.3
Liechtenstein	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Macedonia	0.2	0.0	1.1	2.4	2.5	4.2	4.8	3.3	17.1	13.9	16.1	17.0	17.1	12.6
Moldova	1.1	1.3	1.3	4.0	0.8	3.0	0.3	1.3	2.8	6.4	4.8	6.2	3.6	10.4
Monaco	0.0	0.0	0.3	0.0	0.1	0.2	0.0	0.0	0.8	0.0	0.0	0.0	1.0	0.0
Montenegro <sup>a</sup>	na	na	na	na	0.0	0.3	0.0	0.5	2.8	0.9	2.3	2.7	3.6	2.6
Norway	99.8	127.9	138.6	148.0	156.2	147.0	144.4	143.4	159.0	179.6	142.9	147.6	163.5	136.4
Russia	163.5	166.4	166.2	164.9	169.2	170.2	184.1	173.7	166.9	152.3	188.0	209.5	321.9	384.0
San Marino	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0
Serbia <sup>a</sup>	na	na	na	na	72.9	74.0	78.8	114.2	187.4	417.7	225.8	240.9	237.4	215.3
Serbia and Montenegro <sup>b</sup>	9.9	16.4	38.0	34.4	na	na	na	na	na	na	na	na	na	na
Switzerland	151.5	137.3	156.4	180.5	175.3	248.0	190.0	196.9	195.6	250.7	249.1	254.4	233.9	252.2
Turkey	400.1	579.3	574.4	855.6	814.2	752.5	919.1	916.4	983.8	977.0	1,036.7	971.6	1,072.1	1,158.5
Ukraine	9.1	6.6	11.9	5.6	11.8	14.0	11.1	7.8	13.8	22.7	24.7	30.4	42.2	52.9

## CHAPTER 5 | Academic Research and Development

Region, country, or economy	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Middle East	309.9	389.6	440.4	796.7	1,222.8	1,102.2	1,125.0	1,249.2	1,388.8	1,602.4	1,516.4	1,508.4	1,662.4	1,833.8
Armenia	0.0	0.0	1.0	0.7	0.0	0.7	0.4	0.5	1.8	2.8	1.8	1.4	6.9	6.0
Azerbaijan	0.5	0.0	0.0	2.3	3.0	2.2	3.3	7.7	4.4	3.1	1.5	2.8	6.2	4.1
Bahrain	1.3	2.0	3.0	3.9	2.3	7.2	2.8	6.0	4.0	1.5	7.3	2.0	0.3	0.3
Gaza Strip	0.0	0.0	0.1	0.3	5.3	1.7	2.7	1.5	2.5	0.0	2.0	0.3	0.0	0.3
Georgia	2.4	1.0	4.3	5.0	4.1	1.7	2.9	6.1	4.8	4.8	2.6	4.8	8.1	1.2
Iran	61.8	119.5	178.5	471.5	863.8	766.5	780.4	902.7	999.4	1,182.2	1,051.6	1,064.0	1,200.3	1,281.0
Iraq	0.0	1.7	3.7	4.8	7.8	13.9	6.0	20.1	32.0	23.7	18.0	22.3	18.4	149.5
Israel	121.9	130.8	128.5	103.5	139.5	119.0	134.8	108.0	134.5	131.9	131.6	132.8	130.5	104.6
Jordan	39.8	44.3	31.4	56.7	71.7	73.1	61.3	51.4	53.9	59.1	53.0	43.0	41.4	45.3
Kuwait	6.4	7.9	5.9	8.3	9.8	10.5	10.2	7.1	7.6	12.0	14.9	7.3	11.9	13.7
Lebanon	11.0	6.5	11.1	11.6	7.0	8.0	11.1	17.2	13.6	10.2	7.1	18.0	13.2	15.0
Oman	13.2	16.8	17.5	18.0	25.6	10.4	14.7	11.6	11.2	17.9	22.8	17.2	15.3	9.8
Qatar	3.0	1.0	1.0	0.3	0.5	2.3	2.1	1.0	2.4	1.2	2.8	1.7	4.5	4.1
Saudi Arabia	22.4	32.5	23.3	62.7	53.2	46.6	56.5	71.0	75.3	99.6	150.2	161.0	163.5	152.2
Syria	14.3	13.7	20.1	17.2	17.0	23.2	17.4	24.2	27.1	30.2	26.6	14.6	18.4	25.1
United Arab Emirates	9.0	9.7	9.6	24.2	8.4	10.0	16.3	11.2	11.9	14.9	18.5	9.9	17.1	17.9
West Bank	2.1	2.2	1.1	3.8	2.7	3.2	1.8	1.7	0.5	5.1	2.6	2.8	3.8	2.7
Yemen	0.8	0.0	0.0	2.0	1.0	2.0	0.5	0.2	1.9	2.1	1.4	2.6	2.6	1.1

## CHAPTER 5 | Academic Research and Development

Region, country, or economy	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Africa	789.9	772.6	762.1	1,151.4	1,378.4	1,230.4	1,170.1	1,338.2	1,438.1	1,339.3	1,586.1	1,563.4	1,626.2	1,729.1
Algeria	4.9	7.9	11.5	24.9	24.6	31.5	40.6	42.9	46.3	43.4	70.6	58.1	98.3	90.4
Angola	0.0	0.0	0.5	0.8	0.2	0.1	0.0	0.0	0.5	0.7	0.0	0.6	0.5	0.3
Benin	7.7	9.5	3.7	12.7	6.5	13.3	22.7	19.1	27.9	18.3	18.2	21.1	24.3	21.9
Botswana	11.3	11.1	5.6	10.6	13.9	13.1	10.3	15.8	8.6	5.2	10.7	5.4	5.7	8.1
Burkina Faso	4.8	7.3	10.5	12.1	20.1	19.2	11.3	12.1	17.7	14.5	7.3	10.5	10.5	17.6
Burundi	0.0	0.2	0.0	0.0	0.0	0.0	1.0	0.8	0.0	0.0	0.0	0.2	1.5	1.5
Cameroon	18.7	17.0	25.6	35.8	34.4	32.3	21.7	21.8	24.3	17.2	21.1	33.5	30.1	28.8
Cape Verde	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.3	0.6	0.0	0.0
Central African Republic	0.1	0.0	0.0	0.7	0.2	0.3	1.0	0.8	0.0	0.0	0.0	0.0	0.0	1.0
Chad	0.1	0.0	0.0	1.8	0.5	0.2	0.0	0.0	0.8	0.6	0.5	0.5	2.1	0.0
Comoros	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Congo, Democratic Republic of the	0.2	0.0	0.0	0.0	0.5	1.5	0.8	0.7	2.9	2.0	0.8	2.0	6.6	6.9
Congo, Republic of the	1.2	0.1	0.3	3.4	4.1	0.7	1.7	1.7	0.4	1.2	0.6	3.1	0.9	3.5
Côte d'Ivoire	4.7	1.4	5.7	10.1	12.3	17.3	5.5	15.2	5.6	11.0	11.9	12.8	9.0	13.2
Djibouti	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.2	0.0
Egypt	66.8	52.8	58.3	113.5	169.6	166.9	160.5	174.2	211.4	196.0	255.3	225.1	231.3	262.9
Equatorial Guinea	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Eritrea	0.0	0.0	0.3	0.0	1.0	1.8	0.3	1.0	0.0	0.0	1.9	0.1	0.3	1.7

## CHAPTER 5 | Academic Research and Development

Region, country, or economy	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Ethiopia	35.1	35.1	38.4	63.3	66.3	58.0	58.3	46.9	64.1	65.3	87.8	97.5	85.4	110.1
Gabon	0.7	0.5	1.2	0.5	0.5	0.0	1.0	1.1	0.1	1.4	2.7	2.2	0.1	2.1
Gambia, The	2.9	3.7	1.1	0.3	0.5	1.2	0.8	0.0	1.1	0.1	0.5	0.0	0.0	0.0
Ghana	31.9	22.4	24.8	29.4	35.7	28.9	34.0	39.1	42.1	33.2	44.2	46.3	47.2	52.8
Guinea	0.9	0.0	0.1	0.4	0.5	0.7	0.4	0.5	0.0	0.2	0.9	0.1	0.2	0.6
Guinea-Bissau	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.2	0.3	0.2	0.0	0.8	0.0
Kenya	43.6	51.3	57.0	75.0	73.6	62.6	53.5	75.4	97.5	68.9	68.7	71.0	71.9	94.5
Lesotho	0.0	0.2	0.3	0.3	0.3	1.7	0.9	0.0	0.5	1.0	0.3	0.3	0.8	0.3
Liberia	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.3	0.1	0.0	0.0
Libya	0.7	0.9	2.0	1.0	1.5	1.6	1.6	1.3	9.0	3.8	5.4	1.6	2.2	2.0
Madagascar	0.9	0.4	0.4	0.9	1.6	3.9	3.5	2.5	3.8	6.5	6.0	4.9	2.2	5.2
Malawi	4.4	2.9	1.7	5.6	7.0	4.0	2.2	6.0	9.8	13.0	5.9	5.7	12.2	11.8
Mali	5.6	5.6	4.3	9.0	5.2	12.3	4.7	2.0	8.4	10.5	4.3	6.4	6.5	6.8
Mauritania	0.7	0.0	0.3	1.0	0.0	0.3	0.0	0.3	1.3	1.7	0.6	0.0	0.2	0.0
Mauritius	3.5	1.8	5.8	2.2	1.8	2.7	5.1	5.3	3.4	5.2	3.0	3.4	4.3	4.0
Morocco	21.8	20.0	23.1	23.9	24.3	35.0	20.8	15.6	20.8	19.6	23.4	46.7	43.5	43.9
Mozambique	1.8	2.4	1.7	3.0	0.2	1.9	0.7	1.6	2.1	2.2	3.0	2.6	4.4	5.7
Namibia	1.5	1.7	2.0	1.0	0.5	0.0	1.5	2.7	2.8	0.7	1.3	0.0	0.7	1.9
Niger	2.9	2.0	3.0	3.0	1.4	3.2	4.0	9.5	6.2	3.1	3.7	7.5	9.7	9.1

## CHAPTER 5 | Academic Research and Development

Region, country, or economy	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Nigeria	230.2	182.7	185.4	358.3	443.8	321.9	256.1	305.6	303.0	278.1	306.0	294.7	299.8	285.4
Rwanda	0.0	0.0	0.3	0.0	0.0	0.4	2.3	2.0	2.3	2.3	3.4	7.1	4.4	4.3
São Tomé and Príncipe	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Senegal	12.3	8.7	6.3	7.0	6.6	6.6	10.0	6.6	6.0	6.7	10.4	9.0	8.8	10.1
Seychelles	0.0	0.0	0.3	1.3	0.0	2.1	0.0	0.0	0.0	0.0	0.0	0.8	0.0	0.0
Sierra Leone	1.0	0.3	0.3	1.3	2.3	0.0	1.1	0.8	0.4	0.5	0.4	0.0	2.0	0.4
Somalia	0.0	0.0	0.0	0.2	0.0	0.0	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
South Africa	161.4	239.0	166.1	205.6	210.8	208.4	233.5	273.4	242.7	252.3	323.3	309.2	313.3	330.1
South Sudan	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
Sudan	20.2	16.4	14.5	17.2	28.9	26.0	22.3	29.1	38.6	34.7	28.9	19.5	18.2	21.1
Swaziland	1.6	0.2	3.5	1.7	3.5	2.5	2.9	2.9	1.4	0.8	2.5	0.1	0.8	1.5
Tanzania	19.4	15.4	23.4	30.6	47.6	21.2	13.4	21.3	23.2	19.2	31.7	42.9	35.7	39.6
Togo	2.6	2.4	3.6	4.4	2.3	1.3	3.2	5.8	2.9	3.1	4.9	2.2	2.2	4.6
Tunisia	18.0	18.4	29.4	41.6	92.0	87.4	127.9	142.7	155.1	153.4	164.7	148.1	166.2	164.4
Uganda	10.5	14.0	10.3	12.2	7.8	14.6	14.5	15.3	27.1	16.3	21.9	19.2	27.8	31.7
Western Sahara	0.0	0.0	0.0	0.0	0.0	0.0	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Zambia	7.9	5.3	5.9	3.5	2.7	4.0	0.7	2.3	1.9	6.1	3.3	4.3	6.0	5.7
Zimbabwe	25.6	11.6	23.8	20.6	21.8	17.1	9.6	14.7	14.1	18.8	23.2	36.5	27.7	21.3
Asia	4,605.6	5,151.4	6,052.8	6,956.4	8,814.8	9,921.1	10,685.4	11,682.2	12,947.2	13,130.8	16,267.8	17,333.3	17,926.8	18,036.2

## CHAPTER 5 | Academic Research and Development

Region, country, or economy	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Afghanistan	0.0	0.0	0.0	0.5	0.0	0.0	0.1	0.7	2.1	0.6	0.3	0.9	0.3	1.3
Bangladesh	24.2	41.7	37.6	73.5	62.6	44.5	40.9	44.7	56.4	61.3	101.9	102.5	80.6	96.3
Bhutan	2.5	0.8	0.6	0.6	0.5	0.1	3.0	1.1	1.7	1.5	1.6	1.5	1.3	4.1
Brunei	0.0	1.0	0.0	0.0	0.5	0.0	1.0	1.6	0.0	0.1	1.3	1.6	4.9	6.6
Burma	0.1	0.0	0.4	1.4	2.9	0.9	1.4	1.1	1.1	2.3	0.8	1.5	1.9	1.4
Cambodia	8.3	2.8	6.4	5.2	4.7	5.7	3.8	5.9	4.1	3.8	5.0	7.5	5.1	3.4
China	980.4	1,236.3	2,098.4	2,324.9	2,889.0	3,297.2	3,777.6	4,371.7	5,315.2	5,217.1	7,569.8	8,243.0	9,146.3	9,191.9
India	1,076.7	1,111.2	1,210.4	1,403.7	1,650.6	2,077.0	2,071.5	2,099.6	2,153.4	2,434.4	2,750.3	3,120.9	2,920.2	2,918.4
Indonesia	11.7	36.2	34.8	25.9	31.4	31.4	30.3	78.3	94.9	103.9	126.5	182.1	281.5	301.5
Japan	1,697.6	1,817.5	1,716.0	1,658.9	1,751.4	1,869.6	1,899.5	2,015.5	1,800.3	1,684.8	1,774.4	1,678.6	1,489.9	1,492.9
Kazakhstan	0.0	1.5	3.0	1.4	1.1	1.1	0.6	3.6	3.7	4.6	13.1	11.9	9.8	13.5
Kyrgyzstan	0.1	0.5	1.4	0.0	1.5	0.0	0.6	0.9	1.2	0.9	1.1	1.4	1.4	2.6
Laos	4.2	5.4	0.8	6.0	2.4	7.8	5.4	3.9	5.1	10.8	5.8	3.0	5.4	12.7
Malaysia	48.5	64.0	52.6	96.7	124.2	185.2	259.3	296.4	388.5	446.9	519.1	521.3	470.9	549.7
Maldives	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2
Mongolia	0.2	0.3	0.3	1.0	0.9	2.3	2.3	1.8	2.5	1.2	2.2	2.2	3.2	2.3
Nepal	7.2	6.0	7.1	8.5	11.5	3.4	8.7	5.6	4.8	5.2	10.1	6.6	9.2	11.2
North Korea	0.6	0.0	0.0	0.0	0.0	0.7	2.5	0.3	0.0	1.4	0.4	0.1	2.0	0.0
Pakistan	54.4	54.5	56.8	161.0	227.4	177.4	216.1	240.5	334.8	414.6	534.6	501.4	546.7	483.6

## CHAPTER 5 | Academic Research and Development

Region, country, or economy	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Papua New Guinea	2.0	1.7	0.0	2.1	2.6	3.9	0.2	3.2	4.6	2.0	0.5	2.7	1.3	2.2
Philippines	57.5	80.0	68.4	67.9	69.4	77.7	87.3	77.1	79.0	63.4	100.3	75.6	75.2	61.9
Singapore	7.9	19.2	19.3	32.9	25.2	24.8	23.3	28.1	28.1	31.3	38.4	51.6	51.6	49.4
South Korea	304.2	327.1	361.4	388.4	1,074.5	1,260.6	1,276.1	1,381.9	1,454.5	1,561.6	1,635.5	1,819.8	1,819.8	1,765.3
Sri Lanka	32.3	23.7	19.9	23.3	28.0	26.1	23.4	13.9	29.6	25.3	31.6	25.5	25.3	38.1
Taiwan	175.9	189.2	214.8	248.9	338.0	334.5	396.2	469.9	484.8	439.0	437.0	384.2	355.2	320.9
Tajikistan	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	0.8	0.5	0.8	0.6
Thailand	86.2	105.8	113.8	404.8	488.3	452.3	519.8	493.1	651.1	552.8	536.8	533.7	561.4	615.8
Timor-Leste	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.5	0.8	1.5	2.2	0.7	0.0
Turkmenistan	0.0	0.0	0.3	0.0	0.5	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Uzbekistan	2.6	3.3	3.0	1.9	6.7	5.7	5.5	9.0	7.5	6.0	3.0	2.9	5.9	5.5
Vietnam	20.2	21.4	25.3	16.0	18.9	31.0	29.1	32.9	37.8	52.1	64.2	46.7	49.0	82.7
Australia and Oceania	1,072.7	1,073.7	1,052.3	1,164.2	1,245.0	1,230.9	1,229.2	1,265.9	1,232.6	1,289.0	1,379.1	1,509.8	1,481.8	1,511.3
Australia	794.5	778.6	763.5	864.0	932.9	892.3	937.8	980.0	938.7	960.5	1,020.0	1,133.2	1,126.3	1,115.3
Cook Islands	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0
Fiji	0.7	0.0	2.0	1.9	0.8	2.3	1.0	0.8	1.2	0.8	0.2	1.1	1.5	4.6
Kiribati	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Marshall Islands	0.0	0.0	0.0	0.3	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.3	0.0	0.0
Micronesia, Federated States of	0.1	0.0	0.0	0.3	0.0	0.4	0.5	0.1	0.0	0.0	0.0	0.1	0.1	0.0

## CHAPTER 5 | Academic Research and Development

Region, country, or economy	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Nauru	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
New Zealand	274.1	291.6	284.2	293.3	308.9	335.2	288.6	282.6	291.5	327.4	357.0	371.3	351.2	389.3
Niue	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Palau	0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0
Samoa	2.6	3.0	2.0	3.8	2.5	0.0	0.0	0.3	0.2	0.0	0.0	3.2	2.2	0.0
Solomon Islands	0.3	0.3	0.0	0.0	0.0	0.0	0.0	0.8	0.2	0.3	0.0	0.0	0.1	0.0
Tonga	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0
Tuvalu	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Vanuatu	0.3	0.3	0.6	0.5	0.0	0.6	0.9	1.3	0.3	0.0	1.9	0.3	0.3	2.0
Unassigned	131.8	73.8	84.2	107.0	131.7	174.6	89.8	87.3	63.6	48.6	65.0	49.4	27.0	18.7

na = not applicable; country data do not exist.

EU = European Union.

<sup>a</sup> Beginning in 2006, Serbia and Montenegro represented individual countries.

<sup>b</sup> Serbia and Montenegro represented a single country for data purposes from 1992 to 2006.

### Note(s)

Article counts refer to publications from a selection of journals, books, and conference proceedings in S&E from Scopus. Articles are classified by their year of publication and are assigned to a region, country, or economy on the basis of the institutional address(es) listed in the article. Articles are credited on a fractional-count basis. The sum of the regions, countries, or economies may not add to the world total because of rounding. Some publications have incomplete address information for coauthored publications in the Scopus database. The unassigned category count is the sum of fractional counts for publications that cannot be assigned to a region, country, or economy.

### Source(s)

National Science Foundation, National Center for Science and Engineering Statistics; SRI International; Science-Metrix; Elsevier, Scopus abstract and citation database, accessed July 2017.





**CHAPTER 5 | Academic Research and Development**

*Science and Engineering Indicators 2018*

## CHAPTER 5 | Academic Research and Development

APPENDIX TABLE 5-29 

S&E articles in astronomy, by region, country, or economy: 2003–16

(Number)

[illegible]

## CHAPTER 5 | Academic Research and Development

Region, country, or economy	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Grenada	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.2
Guatemala	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4
Haiti	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Honduras	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0
Jamaica	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Nicaragua	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.1	0.1	0.1	0.0	0.0	0.0	0.0
Panama	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.2	0.0	0.0	0.5	0.0	0.1
Puerto Rico	4.7	3.4	4.2	6.9	6.5	3.1	4.5	4.5	2.4	3.3	3.1	2.6	3.1	3.2
Saint Kitts and Nevis	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Saint Lucia	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Saint Vincent and the Grenadines	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Trinidad and Tobago	0.0	0.2	0.2	0.5	0.6	0.1	0.1	0.3	0.3	0.0	0.0	0.0	0.0	0.0
South America	281.8	323.5	371.6	489.4	367.4	414.9	440.8	355.4	504.7	420.2	423.1	534.9	462.1	426.2
Argentina	71.6	83.7	91.4	98.5	84.1	95.9	95.4	91.7	137.9	81.1	88.2	97.0	85.0	90.7
Bolivia	0.2	0.1	0.9	0.5	1.5	0.4	0.5	0.4	1.3	0.3	0.0	0.3	0.0	0.2
Brazil	118.1	133.0	158.9	206.5	141.6	156.0	173.7	133.1	176.8	173.3	156.4	207.7	164.6	137.9
Chile	82.9	86.6	106.5	161.5	128.8	143.3	135.5	123.0	161.0	146.4	165.5	204.6	195.2	179.7
Colombia	1.1	4.2	1.1	3.1	0.3	8.7	4.4	3.8	4.3	5.0	7.5	13.8	10.7	9.7
Ecuador	0.0	0.0	0.0	0.6	0.5	0.0	0.0	0.0	1.0	1.4	0.0	0.2	1.3	0.7

## CHAPTER 5 | Academic Research and Development

Region, country, or economy	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Guyana	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5
Paraguay	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0
Peru	1.2	2.2	1.7	1.1	1.2	0.2	0.7	0.4	5.4	2.7	0.7	0.1	0.8	0.7
Suriname	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4
Uruguay	0.1	3.5	1.7	1.3	0.0	2.9	2.1	0.1	2.0	3.7	0.1	1.2	0.7	2.3
Venezuela	6.5	9.3	9.6	16.2	9.3	7.5	28.5	2.9	15.0	6.3	4.7	9.7	3.8	3.4
Europe	5,688.1	6,155.0	7,352.2	8,327.9	6,781.0	6,379.6	6,279.3	5,806.9	7,045.2	7,505.2	6,503.0	6,669.3	6,151.8	6,404.2
EU	4,906.0	5,365.6	6,284.6	7,303.9	5,845.5	5,558.7	5,345.4	5,053.6	5,959.2	6,563.9	5,529.3	5,691.5	5,199.2	5,461.9
Austria	67.1	78.5	116.4	94.3	72.0	75.4	67.7	61.3	80.7	65.1	71.3	80.4	71.8	76.6
Belgium	107.5	129.7	157.7	160.6	140.4	136.6	133.7	127.6	131.3	146.9	145.5	169.8	132.1	137.4
Bulgaria	25.3	21.8	20.3	53.3	22.3	47.6	26.9	33.5	26.2	46.0	21.4	45.3	46.1	27.8
Croatia	7.6	10.1	6.7	13.8	12.6	7.9	8.0	6.4	16.4	11.2	8.2	12.7	10.1	7.3
Cyprus	1.1	0.1	0.6	2.2	0.1	0.2	1.1	0.2	0.8	1.1	2.8	1.7	2.2	2.1
Czech Republic	57.6	55.7	90.1	132.4	62.9	87.4	74.9	82.6	121.1	181.2	123.3	125.9	121.8	133.5
Denmark	71.6	63.3	61.5	85.6	49.7	48.1	41.2	50.7	66.8	78.4	58.8	70.1	71.5	67.3
Estonia	9.3	7.3	16.1	17.0	13.7	16.1	7.3	8.4	16.2	17.6	11.2	20.4	10.8	7.5
Finland	52.2	62.2	89.7	100.7	67.4	60.7	71.8	49.1	67.0	70.1	61.6	63.9	53.1	70.4
France	733.5	840.4	990.3	1,207.3	824.6	846.6	819.0	811.2	821.9	930.6	824.5	786.3	766.5	761.3
Germany	937.0	1,093.7	1,340.1	1,325.6	1,254.7	1,210.0	1,086.5	994.7	1,203.9	1,409.2	1,090.1	1,105.7	956.1	1,130.9

## CHAPTER 5 | Academic Research and Development

Region, country, or economy	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Greece	59.6	72.5	77.3	124.9	60.2	59.9	82.7	53.7	65.4	76.3	63.7	70.0	65.5	88.3
Hungary	31.7	47.4	31.2	51.0	57.4	49.4	49.2	30.3	46.4	54.5	61.2	57.0	41.7	57.0
Ireland	23.8	34.1	54.5	33.6	31.1	34.3	31.1	31.6	41.4	37.2	31.1	29.0	19.6	25.2
Italy	719.4	803.2	907.1	1,105.8	965.6	818.5	885.3	752.4	1,009.3	1,018.3	864.0	816.1	737.8	782.7
Latvia	4.7	0.5	3.2	0.5	0.6	1.9	1.7	3.0	7.0	5.1	5.4	2.5	4.2	3.0
Lithuania	25.4	6.5	16.9	11.5	8.1	19.1	10.3	10.6	7.2	11.4	12.8	14.9	8.9	7.5
Luxembourg	0.4	0.0	0.4	2.0	1.9	0.3	0.7	0.2	0.4	0.0	0.1	1.6	2.1	0.1
Malta	0.0	0.2	0.0	0.5	0.4	0.0	0.0	0.0	0.3	0.3	1.2	1.2	1.7	1.2
Netherlands	320.0	354.8	385.1	403.3	308.6	307.1	258.6	233.8	264.9	324.0	281.2	268.5	262.3	272.9
Poland	143.7	143.3	161.2	160.1	154.5	143.8	145.3	140.5	169.9	171.7	148.8	193.4	156.6	158.9
Portugal	30.3	33.8	32.4	90.0	41.8	65.4	40.1	32.5	42.3	86.3	47.8	52.5	40.1	43.7
Romania	7.1	12.9	10.3	11.5	10.2	15.3	13.2	12.1	23.0	18.3	15.8	11.0	11.7	13.3
Slovakia	27.7	22.0	25.9	20.4	23.2	34.1	29.9	31.9	48.6	54.7	34.3	57.1	43.3	23.6
Slovenia	6.2	5.2	8.6	6.0	2.5	5.9	2.4	3.8	6.3	4.6	7.4	4.3	3.7	4.9
Spain	376.1	347.2	475.1	593.7	464.7	444.1	428.4	439.6	470.3	550.7	480.5	527.8	430.4	454.4
Sweden	78.1	87.6	123.6	159.9	103.5	108.8	80.4	116.6	125.8	123.0	108.0	100.5	115.3	122.6
United Kingdom	982.2	1,031.7	1,082.5	1,336.3	1,090.7	914.4	947.9	935.4	1,078.4	1,070.2	947.3	1,001.9	1,012.3	980.4
Other Europe	782.0	789.4	1,067.6	1,024.0	935.5	820.9	934.0	753.3	1,086.0	941.3	973.7	977.8	952.6	942.3
Albania	0.0	0.0	0.5	0.0	0.5	0.5	0.0	0.7	0.0	1.3	0.0	0.0	1.5	2.9

## CHAPTER 5 | Academic Research and Development

Region, country, or economy	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Andorra	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Belarus	0.0	5.0	0.0	2.2	2.8	1.1	0.7	0.0	3.2	1.3	3.0	0.0	0.3	2.1
Bosnia and Herzegovina	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.1	0.0	0.0
Holy See (Vatican City)	0.0	0.0	0.0	0.3	0.4	0.0	0.0	1.3	0.5	0.3	0.0	0.0	0.0	0.0
Iceland	0.3	3.2	4.5	5.7	6.4	2.2	1.1	0.8	4.6	3.5	2.9	2.1	1.0	1.5
Kosovo	0.0	0.0	0.0	0.0	0.0	0.8	0.0	0.3	0.0	0.3	0.0	0.0	0.6	0.0
Liechtenstein	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8
Macedonia	0.3	2.0	0.2	1.7	1.1	0.0	1.0	1.5	0.0	0.0	0.0	2.0	1.0	3.8
Moldova	0.0	0.2	0.0	0.0	0.0	0.0	0.6	0.0	1.9	0.0	0.8	0.0	0.0	0.0
Monaco	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Montenegro <sup>a</sup>	na	na	na	na	0.3	0.2	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0
Norway	29.0	30.0	61.4	36.4	44.2	25.7	28.1	16.5	37.0	28.1	41.4	23.2	34.7	46.8
Russia	506.6	488.2	646.7	576.1	567.6	456.0	598.8	454.3	698.0	522.7	579.4	573.6	569.9	556.5
San Marino	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0
Serbia <sup>a</sup>	na	na	na	na	29.6	48.0	31.7	40.6	34.7	45.8	23.7	53.1	32.4	31.9
Serbia and Montenegro <sup>b</sup>	16.0	18.7	13.3	41.6	na	na	na	na	na	na	na	na	na	na
Switzerland	123.6	164.5	203.6	197.3	183.7	145.2	146.5	138.4	165.1	180.3	163.9	155.5	165.7	160.5
Turkey	27.8	31.4	50.9	71.9	43.4	54.5	46.7	43.9	57.3	68.6	66.6	68.5	60.4	60.8
Ukraine	78.3	46.1	86.3	90.9	55.6	86.7	78.8	55.1	83.8	88.1	91.7	98.7	84.9	74.5

## CHAPTER 5 | Academic Research and Development

Region, country, or economy	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Middle East	109.2	124.2	127.3	156.0	136.5	141.1	152.4	145.3	207.8	265.4	235.1	256.0	239.8	278.2
Armenia	10.9	9.8	13.9	9.4	9.9	10.0	16.2	7.7	20.8	7.6	9.5	29.2	22.7	20.5
Azerbaijan	1.3	3.3	1.6	4.3	6.3	3.6	2.1	2.8	1.8	4.5	4.1	4.0	6.5	4.0
Bahrain	0.0	0.0	0.0	1.0	2.0	0.0	0.7	1.0	0.0	0.0	0.0	0.3	0.3	0.3
Gaza Strip	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3
Georgia	5.1	5.6	17.6	14.2	11.3	9.6	10.7	9.8	11.0	10.2	11.5	7.9	8.3	14.1
Iran	14.3	14.4	14.4	28.2	23.2	26.9	30.0	37.5	66.9	100.5	95.7	86.1	73.9	85.4
Iraq	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.9	2.1	1.9	2.9	1.7
Israel	67.0	84.3	74.2	90.7	75.1	85.9	85.2	80.8	90.8	119.6	88.7	88.9	96.7	106.2
Jordan	0.3	1.0	1.1	0.1	1.0	0.6	1.5	0.2	0.5	1.5	1.0	4.3	0.0	1.8
Kuwait	0.0	0.0	0.0	0.3	1.3	1.0	0.3	0.1	0.3	0.0	0.0	0.7	0.6	0.4
Lebanon	0.0	0.5	0.0	1.5	1.2	0.2	1.9	0.3	1.3	1.9	0.5	0.6	3.1	2.4
Oman	0.0	0.2	1.0	1.0	0.5	1.0	0.7	0.3	1.0	1.1	0.1	2.2	2.4	2.6
Qatar	0.2	0.0	0.0	0.0	0.0	0.1	0.0	0.3	1.3	1.0	4.4	1.7	2.4	2.9
Saudi Arabia	9.5	3.3	2.0	0.5	2.0	1.0	0.6	3.0	9.4	15.9	16.1	22.2	15.9	17.0
Syria	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.2	1.0	0.0	0.0	0.0
United Arab Emirates	0.3	0.4	0.4	2.8	1.8	1.0	1.4	0.6	2.4	0.5	0.3	4.5	4.1	18.1
West Bank	0.0	1.5	0.0	1.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yemen	0.0	0.0	1.2	1.0	1.0	0.0	0.2	1.0	0.0	0.0	0.0	1.4	0.0	0.5

## CHAPTER 5 | Academic Research and Development

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## CHAPTER 5 | Academic Research and Development

Region, country, or economy	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Ethiopia	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.3	0.6	0.5	0.1	2.1	4.7	3.1
Gabon	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Gambia, The	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ghana	0.0	0.0	0.2	0.3	2.2	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.1
Guinea	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Guinea-Bissau	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Kenya	0.0	0.0	0.0	1.2	0.1	0.0	0.7	0.0	0.5	1.8	1.8	0.0	0.6	1.6
Lesotho	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Liberia	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Libya	0.0	0.5	0.5	0.0	0.0	0.0	0.5	0.0	0.1	0.5	0.2	0.0	0.1	0.0
Madagascar	0.0	0.0	0.4	1.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Malawi	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mali	1.3	1.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2
Mauritania	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mauritius	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.0	0.0	0.0	0.0	0.0	0.6
Morocco	1.6	4.2	5.9	6.9	2.7	3.1	2.0	3.2	1.3	1.8	1.1	0.3	2.1	4.3
Mozambique	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0
Namibia	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.0
Niger	0.0	0.0	0.1	0.0	0.5	0.0	0.0	2.0	0.0	0.2	0.0	0.0	0.0	0.0

## CHAPTER 5 | Academic Research and Development

Region, country, or economy	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Nigeria	2.1	0.5	2.3	2.4	3.5	7.6	6.5	12.6	10.9	10.2	22.0	37.5	14.1	11.9
Rwanda	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.9	0.6	0.0	0.0	0.0
São Tomé and Príncipe	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Senegal	0.0	0.0	0.0	0.0	0.8	0.7	0.0	0.0	0.0	1.7	0.0	0.0	0.0	0.7
Seychelles	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sierra Leone	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Somalia	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
South Africa	47.4	43.3	52.5	51.6	61.5	50.7	50.3	60.1	68.1	73.5	76.6	87.4	80.1	81.2
South Sudan	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sudan	0.0	1.0	1.1	0.0	1.8	0.0	3.0	4.4	0.4	0.3	1.0	0.3	0.1	0.0
Swaziland	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tanzania	2.0	3.0	0.0	0.3	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.3	0.1	0.3
Togo	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tunisia	0.0	3.1	2.3	3.2	2.8	1.5	4.0	1.2	5.6	3.9	5.3	5.1	1.6	3.1
Uganda	0.0	0.0	0.0	0.1	0.0	0.1	0.1	0.1	0.1	1.0	0.8	0.5	2.0	0.0
Western Sahara	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Zambia	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0
Zimbabwe	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.0	0.0
Asia	1,078.9	1,234.3	1,441.0	1,681.6	1,729.7	1,615.5	1,753.7	1,529.5	2,075.4	2,203.2	2,150.1	2,325.6	2,153.3	2,428.0

## CHAPTER 5 | Academic Research and Development

Region, country, or economy	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Afghanistan	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bangladesh	1.0	1.5	0.0	1.3	0.0	1.0	1.8	0.0	1.3	6.0	21.0	16.9	10.3	3.5
Bhutan	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Brunei	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Burma	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
Cambodia	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
China	247.4	310.6	394.3	544.8	626.0	567.7	590.8	573.2	714.7	882.9	869.1	920.4	925.5	1,106.1
India	167.4	153.3	267.6	279.5	209.3	252.3	258.0	259.0	391.5	359.6	358.2	447.7	379.4	400.2
Indonesia	4.4	3.4	1.3	2.5	3.5	1.7	2.8	0.7	2.0	4.0	1.1	5.0	2.0	6.7
Japan	576.7	654.2	672.6	680.2	707.6	612.5	667.2	461.4	686.4	600.9	557.6	548.6	456.9	522.8
Kazakhstan	4.1	2.0	1.0	2.1	2.1	3.8	2.3	1.3	6.4	8.9	4.9	8.8	11.0	13.4
Kyrgyzstan	0.0	0.1	0.0	0.7	0.0	0.9	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0
Laos	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Malaysia	0.0	0.5	0.0	2.8	1.3	0.8	5.0	7.0	2.3	4.7	6.3	6.9	6.1	4.1
Maldives	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mongolia	0.0	0.0	0.0	0.2	0.3	0.0	0.1	0.4	0.0	1.0	0.2	0.1	0.3	0.6
Nepal	0.0	0.0	0.0	0.8	1.7	1.0	0.3	0.8	0.5	1.0	0.7	0.0	0.0	0.1
North Korea	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0
Pakistan	0.0	2.1	1.1	1.9	1.3	4.5	4.0	12.0	13.3	29.0	38.2	68.2	56.3	34.6

## CHAPTER 5 | Academic Research and Development

[illegible]

## CHAPTER 5 | Academic Research and Development

Region, country, or economy	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Nauru	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
New Zealand	9.2	15.9	16.0	13.8	9.6	14.7	13.5	13.5	18.8	27.2	19.6	21.7	18.2	24.8
Niue	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Palau	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Samoa	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Solomon Islands	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tonga	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tuvalu	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Vanuatu	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0
Unassigned	26.9	12.7	53.7	29.2	27.3	22.7	11.8	12.1	4.9	10.9	8.1	29.0	22.3	10.2

na = not applicable; country data do not exist.

EU = European Union.

<sup>a</sup> Beginning in 2006, Serbia and Montenegro represented individual countries.

<sup>b</sup> Serbia and Montenegro represented a single country for data purposes from 1992 to 2006.

### Note(s)

Article counts refer to publications from a selection of journals, books, and conference proceedings in S&E from Scopus. Articles are classified by their year of publication and are assigned to a region, country, or economy on the basis of the institutional address(es) listed in the article. Articles are credited on a fractional-count basis. The sum of the regions, countries, or economies may not add to the world total because of rounding. Some publications have incomplete address information for coauthored publications in the Scopus database. The unassigned category count is the sum of fractional counts for publications that cannot be assigned to a region, country, or economy.

### Source(s)

National Science Foundation, National Center for Science and Engineering Statistics; SRI International; Science-Metrix; Elsevier, Scopus abstract and citation database, accessed July 2017.



**CHAPTER 5 | Academic Research and Development**

*Science and Engineering Indicators 2018*

## CHAPTER 5 | Academic Research and Development

APPENDIX TABLE 5-30

## S&amp;E articles in biological sciences, by region, country, or economy: 2003–16

(Number)

Region, country, or economy	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
World	204,709.0	218,773.0	230,356.0	237,684.0	249,605.0	262,930.0	271,339.0	282,223.0	305,909.0	328,879.0	344,741.0	361,805.0	356,715.0	351,877.0
North America	71,605.6	75,921.0	77,660.8	78,018.1	80,768.7	81,521.9	82,430.6	83,292.6	87,789.5	92,760.5	93,738.2	94,895.3	91,568.0	85,798.2
Canada	7,100.7	7,381.3	7,787.3	8,052.1	8,499.2	8,723.6	8,692.6	8,749.6	9,136.8	9,915.4	9,927.6	10,195.6	9,968.0	9,332.0
Greenland	3.2	6.9	3.6	5.5	2.6	4.6	1.2	3.0	3.9	4.0	7.6	3.6	6.1	4.6
Mexico	1,182.9	1,277.7	1,413.0	1,569.1	1,634.1	1,882.5	1,918.8	1,987.3	2,143.6	2,416.2	2,657.0	2,918.7	3,036.8	3,131.5
United States	63,318.8	67,255.1	68,457.0	68,391.4	70,632.9	70,911.3	71,817.9	72,552.7	76,505.1	80,425.0	81,146.0	81,777.5	78,557.2	73,330.2
Central America and Caribbean	491.1	575.1	569.5	610.8	629.0	656.9	669.4	698.6	731.3	762.4	736.2	866.7	688.7	657.7
Antigua and Barbuda	0.0	0.0	0.4	0.1	0.3	0.9	0.0	0.1	0.2	1.3	0.5	0.2	0.7	0.3
Bahamas, The	0.7	0.5	0.3	0.6	1.3	1.1	0.5	0.8	1.0	2.4	2.1	3.4	1.9	2.9
Barbados	4.7	3.0	2.7	5.7	4.3	10.0	2.1	2.4	4.8	1.4	4.1	3.7	7.0	5.0
Belize	0.7	1.4	1.8	3.4	1.9	0.1	2.0	2.4	1.4	3.6	2.9	2.0	1.9	2.8
Costa Rica	68.1	77.9	110.0	75.8	96.0	95.4	95.0	99.4	108.1	102.6	102.4	124.5	103.5	107.7
Cuba	213.7	269.5	257.9	279.8	244.8	279.4	300.7	286.2	290.5	300.5	292.9	309.1	221.2	155.9
Dominica	0.0	0.0	0.1	0.6	0.8	0.2	1.4	0.4	3.1	2.8	0.3	1.2	2.0	1.9
Dominican Republic	3.4	4.2	1.1	1.2	2.3	5.9	4.4	5.5	3.9	6.6	6.1	9.6	10.1	7.2
El Salvador	0.3	2.4	3.4	2.0	1.8	2.7	3.8	4.9	1.8	3.1	5.9	5.2	2.5	9.0

## CHAPTER 5 | Academic Research and Development

Region, country, or economy	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Grenada	1.1	1.4	1.9	9.9	10.3	12.3	7.7	4.5	10.9	8.1	9.8	22.1	11.8	9.1
Guatemala	11.9	11.1	16.0	7.9	9.4	10.9	21.5	24.5	15.2	29.6	22.0	20.1	21.9	20.2
Haiti	1.9	0.4	0.8	2.3	1.7	1.3	3.0	1.5	2.6	4.2	6.0	8.4	6.2	6.5
Honduras	1.4	1.9	3.7	3.1	3.4	5.1	4.6	6.0	7.4	8.8	9.6	8.9	11.2	16.6
Jamaica	16.8	17.2	12.8	22.8	19.1	16.9	19.1	22.2	36.8	21.3	26.8	35.4	18.0	21.3
Nicaragua	3.1	4.6	4.5	6.7	5.7	6.5	8.5	9.1	11.0	8.9	8.0	12.0	8.2	12.4
Panama	43.7	43.9	42.1	51.1	63.7	68.8	64.9	66.8	64.1	78.1	83.6	90.3	87.9	95.0
Puerto Rico	98.7	111.4	85.9	120.6	136.5	115.6	105.3	130.3	141.8	147.4	122.4	153.0	145.4	153.4
Saint Kitts and Nevis	0.2	0.2	0.0	0.2	0.6	0.2	1.3	2.0	0.5	5.1	4.6	6.1	4.4	5.6
Saint Lucia	0.0	0.3	0.3	0.5	0.2	0.5	0.0	0.4	0.3	0.4	0.5	0.0	0.6	2.3
Saint Vincent and the Grenadines	0.0	0.1	0.0	0.5	0.1	0.0	0.0	0.1	0.0	0.0	0.6	0.1	0.3	1.1
Trinidad and Tobago	20.8	23.7	23.8	15.9	24.9	23.2	23.4	29.2	25.9	26.3	25.0	51.3	22.0	21.4
South America	5,756.4	6,409.0	6,671.4	8,118.0	8,929.9	10,189.9	10,938.0	11,595.9	12,763.2	14,210.5	14,806.7	15,880.3	16,060.7	16,616.2
Argentina	1,260.6	1,258.2	1,295.0	1,501.4	1,528.3	1,729.9	1,886.0	1,979.5	2,155.7	2,330.3	2,214.4	2,307.5	2,181.5	2,226.2
Bolivia	21.8	15.5	24.4	27.9	41.9	42.1	39.4	34.0	42.4	33.4	40.9	38.8	32.3	31.5
Brazil	3,520.7	4,069.6	4,180.1	5,316.5	5,993.0	6,797.6	7,174.7	7,672.2	8,505.3	9,652.8	10,246.7	10,886.1	11,117.3	11,488.7
Chile	394.6	438.9	505.4	554.2	625.2	698.3	727.5	770.1	894.6	934.1	1,015.8	1,138.7	1,211.1	1,232.2
Colombia	139.5	182.0	187.4	234.4	224.3	302.8	392.7	528.9	524.7	635.8	639.0	758.9	834.6	879.6
Ecuador	20.1	25.1	40.4	43.1	52.4	53.9	74.0	60.1	61.2	79.3	81.9	110.3	118.0	185.2



## CHAPTER 5 | Academic Research and Development

Region, country, or economy	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Guyana	1.1	1.7	3.5	2.1	3.5	1.9	3.0	6.9	3.0	1.9	2.8	1.7	3.0	6.0
Paraguay	7.3	9.0	9.2	6.4	7.8	8.4	8.0	7.8	12.6	13.4	12.7	18.1	16.7	21.1
Peru	60.6	55.7	54.4	75.4	94.3	96.8	89.1	94.7	121.1	113.7	148.8	180.1	183.1	212.6
Suriname	1.1	2.7	2.1	1.4	0.6	3.0	1.7	1.2	0.7	2.1	3.4	1.0	2.7	6.4
Uruguay	83.1	92.8	107.3	91.7	98.9	113.1	134.2	120.6	161.5	138.6	152.1	208.4	162.6	182.3
Venezuela	246.1	257.7	262.4	263.5	259.8	342.1	407.6	319.8	280.3	275.2	248.1	230.7	198.0	144.4
Europe	76,461.2	79,555.2	82,133.1	82,569.8	84,676.1	89,494.4	91,366.4	93,195.5	99,259.0	107,054.7	109,928.8	114,037.6	112,498.8	108,675.6
EU	66,309.4	68,862.2	71,100.5	72,590.5	74,331.1	78,671.4	79,835.1	80,921.1	85,863.6	92,766.1	95,400.6	98,408.8	96,384.5	92,324.1
Austria	1,244.4	1,297.3	1,313.1	1,300.1	1,411.5	1,454.8	1,524.5	1,581.6	1,690.9	1,749.3	1,881.5	1,920.5	1,961.3	1,870.5
Belgium	1,974.1	2,124.7	2,204.1	2,054.5	2,123.9	2,241.5	2,380.8	2,428.7	2,665.9	2,828.5	2,889.6	2,865.6	2,787.8	2,718.2
Bulgaria	289.2	252.0	377.5	323.7	487.1	501.2	586.3	503.1	504.2	582.3	580.3	581.7	505.3	507.5
Croatia	285.3	301.6	340.7	416.9	470.4	582.0	504.8	452.1	571.7	556.3	550.3	497.7	478.4	520.0
Cyprus	9.0	12.9	18.3	18.7	27.5	29.0	34.5	38.1	38.5	57.0	75.7	69.0	70.7	89.0
Czech Republic	1,068.5	1,206.3	1,173.0	1,280.7	1,460.2	1,587.3	1,623.9	1,812.4	1,741.1	1,904.9	1,925.3	2,276.8	2,334.6	2,221.8
Denmark	1,609.6	1,642.4	1,595.9	1,639.6	1,663.3	1,712.2	1,727.7	1,861.8	1,968.8	2,247.5	2,410.1	2,527.0	2,550.9	2,439.7
Estonia	121.7	122.7	162.2	168.1	191.2	189.3	245.3	242.4	263.9	268.8	270.1	293.0	327.5	285.8
Finland	1,452.5	1,473.9	1,476.3	1,531.6	1,496.8	1,597.3	1,490.2	1,533.2	1,614.5	1,704.4	1,673.3	1,745.9	1,686.7	1,606.6
France	8,580.3	8,828.9	8,922.1	8,992.5	9,005.4	9,191.4	9,279.9	9,390.8	9,911.3	10,605.9	10,689.0	10,877.5	10,536.3	10,034.6
Germany	11,638.1	12,157.1	12,719.9	12,751.6	13,172.1	13,557.0	13,995.0	13,941.6	14,848.1	16,014.9	16,334.2	17,175.6	16,621.6	15,979.6

## CHAPTER 5 | Academic Research and Development

Region, country, or economy	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Greece	808.5	942.2	1,074.2	1,235.5	1,149.8	1,471.4	1,326.8	1,351.6	1,319.5	1,378.0	1,419.9	1,340.8	1,251.3	1,243.6
Hungary	852.8	862.9	1,105.5	1,070.7	1,113.0	1,390.6	1,124.8	1,022.9	1,168.6	1,206.8	1,155.9	1,208.9	1,164.5	1,103.3
Ireland	469.4	547.5	617.5	603.4	695.4	773.1	864.7	964.6	1,131.7	1,104.2	1,035.8	1,108.0	1,002.0	974.7
Italy	6,491.2	6,783.2	6,876.5	7,294.0	7,640.8	8,051.9	8,375.4	8,295.7	8,955.2	9,621.8	10,136.3	10,404.1	10,032.1	9,905.8
Latvia	46.2	45.7	30.2	41.4	41.1	41.7	50.3	54.2	79.1	88.5	86.0	95.0	97.9	108.4
Lithuania	80.0	86.3	98.2	108.9	116.4	102.6	109.1	118.7	136.6	184.1	152.5	180.1	273.9	227.9
Luxembourg	20.5	42.8	23.5	31.2	29.8	47.5	49.9	62.9	83.4	75.4	93.4	110.9	122.5	109.5
Malta	19.2	9.8	7.4	7.9	9.1	21.6	18.6	12.0	18.1	17.0	18.9	21.1	32.5	28.7
Netherlands	3,705.4	3,824.7	3,987.6	3,885.3	3,889.7	4,224.0	4,182.3	4,390.8	4,666.5	5,146.5	5,359.4	5,543.5	5,313.4	5,107.3
Poland	2,573.4	2,479.7	2,711.8	2,769.2	2,714.4	2,910.1	2,941.3	3,098.5	3,403.2	3,786.4	4,410.9	4,725.0	4,555.9	4,572.5
Portugal	734.7	777.5	816.5	894.8	970.8	1,188.6	1,294.5	1,315.1	1,564.9	1,887.6	1,981.0	2,079.0	2,049.2	1,910.5
Romania	148.6	156.9	127.8	184.2	189.3	318.7	487.5	548.8	637.6	777.7	794.1	732.1	759.5	693.0
Slovakia	382.6	408.7	407.9	448.4	439.1	507.1	480.1	483.4	511.9	519.1	627.6	571.1	662.1	587.4
Slovenia	231.2	204.2	298.3	250.8	296.6	349.3	360.1	354.0	377.3	413.7	468.3	432.2	442.2	406.4
Spain	5,182.1	5,365.2	5,868.4	6,285.4	6,340.5	7,032.2	7,386.8	7,696.6	8,199.7	9,170.3	9,156.2	9,453.7	9,218.5	8,533.3
Sweden	2,975.1	2,962.7	3,031.0	2,974.1	2,998.4	3,022.6	3,016.9	2,944.3	3,054.1	3,254.1	3,482.8	3,495.0	3,445.8	3,368.5
United Kingdom	13,316.0	13,942.4	13,715.1	14,027.2	14,187.4	14,575.3	14,373.3	14,421.1	14,737.3	15,615.1	15,742.7	16,078.2	16,099.9	15,169.8
Other Europe	10,151.8	10,693.0	11,032.6	9,979.3	10,345.0	10,823.0	11,531.2	12,274.5	13,395.4	14,288.5	14,528.1	15,628.8	16,114.3	16,351.5
Albania	5.2	4.0	5.5	5.0	8.1	5.8	12.6	9.0	13.0	33.6	13.8	19.3	19.3	25.2

## CHAPTER 5 | Academic Research and Development

Region, country, or economy	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Andorra	0.5	0.4	1.0	0.0	0.4	0.0	0.0	0.0	0.6	1.1	0.9	0.9	2.0	3.8
Belarus	100.7	101.0	94.9	85.2	98.4	74.5	84.7	75.4	75.3	92.2	65.4	88.6	94.2	67.0
Bosnia and Herzegovina	5.8	5.9	12.4	18.2	15.1	34.7	23.2	38.0	31.5	39.4	40.0	37.9	59.4	42.3
Holy See (Vatican City)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Iceland	54.1	60.5	61.7	54.1	59.9	69.5	66.0	65.0	68.4	85.3	96.3	77.9	87.6	91.3
Kosovo	0.0	0.0	0.0	0.0	0.0	5.0	8.0	5.2	4.2	12.8	7.8	14.9	8.2	15.6
Liechtenstein	0.4	1.8	0.8	0.9	0.5	1.8	0.6	2.2	1.8	1.0	2.8	1.4	3.5	3.8
Macedonia	10.5	40.2	25.3	14.4	22.4	26.9	29.2	21.5	25.0	51.4	39.5	54.8	48.0	61.4
Moldova	9.8	7.5	4.5	8.1	5.8	9.3	7.9	7.2	5.5	7.1	15.9	16.6	17.1	18.0
Monaco	4.8	2.7	2.6	3.8	3.2	3.4	4.8	5.0	7.4	4.2	4.8	6.5	10.2	6.7
Montenegro <sup>a</sup>	na	na	na	na	4.9	9.0	8.6	9.8	16.1	24.4	19.6	28.9	22.9	31.7
Norway	858.9	920.2	994.3	1,062.4	1,119.2	1,104.8	1,187.7	1,211.4	1,342.0	1,361.7	1,469.7	1,526.7	1,506.8	1,475.5
Russia	4,547.6	4,521.2	4,563.4	3,271.4	3,439.1	3,741.2	3,759.9	4,097.9	4,492.6	4,660.0	4,566.3	5,050.4	5,694.7	5,818.9
San Marino	0.0	0.3	0.0	0.0	0.0	0.0	0.3	0.4	1.2	0.2	0.3	1.0	0.3	0.5
Serbia <sup>a</sup>	na	na	na	na	308.4	451.2	513.1	557.7	577.0	751.1	732.8	789.5	717.4	673.8
Serbia and Montenegro <sup>b</sup>	161.3	192.4	248.6	277.8	na	na	na	na	na	na	na	na	na	na
Switzerland	2,447.4	2,681.8	2,602.1	2,795.0	2,766.2	2,825.7	3,006.2	3,071.9	3,376.0	3,722.4	3,872.7	4,005.9	3,930.4	3,851.9
Turkey	1,549.9	1,741.4	1,948.9	2,075.2	2,152.0	2,126.0	2,436.2	2,714.0	2,926.6	2,990.3	3,106.8	3,358.2	3,394.6	3,693.3
Ukraine	395.0	411.5	466.7	307.9	341.4	334.1	382.2	383.0	431.2	450.2	472.5	549.5	498.0	470.7

## CHAPTER 5 | Academic Research and Development

Region, country, or economy	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Middle East	2,801.6	2,931.3	3,078.7	3,478.3	3,899.6	4,090.7	4,571.2	5,454.9	7,469.7	7,217.3	7,445.7	8,628.3	8,664.6	9,408.5
Armenia	26.4	31.7	28.6	28.6	25.6	47.1	23.0	26.4	42.0	43.7	44.9	37.9	39.5	35.7
Azerbaijan	9.2	13.9	21.9	14.8	12.0	7.0	10.2	15.2	24.3	21.9	15.0	21.4	25.1	22.0
Bahrain	15.0	12.9	17.2	16.1	13.4	12.1	10.8	12.5	10.1	10.3	12.6	13.4	19.4	17.3
Gaza Strip	0.0	2.3	1.2	4.1	3.8	1.9	4.2	5.9	7.3	8.8	9.3	8.8	6.5	7.2
Georgia	11.6	22.3	34.2	20.5	21.6	20.7	20.3	37.1	32.6	43.8	36.6	53.1	51.6	44.5
Iran	394.5	536.8	680.7	1,060.4	1,376.1	1,555.4	1,961.8	2,517.0	4,129.8	3,668.4	3,715.8	4,365.4	4,466.2	5,179.8
Iraq	15.5	7.7	8.9	17.5	18.9	14.4	34.8	52.5	64.6	63.0	74.0	83.0	76.9	91.0
Israel	1,751.9	1,764.7	1,720.8	1,743.2	1,800.9	1,782.1	1,781.3	1,788.4	1,880.3	1,973.4	1,891.5	1,991.7	1,984.2	1,850.4
Jordan	92.4	86.4	88.0	101.1	117.4	84.7	140.7	136.4	150.5	157.0	156.7	162.0	173.1	204.1
Kuwait	92.2	82.5	96.6	75.4	89.8	86.5	80.4	85.7	99.5	96.6	92.8	82.5	82.2	90.2
Lebanon	65.0	71.0	57.0	54.9	70.6	76.3	72.5	82.7	91.2	103.3	111.8	135.3	130.8	147.1
Oman	28.0	17.4	29.0	29.0	35.9	29.4	27.1	47.5	43.3	56.0	69.4	101.6	79.2	75.9
Qatar	9.7	13.6	8.3	9.5	14.5	17.4	18.6	29.8	33.1	42.8	56.2	80.6	107.0	118.8
Saudi Arabia	198.2	165.1	171.6	183.6	176.6	207.4	259.1	439.7	676.3	745.0	950.7	1,237.0	1,204.7	1,267.8
Syria	25.3	29.1	26.3	25.8	34.6	47.6	32.9	44.8	55.7	53.0	53.6	59.0	40.2	48.7
United Arab Emirates	53.2	60.2	79.7	76.8	69.7	86.6	66.7	95.5	95.2	95.4	118.2	144.9	146.8	164.9
West Bank	5.5	7.2	4.9	8.5	13.2	10.1	16.0	21.9	18.9	21.6	21.9	24.8	19.7	32.7
Yemen	8.0	6.5	3.8	8.5	4.9	4.0	10.7	15.9	15.0	13.2	14.7	25.9	11.6	10.6

## CHAPTER 5 | Academic Research and Development

Region, country, or economy	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Africa	2,602.6	2,677.7	2,881.8	3,336.7	3,775.4	4,084.1	4,744.7	5,406.3	6,131.1	6,212.1	6,577.7	7,155.0	7,202.8	7,649.6
Algeria	40.0	42.7	34.4	60.8	82.2	83.0	90.3	112.0	125.0	160.1	205.1	223.9	236.7	258.6
Angola	0.6	1.9	1.8	0.8	2.0	0.9	3.6	3.1	3.3	5.4	3.8	3.2	4.9	7.6
Benin	13.6	13.4	22.0	25.6	25.8	40.8	38.7	25.7	53.8	62.9	60.1	63.6	52.6	42.4
Botswana	21.4	21.1	16.6	19.2	23.4	19.3	23.1	16.7	22.4	30.3	36.7	29.4	30.2	41.4
Burkina Faso	23.8	18.0	22.2	33.2	27.3	33.7	40.8	38.4	45.3	63.7	48.4	53.4	53.5	45.7
Burundi	0.0	0.5	0.8	0.1	0.9	0.4	0.9	3.8	1.4	3.1	2.5	0.7	2.6	2.2
Cameroon	62.2	54.1	68.9	75.1	105.8	87.4	92.3	115.4	107.7	112.6	117.1	137.5	146.6	142.8
Cape Verde	0.0	0.5	0.0	0.6	0.3	0.7	1.2	1.0	0.0	2.5	2.4	0.7	1.8	2.9
Central African Republic	3.3	4.4	2.8	3.5	1.9	2.2	3.4	5.8	5.6	4.6	4.9	6.2	4.6	6.8
Chad	0.7	0.7	2.0	2.0	1.0	1.6	2.7	0.7	2.7	1.8	0.9	2.6	2.1	2.5
Comoros	0.3	0.2	0.0	0.2	0.1	0.4	0.2	1.1	2.0	1.0	0.6	0.7	0.9	1.6
Congo, Democratic Republic of the	2.6	4.2	6.6	4.0	8.5	9.2	9.7	15.5	15.2	23.9	22.0	25.7	26.1	24.8
Congo, Republic of the	7.4	6.2	12.6	10.6	9.9	11.1	11.7	17.1	12.2	17.0	13.4	17.7	12.6	19.5
Côte d'Ivoire	23.6	26.7	29.3	25.2	30.6	31.4	36.9	38.6	54.4	48.9	45.6	53.2	40.1	32.8
Djibouti	0.0	0.2	0.3	0.1	0.3	0.4	0.5	1.1	1.0	0.8	2.2	0.9	0.6	0.5
Egypt	421.8	415.2	407.9	424.0	471.0	597.8	872.4	903.6	1,260.0	1,309.0	1,264.3	1,615.8	1,501.8	1,772.3
Equatorial Guinea	0.7	1.6	0.5	0.8	1.0	0.7	1.0	1.3	0.7	1.3	1.2	1.0	2.9	3.3
Eritrea	3.9	1.9	2.0	3.1	1.0	1.5	0.4	0.0	2.0	2.0	3.3	3.0	3.9	1.1

## CHAPTER 5 | Academic Research and Development

Region, country, or economy	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Ethiopia	55.2	32.9	50.5	45.5	74.1	64.8	88.7	83.4	118.5	137.3	194.0	221.2	238.9	271.1
Gabon	13.0	16.3	19.4	21.1	15.9	19.4	19.6	17.7	21.0	25.3	24.1	25.2	25.2	25.5
Gambia, The	11.5	14.3	14.6	21.7	19.4	26.4	21.7	28.3	17.0	22.6	20.7	22.5	18.3	22.8
Ghana	31.1	28.2	34.8	33.5	44.4	47.4	66.2	71.7	75.0	98.7	109.5	106.8	148.4	189.8
Guinea	1.6	2.3	1.5	6.6	4.1	4.4	3.3	2.4	4.1	5.9	3.1	5.2	6.3	11.7
Guinea-Bissau	3.2	3.8	5.9	3.7	5.2	3.0	4.2	3.8	5.4	3.7	4.9	8.7	5.0	6.5
Kenya	130.4	123.5	127.0	177.7	161.4	197.8	212.9	215.4	277.7	252.0	272.9	319.0	320.1	317.8
Lesotho	0.0	0.3	1.2	0.2	0.3	0.4	0.7	0.9	3.3	3.0	2.0	1.3	4.4	1.2
Liberia	0.0	0.0	0.2	1.1	0.5	0.2	0.8	1.1	0.5	0.6	0.5	2.0	4.0	3.3
Libya	4.6	8.2	8.0	12.1	12.1	8.9	13.5	25.3	19.9	24.9	26.7	22.7	15.5	21.4
Madagascar	17.8	20.1	31.4	33.0	44.4	31.4	30.0	43.1	42.1	45.7	59.3	43.9	50.6	40.5
Malawi	20.6	12.4	14.2	20.8	24.1	29.5	18.6	31.4	34.2	47.6	36.5	47.1	46.8	43.8
Mali	8.2	10.8	15.2	27.8	27.7	32.6	24.6	34.5	33.4	24.1	19.1	16.8	21.7	23.8
Mauritania	0.6	0.9	1.1	0.6	1.0	0.6	1.7	1.2	3.3	4.3	4.7	2.7	1.9	2.5
Mauritius	7.8	14.1	14.9	15.7	11.0	10.3	11.3	9.2	13.7	19.2	23.5	41.9	16.4	29.9
Morocco	100.1	91.3	87.3	72.5	109.0	110.8	107.8	128.3	141.4	192.4	215.8	176.5	196.6	198.4
Mozambique	5.0	4.6	13.3	6.0	9.9	6.8	11.9	13.4	24.9	21.3	23.2	24.3	37.7	30.4
Namibia	21.7	13.3	18.1	14.3	11.0	12.8	11.3	10.4	15.5	21.7	24.5	26.4	25.0	25.1
Niger	2.1	3.9	3.2	6.8	8.9	5.3	12.5	15.0	12.0	8.5	8.5	12.8	16.3	10.9

## CHAPTER 5 | Academic Research and Development

Region, country, or economy	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Nigeria	211.5	235.5	226.5	392.5	468.2	438.7	638.6	876.7	862.5	716.9	625.4	711.2	622.2	594.1
Rwanda	1.6	1.9	2.8	2.6	4.3	4.4	6.4	7.8	13.1	13.9	17.1	17.3	23.5	27.8
São Tomé and Príncipe	0.2	0.2	0.3	0.5	0.0	0.0	1.0	0.1	0.0	0.5	0.2	0.7	0.0	0.0
Senegal	30.0	33.2	37.7	33.4	38.9	41.1	30.6	38.4	53.5	59.5	64.0	61.4	59.9	71.7
Seychelles	7.7	2.1	2.4	2.5	3.2	2.2	3.4	2.8	5.4	3.7	7.5	5.3	8.4	8.4
Sierra Leone	0.5	0.0	0.0	0.0	0.3	3.1	2.7	3.9	2.6	5.2	3.1	4.8	9.5	13.4
Somalia	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.6	0.4	0.3	0.0	0.6	0.2	0.0
South Africa	1,029.3	1,084.9	1,156.1	1,216.2	1,218.3	1,365.2	1,381.7	1,543.3	1,620.3	1,645.0	1,937.9	1,996.9	2,114.9	2,194.8
South Sudan	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.9	0.5	0.4	0.7	0.7
Sudan	13.7	18.4	17.3	26.8	28.8	40.1	73.1	74.5	83.9	51.5	55.8	50.0	55.9	62.8
Swaziland	3.5	0.3	3.5	3.1	2.7	5.3	6.2	9.4	8.1	6.2	8.0	4.6	4.1	6.4
Tanzania	37.2	41.6	51.5	60.1	68.4	53.4	78.4	83.8	88.5	79.5	96.5	122.3	137.6	146.5
Togo	3.3	2.3	5.7	6.5	5.1	8.7	8.5	8.3	16.1	12.5	10.5	10.0	14.1	18.4
Tunisia	112.7	129.2	197.7	272.7	385.1	449.7	477.1	518.9	613.2	584.2	596.0	535.5	581.0	531.2
Uganda	39.3	75.4	46.9	61.2	115.1	78.4	91.5	132.7	117.5	133.8	148.7	147.5	148.9	156.1
Western Sahara	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0
Zambia	12.5	11.3	13.0	16.3	15.8	22.7	17.1	24.6	35.4	34.2	34.3	40.5	38.9	46.3
Zimbabwe	39.0	26.4	28.3	33.1	43.8	35.7	37.3	43.0	33.2	54.6	64.3	79.6	59.3	85.9
Asia	37,653.2	43,539.5	49,752.6	53,742.3	58,995.9	64,262.8	67,879.1	72,689.1	81,127.3	88,972.0	99,213.9	108,673.1	108,577.7	111,541.2

## CHAPTER 5 | Academic Research and Development

Region, country, or economy	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Afghanistan	2.4	0.0	1.1	1.5	0.3	2.2	1.9	2.5	5.9	4.9	1.0	2.9	1.6	6.6
Bangladesh	107.6	99.7	120.8	129.3	196.0	196.8	258.5	279.9	348.8	373.4	327.0	373.0	345.5	383.6
Bhutan	1.0	1.4	0.6	5.6	2.5	0.9	3.0	3.1	5.0	4.6	8.3	5.1	6.4	12.0
Brunei	1.2	3.3	2.6	3.2	7.5	4.6	5.7	5.4	5.8	6.9	8.3	11.2	14.8	18.0
Burma	4.0	3.2	6.8	7.9	5.1	4.8	8.5	8.0	9.4	6.1	9.0	10.7	15.2	22.5
Cambodia	5.8	7.6	10.6	9.5	9.3	10.8	17.9	17.4	21.5	24.2	33.5	32.0	35.8	35.9
China	11,070.0	14,572.6	19,937.8	22,891.4	26,314.6	29,308.9	31,305.9	33,103.8	36,613.5	41,794.1	49,740.2	57,282.3	57,415.9	59,744.3
India	4,515.8	5,018.7	5,477.4	6,163.5	7,158.0	7,302.7	8,684.1	10,705.7	12,959.6	13,911.8	13,957.7	14,852.0	14,861.8	15,953.1
Indonesia	81.4	71.5	83.8	85.1	101.2	107.4	144.4	144.8	198.2	238.5	371.2	375.7	482.0	524.9
Japan	15,609.8	16,251.8	16,002.9	15,614.9	15,648.6	15,899.8	15,466.9	14,665.6	14,994.0	15,294.1	15,858.9	15,540.1	15,056.5	14,661.7
Kazakhstan	28.5	17.6	18.7	9.7	16.4	17.2	19.7	20.3	29.4	20.2	42.0	52.3	84.4	70.1
Kyrgyzstan	1.4	4.7	1.8	2.6	1.2	1.9	3.9	3.8	3.9	3.9	6.2	6.4	3.9	7.8
Laos	1.5	3.2	7.2	7.3	7.1	5.7	16.6	11.8	11.4	15.2	23.0	14.1	18.5	18.8
Malaysia	180.2	228.8	301.6	319.3	372.6	489.1	727.1	1,015.4	1,567.1	1,601.0	1,705.3	2,019.5	1,792.6	1,880.7
Maldives	0.1	0.0	1.4	0.0	0.6	0.0	1.4	0.0	0.4	0.4	0.2	1.7	1.2	2.0
Mongolia	5.9	5.9	7.9	6.8	12.9	16.4	20.6	25.6	15.4	24.8	26.5	26.9	19.5	29.5
Nepal	40.8	23.5	34.7	41.6	45.9	36.9	41.3	46.9	42.6	48.6	70.4	76.1	90.8	91.4
North Korea	0.3	15.4	8.6	1.3	1.4	3.6	4.0	2.1	2.0	3.7	1.4	0.9	2.5	5.2
Pakistan	283.4	319.0	409.4	557.7	607.2	769.2	904.0	1,200.1	1,491.5	1,449.3	1,580.5	1,672.2	1,773.3	1,704.0



## CHAPTER 5 | Academic Research and Development

Region, country, or economy	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Papua New Guinea	24.9	13.2	7.8	15.1	17.1	25.7	21.5	16.3	18.4	22.8	13.7	22.3	23.6	21.9
Philippines	74.3	59.1	88.0	67.5	74.6	91.2	106.9	118.3	152.4	121.0	179.8	169.3	232.7	215.1
Singapore	455.9	641.9	734.2	800.5	798.7	839.9	932.9	1,066.0	1,110.0	1,244.5	1,330.8	1,400.2	1,425.8	1,440.0
South Korea	3,126.2	3,741.1	3,793.1	4,051.6	4,503.7	5,428.4	5,526.7	6,087.5	6,912.2	7,531.9	8,338.9	8,877.8	9,355.7	9,022.4
Sri Lanka	56.9	54.7	84.2	77.4	94.5	103.3	117.6	98.1	129.6	130.1	122.7	132.8	182.6	237.0
Taiwan	1,540.3	1,902.1	1,977.7	2,185.2	2,184.7	2,591.2	2,584.3	2,829.0	3,244.6	3,616.4	3,813.2	3,978.1	3,541.9	3,375.8
Tajikistan	3.9	5.4	5.2	2.1	0.4	1.4	1.0	2.5	2.3	7.9	2.9	2.0	4.0	3.2
Thailand	373.0	409.0	555.8	595.8	712.6	895.8	842.2	1,073.8	1,066.7	1,277.3	1,407.8	1,484.2	1,486.9	1,730.6
Timor-Leste	0.0	0.0	0.0	0.2	0.2	0.5	0.0	0.9	0.1	2.6	1.3	1.9	0.0	2.3
Turkmenistan	0.3	0.7	0.5	0.2	2.0	0.0	0.0	1.1	0.2	0.4	0.0	3.0	0.0	0.0
Uzbekistan	18.2	17.8	8.6	16.5	22.9	17.3	13.4	16.3	17.9	14.6	16.5	21.3	12.9	21.3
Vietnam	38.2	46.8	62.0	72.0	76.1	89.1	97.3	117.1	147.5	176.7	215.9	225.2	289.5	299.5
Australia and Oceania	5,963.7	6,278.0	6,595.4	7,062.2	7,157.6	7,764.3	7,931.0	8,325.6	8,925.9	9,630.3	10,737.9	11,032.6	11,027.9	11,044.1
Australia	4,875.8	5,176.0	5,388.9	5,876.0	5,840.0	6,465.2	6,575.6	6,829.1	7,442.7	7,966.5	9,035.2	9,315.1	9,278.6	9,362.7
Cook Islands	0.0	0.0	0.3	0.7	0.0	0.0	0.3	0.5	0.9	0.2	1.5	0.4	0.0	0.3
Fiji	4.5	5.0	14.5	8.0	14.9	8.0	8.9	9.2	8.4	8.3	9.2	12.6	13.1	30.5
Kiribati	0.1	0.0	0.0	0.3	1.3	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.3	0.7
Marshall Islands	1.0	0.6	0.5	1.4	0.3	0.0	0.0	0.0	0.4	0.1	0.3	0.4	0.1	0.6
Micronesia, Federated States of	1.1	0.9	1.9	0.2	4.8	3.1	1.1	7.4	4.5	3.2	1.7	1.1	2.1	1.9

## CHAPTER 5 | Academic Research and Development

Region, country, or economy	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Nauru	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.4
New Zealand	1,078.2	1,092.6	1,185.5	1,168.2	1,290.3	1,284.9	1,339.1	1,472.1	1,463.7	1,643.8	1,684.1	1,697.8	1,719.3	1,635.1
Niue	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Palau	0.0	0.5	1.5	1.1	2.1	0.3	1.9	1.6	0.4	2.2	0.4	1.6	2.2	0.8
Samoa	0.7	0.1	0.3	0.4	1.0	1.1	2.4	1.4	1.5	1.1	0.8	1.0	2.7	3.5
Solomon Islands	0.8	0.1	0.8	2.5	1.0	0.3	0.5	2.2	1.4	0.9	2.2	1.5	4.8	2.6
Tonga	0.7	1.0	0.0	0.1	0.2	0.0	0.2	0.5	0.3	0.6	0.0	0.2	0.7	0.4
Tuvalu	0.6	0.0	0.0	0.3	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2
Vanuatu	0.1	1.0	1.2	3.0	1.5	1.5	1.1	1.6	1.9	3.4	1.9	1.0	3.7	4.4
Unassigned	1,373.6	886.2	1,012.8	747.8	772.8	864.9	808.7	1,564.5	1,712.0	2,059.2	1,555.8	636.1	425.8	485.9

na = not applicable; country data do not exist.

EU = European Union.

<sup>a</sup> Beginning in 2006, Serbia and Montenegro represented individual countries.

<sup>b</sup> Serbia and Montenegro represented a single country for data purposes from 1992 to 2006.

### Note(s)

Article counts refer to publications from a selection of journals, books, and conference proceedings in S&E from Scopus. Articles are classified by their year of publication and are assigned to a region, country, or economy on the basis of the institutional address(es) listed in the article. Articles are credited on a fractional-count basis. The sum of the regions, countries, or economies may not add to the world total because of rounding. Some publications have incomplete address information for coauthored publications in the Scopus database. The unassigned category count is the sum of fractional counts for publications that cannot be assigned to a region, country, or economy.

### Source(s)

National Science Foundation, National Center for Science and Engineering Statistics; SRI International; Science-Metrix; Elsevier, Scopus abstract and citation database, accessed July 2017.



**CHAPTER 5 | Academic Research and Development**

*Science and Engineering Indicators 2018*

## CHAPTER 5 | Academic Research and Development

### APPENDIX TABLE 5-31

#### S&E articles in chemistry, by region, country, or economy: 2003–16

(Number)

Region, country, or economy	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
World	99,215.0	111,918.0	124,730.0	130,271.0	130,284.0	137,982.0	140,801.0	148,546.0	164,151.0	165,646.0	175,254.0	182,922.0	189,417.0	180,557.0
North America	19,524.6	23,034.8	25,953.1	24,952.9	24,508.7	26,971.2	24,599.4	26,646.3	29,228.2	27,260.7	27,859.1	27,439.3	26,743.3	24,768.3
Canada	2,160.5	2,399.0	2,648.2	2,812.1	2,724.7	2,883.6	2,937.0	3,020.1	3,310.8	3,220.8	3,315.6	3,111.8	3,123.9	2,862.9
Greenland	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0
Mexico	451.8	517.9	627.0	548.3	701.2	739.2	778.4	835.6	911.9	896.2	935.6	946.8	997.3	925.3
United States	16,912.3	20,118.0	22,677.9	21,592.5	21,082.9	23,348.4	20,884.0	22,790.6	25,005.5	23,143.6	23,607.9	23,380.7	22,622.0	20,980.1
Central America and Caribbean	107.9	116.1	117.5	115.3	135.4	139.9	141.9	138.1	174.6	169.9	124.3	164.0	125.9	109.3
Antigua and Barbuda	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.3	0.0	0.0	0.0	0.0
Bahamas, The	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.4	0.0	0.0	0.0	0.0	0.0
Barbados	4.3	3.0	2.8	3.0	3.2	5.0	0.0	0.9	1.3	2.7	1.2	2.6	3.5	3.3
Belize	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0
Costa Rica	2.1	4.4	3.3	2.0	5.5	10.9	6.0	4.2	9.2	6.4	7.8	12.4	6.4	4.0
Cuba	49.0	53.3	55.8	53.6	54.0	52.3	50.2	45.7	91.7	67.3	51.2	69.6	50.1	55.8
Dominica	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0
Dominican Republic	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.1	0.3	0.4	0.3	0.4	0.1
El Salvador	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.1	0.1	0.0	0.0	0.2	0.3

## CHAPTER 5 | Academic Research and Development

Region, country, or economy	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Grenada	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.4
Guatemala	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.3	0.3	1.6	0.0	0.0	0.1	0.3
Haiti	0.0	0.0	0.0	0.0	0.0	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Honduras	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.4	0.0	0.0	0.0	0.0	0.0
Jamaica	11.6	9.0	12.4	7.7	9.9	9.5	12.5	10.6	9.2	10.2	12.9	7.9	2.7	4.9
Nicaragua	0.0	0.0	0.2	0.0	0.0	0.3	0.0	0.0	0.3	0.2	0.0	0.0	0.0	0.0
Panama	0.2	2.3	0.6	1.1	1.0	2.7	1.6	0.3	0.8	4.2	0.4	1.3	3.7	3.1
Puerto Rico	37.6	40.7	37.7	46.3	56.7	53.7	66.3	69.5	51.9	69.2	46.2	61.1	52.0	34.7
Saint Kitts and Nevis	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Saint Lucia	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
Saint Vincent and the Grenadines	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Trinidad and Tobago	3.1	3.2	4.8	1.7	3.2	4.2	5.0	6.7	8.9	7.5	4.3	8.2	6.8	2.5
South America	2,370.8	2,570.7	2,875.5	3,075.9	3,167.9	3,618.1	3,628.3	3,696.5	4,045.7	4,056.9	4,309.7	4,589.5	4,484.8	4,494.4
Argentina	490.2	419.9	489.3	441.3	452.4	570.0	546.7	565.1	621.1	580.4	607.4	586.5	608.7	616.8
Bolivia	0.8	0.6	0.3	0.2	1.0	2.5	1.5	0.8	2.4	0.4	3.9	0.6	1.7	1.9
Brazil	1,390.2	1,676.8	1,856.0	2,154.4	2,168.6	2,396.7	2,431.5	2,458.2	2,693.5	2,814.4	2,976.5	3,290.9	3,135.8	3,118.1
Chile	249.7	203.0	226.9	223.4	219.2	237.9	268.8	261.3	307.1	307.4	327.0	307.8	317.8	352.0
Colombia	41.1	56.5	62.5	67.0	83.8	162.1	166.3	213.3	226.6	180.4	235.2	249.1	264.7	237.0
Ecuador	4.2	1.4	3.7	2.6	3.8	2.4	2.3	3.3	1.7	0.5	5.0	10.9	17.6	33.0

## CHAPTER 5 | Academic Research and Development

Region, country, or economy	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Guyana	2.0	3.0	12.4	0.5	2.0	4.1	2.0	3.0	1.0	1.0	1.0	1.0	0.0	0.3
Paraguay	0.0	0.0	0.0	0.1	0.0	1.0	0.5	2.5	0.2	1.6	0.0	0.7	1.6	0.4
Peru	6.5	1.5	11.8	3.6	2.0	4.8	4.6	3.9	5.6	5.8	7.5	11.1	11.0	14.6
Suriname	0.2	0.0	0.4	0.0	0.0	0.1	0.0	0.0	0.0	0.3	0.2	0.0	0.3	0.0
Uruguay	18.6	23.4	22.9	23.0	31.8	35.6	31.8	32.5	51.5	34.5	40.5	42.4	36.3	44.6
Venezuela	167.3	184.7	189.3	159.8	203.1	200.9	172.4	152.5	135.0	130.2	105.6	88.5	89.3	75.6
Europe	41,155.3	43,824.1	44,888.3	44,987.3	45,800.3	47,165.4	48,008.6	49,978.9	52,882.1	51,567.8	54,208.2	53,983.3	55,411.5	52,655.8
EU	31,341.6	33,812.7	34,978.1	35,791.8	36,316.2	37,194.6	37,870.7	39,507.2	41,945.7	41,294.7	43,150.9	42,672.9	43,630.6	40,859.9
Austria	491.9	580.4	545.8	537.7	553.5	640.6	663.9	673.3	699.0	686.1	744.4	775.5	786.4	747.1
Belgium	808.5	910.7	951.2	916.4	959.1	920.7	998.0	1,039.2	1,097.7	1,083.0	1,141.3	1,122.9	1,131.1	1,006.6
Bulgaria	246.7	276.3	271.2	310.1	307.7	324.8	279.1	304.5	364.7	363.5	369.5	317.3	294.9	214.5
Croatia	198.6	232.7	283.7	226.1	292.0	278.7	287.5	274.3	303.8	294.3	260.3	241.0	268.9	270.9
Cyprus	7.5	18.0	17.8	25.3	29.5	22.5	43.3	34.1	43.3	40.0	56.3	45.4	48.3	38.7
Czech Republic	693.0	751.7	963.8	903.4	963.3	1,166.6	1,076.7	1,140.1	1,447.7	1,230.9	1,336.4	1,324.5	1,409.7	1,283.1
Denmark	396.7	419.6	492.0	436.2	437.1	457.9	492.2	521.6	603.7	612.3	653.0	754.4	696.7	614.4
Estonia	45.3	54.5	50.2	63.2	74.9	57.6	67.9	79.3	73.2	79.4	101.7	101.9	122.6	90.1
Finland	394.1	464.1	453.6	464.0	486.7	455.4	500.7	542.5	531.6	507.0	564.1	567.8	604.6	501.3
France	4,399.1	4,500.2	4,617.0	4,847.3	4,750.9	5,124.1	4,997.8	5,199.1	5,335.3	5,243.7	5,458.4	5,256.9	5,354.4	4,954.8
Germany	5,960.8	6,698.5	6,792.4	6,952.9	7,048.5	7,228.5	7,453.3	7,876.2	8,419.1	8,447.2	8,486.8	8,722.4	8,834.1	8,220.5

## CHAPTER 5 | Academic Research and Development

Region, country, or economy	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Greece	461.0	497.5	524.9	646.2	610.6	620.4	635.2	578.5	607.9	560.0	592.7	547.8	571.1	526.8
Hungary	570.6	647.7	602.2	579.8	542.0	582.9	514.6	504.0	518.3	514.0	508.4	536.0	568.5	535.5
Ireland	217.2	210.3	244.5	249.8	294.5	334.2	338.1	440.2	478.2	477.1	469.1	438.9	417.4	355.8
Italy	2,982.5	3,184.8	3,335.0	3,233.0	3,384.8	3,431.7	3,664.3	3,617.9	3,865.2	3,689.3	4,108.2	4,013.7	4,159.6	3,943.1
Latvia	53.7	51.1	42.0	33.3	55.0	50.5	63.8	43.9	54.6	65.7	82.1	92.6	114.5	81.5
Lithuania	61.8	85.9	76.2	102.5	109.4	99.6	131.4	93.9	116.8	122.7	145.4	171.5	236.0	152.7
Luxembourg	2.5	2.2	4.5	5.8	6.7	10.7	12.9	15.8	32.1	30.1	31.9	39.5	26.6	32.5
Malta	1.8	0.3	2.0	1.3	1.5	0.5	1.0	2.1	1.0	0.8	2.0	5.5	9.9	4.1
Netherlands	1,149.2	1,289.6	1,372.2	1,308.8	1,188.6	1,242.6	1,325.1	1,337.4	1,394.1	1,283.1	1,410.7	1,285.7	1,234.5	1,309.3
Poland	2,127.6	2,093.1	2,200.6	2,345.1	2,398.1	2,382.8	2,348.0	2,279.4	2,547.2	2,916.9	3,057.0	2,840.4	3,106.5	2,975.6
Portugal	493.7	598.0	644.3	737.3	782.4	895.5	898.4	1,041.6	1,017.0	1,077.2	1,245.0	1,168.5	1,104.0	952.8
Romania	636.0	634.0	753.1	732.7	788.3	903.1	1,033.8	1,227.5	1,150.3	1,063.5	1,215.4	1,146.1	1,383.4	1,226.7
Slovakia	223.4	253.1	338.4	260.2	293.2	367.0	285.8	250.0	411.5	317.8	341.4	339.2	310.4	271.5
Slovenia	211.4	187.9	226.6	211.5	262.7	274.9	268.1	263.9	262.8	270.1	272.1	280.1	310.4	258.0
Spain	3,139.5	3,449.2	3,679.6	3,763.0	4,154.2	3,857.0	3,961.3	4,195.5	4,416.1	4,447.9	4,596.1	4,430.8	4,315.4	4,288.8
Sweden	936.9	1,048.2	979.3	1,061.9	956.3	898.7	918.2	986.1	968.5	1,013.5	1,095.1	1,188.9	1,138.8	1,118.4
United Kingdom	4,430.6	4,673.1	4,514.0	4,837.2	4,585.0	4,565.3	4,610.3	4,945.0	5,185.2	4,857.6	4,806.3	4,917.7	5,072.2	4,884.9
Other Europe	9,813.7	10,011.4	9,910.2	9,195.5	9,484.1	9,970.7	10,138.0	10,471.8	10,936.3	10,273.1	11,057.3	11,310.4	11,780.9	11,795.9
Albania	0.3	1.0	0.9	0.3	0.0	0.0	0.9	5.3	7.9	5.8	7.1	6.9	2.1	3.9

## CHAPTER 5 | Academic Research and Development

Region, country, or economy	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Andorra	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0
Belarus	193.3	186.8	167.9	189.2	150.4	142.9	150.5	153.7	171.9	140.6	123.2	130.8	122.8	104.4
Bosnia and Herzegovina	4.6	0.5	1.8	0.9	3.7	7.5	10.7	10.4	7.9	7.3	17.0	10.1	10.4	11.4
Holy See (Vatican City)	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Iceland	5.9	6.9	2.1	7.5	9.8	8.2	10.6	15.3	12.3	12.0	16.9	13.0	20.8	13.2
Kosovo	0.0	0.0	0.0	0.0	0.0	3.3	4.4	7.5	7.1	5.9	6.4	5.3	6.1	10.8
Liechtenstein	2.7	4.6	2.1	5.3	2.2	2.9	3.0	2.0	2.0	3.4	4.1	6.0	3.7	4.3
Macedonia	37.2	48.0	47.0	31.4	39.5	32.4	26.1	25.3	34.0	34.4	31.3	32.0	39.5	24.6
Moldova	43.3	43.3	50.6	41.2	27.4	54.0	51.7	47.3	52.8	48.1	36.3	45.2	35.4	47.6
Monaco	1.0	3.0	5.7	0.2	2.0	1.0	2.2	5.1	2.2	1.5	1.8	1.5	3.9	2.0
Montenegro <sup>a</sup>	na	na	na	na	2.2	4.1	2.4	1.3	4.6	4.1	6.9	4.9	5.4	3.8
Norway	194.1	262.8	302.6	348.8	320.5	316.7	291.6	333.4	371.5	332.6	344.5	362.1	358.7	356.6
Russia	6,286.0	5,947.3	5,784.2	4,912.7	5,067.9	5,455.0	5,372.8	5,550.0	5,896.7	5,169.8	5,626.2	5,881.0	6,382.0	6,737.6
San Marino	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Serbia <sup>a</sup>	na	na	na	na	312.6	310.4	424.3	393.2	421.3	511.2	543.6	500.3	509.8	497.5
Serbia and Montenegro <sup>b</sup>	203.3	221.5	226.5	233.1	na	na	na	na	na	na	na	na	na	na
Switzerland	1,100.5	1,230.1	1,261.0	1,304.8	1,201.0	1,291.1	1,343.0	1,402.4	1,453.3	1,511.3	1,517.8	1,627.2	1,560.5	1,414.7
Turkey	912.6	1,183.6	1,217.9	1,419.4	1,663.0	1,593.3	1,739.9	1,774.1	1,751.7	1,766.2	1,990.5	1,902.9	1,931.3	1,940.4
Ukraine	829.0	872.3	839.4	700.9	681.8	747.8	704.0	745.3	739.1	719.1	783.6	781.1	788.4	623.0



## CHAPTER 5 | Academic Research and Development

Region, country, or economy	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Middle East	1,776.3	2,030.6	2,419.2	2,761.8	3,167.5	3,487.2	3,778.7	4,459.5	5,312.4	5,920.9	6,201.4	6,564.6	7,098.8	7,155.7
Armenia	44.0	56.4	59.6	56.6	55.1	63.9	46.8	67.2	50.2	48.8	52.7	58.9	64.2	55.5
Azerbaijan	50.8	60.1	93.6	64.9	50.0	63.8	141.1	127.8	129.4	98.9	101.1	63.6	57.5	65.5
Bahrain	5.0	2.3	0.9	4.0	1.0	1.8	2.0	1.3	3.8	2.5	4.5	2.3	3.5	2.5
Gaza Strip	17.2	15.5	13.8	10.6	22.9	16.6	18.6	6.5	13.0	12.8	9.7	9.4	13.5	5.3
Georgia	20.6	22.6	29.9	44.2	38.5	26.4	32.0	34.1	25.5	34.8	21.6	25.0	19.0	8.6
Iran	847.5	1,019.4	1,330.6	1,620.9	2,054.8	2,275.1	2,548.0	2,958.8	3,555.4	3,986.1	4,163.6	4,267.5	4,645.3	4,707.3
Iraq	7.5	7.5	14.9	13.2	25.0	22.6	22.7	36.6	44.9	68.3	88.6	97.7	87.0	98.5
Israel	534.8	545.2	566.7	591.1	538.0	605.5	549.7	595.2	632.5	552.6	608.3	622.4	672.2	679.1
Jordan	47.5	54.2	51.2	74.1	91.0	93.5	83.4	79.5	76.5	84.7	85.9	76.0	68.5	67.1
Kuwait	19.3	33.0	47.0	50.3	49.6	48.4	36.2	40.4	39.6	40.3	34.9	44.2	39.8	43.6
Lebanon	7.1	8.1	12.2	15.2	13.2	22.3	20.4	17.2	34.6	24.7	38.7	34.3	54.5	57.2
Oman	11.5	10.4	8.2	19.8	7.3	18.2	14.6	20.7	16.1	29.2	25.3	39.2	46.8	35.9
Qatar	4.7	14.6	11.3	6.6	7.3	15.2	8.5	21.1	32.0	30.4	33.4	64.5	78.9	98.7
Saudi Arabia	120.6	134.6	140.4	141.8	160.4	164.3	190.1	344.5	537.5	796.8	822.7	1,032.5	1,108.3	1,101.4
Syria	15.9	17.3	11.7	12.8	8.6	9.7	10.8	27.7	29.1	31.6	20.4	21.1	27.9	16.2
United Arab Emirates	14.0	13.8	21.2	27.0	32.8	21.6	27.2	44.9	65.4	57.7	74.2	79.4	91.4	95.9
West Bank	4.5	6.1	2.4	4.8	5.8	12.3	19.0	29.7	16.5	12.5	11.6	15.1	13.2	12.1
Yemen	3.8	9.5	3.6	4.3	6.3	6.1	7.7	6.6	10.5	8.1	4.3	11.7	7.1	5.2

## CHAPTER 5 | Academic Research and Development

Region, country, or economy	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Africa	1,326.8	1,417.4	1,405.8	1,682.4	1,868.2	1,819.8	2,002.1	2,239.3	2,547.3	2,607.2	2,732.0	2,761.1	3,017.1	3,143.6
Algeria	74.5	89.3	96.7	168.7	163.2	175.3	216.4	230.6	225.8	249.0	274.3	287.8	287.2	311.5
Angola	0.0	0.2	0.0	1.0	0.2	0.0	0.2	0.9	1.2	0.2	0.2	0.1	0.1	0.0
Benin	1.3	6.3	0.5	0.5	2.1	1.3	1.6	0.4	2.0	1.3	1.8	1.1	0.1	3.3
Botswana	11.8	21.8	13.1	18.9	14.1	14.6	12.9	6.6	10.1	11.5	8.2	14.1	6.9	10.3
Burkina Faso	0.2	5.5	0.0	0.3	3.8	2.1	6.2	2.5	4.9	6.2	3.9	3.2	3.6	5.4
Burundi	0.0	0.0	0.0	0.2	0.3	0.3	1.0	1.9	0.3	0.6	0.2	0.2	0.8	0.0
Cameroon	7.6	9.9	11.3	15.8	21.5	18.8	16.6	21.3	28.2	16.1	23.9	20.4	24.0	25.1
Cape Verde	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.2
Central African Republic	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0
Chad	0.0	0.1	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Comoros	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Congo, Democratic Republic of the	2.2	0.0	1.2	0.5	0.0	0.5	0.6	2.7	1.0	0.7	2.8	2.2	2.3	5.8
Congo, Republic of the	0.0	0.4	0.0	0.0	0.0	0.6	0.0	0.0	0.4	0.0	1.0	0.2	0.0	0.7
Côte d'Ivoire	2.7	4.4	5.0	3.7	10.7	7.9	12.2	10.0	10.9	5.3	5.3	6.0	5.1	12.9
Djibouti	0.0	0.0	0.0	0.0	0.3	0.2	0.3	0.7	1.1	0.0	1.3	0.4	0.5	0.1
Egypt	662.3	666.0	681.0	756.8	851.5	852.9	833.5	861.7	905.0	974.8	1,053.2	1,103.6	1,261.7	1,292.6
Equatorial Guinea	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Eritrea	0.0	0.5	0.0	0.5	0.0	0.3	0.8	0.0	0.3	0.0	0.0	0.5	0.0	0.0

## CHAPTER 5 | Academic Research and Development

Region, country, or economy	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Ethiopia	4.7	3.5	3.5	8.4	6.0	7.8	6.6	13.4	15.9	23.4	20.4	23.4	26.2	22.7
Gabon	0.0	0.2	0.4	0.4	0.3	0.2	1.2	0.6	1.0	0.0	0.4	0.6	0.4	1.8
Gambia, The	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.1
Ghana	5.7	2.2	5.4	8.0	7.7	5.2	14.0	4.9	11.0	9.5	11.0	11.2	9.5	12.6
Guinea	0.0	0.8	0.0	0.1	0.0	0.5	0.2	0.0	0.0	0.5	1.0	0.3	0.7	0.1
Guinea-Bissau	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Kenya	11.3	9.3	7.8	2.8	6.0	3.5	10.7	7.3	11.1	17.0	13.0	2.5	5.6	14.0
Lesotho	0.0	1.1	0.0	1.0	1.3	1.0	0.0	0.0	0.3	1.0	0.0	1.0	0.3	2.0
Liberia	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.1
Libya	3.4	4.3	5.6	10.7	20.1	13.0	17.6	22.9	14.3	10.7	17.0	16.8	7.7	6.7
Madagascar	0.3	0.8	2.5	0.5	0.6	1.7	2.9	1.9	1.1	1.4	4.4	1.5	1.9	2.2
Malawi	0.0	0.0	0.0	0.0	0.7	0.0	0.1	0.9	0.2	0.1	0.1	0.0	0.4	0.0
Mali	0.0	1.0	0.0	1.6	0.0	0.3	0.3	0.3	0.3	0.2	0.3	0.5	0.0	1.3
Mauritania	0.5	1.2	0.7	0.5	0.9	1.5	1.7	0.3	0.6	0.2	0.2	0.2	0.2	0.2
Mauritius	6.0	4.9	3.9	5.5	7.5	5.7	6.0	7.3	4.9	10.1	9.7	5.4	14.1	8.1
Morocco	108.9	109.5	97.4	96.9	114.6	112.1	153.9	228.1	280.4	214.5	230.4	189.6	166.2	134.3
Mozambique	0.0	0.5	0.0	0.0	0.0	0.0	0.4	0.3	0.3	0.0	0.4	0.3	0.8	0.8
Namibia	0.3	0.0	0.0	0.9	0.5	0.0	0.0	0.3	0.6	0.1	0.2	0.7	1.3	0.4
Niger	0.0	1.3	0.4	0.0	1.5	0.0	0.0	2.3	2.0	0.1	0.0	0.2	0.0	1.0

## CHAPTER 5 | Academic Research and Development

Region, country, or economy	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Nigeria	31.9	36.7	44.7	44.2	61.4	59.1	85.1	89.7	78.2	90.4	79.4	103.9	86.5	122.9
Rwanda	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.1	0.0	0.3	0.8	0.1	1.0
São Tomé and Príncipe	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Senegal	8.8	4.6	7.2	5.3	10.9	9.1	12.6	10.9	20.0	20.0	21.6	24.4	22.4	14.8
Seychelles	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.2
Sierra Leone	0.0	0.3	0.0	0.2	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0
Somalia	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0
South Africa	274.1	302.2	293.2	377.7	391.0	351.9	390.5	498.7	682.7	700.3	663.0	654.5	728.0	756.3
South Sudan	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sudan	4.8	1.2	2.1	2.1	3.4	4.7	9.8	8.1	14.0	15.4	12.4	13.6	12.1	10.2
Swaziland	0.1	0.0	2.0	0.0	0.0	1.3	1.7	0.2	0.5	0.2	2.0	0.3	0.5	0.3
Tanzania	3.0	3.5	3.3	1.3	3.5	4.1	2.1	3.1	4.7	5.3	7.3	4.4	5.9	11.3
Togo	0.6	1.3	0.0	0.0	1.0	1.0	0.0	0.3	0.1	0.0	0.0	0.4	0.5	0.2
Tunisia	97.6	120.9	115.1	142.6	159.2	159.9	179.1	192.9	211.7	217.4	256.5	262.5	320.5	341.5
Uganda	0.0	0.7	0.6	0.0	0.4	1.3	2.3	2.1	0.1	2.6	0.4	0.5	5.5	0.9
Western Sahara	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Zambia	0.0	1.0	0.5	1.0	0.5	0.0	1.2	0.5	0.0	0.0	0.8	0.3	0.5	0.6
Zimbabwe	2.0	0.0	0.3	3.8	1.6	0.3	0.0	2.0	0.0	1.2	3.4	1.7	6.5	6.4
Asia	31,250.9	37,155.4	45,198.9	50,601.7	49,774.7	52,820.0	56,597.1	58,973.0	67,437.3	71,579.7	77,107.4	84,668.5	89,593.7	85,623.4

## CHAPTER 5 | Academic Research and Development

Region, country, or economy	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Afghanistan	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.2	0.0	0.5	0.0	0.0
Bangladesh	35.1	39.4	42.1	41.5	46.3	42.7	44.9	46.2	66.4	75.9	82.8	82.6	100.1	84.8
Bhutan	0.0	0.0	0.0	0.1	0.0	0.1	0.2	0.3	0.0	0.1	0.3	0.5	0.0	0.0
Brunei	2.4	4.3	1.5	2.1	1.2	1.9	0.5	2.6	4.0	8.2	4.0	6.5	10.0	11.2
Burma	0.8	1.7	1.5	0.2	1.1	0.1	2.3	1.0	0.0	1.0	0.0	0.0	1.6	2.8
Cambodia	0.0	0.0	0.0	0.0	0.0	0.5	0.3	1.2	0.1	0.1	0.0	0.1	0.3	0.8
China	11,632.6	15,439.5	19,067.7	22,132.3	24,677.1	26,244.3	29,237.8	30,279.0	35,418.0	38,300.4	43,240.2	49,335.4	53,344.0	52,423.6
India	4,724.2	5,300.5	5,633.5	6,705.5	7,296.7	7,433.2	7,914.4	8,432.2	9,803.8	10,392.5	10,848.1	12,045.7	12,180.1	11,173.3
Indonesia	11.5	18.5	36.2	23.6	22.4	29.7	36.6	48.5	56.8	114.5	115.6	128.3	166.4	188.6
Japan	9,753.0	10,390.8	14,079.0	14,303.5	10,302.9	10,278.1	10,110.4	9,556.5	10,054.9	10,137.6	10,277.1	9,865.3	9,859.0	8,832.8
Kazakhstan	67.7	74.8	75.5	66.3	48.6	66.1	65.2	73.7	50.4	63.6	91.8	93.5	78.9	111.7
Kyrgyzstan	1.0	0.2	4.0	1.5	1.0	0.2	3.8	0.5	2.1	3.0	2.8	1.3	1.6	2.2
Laos	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.2	0.4	0.0	0.0	0.4	0.3	0.3
Malaysia	165.1	201.1	244.3	283.5	329.7	465.4	605.4	960.8	1,172.9	1,171.4	1,045.9	1,117.9	1,547.9	1,461.7
Maldives	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	1.0	0.0	0.0
Mongolia	0.5	1.9	1.6	0.0	2.4	30.6	1.9	0.9	3.6	2.8	4.6	2.7	2.9	1.0
Nepal	0.4	1.0	4.0	2.4	1.1	1.4	2.0	4.7	5.6	7.6	7.0	4.2	7.7	11.7
North Korea	0.0	3.4	0.2	3.0	3.8	0.6	2.1	0.4	0.1	1.5	0.6	1.4	3.5	8.3
Pakistan	151.7	192.4	234.1	338.7	373.8	486.7	562.7	676.7	603.9	670.4	723.9	590.8	703.7	687.5

## CHAPTER 5 | Academic Research and Development

Region, country, or economy	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Papua New Guinea	0.2	0.0	0.1	0.5	1.5	0.0	1.3	0.5	0.3	0.5	0.5	0.4	1.0	1.4
Philippines	7.8	4.4	11.1	5.6	8.2	10.2	7.2	15.5	22.2	20.5	21.7	30.9	40.8	34.2
Singapore	432.7	584.9	598.9	618.2	604.7	805.7	863.2	1,000.4	1,237.5	1,269.3	1,313.3	1,391.6	1,384.5	1,294.2
South Korea	2,548.5	2,904.3	2,990.2	3,600.0	3,698.9	4,274.3	4,257.3	4,873.4	5,450.7	5,802.4	5,811.6	6,431.9	6,801.8	6,204.9
Sri Lanka	8.2	7.8	14.1	13.5	9.6	11.7	14.8	11.0	12.7	20.9	17.4	28.9	25.6	25.9
Taiwan	1,433.7	1,665.4	1,825.0	2,062.3	1,920.9	2,156.8	2,354.1	2,377.6	2,712.4	2,757.4	2,675.5	2,660.9	2,416.4	2,191.0
Tajikistan	7.0	10.0	3.2	5.3	9.0	10.2	7.7	9.2	8.5	5.5	13.7	5.1	6.2	12.8
Thailand	179.6	204.5	242.6	327.8	337.3	401.7	417.9	441.6	513.5	561.0	589.8	621.6	659.9	588.0
Timor-Leste	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0
Turkmenistan	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.2
Uzbekistan	80.0	94.2	77.4	55.2	55.8	51.3	52.6	74.4	101.7	60.0	58.2	40.7	37.6	39.5
Vietnam	7.1	10.6	10.5	9.4	20.7	16.3	30.5	83.9	133.9	131.3	161.1	178.6	211.7	229.0
Australia and Oceania	1,411.7	1,468.6	1,539.1	1,854.2	1,637.0	1,706.3	1,890.0	2,260.8	2,397.7	2,367.5	2,555.2	2,636.6	2,870.3	2,545.8
Australia	1,234.1	1,278.4	1,321.6	1,616.0	1,408.4	1,470.4	1,624.9	1,997.9	2,088.8	2,102.9	2,245.4	2,339.8	2,562.6	2,285.8
Cook Islands	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fiji	2.3	4.7	7.3	4.3	3.9	3.3	5.6	0.7	4.1	1.2	3.8	2.8	3.1	1.3
Kiribati	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Marshall Islands	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Micronesia, Federated States of	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.2	0.0

## CHAPTER 5 | Academic Research and Development

Region, country, or economy	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Nauru	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
New Zealand	175.3	185.3	209.8	233.7	224.7	232.6	259.5	261.5	304.8	263.3	305.0	294.0	304.5	258.8
Niue	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Palau	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0
Samoa	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Solomon Islands	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tonga	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tuvalu	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Vanuatu	0.0	0.3	0.3	0.0	0.0	0.0	0.0	0.6	0.0	0.0	0.0	0.0	0.0	0.0
Unassigned	290.6	300.3	332.6	239.4	224.3	254.2	154.9	153.4	125.8	115.6	156.7	114.9	71.7	60.7

na = not applicable; country data do not exist.

EU = European Union.

<sup>a</sup> Beginning in 2006, Serbia and Montenegro represented individual countries.

<sup>b</sup> Serbia and Montenegro represented a single country for data purposes from 1992 to 2006.

### Note(s)

Article counts refer to publications from a selection of journals, books, and conference proceedings in S&E from Scopus. Articles are classified by their year of publication and are assigned to a region, country, or economy on the basis of the institutional address(es) listed in the article. Articles are credited on a fractional-count basis. The sum of the regions, countries, or economies may not add to the world total because of rounding. Some publications have incomplete address information for coauthored publications in the Scopus database. The unassigned category count is the sum of fractional counts for publications that cannot be assigned to a region, country, or economy.

### Source(s)

National Science Foundation, National Center for Science and Engineering Statistics; SRI International; Science-Metrix; Elsevier, Scopus abstract and citation database, accessed July 2017.



**CHAPTER 5 | Academic Research and Development**

*Science and Engineering Indicators 2018*



## CHAPTER 5 | Academic Research and Development

APPENDIX TABLE 5-32

## S&amp;E articles in computer sciences, by region, country, or economy: 2003–16

(Number)

Region, country, or economy	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
World	67,577.0	83,413.0	111,282.0	120,976.0	137,497.0	154,429.0	181,751.0	206,663.0	200,142.0	196,054.0	189,696.0	195,084.0	200,495.0	191,637.0
North America	22,316.9	25,944.0	31,648.3	31,965.0	34,200.9	33,312.7	34,373.9	34,706.1	35,187.2	34,205.3	34,474.3	33,740.5	33,916.1	31,140.0
Canada	2,415.1	2,843.7	3,936.4	4,184.5	4,817.0	4,624.0	4,996.5	4,850.8	4,755.6	4,798.9	4,612.3	4,734.5	4,355.2	4,057.2
Greenland	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5
Mexico	318.3	437.5	540.6	602.3	613.0	835.0	766.9	846.2	779.0	797.9	1,085.6	1,151.1	1,034.6	965.0
United States	19,583.5	22,662.8	27,171.3	27,178.2	28,771.0	27,853.8	28,610.4	29,009.1	29,652.6	28,608.5	28,776.4	27,854.9	28,526.3	26,117.3
Central America and Caribbean	56.4	63.4	93.8	90.6	106.9	132.9	119.7	152.8	134.3	169.3	183.2	200.8	201.7	146.0
Antigua and Barbuda	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.5	0.0
Bahamas, The	0.0	0.0	0.0	0.0	0.0	0.0	0.5	1.5	0.5	0.7	1.0	0.0	0.0	0.0
Barbados	4.0	5.0	3.0	1.0	1.0	5.4	0.1	0.0	2.2	0.8	2.0	2.3	6.0	2.7
Belize	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.1	0.0
Costa Rica	1.5	9.3	6.9	10.3	8.1	10.6	6.1	8.3	8.0	30.7	30.5	32.9	43.1	41.3
Cuba	16.7	12.1	36.7	39.9	46.9	55.2	36.4	65.4	57.8	64.1	79.3	91.7	64.6	49.9
Dominica	0.0	0.0	0.3	0.0	0.3	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.3
Dominican Republic	0.0	0.0	4.7	0.3	0.0	0.0	1.5	0.0	1.0	0.2	0.8	0.0	1.1	0.3
El Salvador	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.3	0.0	0.5	0.8

## CHAPTER 5 | Academic Research and Development

Region, country, or economy	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Grenada	0.5	0.0	0.0	0.0	0.0	1.5	0.0	0.0	0.7	0.0	0.0	0.0	0.0	0.0
Guatemala	0.0	1.0	0.0	0.0	0.7	1.0	0.7	2.3	1.8	6.2	3.9	5.0	9.2	3.5
Haiti	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0	1.0	0.3	0.0	0.0	0.4	0.0
Honduras	0.0	0.2	0.0	1.0	0.0	0.3	0.5	2.0	0.1	1.5	0.0	1.2	0.7	0.7
Jamaica	1.0	4.8	6.8	5.5	4.8	18.5	21.0	12.3	9.2	11.5	17.7	13.2	9.9	7.4
Nicaragua	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.7	0.0	1.0	0.0	0.0	0.6	1.0
Panama	0.0	0.7	1.0	3.5	0.5	2.0	5.2	7.5	5.5	11.9	9.7	12.5	7.2	5.1
Puerto Rico	27.4	23.0	28.7	25.7	31.4	21.8	25.8	33.0	18.7	25.1	25.4	29.0	41.1	23.0
Saint Kitts and Nevis	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Saint Lucia	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Saint Vincent and the Grenadines	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Trinidad and Tobago	5.3	5.6	5.6	3.4	12.8	15.6	22.0	19.5	27.9	14.5	12.5	13.1	16.8	10.1
South America	1,084.1	1,409.7	1,814.2	2,122.2	2,430.2	2,859.9	3,084.7	3,358.4	3,819.3	4,413.7	4,652.2	4,895.9	5,467.4	5,045.1
Argentina	44.3	67.9	127.8	143.0	179.1	203.3	213.9	238.5	254.9	276.5	338.1	286.2	296.3	256.6
Bolivia	0.0	1.0	0.3	1.8	0.3	1.8	0.7	1.5	0.9	0.4	1.8	0.5	2.5	2.2
Brazil	896.2	1,157.7	1,411.5	1,593.4	1,818.3	2,150.9	2,330.9	2,508.3	2,880.0	3,284.3	3,459.1	3,523.2	3,739.4	3,482.1
Chile	76.8	107.1	128.4	172.0	185.4	215.7	251.1	232.4	270.0	260.7	298.3	380.0	379.8	415.5
Colombia	32.6	31.7	51.4	76.4	109.8	158.5	166.8	222.0	284.9	421.2	369.8	464.4	676.8	464.9
Ecuador	1.0	0.0	1.2	6.4	7.3	7.8	8.5	16.0	10.7	12.2	18.2	38.5	162.6	210.0

## CHAPTER 5 | Academic Research and Development

Region, country, or economy	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Guyana	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.5	0.0	0.3	0.0	0.0
Paraguay	1.0	6.3	5.0	6.5	4.0	5.5	4.8	3.2	7.2	6.0	15.1	11.2	23.9	18.2
Peru	0.0	1.8	4.0	9.4	10.8	15.8	8.4	15.3	18.7	19.7	27.3	39.7	77.2	97.8
Suriname	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.0	0.0	0.0
Uruguay	7.6	10.1	18.9	27.6	27.8	19.5	36.1	39.9	47.6	61.6	62.2	80.7	71.2	71.5
Venezuela	24.6	26.1	65.7	85.6	87.4	80.4	63.5	81.4	44.5	70.8	61.6	71.2	37.7	26.3
Europe	24,164.3	28,033.6	37,909.7	41,786.4	47,790.5	51,875.5	57,607.5	61,486.9	61,496.0	61,332.9	64,564.5	66,316.9	66,570.1	62,445.0
EU	22,183.7	25,970.5	34,867.5	38,153.5	43,806.8	47,544.9	52,430.4	55,720.3	55,488.6	55,153.2	57,914.2	58,709.8	57,774.5	52,875.5
Austria	583.9	607.3	929.2	1,074.0	1,336.4	1,365.8	1,613.1	1,624.0	1,702.0	1,810.6	1,852.9	1,787.9	1,891.3	1,644.6
Belgium	537.2	597.1	859.3	955.6	991.9	1,101.2	1,114.4	1,158.5	1,212.7	1,267.8	1,261.5	1,214.7	1,206.6	1,126.1
Bulgaria	58.3	97.0	81.7	99.9	193.1	212.3	172.1	246.4	257.4	212.0	193.7	206.5	222.2	178.3
Croatia	183.6	140.3	262.0	243.1	360.8	360.6	490.3	464.7	480.8	313.8	435.0	389.8	426.4	378.8
Cyprus	34.2	45.2	75.5	86.3	81.9	113.1	123.7	121.8	131.8	194.7	179.5	172.2	151.7	200.2
Czech Republic	334.9	384.2	588.8	730.0	885.1	909.9	1,014.3	1,239.0	1,282.5	1,221.9	1,345.9	1,350.9	1,423.4	1,396.2
Denmark	310.4	370.8	457.1	537.2	589.2	592.2	701.6	796.5	774.7	839.9	894.3	991.3	952.5	875.8
Estonia	25.7	31.3	56.6	61.1	68.5	103.4	97.7	183.8	160.8	154.8	186.4	199.5	189.0	171.5
Finland	597.1	753.0	1,025.3	1,141.2	1,236.9	1,301.3	1,361.2	1,421.9	1,424.5	1,386.2	1,455.6	1,481.1	1,413.2	1,343.0
France	2,974.7	3,316.6	4,576.8	4,945.3	5,649.3	6,011.9	6,441.4	6,560.1	6,676.5	6,877.9	7,042.7	7,211.1	7,009.7	5,937.8
Germany	3,703.8	4,305.7	6,086.5	6,513.3	7,382.6	8,466.7	9,423.3	10,321.7	9,925.2	9,742.9	10,204.6	10,787.4	10,037.1	9,301.4

## CHAPTER 5 | Academic Research and Development

Region, country, or economy	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Greece	695.4	832.0	1,194.8	1,330.7	1,435.8	1,627.1	1,801.1	1,676.7	1,668.4	1,795.6	1,695.3	1,867.3	1,803.9	1,580.8
Hungary	221.2	293.4	363.4	438.7	541.0	457.6	576.3	516.8	623.2	628.5	701.3	677.6	546.3	621.8
Ireland	270.3	434.3	622.9	721.4	788.7	780.2	922.7	1,019.2	881.8	842.8	825.5	797.7	750.3	774.3
Italy	2,421.9	2,778.2	3,624.2	3,696.6	4,273.0	4,421.8	5,001.3	5,178.5	5,221.2	5,080.8	5,895.3	5,981.2	5,777.1	5,612.3
Latvia	27.3	14.4	69.7	62.8	58.9	100.4	107.4	179.1	203.5	178.9	167.5	157.0	197.7	187.5
Lithuania	44.4	63.0	89.8	133.5	121.3	167.0	130.2	158.8	115.4	171.6	133.3	181.1	268.1	167.6
Luxembourg	13.0	19.1	30.4	54.6	62.4	106.3	129.5	156.6	181.7	185.2	227.1	274.2	249.3	200.3
Malta	3.0	5.3	6.9	13.2	17.1	18.6	23.9	26.0	33.4	31.9	39.0	40.9	48.2	48.7
Netherlands	1,108.1	1,375.6	1,781.5	1,904.9	2,206.0	2,369.1	2,613.1	2,563.9	2,552.2	2,421.5	2,406.2	2,434.8	2,235.7	1,971.2
Poland	498.3	961.2	955.2	1,256.5	1,255.5	1,660.8	1,447.7	1,854.9	1,888.4	2,288.3	2,347.6	2,474.2	2,915.4	2,871.5
Portugal	535.4	498.9	672.6	840.5	1,092.8	1,157.0	1,398.5	1,612.2	1,850.5	1,941.0	2,089.6	2,176.5	2,182.1	1,785.0
Romania	121.3	144.0	251.6	276.4	631.6	993.3	1,239.5	1,617.8	1,240.8	1,033.6	1,123.2	820.5	1,059.8	941.5
Slovakia	91.4	96.8	193.0	202.7	190.5	267.1	253.3	458.4	446.2	461.3	521.3	398.3	582.0	661.5
Slovenia	196.6	179.7	226.3	247.3	255.6	266.3	325.2	334.1	352.2	302.8	352.5	344.8	432.1	284.0
Spain	1,984.9	2,451.7	3,034.5	3,484.3	4,245.7	4,432.5	5,236.7	5,196.7	5,471.4	5,356.2	5,307.6	5,105.6	4,796.8	4,335.5
Sweden	789.9	803.2	1,048.1	1,103.3	1,177.2	1,141.5	1,248.1	1,363.7	1,495.0	1,512.0	1,611.5	1,713.6	1,705.4	1,534.6
United Kingdom	3,817.7	4,371.2	5,703.9	5,999.2	6,678.0	7,039.9	7,422.7	7,668.6	7,234.3	6,898.7	7,418.1	7,472.0	7,301.0	6,743.6
Other Europe	1,980.6	2,063.1	3,042.2	3,633.0	3,983.7	4,330.6	5,177.1	5,766.6	6,007.5	6,179.8	6,650.3	7,607.1	8,795.6	9,569.5
Albania	0.0	0.5	0.2	0.0	0.8	1.0	4.6	12.8	23.6	23.6	26.1	17.2	27.2	37.2

## CHAPTER 5 | Academic Research and Development

Region, country, or economy	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Andorra	0.0	0.0	0.0	1.0	1.7	1.0	0.0	0.0	0.0	1.5	0.0	0.5	1.1	0.5
Belarus	29.1	19.1	25.3	33.8	45.5	29.8	34.8	34.2	32.3	32.9	54.6	36.2	38.5	55.9
Bosnia and Herzegovina	5.2	7.3	16.8	16.0	37.4	67.4	75.6	95.4	112.8	72.6	62.9	64.0	60.5	58.4
Holy See (Vatican City)	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Iceland	6.8	9.5	20.9	20.3	21.7	33.4	47.3	38.5	51.2	60.7	43.7	36.6	44.1	47.4
Kosovo	0.0	0.0	0.0	0.0	0.0	4.0	2.5	5.7	10.7	6.9	10.4	6.2	8.4	14.9
Liechtenstein	0.8	1.5	0.5	1.2	2.1	10.1	6.9	10.9	12.0	5.9	5.8	11.6	6.0	8.2
Macedonia	15.3	19.7	22.4	20.1	35.1	44.6	63.1	71.9	107.1	91.8	99.2	138.7	129.0	64.9
Moldova	4.1	3.6	5.5	6.7	4.0	4.7	5.1	7.8	4.8	8.7	15.6	12.8	13.1	5.8
Monaco	0.0	0.0	0.0	2.0	1.2	0.0	0.3	0.0	0.5	0.0	0.0	0.0	0.5	0.0
Montenegro <sup>a</sup>	na	na	na	na	5.2	4.1	3.5	15.1	12.0	11.1	29.3	23.2	20.7	40.2
Norway	254.2	306.6	471.7	577.8	599.8	673.1	803.5	882.0	792.6	896.0	846.3	936.5	922.8	947.6
Russia	330.6	268.4	547.3	512.2	662.6	580.2	710.5	838.5	910.9	871.0	1,586.4	1,807.0	2,850.5	3,280.6
San Marino	0.0	0.0	0.0	0.0	0.5	0.5	0.0	0.0	0.0	0.6	0.2	0.0	0.0	0.0
Serbia <sup>a</sup>	na	na	na	na	154.0	176.8	276.1	367.8	405.0	538.8	373.0	348.2	416.4	300.1
Serbia and Montenegro <sup>b</sup>	53.5	64.6	102.0	120.5	na	na	na	na	na	na	na	na	na	na
Switzerland	762.0	871.2	1,132.2	1,259.3	1,366.1	1,408.0	1,577.2	1,651.1	1,640.2	1,733.3	1,794.5	1,802.8	1,740.4	1,587.1
Turkey	285.6	367.5	487.5	691.3	802.8	927.4	1,242.7	1,484.4	1,653.9	1,252.9	1,325.5	2,051.5	2,043.6	2,100.4
Ukraine	233.4	123.1	209.9	370.9	243.2	364.5	323.4	250.7	237.9	571.5	376.8	314.1	472.8	1,020.6

## CHAPTER 5 | Academic Research and Development

Region, country, or economy	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Middle East	1,193.8	1,390.3	1,788.6	2,261.6	2,774.3	3,692.5	4,612.9	5,510.1	5,825.6	5,172.2	5,457.6	5,365.3	5,525.6	5,816.7
Armenia	4.8	10.1	6.3	9.0	8.8	6.8	10.5	17.8	20.7	9.4	44.5	12.0	24.9	14.2
Azerbaijan	10.0	10.1	21.8	15.4	21.8	28.3	81.8	45.5	80.7	179.0	54.4	46.7	38.2	62.6
Bahrain	5.0	3.6	9.3	11.5	16.8	23.3	18.1	33.4	26.3	24.2	40.1	21.4	15.8	23.4
Gaza Strip	0.0	2.0	1.0	2.0	3.0	4.3	4.3	5.7	5.1	13.2	10.2	6.7	4.2	6.2
Georgia	5.3	4.3	10.4	8.0	7.7	5.5	16.4	15.8	24.0	37.7	17.1	11.3	17.3	13.0
Iran	196.6	301.8	490.7	633.1	1,056.5	1,704.4	2,349.6	2,959.9	3,089.6	2,007.7	2,342.0	2,132.5	2,050.9	2,449.2
Iraq	17.8	0.0	1.0	18.8	9.0	13.3	29.5	45.8	74.8	68.3	59.2	77.9	82.1	93.5
Israel	715.2	822.3	899.8	1,062.9	1,087.4	1,141.0	1,110.3	1,117.9	1,146.0	1,392.5	1,188.1	1,282.6	1,160.2	1,118.2
Jordan	45.3	40.0	60.2	93.7	114.4	171.9	180.7	289.8	221.9	204.3	211.2	235.0	265.5	288.4
Kuwait	25.8	23.8	47.9	51.7	62.7	62.9	104.1	97.1	101.1	88.7	88.1	85.7	88.2	86.1
Lebanon	28.0	32.8	53.9	64.2	69.8	60.6	91.3	99.0	120.1	134.0	102.4	120.4	136.8	163.4
Oman	16.1	18.5	18.3	27.4	42.1	44.9	60.0	53.6	58.2	66.1	54.1	60.6	89.9	94.0
Qatar	4.2	5.5	5.3	8.6	12.0	32.5	24.7	47.2	61.4	94.3	140.2	163.8	201.9	181.8
Saudi Arabia	62.4	57.2	64.9	91.7	120.3	194.5	291.8	394.7	486.2	539.5	755.5	811.5	963.2	791.8
Syria	0.3	1.0	3.0	7.1	7.8	7.2	17.2	8.7	8.3	7.6	5.2	3.5	11.4	8.2
United Arab Emirates	55.7	55.6	91.7	147.0	128.1	181.7	209.6	256.5	279.6	287.8	318.2	271.4	352.6	390.4
West Bank	1.5	1.0	2.0	6.8	5.8	7.7	6.6	13.2	10.3	12.5	14.4	12.7	16.9	24.6
Yemen	0.0	0.7	1.3	2.8	0.3	1.7	6.4	8.7	11.4	5.4	12.8	9.4	6.0	7.6

## CHAPTER 5 | Academic Research and Development

Region, country, or economy	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Africa	340.3	340.6	719.0	944.5	1,112.2	1,534.3	2,029.5	2,415.5	2,531.2	3,087.9	3,265.4	3,713.8	4,710.8	4,984.7
Algeria	56.7	55.9	112.0	201.5	210.4	221.4	338.0	349.7	458.7	553.6	557.1	648.3	1,003.5	656.4
Angola	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.2	0.0	0.3	0.6	1.0	1.2	2.7
Benin	0.0	0.0	0.5	0.3	0.0	0.3	1.5	3.3	0.4	2.5	2.8	2.4	3.5	3.7
Botswana	1.3	0.6	4.4	4.8	5.6	12.5	7.8	9.3	17.9	12.6	12.7	15.8	13.6	20.3
Burkina Faso	0.0	0.3	1.5	1.3	1.9	1.3	0.7	0.8	0.4	0.9	0.7	0.3	2.0	8.5
Burundi	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cameroon	3.5	2.0	8.0	3.1	2.8	7.3	10.0	7.6	9.8	16.8	12.3	13.0	12.9	20.9
Cape Verde	0.0	0.0	0.0	1.2	1.0	0.0	1.5	0.0	0.7	0.0	0.5	1.5	0.2	0.0
Central African Republic	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Chad	0.0	0.0	0.0	0.0	0.2	0.0	2.0	0.0	0.0	0.3	0.3	0.2	0.0	0.2
Comoros	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Congo, Democratic Republic of the	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	1.0	0.0	1.5	0.1
Congo, Republic of the	0.0	0.0	0.0	0.0	1.0	0.0	0.3	0.0	0.0	0.0	0.4	0.0	0.3	1.0
Côte d'Ivoire	0.5	0.7	0.7	0.0	1.0	3.0	0.5	1.8	2.0	3.6	1.0	1.0	1.3	0.0
Djibouti	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.3	0.5	0.0	0.4
Egypt	92.9	85.6	181.9	219.0	282.4	328.0	494.7	578.0	521.4	589.3	575.3	597.0	740.2	854.5
Equatorial Guinea	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0
Eritrea	0.3	0.0	1.0	0.0	0.0	0.0	0.0	0.0	2.6	0.0	0.0	0.0	0.0	0.0

## CHAPTER 5 | Academic Research and Development

Region, country, or economy	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Ethiopia	1.2	0.3	4.0	3.1	1.8	3.3	10.7	20.2	8.1	38.8	23.2	29.7	35.6	28.2
Gabon	0.0	0.0	0.0	0.0	0.0	0.0	0.8	0.0	0.0	0.3	0.0	0.3	0.5	0.6
Gambia, The	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.8	0.3	0.3
Ghana	0.0	0.0	0.3	2.4	3.4	4.8	5.8	9.0	9.3	11.3	16.6	20.5	24.1	32.7
Guinea	0.0	0.0	0.3	0.3	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Guinea-Bissau	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Kenya	1.0	0.0	2.7	0.7	5.8	1.4	15.4	13.8	15.1	12.5	33.6	35.7	28.1	36.6
Lesotho	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.5	0.3	1.0	1.4
Liberia	0.0	0.0	0.0	0.3	0.3	0.0	0.5	0.5	0.7	1.1	0.0	0.0	0.3	0.0
Libya	1.3	1.3	1.0	4.1	5.2	15.0	33.5	54.0	14.6	16.2	34.8	31.2	32.5	11.8
Madagascar	0.0	0.0	0.5	0.5	0.3	2.0	1.3	0.3	1.9	4.5	7.1	7.2	2.2	1.5
Malawi	0.0	0.5	1.3	0.0	0.0	0.0	1.0	3.2	3.7	4.3	0.7	12.7	11.9	3.8
Mali	0.0	0.0	1.1	0.0	0.0	0.0	0.3	0.1	1.1	1.2	1.3	1.1	0.8	1.0
Mauritania	0.0	0.0	0.5	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.4	0.4	1.0
Mauritius	4.7	7.8	15.6	11.3	10.5	14.4	13.8	27.3	13.3	17.0	22.2	24.0	18.1	52.6
Morocco	21.9	16.1	29.5	44.1	36.6	80.8	167.5	167.2	286.8	374.8	367.5	504.8	730.0	859.5
Mozambique	2.0	0.3	0.0	0.7	0.0	2.1	0.9	2.6	2.8	0.6	1.7	0.4	0.0	1.7
Namibia	0.0	0.0	2.0	0.3	1.7	3.3	2.0	6.1	6.7	10.7	12.9	31.2	22.2	27.2
Niger	0.0	0.5	0.0	1.0	0.0	0.0	1.0	0.8	0.0	0.5	1.0	0.3	2.1	1.1



## CHAPTER 5 | Academic Research and Development

Region, country, or economy	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Nigeria	10.8	10.1	24.6	13.1	21.4	36.9	51.3	86.6	107.8	92.9	131.6	152.3	181.4	233.7
Rwanda	0.5	0.0	0.2	2.0	1.0	3.3	1.5	5.7	1.5	1.5	2.9	2.0	2.6	2.0
São Tomé and Príncipe	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0
Senegal	0.2	0.2	2.3	2.0	4.8	3.2	7.8	6.9	13.5	16.7	7.8	13.4	30.7	23.7
Seychelles	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.3	0.0
Sierra Leone	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	1.0	0.5
Somalia	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.5
South Africa	89.3	98.6	179.8	231.4	267.6	451.3	381.1	523.8	485.1	606.2	684.5	596.9	794.1	888.8
South Sudan	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5
Sudan	1.6	0.0	2.0	2.5	1.6	8.0	6.8	13.1	11.6	16.6	19.0	19.3	41.6	83.4
Swaziland	1.3	0.0	0.0	1.0	0.0	1.0	0.9	0.0	1.8	1.2	1.8	5.0	4.6	2.4
Tanzania	0.0	1.0	0.3	3.3	1.0	2.4	6.1	9.0	13.4	13.7	18.3	9.1	12.1	11.1
Togo	0.0	0.0	0.0	0.0	0.0	0.5	0.8	0.7	0.0	0.0	0.0	0.5	0.0	0.0
Tunisia	46.7	56.5	137.9	185.5	231.0	312.5	453.0	487.6	484.0	627.5	673.0	917.1	921.6	1,092.8
Uganda	0.8	2.0	0.8	3.0	9.5	13.3	8.0	19.0	28.5	27.7	24.7	10.6	21.1	9.7
Western Sahara	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Zambia	1.0	0.3	0.0	0.5	0.6	0.0	0.0	4.9	1.8	0.6	5.2	0.5	2.5	2.4
Zimbabwe	1.0	0.1	2.3	0.3	2.3	0.5	0.0	0.8	3.3	9.6	4.7	5.7	5.9	3.8
Asia	16,141.4	23,650.8	33,208.9	37,696.7	44,047.5	56,111.9	75,199.7	93,985.4	86,646.8	83,172.5	72,283.2	76,204.3	79,886.7	77,866.3

## CHAPTER 5 | Academic Research and Development

Region, country, or economy	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Afghanistan	1.0	0.0	0.0	0.5	0.0	1.2	0.0	1.5	1.2	0.3	1.0	0.8	0.0	4.2
Bangladesh	96.8	33.3	35.0	35.0	123.0	160.9	193.4	169.1	205.1	347.8	143.9	395.8	387.5	352.0
Bhutan	0.0	0.0	0.5	1.0	1.0	0.8	0.7	0.0	0.5	2.0	0.0	3.8	3.5	3.5
Brunei	1.6	0.2	1.0	0.0	3.0	1.5	2.6	1.6	4.3	9.1	12.9	24.3	23.1	29.2
Burma	0.3	0.0	31.9	5.3	7.3	21.8	48.5	29.6	48.0	4.1	2.7	0.9	13.2	38.8
Cambodia	0.0	0.0	0.7	0.6	1.5	2.1	1.2	0.3	0.0	0.2	0.3	2.5	3.8	1.0
China	5,822.6	10,715.3	16,655.4	19,383.1	22,675.7	31,841.7	48,050.2	61,863.5	52,589.5	48,661.0	38,338.9	35,970.0	35,419.7	37,132.6
India	814.3	1,140.8	1,496.6	2,005.8	2,939.8	3,728.4	4,423.6	6,700.5	8,183.8	9,105.6	9,011.6	14,548.8	20,501.4	15,571.1
Indonesia	9.9	9.2	22.8	31.3	33.9	76.6	105.5	239.1	270.5	298.6	531.0	884.5	1,040.8	1,212.8
Japan	4,269.5	5,040.5	5,997.4	6,063.5	6,778.7	7,259.7	7,995.1	8,324.1	8,310.5	8,537.7	8,505.0	8,041.8	7,231.0	7,851.8
Kazakhstan	2.5	4.0	3.6	3.2	5.6	5.7	4.8	18.4	31.3	46.1	222.6	120.2	130.1	138.7
Kyrgyzstan	1.0	0.3	0.3	0.0	1.0	1.7	1.8	1.0	4.8	4.0	2.5	2.0	1.0	7.2
Laos	0.0	0.0	0.0	0.0	0.0	0.4	1.0	0.0	0.6	0.0	0.1	2.4	0.7	0.6
Malaysia	221.4	190.3	249.5	401.0	573.6	1,184.2	1,703.6	2,768.7	2,802.7	2,142.4	2,090.3	2,539.1	2,575.3	2,434.3
Maldives	0.7	0.0	0.0	0.0	1.1	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mongolia	0.0	0.0	1.3	1.3	54.1	6.6	6.6	2.9	6.0	4.5	7.3	15.7	1.4	6.0
Nepal	0.0	0.8	1.9	1.6	9.4	9.3	3.4	4.4	1.5	5.7	0.5	9.2	4.6	22.1
North Korea	1.0	8.0	9.7	13.9	6.1	12.3	8.8	0.1	0.8	1.8	0.4	3.0	8.9	1.3
Pakistan	99.3	172.6	269.5	225.9	296.2	400.0	599.4	762.6	527.8	554.2	762.7	721.7	655.9	925.1

## CHAPTER 5 | Academic Research and Development

Region, country, or economy	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Papua New Guinea	0.0	0.0	0.2	0.0	0.0	1.8	1.0	1.3	1.0	1.0	0.0	0.2	2.6	1.8
Philippines	9.2	5.5	18.2	13.0	15.9	32.4	29.3	63.6	70.1	40.2	58.8	154.4	75.0	137.7
Singapore	944.5	1,203.8	1,214.6	1,346.7	1,285.1	1,284.5	1,317.2	1,630.8	1,548.4	1,769.4	1,771.6	1,674.2	1,573.9	1,669.3
South Korea	2,038.2	2,850.9	3,836.0	4,348.2	4,551.4	4,340.5	4,323.5	4,558.3	5,109.6	5,243.4	5,043.1	5,386.2	5,012.5	4,920.9
Sri Lanka	2.7	2.7	16.4	43.1	22.9	97.4	29.2	95.1	60.2	92.1	199.3	107.1	66.6	170.6
Taiwan	1,646.1	2,086.8	3,091.9	3,414.2	4,248.9	5,051.4	5,578.2	5,647.5	5,936.2	5,350.1	4,590.1	4,374.2	3,949.8	3,766.5
Tajikistan	0.9	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.3	0.0
Thailand	120.0	166.2	233.2	317.6	334.2	493.4	616.8	880.4	714.0	631.0	623.0	841.1	743.5	904.0
Timor-Leste	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	1.1
Turkmenistan	0.0	0.0	0.8	0.0	0.0	0.0	0.0	0.5	1.4	2.1	0.3	1.0	1.5	0.5
Uzbekistan	1.0	1.0	1.0	2.3	2.1	5.8	5.3	8.3	6.9	7.8	9.7	6.2	7.0	6.2
Vietnam	37.2	18.6	19.5	38.8	75.9	89.5	149.1	211.9	209.5	310.2	353.8	373.3	451.8	555.5
Australia and Oceania	2,009.3	2,388.2	3,752.0	3,605.0	4,236.9	4,143.4	4,263.0	4,686.4	4,218.4	4,217.8	4,648.3	4,519.9	4,116.6	4,046.2
Australia	1,754.1	2,052.4	3,311.9	3,106.3	3,707.4	3,492.6	3,650.0	4,056.9	3,584.5	3,558.4	3,943.3	3,775.9	3,554.9	3,395.4
Cook Islands	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0
Fiji	0.3	3.3	1.8	4.3	9.6	7.0	4.5	8.5	3.2	6.9	16.6	33.7	22.1	45.9
Kiribati	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Marshall Islands	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Micronesia, Federated States of	0.0	0.0	1.3	0.0	0.8	0.3	0.3	0.0	0.0	0.3	0.0	0.0	0.0	0.0

## CHAPTER 5 | Academic Research and Development

Region, country, or economy	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Nauru	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
New Zealand	254.9	332.5	437.0	492.3	518.9	642.5	607.6	621.0	630.7	652.2	687.9	709.2	539.1	604.8
Niue	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Palau	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Samoa	0.0	0.0	0.0	0.5	0.3	1.0	0.3	0.0	0.0	0.0	0.3	1.0	0.5	0.0
Solomon Islands	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tonga	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0
Tuvalu	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Vanuatu	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0
Unassigned	270.4	192.5	347.5	503.9	797.5	766.0	460.2	361.4	283.2	282.3	167.4	126.7	100.1	147.2

na = not applicable; country data do not exist.

EU = European Union.

<sup>a</sup> Beginning in 2006, Serbia and Montenegro represented individual countries.

<sup>b</sup> Serbia and Montenegro represented a single country for data purposes from 1992 to 2006.

### Note(s)

Article counts refer to publications from a selection of journals, books, and conference proceedings in S&E from Scopus. Articles are classified by their year of publication and are assigned to a region, country, or economy on the basis of the institutional address(es) listed in the article. Articles are credited on a fractional-count basis. The sum of the regions, countries, or economies may not add to the world total because of rounding. Some publications have incomplete address information for coauthored publications in the Scopus database. The unassigned category count is the sum of fractional counts for publications that cannot be assigned to a region, country, or economy.

### Source(s)

National Science Foundation, National Center for Science and Engineering Statistics; SRI International; Science-Metrix; Elsevier, Scopus abstract and citation database, accessed July 2017.



CHAPTER 5 | **Academic Research and Development**

*Science and Engineering Indicators 2018*

## CHAPTER 5 | Academic Research and Development

APPENDIX TABLE 5-33

## S&amp;E articles in engineering, by region, country, or economy: 2003–16

(Number)

Region, country, or economy	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
World	172,836.0	199,932.0	242,272.0	256,063.0	282,707.0	300,257.0	320,103.0	343,633.0	361,538.0	370,294.0	383,289.0	391,291.0	405,715.0	423,198.0
North America	46,364.2	50,880.4	60,003.8	57,963.0	58,720.7	58,389.7	60,415.5	65,176.9	64,816.0	65,062.8	65,564.5	62,439.3	62,117.6	61,228.5
Canada	5,477.7	6,652.4	8,158.4	7,878.9	8,698.1	8,496.8	8,902.8	9,721.7	9,175.1	9,589.8	9,339.4	9,257.2	9,331.2	9,023.8
Greenland	0.0	0.0	0.5	0.3	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mexico	829.2	1,059.5	1,176.7	1,461.0	1,348.6	1,557.1	1,645.2	1,863.6	1,765.9	1,987.6	1,957.9	1,961.6	2,066.4	2,047.1
United States	40,057.3	43,168.4	50,668.1	48,622.9	48,673.6	48,335.8	49,867.4	53,591.5	53,875.0	53,485.4	54,267.1	51,220.4	50,720.1	50,157.7
Central America and Caribbean	173.7	138.8	214.7	216.3	191.5	232.8	228.2	202.6	208.3	222.4	326.6	208.6	209.8	233.6
Antigua and Barbuda	0.0	0.0	0.0	0.0	0.0	0.0	0.8	0.0	0.0	0.0	0.0	0.0	0.0	1.0
Bahamas, The	0.0	0.0	1.5	0.5	0.0	0.3	1.1	0.0	0.0	0.1	1.0	0.0	0.3	0.0
Barbados	2.5	1.0	0.0	0.0	0.0	1.0	2.2	0.7	0.3	2.0	2.2	1.4	0.5	2.4
Belize	0.0	0.5	0.0	0.0	0.0	1.0	0.0	1.2	0.0	0.1	0.8	0.0	0.0	0.0
Costa Rica	2.4	3.6	3.2	2.7	7.8	11.8	9.3	11.2	15.8	22.9	21.5	14.5	37.8	29.2
Cuba	54.5	44.8	67.6	65.8	49.7	80.0	69.5	48.6	62.3	64.0	205.8	58.1	88.4	54.4
Dominica	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0
Dominican Republic	1.3	1.8	1.0	0.0	0.8	0.3	2.1	0.9	0.9	2.8	1.2	2.2	1.2	1.2
El Salvador	0.0	0.0	3.3	5.3	4.5	9.5	3.6	5.5	1.8	1.8	0.9	0.4	2.1	1.8

## CHAPTER 5 | Academic Research and Development

Region, country, or economy	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Grenada	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.2	0.0
Guatemala	0.0	0.0	1.0	0.6	2.3	1.3	2.7	2.2	0.3	0.6	1.3	2.1	0.8	7.0
Haiti	0.0	0.0	0.3	0.8	1.0	0.1	0.0	0.3	0.8	0.3	0.7	0.1	0.0	0.0
Honduras	0.3	0.8	0.0	1.0	0.5	0.2	1.3	0.6	0.1	1.0	0.0	0.3	1.1	3.1
Jamaica	14.2	7.9	8.2	5.9	10.4	10.0	13.5	5.0	6.6	6.4	9.2	6.6	13.4	16.0
Nicaragua	1.1	0.5	2.7	4.7	2.3	0.2	1.0	2.3	1.8	2.6	0.7	1.3	0.5	3.4
Panama	0.9	2.3	1.6	0.9	0.7	0.7	3.5	2.9	6.5	7.2	3.6	5.7	4.6	4.1
Puerto Rico	66.7	52.6	92.8	105.7	89.6	93.4	85.7	82.4	69.9	76.8	61.6	67.9	46.2	60.5
Saint Kitts and Nevis	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0
Saint Lucia	0.0	0.0	1.3	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Saint Vincent and the Grenadines	0.0	0.0	1.3	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5
Trinidad and Tobago	29.8	23.1	28.8	21.5	21.4	22.9	32.0	38.7	40.2	34.0	16.1	48.1	12.5	48.7
South America	3,130.7	3,023.9	3,657.8	4,846.7	4,056.2	5,187.0	5,465.3	6,446.0	5,817.6	7,129.2	7,114.7	8,129.6	8,163.9	8,400.7
Argentina	394.8	361.1	469.2	692.8	463.0	578.5	561.2	694.0	582.1	706.2	599.8	801.4	719.5	822.5
Bolivia	1.2	5.7	2.8	2.6	0.7	1.0	1.8	4.1	0.7	3.6	3.3	7.8	8.7	5.9
Brazil	2,305.4	2,276.9	2,663.4	3,412.9	2,971.8	3,692.1	3,974.9	4,659.4	4,161.7	5,023.8	5,092.4	5,685.4	5,803.2	5,523.1
Chile	211.4	167.2	257.4	300.0	258.7	375.8	386.1	399.0	361.3	481.2	459.2	527.5	568.3	684.7
Colombia	60.6	69.3	84.3	158.1	142.5	297.5	315.7	446.9	478.2	617.0	729.9	795.5	773.3	857.6
Ecuador	3.6	5.7	11.6	4.3	2.0	4.4	7.4	14.7	7.8	24.8	24.2	53.2	83.4	236.4

## CHAPTER 5 | Academic Research and Development

Region, country, or economy	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Guyana	0.0	0.0	0.3	0.0	0.5	0.0	0.6	0.3	0.3	0.0	0.2	0.0	0.0	0.7
Paraguay	0.0	2.0	2.2	2.0	0.9	1.8	0.8	1.5	7.0	4.6	8.0	7.6	5.9	16.0
Peru	11.8	12.0	15.2	23.5	18.6	17.4	16.5	43.8	31.4	48.1	28.9	49.9	62.4	100.9
Suriname	0.0	0.0	0.0	0.0	0.0	0.0	0.9	0.5	0.9	0.3	4.2	1.7	0.9	0.8
Uruguay	12.5	13.3	16.9	22.5	31.5	32.1	36.9	51.3	53.2	69.2	47.5	58.7	59.4	90.2
Venezuela	129.4	110.6	134.5	228.1	166.0	186.4	162.4	130.6	132.9	150.5	117.1	140.9	78.9	61.9
Europe	53,378.0	59,138.7	70,414.2	70,714.2	80,484.8	84,109.0	89,644.1	94,544.0	96,305.9	105,961.0	104,559.5	110,440.6	113,322.4	114,170.4
EU	41,677.6	46,421.7	57,104.1	58,950.7	66,694.9	70,223.0	74,726.3	78,683.8	80,104.1	87,596.3	84,962.7	90,676.4	91,362.0	89,342.1
Austria	743.0	865.4	1,120.1	1,114.3	1,314.5	1,494.6	1,504.2	1,715.6	1,612.0	1,923.7	1,679.0	1,824.2	1,881.7	1,923.4
Belgium	954.1	1,108.1	1,424.7	1,339.1	1,661.8	1,781.0	1,907.9	1,930.0	2,136.0	2,217.7	2,185.3	2,188.2	2,154.8	2,086.5
Bulgaria	254.8	256.9	371.2	254.2	370.1	223.4	439.6	283.4	299.5	276.1	293.8	348.0	299.4	466.3
Croatia	323.0	296.6	448.2	440.5	494.3	533.6	536.3	550.3	543.7	740.8	462.9	527.7	545.8	490.7
Cyprus	21.9	44.0	52.3	55.3	78.6	86.3	97.4	154.7	143.1	147.7	171.4	151.4	176.6	181.6
Czech Republic	605.8	636.4	1,112.0	1,229.1	1,424.2	1,670.3	1,853.7	2,401.9	2,517.1	2,677.2	2,629.8	3,171.1	3,549.5	3,252.0
Denmark	560.7	650.1	820.9	780.9	995.6	906.3	1,118.5	1,105.8	1,338.1	1,482.9	1,598.2	1,716.7	1,876.1	1,701.9
Estonia	50.2	62.9	70.0	171.2	181.7	238.1	171.0	234.0	221.6	293.5	209.9	295.3	250.2	239.3
Finland	1,177.1	1,356.9	1,647.7	1,528.9	1,637.5	1,525.2	1,647.4	1,694.3	1,698.8	1,764.4	1,887.8	1,886.1	1,837.8	1,735.3
France	5,579.9	6,035.3	7,254.7	7,968.1	8,476.6	9,056.3	9,563.2	9,551.0	9,936.9	10,707.6	10,554.8	10,253.6	10,091.4	9,511.0
Germany	8,201.9	8,376.9	10,427.1	10,114.3	11,550.8	11,914.7	12,443.1	12,618.7	13,173.4	14,675.2	13,527.5	14,584.9	14,738.7	14,897.6



## CHAPTER 5 | Academic Research and Development

Region, country, or economy	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Greece	946.4	1,169.0	1,435.5	1,715.2	1,898.3	1,806.4	1,771.9	1,958.0	1,934.7	2,000.7	1,929.6	1,881.2	1,859.6	1,931.8
Hungary	396.6	417.1	584.5	532.6	686.3	729.7	599.2	766.5	699.7	786.3	832.7	812.3	884.9	705.2
Ireland	346.1	478.1	679.1	555.4	805.9	732.7	743.4	822.9	797.8	789.9	826.5	854.7	859.5	895.9
Italy	4,574.2	4,981.6	5,909.8	6,563.4	7,087.4	7,495.7	8,161.8	8,407.8	8,668.3	9,403.6	9,563.2	10,898.5	11,995.1	10,867.5
Latvia	47.1	67.6	86.6	77.0	117.6	193.5	168.8	179.0	351.2	379.3	338.1	330.2	404.2	342.2
Lithuania	146.0	197.7	284.7	375.8	362.3	700.7	589.8	643.7	590.9	559.6	567.2	477.5	413.0	379.9
Luxembourg	12.2	13.7	12.2	27.6	23.2	34.9	38.1	56.1	73.1	80.2	125.8	109.8	113.4	134.1
Malta	8.2	7.9	12.2	17.1	24.6	33.8	26.5	50.5	24.9	46.3	42.8	48.0	33.3	47.4
Netherlands	1,777.1	1,919.8	2,497.6	2,292.2	2,808.5	2,815.4	3,054.7	3,292.4	3,041.3	3,405.5	3,160.7	3,109.3	3,084.5	2,880.1
Poland	1,367.0	2,187.8	2,436.5	2,598.6	3,229.2	3,665.8	3,510.4	4,243.9	3,989.2	4,854.7	4,513.0	5,718.8	5,506.4	6,195.4
Portugal	705.2	1,058.9	1,166.7	1,619.3	1,493.5	1,643.5	1,807.6	2,013.2	2,055.0	2,324.6	2,448.1	2,460.7	2,647.5	2,502.6
Romania	568.9	590.5	949.1	939.0	1,704.6	2,246.2	2,967.3	3,207.0	2,621.1	2,681.5	2,392.5	2,603.3	2,300.2	2,517.8
Slovakia	216.4	258.0	405.8	365.2	501.4	520.2	585.4	679.0	755.8	1,047.9	958.4	1,298.4	1,292.2	1,312.6
Slovenia	546.5	483.0	523.2	568.3	674.7	680.0	648.5	621.1	749.1	755.4	714.8	695.5	579.1	572.2
Spain	2,553.4	3,072.6	3,746.0	4,361.7	4,762.3	4,967.6	5,692.7	6,121.2	6,483.4	7,047.4	6,935.7	7,420.0	7,014.8	6,487.9
Sweden	1,664.0	1,952.3	2,211.3	2,183.9	2,330.4	2,315.6	2,596.1	2,731.3	2,863.2	3,248.2	3,228.7	3,460.3	3,252.4	3,328.0
United Kingdom	7,329.6	7,876.2	9,414.4	9,162.5	9,998.7	10,211.4	10,482.0	10,650.5	10,785.3	11,278.4	11,184.7	11,550.9	11,719.7	11,755.9
Other Europe	11,700.4	12,717.0	13,310.0	11,763.5	13,789.9	13,886.0	14,917.8	15,860.2	16,201.8	18,364.7	19,596.8	19,764.2	21,960.4	24,828.2
Albania	1.6	1.9	0.7	6.4	3.5	3.2	4.6	15.5	10.6	11.6	20.4	8.9	18.6	12.5

## CHAPTER 5 | Academic Research and Development

Region, country, or economy	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Andorra	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.3	0.0	0.0	0.7
Belarus	240.6	329.9	303.8	192.5	247.8	243.7	352.0	250.4	206.9	274.6	269.1	229.6	177.3	185.9
Bosnia and Herzegovina	17.1	19.4	44.2	29.7	36.8	39.6	48.1	56.3	95.4	145.5	114.7	104.7	150.1	145.5
Holy See (Vatican City)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Iceland	17.4	16.8	23.9	21.1	38.4	27.6	43.1	55.6	76.0	79.6	79.7	87.9	96.4	119.1
Kosovo	0.0	0.0	0.0	0.0	0.0	8.9	13.7	32.3	25.9	31.5	33.4	22.0	26.5	51.7
Liechtenstein	3.5	3.9	9.3	11.2	8.8	12.2	5.5	8.0	4.1	10.5	6.2	5.9	6.7	8.0
Macedonia	34.9	37.2	54.9	45.1	69.2	42.3	64.0	69.4	65.0	98.5	82.4	76.0	84.8	85.5
Moldova	28.6	11.8	35.9	19.9	33.5	30.8	35.4	33.2	22.1	23.7	26.0	29.0	21.2	95.5
Monaco	0.0	2.0	3.0	7.6	2.7	4.1	0.5	0.8	3.5	3.1	4.7	2.3	0.6	0.5
Montenegro <sup>a</sup>	na	na	na	0.0	22.6	18.9	20.7	33.0	49.6	70.1	55.4	57.3	78.2	65.2
Norway	481.5	556.5	767.8	826.8	1,035.5	933.9	1,173.0	1,263.9	1,268.0	1,632.2	1,497.5	1,600.1	1,486.4	1,576.4
Russia	5,917.8	5,867.2	5,597.9	4,167.2	4,716.2	5,057.8	5,343.9	5,447.0	5,668.1	6,190.4	6,549.2	7,829.5	10,048.2	12,038.3
San Marino	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.3	2.3	1.8	2.5	1.0	5.2
Serbia <sup>a</sup>	na	na	na	na	545.1	502.7	663.4	740.7	1,147.0	1,323.4	1,254.7	949.9	951.7	1,156.4
Serbia and Montenegro <sup>b</sup>	295.4	329.2	505.3	503.4	na	na	na	na	na	na	na	na	na	na
Switzerland	1,089.7	1,284.8	1,597.3	1,646.5	1,787.4	1,897.5	1,890.1	2,125.3	2,116.8	2,331.8	2,304.3	2,503.2	2,411.4	2,356.1
Turkey	1,565.7	2,259.2	2,458.8	2,857.0	3,344.0	3,445.1	3,799.9	3,849.7	3,855.5	4,347.9	5,139.6	4,263.9	4,332.7	5,010.1
Ukraine	2,006.7	1,997.2	1,907.3	1,429.1	1,898.3	1,617.6	1,459.9	1,879.2	1,586.7	1,787.8	2,157.5	1,991.5	2,068.8	1,915.6

## CHAPTER 5 | Academic Research and Development

Region, country, or economy	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Middle East	2,901.1	3,517.5	4,103.3	5,043.3	5,752.0	7,084.8	8,359.2	10,296.9	12,042.3	13,006.4	13,160.2	14,024.0	14,773.9	15,896.3
Armenia	39.6	58.0	66.1	53.7	70.6	62.1	62.5	51.6	86.5	57.8	54.6	50.8	53.8	36.5
Azerbaijan	43.6	45.0	35.7	47.2	34.0	43.3	58.6	83.2	74.0	65.7	46.6	45.4	58.3	54.4
Bahrain	36.4	26.9	28.4	29.2	39.7	26.7	45.3	41.1	37.9	29.3	33.1	28.1	28.2	22.2
Gaza Strip	2.1	2.0	6.6	10.5	7.1	4.7	4.8	10.4	9.4	10.7	21.7	19.5	17.3	16.5
Georgia	44.0	56.3	41.3	49.4	38.6	48.6	62.6	48.4	33.1	35.1	41.2	52.4	35.0	55.2
Iran	1,007.1	1,337.0	1,819.6	2,531.0	3,130.8	4,393.7	5,230.3	6,952.2	8,048.1	8,567.4	8,171.9	9,215.6	9,008.8	10,301.9
Iraq	18.2	21.1	23.5	60.8	43.3	66.7	64.9	140.5	159.6	249.8	212.6	229.9	250.8	342.2
Israel	734.0	939.6	941.2	1,045.3	990.4	1,048.2	1,106.8	1,013.2	994.5	959.4	1,010.3	1,054.0	1,114.2	1,037.6
Jordan	144.3	172.5	178.5	180.3	222.3	242.5	240.9	271.9	315.3	261.8	313.1	229.5	286.1	306.1
Kuwait	132.8	128.5	138.8	133.7	173.2	157.9	173.3	170.6	205.3	226.9	228.4	190.8	318.8	168.2
Lebanon	59.8	84.5	85.4	107.1	99.7	126.1	139.0	137.7	181.4	236.0	266.3	282.9	272.8	329.0
Oman	62.9	68.2	84.0	72.0	111.3	92.0	94.6	112.0	150.3	150.0	146.3	134.0	193.3	162.2
Qatar	18.5	28.3	34.6	35.3	50.3	71.3	77.7	121.3	116.9	197.6	267.7	288.3	349.2	374.3
Saudi Arabia	385.6	353.4	386.4	419.7	479.2	435.7	647.0	695.2	1,061.4	1,228.8	1,601.9	1,486.6	1,819.3	1,923.8
Syria	8.2	25.3	19.2	25.7	24.4	52.1	21.2	35.7	39.6	64.7	33.1	32.3	41.6	28.6
United Arab Emirates	149.6	163.1	202.9	229.0	219.6	201.1	313.1	392.1	487.0	627.8	665.8	640.0	885.7	695.2
West Bank	13.2	6.6	8.3	9.0	11.0	9.0	12.7	12.3	32.6	23.2	27.0	29.8	31.1	30.2
Yemen	1.3	1.3	3.0	4.3	6.7	3.2	3.8	7.6	9.4	14.3	18.8	14.0	9.5	12.1

## CHAPTER 5 | Academic Research and Development

Region, country, or economy	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Africa	1,905.6	2,690.1	2,634.7	2,851.5	3,295.0	3,462.6	4,324.3	4,529.5	5,141.0	5,985.0	7,160.2	7,038.1	7,186.3	8,597.6
Algeria	215.5	346.5	324.5	428.3	468.4	595.1	709.2	701.5	910.6	1,142.8	1,432.4	1,320.0	1,295.9	1,624.2
Angola	0.0	0.9	2.1	2.1	1.4	0.7	1.2	0.6	0.1	1.0	5.2	4.3	3.4	1.4
Benin	2.3	0.8	0.6	0.3	1.3	1.0	0.5	2.8	2.0	1.0	3.3	5.0	6.1	3.5
Botswana	8.3	11.6	7.8	29.4	7.8	9.8	13.6	17.0	13.4	15.3	16.5	16.7	11.8	52.1
Burkina Faso	4.1	0.2	1.2	1.3	1.3	3.9	5.8	3.0	3.8	16.7	8.7	8.0	5.7	6.4
Burundi	1.0	0.0	0.0	0.5	0.5	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.3	1.0
Cameroon	6.3	10.8	14.2	13.3	15.8	21.2	22.8	24.3	24.6	35.5	30.1	40.3	34.8	57.7
Cape Verde	0.7	0.0	0.0	0.2	0.8	0.5	0.5	0.0	0.0	0.3	0.3	0.2	0.9	0.8
Central African Republic	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.4	0.0	0.3	0.0
Chad	0.5	0.0	0.0	0.2	0.4	0.1	0.7	0.0	0.0	0.2	0.1	0.0	1.2	1.1
Comoros	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0
Congo, Democratic Republic of the	0.7	0.0	1.6	1.0	0.0	0.0	1.9	0.0	0.5	0.4	1.0	0.8	0.9	0.3
Congo, Republic of the	0.0	1.0	2.3	1.4	0.8	1.8	1.7	0.0	2.8	2.3	3.9	1.7	0.3	2.0
Côte d'Ivoire	2.7	2.6	2.5	0.1	4.6	4.7	5.1	3.2	1.4	5.4	1.2	8.4	7.5	6.1
Djibouti	0.0	0.0	0.1	0.0	0.5	0.0	0.5	0.3	0.3	0.1	0.4	1.3	0.0	0.5
Egypt	818.4	1,073.7	920.6	1,001.5	1,097.3	1,146.6	1,335.6	1,410.1	1,435.6	1,712.3	1,949.6	1,802.9	1,850.0	2,021.8
Equatorial Guinea	0.0	0.0	0.2	0.0	0.5	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0
Eritrea	1.1	0.3	0.2	0.1	1.0	1.0	0.5	1.0	2.0	1.0	0.3	0.4	0.1	0.1

## CHAPTER 5 | Academic Research and Development

Region, country, or economy	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Ethiopia	6.2	2.0	4.8	2.3	5.4	6.7	6.8	6.2	16.5	13.9	17.1	28.8	61.9	54.9
Gabon	0.5	0.8	0.0	0.5	0.3	1.3	0.5	0.0	1.7	0.6	1.4	0.9	0.1	2.6
Gambia, The	0.2	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.4	0.8	1.3	0.4	0.0	0.0
Ghana	4.3	9.5	14.5	10.4	13.4	13.3	38.0	27.4	45.0	67.8	45.2	41.0	60.2	60.4
Guinea	0.0	1.9	0.2	0.5	1.0	0.0	0.0	0.0	0.0	0.0	0.3	0.7	0.4	0.3
Guinea-Bissau	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Kenya	8.0	7.5	7.9	9.6	11.2	9.0	19.9	12.7	13.4	19.7	16.9	24.0	41.7	29.5
Lesotho	0.0	0.2	0.0	1.0	2.1	0.2	1.2	1.8	0.0	3.6	1.5	0.4	0.5	1.0
Liberia	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.3	0.3	0.2
Libya	25.3	32.9	33.9	29.8	40.0	53.1	39.8	57.0	25.0	49.7	67.4	69.9	53.1	34.9
Madagascar	0.1	0.5	0.0	1.0	2.2	1.9	3.6	0.2	4.6	3.5	2.4	5.1	6.1	4.4
Malawi	0.0	0.0	0.5	2.1	4.1	2.8	5.4	1.5	3.1	4.3	5.4	3.0	0.5	2.2
Mali	0.3	0.7	0.0	0.0	1.3	0.0	0.2	0.4	0.8	0.3	0.4	3.2	0.6	1.6
Mauritania	0.4	0.0	0.0	0.0	0.3	0.0	0.4	0.3	0.6	0.8	1.7	1.1	0.8	1.2
Mauritius	11.2	7.5	3.3	7.3	11.2	7.7	7.3	9.5	5.7	17.6	25.8	11.7	27.0	23.1
Morocco	98.3	142.3	123.6	126.4	163.5	156.1	175.0	194.4	225.6	382.8	426.4	661.1	541.8	1,162.7
Mozambique	3.3	1.8	2.3	1.0	1.9	0.6	2.1	0.5	3.3	3.0	0.8	3.0	2.0	1.9
Namibia	1.3	0.2	3.9	2.3	5.5	2.0	4.0	1.9	5.1	2.6	7.4	6.1	6.3	7.2
Niger	1.1	0.5	1.5	0.3	1.0	1.2	2.3	5.3	0.7	1.8	0.9	1.0	1.7	4.3

## CHAPTER 5 | Academic Research and Development

Region, country, or economy	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Nigeria	96.7	146.9	116.8	129.2	139.3	169.1	322.2	333.7	383.4	378.8	437.5	497.7	575.4	590.2
Rwanda	1.0	0.0	0.0	0.6	2.2	0.5	0.1	3.4	1.6	3.0	0.8	3.7	5.1	2.4
São Tomé and Príncipe	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Senegal	3.6	4.3	2.0	4.8	3.0	4.6	6.7	6.6	5.3	9.4	13.4	14.4	16.0	18.6
Seychelles	1.0	0.0	0.0	0.0	0.0	0.0	0.5	5.0	0.0	0.0	0.0	0.0	0.0	0.0
Sierra Leone	0.3	3.0	0.3	0.5	0.1	0.0	0.0	0.0	0.3	0.0	0.0	0.3	0.3	0.0
Somalia	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.2
South Africa	417.2	532.3	701.9	670.7	868.1	629.2	906.6	975.5	1,126.4	1,211.7	1,316.0	1,293.8	1,344.8	1,507.4
South Sudan	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.2	0.0	0.0	0.0
Sudan	1.8	3.8	3.8	6.4	12.6	11.5	13.7	12.9	25.9	31.1	107.1	18.6	24.4	25.6
Swaziland	0.5	0.3	2.2	1.7	2.3	1.3	1.7	3.2	2.3	3.9	3.1	3.2	1.2	4.4
Tanzania	4.3	7.5	8.0	10.1	10.1	17.0	10.6	7.6	9.8	9.4	14.3	26.1	24.9	25.6
Togo	0.3	0.9	0.0	0.0	1.3	4.0	1.7	0.0	2.4	1.6	1.9	3.6	1.6	1.7
Tunisia	145.8	322.6	310.2	338.3	378.2	565.0	639.6	691.3	815.3	796.8	1,162.3	1,067.0	1,137.5	1,208.6
Uganda	1.5	2.9	2.8	4.1	3.5	6.8	5.7	2.6	12.4	16.1	11.0	22.0	13.6	16.3
Western Sahara	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Zambia	1.5	2.1	5.4	2.2	2.3	8.0	4.6	1.6	3.0	9.1	7.0	9.5	6.6	12.3
Zimbabwe	7.8	6.9	7.2	8.8	5.2	2.6	4.6	3.2	4.3	6.0	8.8	6.3	10.9	12.9
Asia	60,159.4	75,439.5	95,152.4	107,905.7	122,261.6	134,516.4	145,215.5	155,727.7	169,879.9	165,359.8	177,692.0	181,600.5	192,645.5	207,596.1

## CHAPTER 5 | Academic Research and Development

Region, country, or economy	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Afghanistan	0.0	0.0	0.0	0.0	0.2	0.6	0.4	1.3	0.6	2.8	1.4	1.9	0.0	7.6
Bangladesh	65.5	58.5	98.2	112.0	213.2	234.1	238.3	418.2	255.3	492.2	613.5	598.3	461.3	719.4
Bhutan	0.0	2.0	1.8	1.7	0.0	1.2	0.3	1.8	1.3	2.3	2.2	1.0	1.0	1.8
Brunei	4.1	7.5	3.2	9.8	6.0	2.3	7.5	8.0	7.6	12.8	18.9	44.3	34.0	66.4
Burma	0.0	0.5	0.8	3.9	1.0	8.5	5.0	3.0	20.5	2.0	1.2	0.7	10.0	7.1
Cambodia	0.1	0.0	1.0	0.5	2.5	0.3	0.8	1.6	0.2	3.7	1.5	2.7	1.0	3.3
China	25,515.2	36,524.7	51,013.0	59,409.2	67,098.9	77,644.2	84,752.8	92,247.2	100,414.5	94,173.2	101,264.3	107,189.2	113,912.9	123,033.5
India	4,288.3	4,771.7	5,884.9	7,034.6	7,789.8	9,218.5	10,538.6	10,969.3	14,260.2	15,823.2	18,834.7	19,493.9	21,631.0	26,739.6
Indonesia	60.8	93.6	96.0	129.7	156.8	139.6	295.3	200.7	626.8	595.2	692.0	750.3	1,458.4	2,213.8
Japan	16,910.1	17,672.9	18,908.9	19,833.5	21,548.9	20,486.9	21,518.7	21,408.6	20,833.5	20,200.1	20,585.5	18,183.8	17,743.9	16,542.9
Kazakhstan	37.2	42.6	38.2	30.8	42.8	39.1	45.8	66.4	56.6	79.7	129.8	187.9	273.7	341.4
Kyrgyzstan	0.1	1.8	1.5	6.7	2.4	4.5	1.5	1.1	3.9	3.9	4.9	5.6	4.6	5.3
Laos	0.0	1.3	0.6	0.7	0.0	3.0	2.3	4.6	1.6	1.2	2.0	4.0	1.6	4.4
Malaysia	545.2	678.1	788.6	922.5	1,234.4	1,851.7	2,290.1	2,785.2	4,454.4	4,638.7	5,481.0	5,679.4	6,934.3	8,235.1
Maldives	0.0	0.3	0.0	0.0	0.0	0.1	0.0	0.3	0.0	0.0	0.0	0.2	0.0	0.0
Mongolia	6.6	6.6	4.7	9.4	11.8	2.3	6.5	15.8	26.2	35.1	74.9	10.0	11.1	10.4
Nepal	0.5	3.8	4.9	5.3	9.2	5.7	11.9	12.9	14.8	36.3	13.6	14.6	16.9	32.5
North Korea	1.3	13.6	24.1	27.5	21.8	4.3	17.9	3.6	0.9	5.2	4.4	5.3	5.7	11.2
Pakistan	70.8	105.2	240.7	307.1	399.7	490.6	541.5	503.3	665.9	881.6	1,042.7	908.6	1,111.3	1,386.4

## CHAPTER 5 | Academic Research and Development

Region, country, or economy	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Papua New Guinea	2.6	2.0	0.0	0.1	0.3	0.5	1.3	2.3	2.5	2.5	1.0	4.1	2.3	4.4
Philippines	27.2	23.6	21.7	30.4	49.2	28.2	45.8	52.0	69.0	112.8	71.4	80.3	187.2	338.9
Singapore	1,997.1	2,327.4	2,567.1	2,207.3	2,517.5	2,413.0	2,499.4	2,577.2	2,529.5	2,622.5	2,640.6	2,445.5	2,684.7	2,701.1
South Korea	6,056.1	7,310.1	8,737.7	9,805.8	11,853.8	12,306.6	12,406.4	13,358.5	14,395.8	14,486.9	14,852.8	15,442.5	16,156.2	15,546.0
Sri Lanka	21.3	15.6	26.7	64.2	66.9	42.0	72.2	48.7	81.3	66.1	59.0	49.5	73.1	124.6
Taiwan	4,064.8	5,063.4	5,934.5	7,004.8	8,042.9	8,121.0	8,508.0	9,313.4	9,117.8	9,015.0	9,112.0	8,305.7	7,345.2	6,358.7
Tajikistan	0.8	2.0	0.5	0.2	1.8	1.1	0.7	1.8	7.2	6.6	2.7	3.3	6.4	3.7
Thailand	438.8	650.4	671.2	867.1	1,075.4	1,307.2	1,260.0	1,414.7	1,802.7	1,723.3	1,739.5	1,776.6	1,997.2	2,256.4
Timor-Leste	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0
Turkmenistan	0.5	0.0	0.0	0.0	0.0	0.0	0.2	0.5	0.0	0.0	0.0	1.0	0.0	0.0
Uzbekistan	16.0	21.6	28.7	22.9	68.0	25.3	28.4	71.6	28.7	20.6	27.8	30.4	24.8	60.9
Vietnam	27.9	38.7	53.3	58.1	46.0	134.1	117.9	234.0	200.7	314.3	416.9	380.0	555.5	838.5
Australia and Oceania	2,837.5	2,985.1	3,876.1	4,215.6	5,114.5	4,864.2	4,972.7	5,520.1	6,196.1	6,529.3	6,994.1	7,030.6	7,022.5	6,826.7
Australia	2,536.3	2,623.7	3,477.3	3,715.0	4,516.2	4,235.0	4,332.3	4,854.8	5,461.7	5,767.6	6,278.7	6,279.9	6,308.9	6,104.1
Cook Islands	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3
Fiji	4.0	9.0	7.9	12.1	8.3	7.9	6.6	8.9	14.0	13.9	21.1	19.9	19.0	19.5
Kiribati	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2
Marshall Islands	0.0	0.2	0.0	0.2	0.3	0.1	0.0	0.0	0.0	0.0	0.0	0.0	1.3	0.0
Micronesia, Federated States of	0.0	0.4	0.0	0.8	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0



## CHAPTER 5 | Academic Research and Development

Region, country, or economy	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Nauru	0.0	0.0	0.0	0.3	0.0	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
New Zealand	297.0	351.2	390.9	487.2	589.7	621.2	632.2	653.8	719.0	746.9	694.1	730.8	692.8	702.8
Niue	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Palau	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0
Samoa	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.0	0.0	0.0	0.1	0.0	0.2	0.0
Solomon Islands	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.0	0.0	0.0	0.0
Tonga	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.5	0.0	0.0	0.0	0.0
Tuvalu	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Vanuatu	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0
Unassigned	1,985.8	2,118.1	2,214.9	2,306.7	2,830.8	2,410.4	1,478.2	1,189.4	1,130.9	1,038.1	717.3	379.8	273.1	248.0

na = not applicable; country data do not exist.

EU = European Union.

<sup>a</sup> Beginning in 2006, Serbia and Montenegro represented individual countries.

<sup>b</sup> Serbia and Montenegro represented a single country for data purposes from 1992 to 2006.

### Note(s)

Article counts refer to publications from a selection of journals, books, and conference proceedings in S&E from Scopus. Articles are classified by their year of publication and are assigned to a region, country, or economy on the basis of the institutional address(es) listed in the article. Articles are credited on a fractional-count basis. The sum of the regions, countries, or economies may not add to the world total because of rounding. Some publications have incomplete address information for coauthored publications in the Scopus database. The unassigned category count is the sum of fractional counts for publications that cannot be assigned to a region, country, or economy.

### Source(s)

National Science Foundation, National Center for Science and Engineering Statistics; SRI International; Science-Metrix; Elsevier, Scopus abstract and citation database, accessed July 2017.



**CHAPTER 5 | Academic Research and Development**

*Science and Engineering Indicators 2018*

## CHAPTER 5 | Academic Research and Development

APPENDIX TABLE 5-34

## S&amp;E articles in geosciences, by region, country, or economy: 2003–16

(Number)

Region, country, or economy	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
World	60,921.0	69,638.0	77,464.0	81,174.0	85,757.0	90,405.0	100,155.0	101,782.0	112,871.0	109,738.0	121,069.0	126,212.0	125,460.0	131,792.0
North America	18,680.1	22,675.4	24,148.4	23,279.9	24,403.5	23,698.2	23,872.8	23,898.7	24,579.0	24,767.2	26,104.1	27,267.7	25,346.9	25,414.4
Canada	2,625.0	2,903.2	3,260.5	3,397.1	3,486.2	3,513.9	3,544.2	3,511.3	3,702.2	3,737.5	3,807.1	3,933.7	3,848.6	3,821.4
Greenland	2.4	5.0	7.1	5.5	8.8	7.6	4.3	9.7	10.1	10.3	10.6	12.0	15.6	9.6
Mexico	644.9	673.9	654.1	691.5	722.5	759.7	823.7	865.8	865.3	906.8	999.4	996.8	997.6	1,057.8
United States	15,407.7	19,093.2	20,226.7	19,185.8	20,186.1	19,417.0	19,500.6	19,512.0	20,001.3	20,112.5	21,286.9	22,325.2	20,485.0	20,525.7
Central America and Caribbean	151.5	186.6	178.6	205.4	152.9	204.2	210.4	216.8	178.0	204.8	169.3	223.6	194.9	189.7
Antigua and Barbuda	0.0	0.2	0.1	0.2	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.3
Bahamas, The	0.3	0.5	1.5	0.5	3.0	1.3	1.1	1.5	1.9	1.9	2.1	4.8	4.1	2.6
Barbados	2.3	3.9	5.4	2.3	1.9	1.6	3.6	0.8	4.5	9.1	4.1	6.8	3.6	5.9
Belize	1.1	0.7	3.5	0.8	0.3	1.5	1.7	1.1	0.4	2.3	2.7	0.7	1.2	1.2
Costa Rica	34.2	75.6	26.5	64.0	37.5	41.6	63.7	58.1	41.8	64.1	33.3	64.1	65.4	61.9
Cuba	26.8	21.0	28.2	39.9	24.7	33.6	33.3	42.9	39.5	33.6	35.9	39.9	27.0	32.0
Dominica	1.5	0.0	1.3	0.8	0.0	1.0	0.0	2.4	0.0	1.4	0.6	0.5	0.0	0.3
Dominican Republic	1.5	0.1	1.6	2.6	0.9	1.7	0.4	1.0	1.8	0.7	2.6	2.5	1.8	1.0
El Salvador	1.8	11.4	0.3	4.9	2.8	2.1	1.7	1.9	6.2	1.8	2.7	2.7	1.8	3.1

## CHAPTER 5 | Academic Research and Development

Region, country, or economy	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Grenada	0.0	0.4	0.0	0.0	0.5	0.2	0.0	0.0	0.4	0.6	0.0	2.0	0.4	0.8
Guatemala	1.6	3.9	3.4	2.4	1.1	1.3	0.9	1.8	2.5	2.5	2.7	0.7	2.1	2.1
Haiti	0.0	0.0	0.0	0.0	1.2	0.1	1.5	1.7	2.1	0.3	3.3	2.9	0.6	3.1
Honduras	0.5	1.7	0.6	1.8	1.2	0.5	1.7	1.4	0.9	2.4	1.2	3.2	1.3	0.9
Jamaica	26.0	13.1	14.8	8.0	7.8	15.1	11.9	11.6	10.7	6.3	8.3	15.5	13.3	8.0
Nicaragua	3.7	2.9	3.4	4.9	3.3	10.4	3.7	2.5	2.8	3.6	3.3	4.7	2.6	2.7
Panama	7.5	5.2	15.4	9.3	12.5	19.0	16.9	18.6	11.5	22.6	17.9	17.2	14.3	12.5
Puerto Rico	37.6	30.7	46.0	45.9	39.2	51.9	55.5	51.0	39.1	35.9	36.5	44.6	40.4	38.7
Saint Kitts and Nevis	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	1.4	0.2	0.6	0.9
Saint Lucia	0.1	0.0	0.1	0.3	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.0
Saint Vincent and the Grenadines	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.3	0.0	0.0	0.2	0.0	0.0	0.0
Trinidad and Tobago	5.1	15.3	26.3	17.0	14.7	21.2	12.6	18.3	11.4	14.9	10.4	10.8	13.8	11.8
South America	1,535.5	1,763.6	2,247.5	2,644.3	2,712.1	3,014.9	3,513.1	3,458.2	3,789.2	3,941.3	4,589.3	4,736.9	4,628.1	5,173.4
Argentina	388.5	459.6	516.4	512.8	549.6	641.2	742.7	728.4	778.9	815.8	858.4	901.7	891.6	878.7
Bolivia	6.5	4.2	9.1	9.4	10.6	10.6	9.1	7.9	7.6	13.6	9.5	15.2	11.1	12.9
Brazil	792.7	903.0	1,266.0	1,562.0	1,641.8	1,699.0	2,070.0	2,002.6	2,243.8	2,305.0	2,887.7	2,841.4	2,800.4	3,222.2
Chile	202.6	232.1	220.8	285.2	303.6	339.4	345.4	360.4	388.5	424.5	397.5	486.7	488.7	497.0
Colombia	34.3	44.9	51.7	104.6	88.1	148.0	191.8	213.0	195.2	197.0	245.5	285.0	222.7	304.2
Ecuador	16.5	12.6	16.4	15.3	16.9	24.7	14.6	19.5	20.3	21.6	27.9	32.2	48.8	83.3

## CHAPTER 5 | Academic Research and Development

Region, country, or economy	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Guyana	0.0	0.0	0.0	1.4	0.7	0.0	0.6	1.1	0.3	1.9	0.8	3.0	0.0	0.4
Paraguay	0.3	1.2	1.3	4.5	0.0	0.5	1.6	0.2	0.5	4.1	0.8	3.0	1.3	0.6
Peru	10.6	23.1	24.3	36.2	26.5	48.7	36.1	32.4	43.2	41.0	47.1	53.1	49.6	52.6
Suriname	0.2	1.1	0.3	2.2	3.1	1.2	1.1	0.0	0.7	2.9	1.3	0.1	0.5	3.6
Uruguay	25.2	28.2	37.9	32.4	21.4	39.6	43.4	34.5	44.7	54.2	42.1	50.5	56.5	56.0
Venezuela	58.0	53.7	103.2	78.3	49.9	62.0	56.5	58.2	65.5	59.8	70.7	65.0	56.8	61.9
Europe	24,133.5	25,155.1	27,738.7	29,449.3	30,314.1	32,548.1	34,810.3	35,672.4	37,993.8	39,137.3	41,697.6	42,529.4	42,345.1	42,788.1
EU	19,579.0	20,231.6	22,492.4	23,922.1	24,398.6	26,178.4	28,082.0	28,547.2	30,288.3	31,634.3	33,294.1	33,862.1	33,250.5	33,488.3
Austria	329.0	361.7	369.4	403.8	454.5	471.6	524.8	503.1	575.5	582.1	654.7	636.3	598.3	658.9
Belgium	462.2	462.5	522.7	551.4	556.7	609.6	644.5	587.4	664.3	648.1	725.4	702.7	706.5	731.4
Bulgaria	59.8	58.4	78.9	89.0	93.1	110.3	101.6	117.8	145.2	158.2	144.9	164.7	169.1	103.2
Croatia	195.2	193.4	266.3	218.9	225.1	234.6	304.7	318.5	350.8	357.1	361.8	288.8	336.6	291.0
Cyprus	6.5	7.2	7.8	6.3	13.6	22.9	28.2	38.8	33.9	29.6	45.0	56.9	44.6	58.2
Czech Republic	351.4	338.1	353.1	384.9	474.9	459.0	544.3	580.8	650.6	739.8	791.5	996.5	944.8	880.4
Denmark	516.5	493.8	504.7	586.6	532.1	567.4	567.2	584.0	648.8	752.6	662.1	675.4	704.0	692.4
Estonia	81.5	103.1	86.3	98.9	130.9	161.6	133.3	177.9	177.3	180.4	146.6	156.5	115.6	124.8
Finland	441.3	471.3	511.0	492.9	532.6	544.0	507.8	488.0	556.7	577.9	581.2	620.2	642.0	634.3
France	2,726.9	2,735.8	2,931.4	3,163.0	3,149.6	3,300.9	3,722.3	3,714.3	3,768.3	3,714.7	4,136.8	4,113.8	3,663.4	3,883.8
Germany	3,061.8	3,189.6	3,725.8	3,631.8	3,633.7	3,901.9	3,949.5	4,234.0	4,183.9	4,556.1	4,539.8	4,631.1	4,653.3	4,834.1

## CHAPTER 5 | Academic Research and Development

Region, country, or economy	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Greece	448.3	508.9	533.2	640.6	624.8	670.5	751.5	771.3	680.9	771.1	803.2	826.2	801.9	796.0
Hungary	216.8	254.2	255.4	281.4	263.0	258.0	325.3	314.7	340.6	351.5	308.5	378.4	374.8	336.1
Ireland	144.9	136.1	167.1	196.3	206.7	209.7	236.1	227.9	287.3	271.9	276.4	257.8	223.8	260.5
Italy	2,145.0	2,154.8	2,299.1	2,610.4	2,652.2	3,110.2	3,105.0	3,216.4	3,228.0	3,700.8	3,880.1	3,463.9	3,554.0	3,933.4
Latvia	8.5	10.0	33.2	11.2	15.1	28.8	73.5	27.6	118.5	57.2	93.6	51.5	139.2	42.5
Lithuania	28.7	131.1	127.6	130.0	137.2	237.4	135.8	128.8	329.1	116.4	109.5	116.6	117.1	126.1
Luxembourg	1.9	10.6	15.5	12.0	14.8	12.7	21.4	21.8	21.8	25.6	33.3	34.1	31.1	28.7
Malta	9.9	2.8	6.3	5.0	4.5	10.3	8.7	9.1	17.5	11.6	11.4	6.3	17.4	18.6
Netherlands	929.3	931.8	1,070.6	1,229.9	1,159.7	1,135.1	1,367.3	1,261.3	1,357.2	1,369.8	1,442.3	1,548.5	1,364.0	1,418.8
Poland	950.5	926.1	1,052.9	1,032.0	1,205.0	1,493.0	1,764.5	1,584.0	1,965.4	1,747.4	2,156.5	2,108.3	2,395.9	2,533.0
Portugal	344.4	360.8	448.7	574.0	631.1	715.7	800.6	716.8	909.7	905.9	1,017.8	1,245.9	1,144.1	1,092.5
Romania	56.1	44.6	68.3	81.0	94.6	248.5	427.5	532.6	632.4	831.6	914.2	857.2	1,075.9	448.0
Slovakia	106.0	111.7	121.4	114.4	173.9	201.5	194.1	200.8	283.9	303.5	374.5	488.6	432.5	355.2
Slovenia	58.8	62.0	110.0	98.0	132.6	109.4	142.4	137.4	136.4	153.8	140.2	170.9	208.0	191.0
Spain	1,424.7	1,465.9	1,743.4	2,074.7	2,082.0	2,300.7	2,451.1	2,584.4	2,783.1	2,974.2	3,077.7	3,274.7	2,985.1	3,163.3
Sweden	812.1	933.4	976.7	958.5	802.9	805.6	794.7	857.4	878.3	919.5	999.6	1,036.2	1,004.0	1,024.1
United Kingdom	3,661.2	3,771.8	4,105.6	4,245.3	4,402.0	4,247.4	4,454.2	4,610.3	4,563.0	4,826.0	4,865.8	4,954.1	4,803.6	4,828.2
Other Europe	4,554.4	4,923.6	5,246.3	5,527.2	5,915.5	6,369.7	6,728.4	7,125.1	7,705.5	7,503.0	8,403.4	8,667.2	9,094.6	9,299.9
Albania	3.7	4.7	8.0	4.9	4.3	17.8	20.1	28.2	45.7	39.1	25.2	36.0	34.3	18.6

## CHAPTER 5 | Academic Research and Development

Region, country, or economy	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Andorra	1.2	0.5	0.3	0.8	0.4	0.0	0.3	0.4	0.0	0.8	3.8	0.6	0.5	0.4
Belarus	11.8	14.2	13.2	16.0	14.0	18.8	11.7	12.8	20.4	13.2	27.7	43.0	17.8	15.7
Bosnia and Herzegovina	0.8	0.6	5.7	3.9	5.8	4.9	8.2	15.7	17.8	15.2	15.0	10.7	18.8	15.0
Holy See (Vatican City)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.1	0.1	0.0
Iceland	55.5	61.0	89.5	70.5	76.6	63.4	74.4	82.9	71.6	95.1	72.1	98.8	88.8	91.6
Kosovo	0.0	0.0	0.0	0.0	0.0	4.1	7.0	2.9	13.5	11.7	11.1	16.8	19.2	11.5
Liechtenstein	0.0	5.5	0.1	0.0	0.0	0.0	0.3	0.3	1.1	0.1	0.3	0.0	1.6	0.0
Macedonia	1.0	4.5	9.5	13.7	11.5	10.9	15.8	19.0	28.9	28.7	37.8	27.7	28.7	24.5
Moldova	0.2	1.9	2.0	2.9	3.6	3.3	2.9	2.1	8.7	8.0	14.6	8.0	2.0	7.7
Monaco	12.7	16.5	12.5	10.1	10.2	15.4	19.6	13.3	14.6	6.5	8.5	10.0	8.2	10.7
Montenegro <sup>a</sup>	na	na	na	na	3.3	1.8	4.3	4.3	5.7	5.7	9.4	15.2	11.4	17.5
Norway	728.0	799.6	844.4	907.2	986.5	985.7	1,180.4	1,107.1	1,313.5	1,282.5	1,388.9	1,390.4	1,297.3	1,371.7
Russia	2,241.2	2,311.9	2,386.9	2,400.7	2,468.4	2,674.9	2,570.7	2,972.3	2,949.8	2,762.4	3,231.9	3,627.7	3,938.2	4,167.2
San Marino	0.0	0.0	0.0	0.0	0.7	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1
Serbia <sup>a</sup>	na	na	na	na	81.1	81.1	110.9	152.5	213.6	238.3	243.7	255.2	263.0	293.3
Serbia and Montenegro <sup>b</sup>	26.8	40.3	34.0	56.9	na	na	na	na	na	na	na	na	na	na
Switzerland	649.7	677.6	776.7	888.6	869.7	943.8	1,022.1	972.7	1,110.5	1,137.4	1,299.5	1,209.1	1,184.1	1,176.4
Turkey	617.0	769.3	827.9	945.7	1,155.9	1,291.6	1,423.7	1,405.6	1,507.8	1,392.0	1,504.3	1,495.0	1,836.3	1,714.6
Ukraine	204.9	215.6	235.8	205.2	223.5	252.2	256.1	333.0	382.2	466.4	509.4	422.9	344.3	363.2

## CHAPTER 5 | Academic Research and Development

Region, country, or economy	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Middle East	656.3	771.1	863.2	1,111.0	1,277.0	1,610.9	2,123.0	2,230.6	2,538.1	2,728.9	3,226.7	3,672.0	3,775.3	4,241.3
Armenia	5.4	5.4	6.2	9.4	2.8	4.4	8.3	9.4	12.8	19.8	19.4	7.0	9.7	17.9
Azerbaijan	6.7	10.1	15.2	8.9	8.2	35.0	17.9	19.1	22.9	18.0	19.7	16.0	19.4	19.9
Bahrain	4.9	3.6	6.8	4.8	4.4	2.6	9.2	8.9	5.3	6.0	7.4	9.0	4.0	5.7
Gaza Strip	3.0	5.9	4.1	5.3	0.7	4.3	10.0	4.9	8.5	2.3	5.3	8.5	4.8	8.7
Georgia	16.9	18.2	7.8	18.7	21.6	16.0	23.1	34.5	22.5	22.3	37.0	23.4	20.8	25.9
Iran	126.9	171.0	258.1	406.5	521.1	716.5	1,065.7	1,251.8	1,480.4	1,578.9	1,747.7	1,974.4	2,195.7	2,455.8
Iraq	3.0	1.3	3.4	11.3	6.7	21.4	27.1	38.6	48.1	44.5	92.9	78.9	136.6	116.3
Israel	270.6	310.8	292.5	354.8	329.1	360.7	349.7	336.1	347.7	303.1	323.3	388.5	353.8	402.8
Jordan	45.3	47.7	60.5	67.3	107.7	115.8	135.9	89.7	81.5	97.2	122.2	131.2	156.1	147.6
Kuwait	31.7	35.1	29.8	39.3	51.2	42.6	69.8	44.5	63.6	81.3	108.1	77.9	63.9	54.3
Lebanon	23.8	26.8	27.4	33.2	35.0	24.4	31.0	24.7	25.0	31.2	36.8	49.3	48.0	50.4
Oman	17.4	24.5	27.2	28.7	38.6	39.1	58.3	61.3	58.0	41.2	61.8	73.7	55.8	75.4
Qatar	6.9	2.3	6.1	2.9	9.3	9.2	56.9	18.6	21.1	23.3	26.9	139.0	37.9	70.1
Saudi Arabia	45.4	67.9	55.7	70.7	68.0	94.5	164.3	176.9	236.4	313.6	482.1	546.6	502.9	612.4
Syria	9.5	7.1	11.3	8.2	11.7	9.5	6.2	14.9	18.3	17.0	13.8	21.7	20.4	26.0
United Arab Emirates	31.6	26.4	40.1	32.0	50.1	102.5	62.6	70.0	60.3	104.9	97.2	104.1	121.4	125.1
West Bank	4.6	6.5	6.0	6.7	7.8	8.1	17.0	17.1	14.3	10.8	6.9	7.5	10.7	10.3
Yemen	2.7	0.7	4.8	2.4	3.1	4.1	10.1	9.6	11.4	13.6	17.9	15.2	13.3	16.6



## CHAPTER 5 | Academic Research and Development

Region, country, or economy	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Africa	1,055.0	1,159.1	1,235.3	1,355.1	1,461.5	1,569.5	2,256.7	2,136.7	2,075.4	2,468.7	2,431.2	2,539.8	2,802.6	3,294.4
Algeria	38.2	43.0	66.4	50.3	45.5	70.5	129.7	114.4	103.6	156.1	209.4	224.0	237.3	373.3
Angola	3.2	1.6	1.6	1.6	2.5	3.2	2.5	4.2	6.9	7.6	4.9	8.3	3.2	4.5
Benin	3.7	0.9	4.1	3.0	5.3	3.2	6.9	6.5	2.5	8.2	12.6	10.9	10.2	13.1
Botswana	11.8	13.5	17.7	30.5	26.4	23.7	16.3	22.0	15.9	15.3	10.6	18.0	17.0	9.8
Burkina Faso	8.0	4.8	2.4	4.4	3.6	4.4	8.1	7.1	7.8	8.4	19.9	11.1	16.1	10.6
Burundi	1.0	0.1	0.6	0.3	0.6	1.1	0.0	1.9	1.2	0.0	2.3	3.6	0.3	0.1
Cameroon	16.7	13.8	14.3	25.3	17.1	22.1	31.8	42.3	28.0	41.7	42.6	41.3	51.8	38.3
Cape Verde	1.2	0.3	0.2	1.0	0.5	0.3	0.7	1.1	0.2	0.9	2.0	4.3	4.0	2.2
Central African Republic	0.0	0.5	0.3	0.0	1.5	2.2	0.1	1.4	0.8	1.4	1.2	1.1	0.3	0.5
Chad	0.0	1.0	1.8	1.3	1.1	1.5	1.5	2.4	0.9	1.0	1.2	0.9	0.4	0.9
Comoros	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.9	0.0	8.9	0.0	0.2	0.5
Congo, Democratic Republic of the	0.8	0.9	3.2	3.5	4.3	1.8	3.4	3.2	3.6	2.0	6.1	8.3	7.3	10.6
Congo, Republic of the	2.6	1.3	1.3	1.0	1.4	3.3	2.1	1.8	4.7	2.7	6.9	5.6	2.2	4.3
Côte d'Ivoire	6.0	3.4	6.0	7.0	8.5	10.7	14.4	12.5	11.9	13.3	9.1	15.9	13.9	11.7
Djibouti	0.0	0.5	0.0	0.5	0.5	0.0	0.2	0.7	0.7	0.4	1.0	1.3	1.5	0.3
Egypt	184.2	162.6	173.4	198.8	243.4	249.9	444.2	426.2	420.8	697.9	458.3	439.0	594.9	660.0
Equatorial Guinea	0.0	0.0	0.8	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.4	0.5	0.0
Eritrea	2.8	5.5	2.2	6.4	3.8	0.7	1.0	2.5	0.3	0.8	1.0	0.3	2.0	0.2

## CHAPTER 5 | Academic Research and Development

Region, country, or economy	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Ethiopia	11.8	14.9	15.8	28.6	30.1	26.8	45.8	44.8	30.9	41.3	54.8	67.0	70.3	75.2
Gabon	1.8	0.0	1.7	0.7	0.3	1.9	1.0	0.4	0.6	1.6	4.8	3.6	3.2	3.0
Gambia, The	0.3	1.1	0.0	0.3	0.0	0.0	0.0	0.0	0.1	0.7	1.0	0.9	1.6	0.6
Ghana	10.1	13.8	12.8	22.3	20.5	61.4	57.7	68.1	49.5	76.5	56.8	59.7	75.1	82.3
Guinea	1.1	0.2	0.2	0.0	0.0	0.3	1.1	0.8	1.4	0.1	0.0	0.3	0.2	0.6
Guinea-Bissau	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.3	0.5	0.0	0.6	0.1	0.5
Kenya	41.8	27.3	38.1	27.5	52.2	27.9	59.8	54.2	65.2	56.1	92.5	68.9	63.7	68.6
Lesotho	0.7	0.0	0.1	0.2	0.5	0.6	1.0	0.5	1.0	0.0	0.0	1.3	0.2	1.0
Liberia	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.3	0.0	0.0	0.0	0.0	0.1	1.1
Libya	2.3	4.5	11.2	7.3	8.3	6.5	20.2	28.5	10.3	6.6	14.1	6.3	20.1	17.8
Madagascar	5.0	2.7	0.6	3.3	3.5	3.0	19.2	5.8	4.7	4.2	5.0	6.3	6.0	7.6
Malawi	4.0	4.3	8.1	8.2	8.9	9.9	6.2	7.4	16.1	7.2	10.3	8.5	6.9	10.5
Mali	1.5	0.6	0.0	1.5	1.4	1.8	5.7	2.1	2.0	1.7	3.5	1.8	1.1	4.0
Mauritania	0.5	1.4	2.4	1.0	2.3	0.9	1.1	1.0	0.4	0.7	2.1	2.5	0.4	2.7
Mauritius	6.2	6.3	6.0	3.0	4.8	7.5	1.0	7.1	7.6	7.7	9.3	9.3	7.3	5.7
Morocco	56.8	73.8	78.5	79.6	66.1	96.6	90.5	84.0	72.4	84.5	88.1	110.2	122.5	145.5
Mozambique	3.2	6.0	8.4	6.4	4.4	7.8	9.8	5.9	8.1	6.6	3.3	14.4	8.7	6.8
Namibia	6.8	9.4	13.1	7.9	11.5	10.3	9.5	5.6	4.1	8.1	14.2	8.5	12.6	15.3
Niger	3.4	0.8	2.7	4.0	2.8	5.0	16.9	6.3	2.6	4.3	5.6	5.1	5.9	3.6

## CHAPTER 5 | Academic Research and Development

Region, country, or economy	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Nigeria	84.3	129.8	132.0	157.0	172.8	216.3	319.3	323.5	275.6	260.6	251.7	237.3	294.4	374.9
Rwanda	0.0	2.0	0.0	0.5	1.2	4.0	4.7	9.5	5.8	5.6	1.6	2.8	2.7	4.8
São Tomé and Príncipe	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Senegal	12.6	12.7	14.1	9.6	5.5	11.8	12.0	13.0	15.3	20.8	18.5	15.1	14.6	21.4
Seychelles	0.8	1.9	0.5	3.2	4.9	3.4	1.1	2.0	1.2	2.9	5.7	3.1	5.8	1.3
Sierra Leone	0.0	0.0	0.0	0.0	0.0	0.3	1.5	0.5	1.0	2.0	1.6	1.0	1.1	1.6
Somalia	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.8	0.0
South Africa	398.4	468.6	432.4	493.0	490.5	453.4	594.2	510.2	591.2	623.2	635.7	728.0	694.4	820.4
South Sudan	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.3	0.3	0.1	0.2
Sudan	3.0	2.4	4.8	4.0	6.1	3.8	13.2	27.0	25.4	9.2	10.0	9.2	9.0	42.6
Swaziland	0.7	3.5	1.2	4.7	1.4	3.0	4.3	7.3	0.2	3.4	1.0	1.0	1.3	0.6
Tanzania	28.2	31.3	34.2	25.1	33.5	26.0	25.5	27.8	28.4	27.1	22.4	33.3	38.4	36.3
Togo	0.6	1.3	1.7	1.2	0.6	0.3	2.4	0.0	1.0	1.7	1.3	1.4	1.9	2.3
Tunisia	44.7	40.6	80.0	75.8	102.6	139.4	216.9	194.9	200.9	204.3	270.4	281.5	310.3	326.4
Uganda	8.1	12.8	13.6	11.8	20.1	12.1	22.8	26.8	20.0	18.8	23.7	23.1	30.8	25.6
Western Sahara	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0
Zambia	6.4	4.1	11.3	7.6	3.7	6.4	10.9	3.7	3.4	6.9	6.2	8.3	6.1	8.4
Zimbabwe	29.8	27.5	13.6	25.4	35.2	22.3	17.3	17.4	17.9	15.9	16.7	25.0	22.1	34.0
Asia	11,877.0	15,012.6	17,404.8	19,694.2	21,408.7	24,158.4	29,140.7	30,418.2	36,992.0	32,082.4	38,501.7	40,507.5	41,705.5	46,001.6

## CHAPTER 5 | Academic Research and Development

Region, country, or economy	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Afghanistan	0.0	0.0	0.0	0.2	2.3	0.8	0.4	2.9	6.9	1.2	2.7	2.0	1.4	4.0
Bangladesh	32.5	49.6	48.6	53.7	65.9	67.9	82.9	82.7	75.2	111.8	108.8	104.0	122.4	155.8
Bhutan	0.1	1.3	0.8	2.4	1.1	1.9	2.3	3.3	0.4	0.4	8.6	4.6	1.4	3.0
Brunei	14.3	2.7	2.7	1.5	3.4	3.6	2.7	2.7	1.9	14.2	8.9	11.4	12.7	22.9
Burma	1.5	2.7	2.0	1.4	3.9	4.9	3.9	1.8	7.3	4.9	3.0	8.1	6.9	7.6
Cambodia	0.8	2.8	1.2	3.1	4.5	7.8	8.3	2.4	4.4	3.4	2.1	7.6	7.9	5.3
China	5,240.6	7,851.0	9,724.0	10,880.6	12,085.2	13,860.7	17,699.0	18,774.9	24,561.2	19,119.3	24,776.9	25,968.4	27,685.6	30,314.9
India	1,744.0	1,807.7	2,123.7	2,346.7	2,768.1	2,972.1	3,393.8	3,566.2	3,779.0	4,089.9	4,270.3	4,607.6	4,652.3	5,372.5
Indonesia	37.2	34.1	47.0	43.9	59.2	58.2	88.1	85.1	136.9	180.4	172.0	221.7	225.0	395.2
Japan	3,056.7	3,156.7	3,376.7	3,708.4	3,482.8	3,981.9	3,855.5	3,687.9	4,004.1	3,700.0	3,918.4	3,866.5	3,718.1	3,623.2
Kazakhstan	15.7	11.8	16.9	14.1	16.2	19.1	20.6	36.8	50.1	31.9	58.6	112.5	101.1	167.9
Kyrgyzstan	1.9	9.0	8.0	17.2	9.3	12.1	4.2	9.6	19.3	8.1	16.5	8.9	12.2	30.0
Laos	3.2	17.4	3.6	8.9	1.3	1.6	2.0	4.8	5.5	7.1	10.5	9.5	8.0	13.5
Malaysia	79.1	75.2	108.0	163.1	198.9	305.9	574.1	643.5	755.1	887.1	979.2	1,147.4	829.7	1,004.2
Maldives	0.7	0.3	0.1	0.1	2.6	0.3	0.7	0.5	1.4	6.2	1.4	1.1	3.6	1.9
Mongolia	6.3	6.0	9.1	7.4	11.3	12.3	11.3	11.9	11.6	11.6	18.7	18.3	15.0	24.8
Nepal	9.4	14.0	27.7	20.4	23.3	19.8	18.0	19.5	22.5	24.3	27.6	41.4	44.6	45.7
North Korea	0.3	0.0	0.1	1.0	0.3	0.5	1.0	0.1	0.2	0.5	0.3	1.4	1.2	1.9
Pakistan	31.0	28.9	54.5	58.2	85.2	90.4	159.8	139.7	172.4	166.0	251.4	303.4	385.2	492.3

## CHAPTER 5 | Academic Research and Development

Region, country, or economy	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Papua New Guinea	6.0	3.7	2.7	2.7	4.0	5.1	4.5	5.0	1.8	4.8	3.6	3.5	6.4	5.9
Philippines	54.0	57.4	50.8	57.2	60.9	54.3	59.7	54.2	88.4	72.3	97.2	102.0	119.1	150.1
Singapore	122.7	133.4	142.9	154.4	127.5	174.6	180.2	235.4	241.9	258.3	297.8	334.1	316.1	356.6
South Korea	617.4	837.7	794.5	971.2	1,020.3	1,122.4	1,312.6	1,398.4	1,396.6	1,658.3	1,750.7	1,905.5	1,833.0	2,058.1
Sri Lanka	26.2	27.8	25.1	18.3	61.4	35.4	41.6	30.8	37.8	33.3	41.6	56.7	57.2	65.3
Taiwan	645.9	725.4	642.6	891.4	1,024.5	1,054.8	1,227.2	1,221.0	1,202.2	1,262.3	1,198.2	1,162.2	1,013.0	1,044.7
Tajikistan	8.0	6.7	5.3	5.4	5.5	1.1	2.7	6.8	5.9	4.8	11.3	7.6	4.3	3.4
Thailand	105.3	112.3	159.9	225.8	235.6	249.4	315.9	323.4	306.0	329.0	338.9	353.8	416.3	480.7
Timor-Leste	0.0	0.0	0.3	0.5	0.5	0.0	0.0	0.0	1.2	0.4	0.3	0.7	0.5	0.4
Turkmenistan	0.2	1.0	0.1	0.1	1.0	1.0	2.0	0.6	2.5	1.4	2.2	6.2	0.2	1.4
Uzbekistan	6.1	15.3	4.5	5.8	6.6	2.9	16.5	12.3	28.1	12.3	34.4	7.1	8.7	10.2
Vietnam	10.0	20.7	21.8	29.1	35.9	35.8	49.5	54.2	64.2	76.7	89.8	122.7	96.4	138.0
Australia and Oceania	2,543.3	2,598.2	3,195.8	2,959.8	3,489.6	3,142.4	3,922.2	3,557.4	4,454.1	4,239.4	4,114.5	4,600.7	4,585.0	4,607.1
Australia	2,044.0	2,159.3	2,656.3	2,434.7	2,899.1	2,613.0	3,281.4	2,946.8	3,743.7	3,558.0	3,484.8	3,879.1	3,919.6	3,931.4
Cook Islands	0.0	0.0	0.0	0.0	0.1	0.0	0.4	0.0	0.8	0.9	0.0	1.5	0.9	0.6
Fiji	4.7	3.9	7.2	7.7	7.2	6.0	12.4	5.0	5.1	12.5	9.2	8.7	9.1	13.1
Kiribati	0.0	0.0	0.0	0.1	0.5	0.0	0.0	0.3	0.0	0.0	0.7	0.8	0.5	0.8
Marshall Islands	1.5	0.0	0.0	0.6	0.0	0.4	0.3	1.0	0.7	1.4	0.0	0.1	0.0	0.0
Micronesia, Federated States of	0.5	0.6	1.0	0.6	0.7	0.3	0.1	0.2	0.0	0.3	2.1	0.2	0.2	0.3

## CHAPTER 5 | Academic Research and Development

Region, country, or economy	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Nauru	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
New Zealand	489.1	431.7	523.7	509.5	579.1	519.8	625.0	600.8	698.9	663.9	613.3	702.9	649.2	650.6
Niue	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0
Palau	0.5	1.0	2.5	0.8	1.6	1.5	0.6	1.0	0.6	0.0	1.9	3.1	2.3	1.3
Samoa	0.0	0.0	1.3	2.7	0.0	0.1	0.2	0.9	1.1	0.4	0.4	0.5	0.3	1.2
Solomon Islands	2.4	0.4	1.4	2.3	0.8	0.8	0.4	0.4	1.7	0.1	1.1	0.7	0.2	2.7
Tonga	0.1	0.0	0.2	0.2	0.4	0.0	0.1	0.0	0.6	0.0	0.0	0.1	1.3	0.8
Tuvalu	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.8	0.0	0.2
Vanuatu	0.5	1.2	1.7	0.7	0.0	0.3	1.4	0.9	1.1	1.8	0.6	2.1	1.5	4.2
Unassigned	288.8	316.2	451.6	475.0	537.6	458.4	305.8	193.2	271.5	168.1	234.7	134.4	76.5	82.1

na = not applicable; country data do not exist.

EU = European Union.

<sup>a</sup> Beginning in 2006, Serbia and Montenegro represented individual countries.

<sup>b</sup> Serbia and Montenegro represented a single country for data purposes from 1992 to 2006.

### Note(s)

Article counts refer to publications from a selection of journals, books, and conference proceedings in S&E from Scopus. Articles are classified by their year of publication and are assigned to a region, country, or economy on the basis of the institutional address(es) listed in the article. Articles are credited on a fractional-count basis. The sum of the regions, countries, or economies may not add to the world total because of rounding. Some publications have incomplete address information for coauthored publications in the Scopus database. The unassigned category count is the sum of fractional counts for publications that cannot be assigned to a region, country, or economy.

### Source(s)

National Science Foundation, National Center for Science and Engineering Statistics; SRI International; Science-Metrix; Elsevier, Scopus abstract and citation database, accessed July 2017.



CHAPTER 5 | **Academic Research and Development**

*Science and Engineering Indicators 2018*

## CHAPTER 5 | Academic Research and Development

APPENDIX TABLE 5-35 

## S&E articles in mathematics, by region, country, or economy: 2003–16

(Number)

[illegible]



## CHAPTER 5 | Academic Research and Development

Region, country, or economy	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Grenada	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5
Guatemala	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Haiti	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.5	0.3	1.0
Honduras	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Jamaica	2.5	0.0	1.7	1.7	0.5	3.5	4.8	2.0	3.3	1.0	1.0	2.8	2.2	2.0
Nicaragua	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Panama	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.3	0.4
Puerto Rico	12.2	5.6	6.1	11.5	8.0	8.4	9.3	10.4	12.5	10.6	16.4	13.2	9.0	15.0
Saint Kitts and Nevis	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Saint Lucia	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Saint Vincent and the Grenadines	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Trinidad and Tobago	1.0	1.3	1.3	0.0	0.5	0.0	2.0	1.2	0.8	3.5	2.0	3.0	1.5	1.0
South America	644.3	701.2	697.9	789.0	842.5	1,011.5	1,084.2	1,088.4	1,262.4	1,222.4	1,398.0	1,479.4	1,597.4	1,616.1
Argentina	101.2	121.8	104.8	127.7	127.6	160.2	169.4	185.6	207.1	185.1	171.1	198.6	191.2	174.8
Bolivia	0.0	0.0	0.0	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0
Brazil	369.9	407.6	428.2	448.6	478.2	577.8	632.4	624.5	745.9	709.0	851.2	899.7	956.8	989.5
Chile	86.9	98.7	84.5	122.9	128.1	142.9	167.9	158.4	177.7	178.0	183.4	193.9	230.2	224.6
Colombia	23.5	22.2	23.1	40.8	41.1	52.7	45.0	59.6	67.3	90.5	116.2	109.7	139.9	139.2
Ecuador	0.5	3.0	1.5	1.3	1.2	1.3	1.8	4.5	3.0	5.0	6.0	4.2	4.3	11.8

## CHAPTER 5 | Academic Research and Development

Region, country, or economy	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Guyana	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Paraguay	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.2	0.5	0.0	0.3	0.7	1.5	0.0
Peru	2.1	2.0	1.5	2.3	3.3	0.8	5.2	5.7	2.6	5.5	5.5	9.5	7.8	14.2
Suriname	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.3	0.0
Uruguay	11.0	6.2	8.5	7.6	11.4	10.5	20.0	16.4	16.0	14.6	15.8	23.5	25.9	28.2
Venezuela	49.3	39.8	45.9	37.9	51.0	65.4	42.0	33.1	42.3	34.6	48.5	39.6	39.2	33.8
Europe	12,732.9	13,541.3	14,764.7	15,671.6	16,849.0	17,655.4	18,813.4	18,883.7	20,091.6	20,438.3	21,844.8	22,009.8	22,055.5	21,592.8
EU	10,319.0	10,714.0	11,698.7	12,353.6	13,198.8	13,784.2	14,684.5	14,466.3	15,312.3	15,748.3	16,700.1	16,600.8	16,343.3	15,930.3
Austria	213.5	234.1	252.3	297.1	304.4	334.4	330.5	330.8	379.2	385.0	424.0	415.6	421.5	453.7
Belgium	257.3	304.4	325.1	323.9	355.3	372.9	363.9	379.7	354.7	352.7	398.7	361.5	336.7	361.7
Bulgaria	56.2	73.1	74.7	73.5	79.6	87.9	86.7	89.2	89.4	99.9	106.9	111.6	94.0	108.9
Croatia	37.9	49.6	87.3	66.7	108.4	101.4	104.2	121.0	140.1	129.8	123.8	145.3	142.3	142.2
Cyprus	11.9	18.9	18.8	17.1	28.0	25.4	31.5	35.3	26.5	27.1	32.3	29.2	32.7	25.2
Czech Republic	222.7	196.2	232.1	245.9	395.6	349.8	309.3	391.6	366.6	397.4	443.9	435.3	481.8	474.4
Denmark	124.8	123.2	134.2	127.3	107.4	114.4	115.3	126.0	138.9	129.8	133.8	153.9	167.5	146.9
Estonia	19.3	17.8	25.8	19.9	45.0	23.3	38.0	29.9	29.9	29.7	25.0	32.6	19.4	22.4
Finland	126.8	178.2	117.5	149.4	177.5	177.4	168.8	201.5	209.9	192.8	237.4	248.2	241.2	235.1
France	2,016.2	2,127.8	2,250.8	2,342.6	2,377.8	2,461.3	2,632.8	2,690.7	2,661.3	2,745.4	2,883.0	2,797.4	2,722.3	2,653.8
Germany	1,629.7	1,709.5	1,866.5	1,871.0	1,952.7	2,091.4	2,132.6	2,056.8	2,331.9	2,386.1	2,604.2	2,583.8	2,625.4	2,558.7

## CHAPTER 5 | Academic Research and Development

Region, country, or economy	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Greece	225.4	261.1	273.7	291.5	273.9	324.2	311.7	284.3	295.1	316.6	320.9	301.0	271.4	240.9
Hungary	236.3	215.3	234.9	257.2	235.9	287.4	305.3	274.8	318.7	315.6	340.0	302.2	324.0	338.4
Ireland	68.5	75.9	81.8	103.5	95.6	106.7	121.4	120.6	139.3	124.3	116.0	112.2	98.8	91.5
Italy	1,293.5	1,357.7	1,481.1	1,563.7	1,666.2	1,724.8	1,956.2	1,824.2	1,924.7	2,019.1	2,094.4	2,087.8	2,056.2	1,994.5
Latvia	9.3	4.9	14.5	6.5	33.7	13.3	13.3	14.0	23.1	19.1	23.0	19.1	29.0	23.3
Lithuania	76.4	61.4	71.7	76.8	110.1	79.0	67.8	70.1	70.1	72.3	57.5	66.6	52.1	54.8
Luxembourg	1.5	3.7	1.2	3.2	4.7	13.0	14.2	16.8	28.0	21.1	35.0	45.5	43.2	36.5
Malta	2.0	0.0	2.5	1.5	4.3	3.5	3.0	5.1	3.0	4.5	6.0	12.7	6.5	12.2
Netherlands	328.5	267.7	355.5	345.0	321.8	337.0	352.0	322.1	323.5	348.6	376.3	348.4	394.3	372.4
Poland	534.5	471.8	568.6	574.8	690.6	705.5	826.0	725.2	877.8	1,003.0	1,011.4	1,016.2	1,082.3	1,083.7
Portugal	158.9	165.3	205.8	226.2	224.6	258.7	346.7	344.8	405.1	381.9	407.3	401.8	379.8	337.0
Romania	181.5	179.8	219.4	243.9	268.8	430.4	519.3	500.5	602.8	574.7	601.2	538.3	512.9	479.2
Slovakia	65.6	61.8	61.2	64.5	138.1	107.4	94.1	103.8	137.9	130.3	141.8	113.2	141.2	159.3
Slovenia	67.5	74.0	103.8	80.4	129.1	113.3	106.9	115.5	143.9	138.7	150.4	128.0	141.7	119.9
Spain	952.2	1,029.8	1,047.7	1,228.1	1,297.9	1,302.8	1,374.9	1,347.8	1,349.6	1,450.4	1,531.4	1,584.9	1,392.8	1,298.4
Sweden	222.3	269.4	303.9	313.3	288.4	280.5	326.0	320.9	280.8	295.2	312.2	344.4	356.9	328.8
United Kingdom	1,179.0	1,181.8	1,286.4	1,439.3	1,483.6	1,557.0	1,631.9	1,623.2	1,660.5	1,657.2	1,762.7	1,863.8	1,775.4	1,776.7
Other Europe	2,413.9	2,827.3	3,066.1	3,318.0	3,650.2	3,871.2	4,129.0	4,417.4	4,779.3	4,690.0	5,144.7	5,409.1	5,712.2	5,662.5
Albania	1.5	0.5	0.5	0.3	1.3	2.0	0.0	2.9	7.7	6.0	10.7	10.9	7.9	3.8

## CHAPTER 5 | Academic Research and Development

Region, country, or economy	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Andorra	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Belarus	69.2	68.8	77.0	82.8	69.1	61.3	75.7	83.3	86.3	77.2	68.6	74.8	84.1	91.4
Bosnia and Herzegovina	1.3	0.7	4.7	6.8	13.3	6.9	7.7	12.8	10.6	12.6	10.8	18.7	19.9	15.7
Holy See (Vatican City)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0
Iceland	4.2	4.1	3.4	6.3	8.5	12.9	8.7	22.5	7.3	8.7	4.8	8.2	5.7	10.4
Kosovo	0.0	0.0	0.0	0.0	0.0	5.3	3.0	12.8	7.3	6.7	12.1	12.5	7.3	7.1
Liechtenstein	0.0	0.0	1.0	1.5	0.0	0.0	0.0	0.2	0.0	0.0	0.3	0.0	0.0	0.0
Macedonia	6.3	6.0	4.5	4.8	8.3	7.2	7.8	8.2	13.9	12.4	9.8	15.7	13.4	16.8
Moldova	5.8	2.7	9.8	6.3	4.7	6.2	8.3	5.3	14.6	29.0	20.2	26.4	22.1	14.6
Monaco	0.0	0.0	0.2	0.0	1.0	0.0	1.3	0.0	0.0	0.0	0.0	0.0	1.0	0.0
Montenegro <sup>a</sup>	na	na	na	na	4.8	2.0	6.3	10.8	17.9	18.5	21.7	12.3	21.7	12.2
Norway	92.5	110.0	109.2	159.1	147.9	169.6	193.4	177.3	186.5	204.6	204.3	205.3	192.2	234.2
Russia	1,536.4	1,713.8	1,836.8	1,878.2	2,129.1	2,261.9	2,287.7	2,512.3	2,504.5	2,379.0	2,515.4	2,835.3	3,356.9	3,195.4
San Marino	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0
Serbia <sup>a</sup>	na	na	na	na	194.9	178.9	201.5	215.1	263.3	262.9	239.4	207.0	207.4	185.5
Serbia and Montenegro <sup>b</sup>	70.7	77.0	99.1	113.1	na	na	na	na	na	na	na	na	na	na
Switzerland	199.1	224.7	250.1	277.4	265.3	279.6	301.7	275.3	334.0	352.8	420.8	429.6	458.4	455.6
Turkey	210.1	329.3	341.9	454.1	451.9	508.9	635.1	688.2	832.3	837.9	1,173.3	1,040.8	881.4	1,001.5
Ukraine	216.8	289.7	327.9	327.2	350.2	368.5	390.9	390.7	493.2	481.3	432.7	511.3	432.9	418.4

## CHAPTER 5 | Academic Research and Development

Region, country, or economy	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Middle East	785.1	913.2	1,071.3	1,262.6	1,331.4	1,499.2	1,570.4	1,716.7	2,279.4	2,593.7	2,814.2	3,123.8	2,735.1	2,926.6
Armenia	10.6	22.8	17.4	21.3	21.3	17.2	45.8	49.3	61.5	41.9	57.1	43.7	54.9	49.2
Azerbaijan	11.8	17.5	18.0	27.7	24.5	29.5	42.8	53.8	43.4	54.8	47.4	63.7	58.2	67.1
Bahrain	2.0	3.2	4.8	3.3	2.0	6.0	1.0	5.3	1.8	5.0	8.0	5.8	5.2	2.3
Gaza Strip	1.0	0.0	1.5	2.3	0.7	2.3	2.5	1.8	5.5	4.0	4.6	2.3	2.3	1.0
Georgia	30.5	40.9	48.5	55.3	49.0	72.0	83.1	49.5	160.6	127.4	177.1	132.8	154.3	172.8
Iran	140.5	223.2	335.5	445.5	546.2	542.2	650.6	705.7	1,069.8	1,205.4	1,280.1	1,424.7	1,236.0	1,354.7
Iraq	1.0	1.0	1.6	4.7	3.5	13.0	2.0	12.8	12.2	25.0	21.1	30.8	25.3	38.3
Israel	373.9	381.2	388.1	436.4	429.1	494.7	456.7	443.6	456.8	463.8	489.2	547.8	457.2	471.4
Jordan	29.0	41.5	51.6	55.5	54.1	69.2	49.9	66.2	77.6	119.0	87.6	98.3	66.3	92.7
Kuwait	19.3	13.7	17.9	23.8	16.8	26.6	18.5	25.7	23.9	20.8	36.1	36.9	33.6	37.4
Lebanon	12.9	12.2	9.9	14.8	13.1	13.2	15.7	16.4	20.2	32.4	26.1	26.8	31.4	26.4
Oman	19.8	22.6	17.1	18.8	16.1	17.7	22.0	35.8	17.8	24.8	19.1	30.5	20.8	25.7
Qatar	1.7	6.0	4.0	3.5	10.8	9.1	7.9	8.2	15.5	10.6	10.6	24.8	19.6	19.2
Saudi Arabia	89.4	82.4	106.5	107.5	108.4	148.0	138.5	206.3	260.3	407.9	503.2	591.7	502.7	501.4
Syria	2.3	0.0	1.3	1.2	1.7	5.3	1.0	3.5	4.0	2.0	4.0	5.5	4.0	3.8
United Arab Emirates	34.8	39.8	40.1	33.0	29.4	26.9	26.4	28.6	38.5	45.2	34.8	46.2	51.5	60.2
West Bank	3.7	4.9	5.8	5.3	4.2	2.0	1.8	0.3	1.3	0.1	2.4	2.6	3.7	0.3
Yemen	1.0	0.5	1.8	3.0	0.5	4.3	4.5	3.8	8.8	3.3	5.7	9.0	8.1	2.9

## CHAPTER 5 | Academic Research and Development

Region, country, or economy	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Africa	544.7	553.2	619.9	664.9	650.9	827.8	899.3	922.5	1,091.4	1,119.3	1,259.9	1,439.7	1,283.9	1,505.9
Algeria	44.3	43.1	72.9	92.8	89.0	120.6	130.0	167.7	183.5	190.2	227.8	268.1	268.3	290.0
Angola	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Benin	1.8	2.0	1.0	1.8	2.0	1.0	5.5	6.2	6.3	0.3	9.8	3.3	5.8	5.3
Botswana	3.3	7.0	4.3	5.0	3.0	11.5	4.4	5.5	7.5	9.2	12.5	12.7	13.9	8.9
Burkina Faso	0.5	0.0	0.3	0.7	1.0	0.6	5.4	3.4	7.0	13.2	13.3	7.6	5.8	12.3
Burundi	0.0	1.0	1.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.5	0.0	0.0
Cameroon	5.5	7.4	9.7	6.3	11.5	12.0	14.8	15.7	21.6	17.8	25.2	28.8	17.7	18.0
Cape Verde	0.0	0.0	0.0	0.0	0.0	0.5	0.2	0.5	1.0	0.3	0.0	0.6	0.0	0.0
Central African Republic	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.5	0.3	0.5	0.0
Chad	0.3	0.3	0.0	1.3	0.0	0.0	0.0	0.3	0.0	0.0	0.8	0.0	0.0	1.0
Comoros	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.3	0.2
Congo, Democratic Republic of the	0.0	0.0	0.0	0.5	1.0	1.0	1.0	0.0	0.0	0.0	0.0	0.5	0.7	0.8
Congo, Republic of the	1.0	0.0	0.0	0.0	0.1	2.8	1.0	1.0	1.0	0.0	1.6	0.0	0.0	2.2
Côte d'Ivoire	4.0	0.0	2.0	1.2	1.8	18.6	9.5	9.3	8.7	10.3	8.3	6.8	10.0	8.0
Djibouti	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Egypt	174.5	184.2	147.8	129.6	118.8	172.3	176.0	150.9	185.2	212.9	230.7	225.8	185.6	231.0
Equatorial Guinea	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Eritrea	0.0	0.0	0.5	0.5	0.0	0.0	0.0	2.5	0.0	0.0	0.0	0.0	0.0	1.0

## CHAPTER 5 | Academic Research and Development

Region, country, or economy	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Ethiopia	0.2	0.0	3.1	0.5	3.2	4.0	7.5	5.1	8.2	3.4	4.2	4.5	6.0	6.5
Gabon	1.0	0.3	1.0	0.0	0.3	1.0	1.9	1.0	1.1	2.8	0.9	1.0	0.6	1.9
Gambia, The	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0
Ghana	0.0	0.0	0.0	0.0	1.3	1.2	1.0	2.5	1.9	5.0	2.8	4.0	7.7	5.6
Guinea	0.0	0.0	0.2	0.0	1.0	0.5	1.0	0.0	0.0	0.3	0.3	0.3	0.0	3.0
Guinea-Bissau	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Kenya	1.3	0.5	0.0	0.0	0.5	2.7	4.4	3.0	4.7	6.3	8.7	4.3	4.8	9.8
Lesotho	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.3	0.5	0.3	0.0	0.2	0.0	0.0
Liberia	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5
Libya	1.8	1.0	1.5	0.8	0.6	1.3	2.0	3.0	0.3	3.3	0.8	1.5	2.5	6.3
Madagascar	0.5	1.5	3.5	1.0	2.0	2.4	1.3	1.0	0.5	1.5	2.5	0.5	1.0	2.0
Malawi	0.0	1.0	0.0	1.0	0.0	0.0	1.3	0.0	0.0	0.0	0.7	0.4	0.5	0.6
Mali	0.0	0.0	0.0	0.0	1.0	0.0	1.7	2.7	0.5	0.0	1.7	1.5	1.5	1.3
Mauritania	1.5	2.4	1.7	2.3	2.2	0.0	0.0	0.0	0.5	0.5	1.0	0.5	0.0	1.3
Mauritius	0.5	0.0	3.0	4.0	0.5	6.8	7.3	3.9	1.0	4.3	4.8	1.6	2.0	3.4
Morocco	109.0	99.3	118.3	108.3	96.8	120.3	123.3	122.8	151.4	120.4	149.1	203.3	189.3	229.1
Mozambique	0.0	1.0	0.3	0.3	0.0	0.5	0.0	0.0	0.0	1.0	0.3	1.0	1.2	0.4
Namibia	1.0	0.0	0.5	0.5	0.0	0.0	0.0	1.5	1.0	1.8	0.0	1.5	2.0	1.0
Niger	1.0	0.0	1.0	1.0	0.3	0.8	0.3	0.3	0.0	0.5	2.0	2.8	0.8	1.5

## CHAPTER 5 | Academic Research and Development

Region, country, or economy	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Nigeria	10.7	8.5	14.1	13.9	18.5	31.5	33.2	42.5	65.8	61.0	57.7	91.3	64.1	67.3
Rwanda	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.3	1.3	0.0
São Tomé and Príncipe	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Senegal	3.9	3.3	3.5	5.8	4.2	6.9	5.8	9.2	19.2	12.2	14.3	17.4	18.5	20.3
Seychelles	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sierra Leone	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.2
Somalia	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0
South Africa	103.0	115.6	128.7	189.2	169.3	170.9	203.1	163.2	207.3	244.4	266.7	331.8	246.7	247.9
South Sudan	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sudan	0.0	0.3	0.3	1.5	0.0	2.0	0.0	2.3	2.5	1.6	3.1	5.9	0.8	0.3
Swaziland	0.3	3.0	1.1	0.3	0.0	0.3	0.5	1.2	1.3	0.6	1.5	1.5	0.1	0.0
Tanzania	1.0	0.0	0.0	1.0	1.3	2.0	1.9	0.2	7.8	0.7	2.7	1.3	1.0	4.0
Togo	1.0	1.3	0.0	0.0	0.3	1.0	1.0	0.0	1.3	0.7	0.5	1.0	0.9	0.0
Tunisia	71.4	68.8	94.7	91.5	113.8	126.2	148.5	190.5	186.3	188.8	194.3	198.3	214.9	303.5
Uganda	0.0	0.0	1.5	0.0	2.5	2.0	0.2	1.7	0.3	1.3	2.8	3.0	1.1	4.3
Western Sahara	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Zambia	0.0	0.0	0.0	0.0	0.3	0.0	0.0	1.0	0.0	0.0	0.0	0.3	2.0	0.8
Zimbabwe	0.5	0.3	1.8	1.0	2.9	2.5	4.2	0.6	4.7	2.5	3.3	3.8	4.1	3.5
Asia	4,979.3	5,423.5	5,765.8	7,067.2	8,019.0	9,388.7	10,872.4	11,112.1	12,316.9	14,229.0	17,013.2	17,696.4	15,619.5	15,537.6



## CHAPTER 5 | Academic Research and Development

Region, country, or economy	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Afghanistan	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0	35.9
Bangladesh	6.2	5.5	6.2	4.3	3.4	14.8	14.5	19.4	21.5	22.3	18.4	19.5	19.5	21.0
Bhutan	0.0	0.0	0.0	1.0	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Brunei	4.3	2.8	3.5	1.0	5.1	6.7	2.5	1.3	3.8	4.5	4.3	4.7	0.9	3.3
Burma	0.0	0.0	0.0	0.3	1.0	0.0	1.0	1.0	1.0	0.8	0.7	0.7	0.0	0.0
Cambodia	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	0.0	0.0	0.0	0.0	0.0
China	2,049.4	2,513.5	2,636.8	3,522.3	4,135.0	4,857.4	5,855.8	5,981.2	6,568.8	7,906.5	9,906.3	10,543.9	8,720.2	8,656.1
India	546.6	503.1	554.7	620.3	763.7	973.4	1,131.6	1,142.7	1,467.7	1,571.1	1,884.2	1,937.8	2,172.6	2,117.5
Indonesia	4.5	4.3	5.8	8.5	11.5	20.4	29.5	32.4	24.4	32.0	68.7	47.8	58.3	79.2
Japan	1,269.1	1,277.1	1,238.8	1,337.3	1,442.2	1,565.9	1,655.6	1,629.6	1,636.2	1,730.5	1,784.6	1,786.2	1,695.8	1,593.1
Kazakhstan	25.3	26.5	14.9	22.8	22.2	15.5	26.8	41.8	34.3	44.5	52.3	72.9	95.0	91.4
Kyrgyzstan	0.0	3.0	0.0	3.5	3.0	4.0	2.3	1.3	1.3	1.5	0.9	4.0	2.0	5.4
Laos	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.1	0.3	0.1	0.1	0.3	0.2	0.0
Malaysia	20.0	17.3	28.7	51.8	42.7	70.0	117.0	142.7	185.2	239.2	291.1	255.0	257.0	176.9
Maldives	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.5	0.0	0.0	0.0	0.0	0.0
Mongolia	2.1	0.3	1.1	0.0	0.0	0.5	3.7	5.0	2.5	7.0	5.3	7.1	9.5	7.7
Nepal	0.3	0.0	1.0	0.3	0.3	0.6	0.8	1.5	1.0	0.0	1.3	2.4	3.1	4.5
North Korea	0.0	0.0	0.3	0.3	1.5	0.1	1.3	1.3	0.5	0.3	0.5	3.0	8.3	4.0
Pakistan	9.8	20.7	35.5	62.4	89.6	119.4	155.0	176.3	215.9	266.0	285.9	353.5	295.0	334.2

## CHAPTER 5 | Academic Research and Development

[illegible]

## CHAPTER 5 | Academic Research and Development

Region, country, or economy	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Nauru	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
New Zealand	94.6	97.0	93.9	94.5	110.7	104.7	117.7	112.0	119.3	130.2	138.3	133.0	127.1	121.0
Niue	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Palau	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Samoa	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Solomon Islands	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tonga	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tuvalu	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Vanuatu	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Unassigned	84.4	193.8	208.3	226.2	214.2	147.0	80.0	81.1	72.0	37.6	39.7	50.3	38.9	41.8

na = not applicable; country data do not exist.

EU = European Union.

<sup>a</sup> Beginning in 2006, Serbia and Montenegro represented individual countries.

<sup>b</sup> Serbia and Montenegro represented a single country for data purposes from 1992 to 2006.

### Note(s)

Article counts refer to publications from a selection of journals, books, and conference proceedings in S&E from Scopus. Articles are classified by their year of publication and are assigned to a region, country, or economy on the basis of the institutional address(es) listed in the article. Articles are credited on a fractional-count basis. The sum of the regions, countries, or economies may not add to the world total because of rounding. Some publications have incomplete address information for coauthored publications in the Scopus database. The unassigned category count is the sum of fractional counts for publications that cannot be assigned to a region, country, or economy.

### Source(s)

National Science Foundation, National Center for Science and Engineering Statistics; SRI International; Science-Metrix; Elsevier, Scopus abstract and citation database, accessed July 2017.



CHAPTER 5 | Academic Research and Development

*Science and Engineering Indicators 2018*

## CHAPTER 5 | Academic Research and Development

APPENDIX TABLE 5-36

## S&amp;E articles in medical sciences, by region, country, or economy: 2003–16

(Number)

Region, country, or economy	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
World	308,849.0	328,054.0	354,744.0	373,230.0	386,240.0	402,167.0	422,899.0	435,624.0	457,789.0	482,301.0	497,032.0	519,055.0	517,978.0	507,604.0
North America	96,347.1	102,261.3	108,480.7	112,691.6	114,610.2	118,223.3	122,557.5	124,420.6	129,898.2	134,686.4	136,761.3	142,860.4	141,996.4	137,171.6
Canada	9,045.6	9,661.5	10,576.2	11,228.6	11,784.2	12,523.9	13,171.2	13,319.3	13,861.4	14,652.5	14,954.6	15,591.3	15,563.8	14,860.9
Greenland	2.2	11.4	4.3	2.4	2.8	3.4	5.9	6.3	3.6	8.9	12.8	5.2	5.8	8.0
Mexico	1,342.5	1,446.7	1,651.4	1,859.3	1,755.5	1,992.1	2,092.7	2,166.4	2,139.7	2,492.7	2,340.0	2,899.0	2,725.0	2,661.2
United States	85,956.8	91,141.7	96,248.8	99,601.3	101,067.8	103,704.0	107,287.8	108,928.6	113,893.5	117,532.2	119,453.9	124,364.9	123,701.7	119,641.5
Central America and Caribbean	528.8	576.3	637.0	928.6	929.2	914.8	1,207.2	1,154.3	1,339.2	1,332.9	1,228.0	1,195.4	1,159.9	999.2
Antigua and Barbuda	1.8	0.5	1.3	1.3	4.0	5.4	2.9	2.1	0.0	0.6	1.3	0.6	1.6	6.1
Bahamas, The	1.5	0.5	2.1	4.0	3.0	0.9	4.1	0.2	6.1	1.5	6.0	2.0	3.6	3.7
Barbados	7.8	14.4	11.0	17.9	20.4	9.2	10.6	6.5	8.9	13.0	9.2	9.9	9.6	16.3
Belize	1.3	1.3	0.2	0.0	0.0	0.5	1.5	2.1	0.2	2.8	0.6	1.5	2.1	0.2
Costa Rica	22.4	25.1	34.0	35.1	28.5	35.0	44.6	38.8	36.8	25.4	40.1	46.4	33.6	51.2
Cuba	272.0	284.5	317.9	572.1	549.4	482.0	735.5	701.0	856.5	831.4	729.1	741.6	711.5	546.0
Dominica	2.1	2.2	0.6	0.5	0.3	0.0	0.0	2.3	1.8	2.5	6.3	5.1	4.2	2.7
Dominican Republic	5.5	6.0	7.9	10.2	8.8	5.8	5.5	4.5	6.3	7.8	17.2	15.1	12.9	12.3
El Salvador	2.5	2.4	5.4	1.9	4.7	5.9	6.8	3.3	7.0	9.2	3.9	10.3	8.6	10.1

## CHAPTER 5 | Academic Research and Development

Region, country, or economy	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Grenada	3.0	2.3	3.5	3.0	9.3	9.4	10.1	10.3	11.0	18.3	20.8	27.8	16.5	21.1
Guatemala	11.1	6.3	26.4	17.9	17.0	18.0	29.4	15.0	21.5	23.5	38.4	29.4	32.1	36.0
Haiti	3.9	5.0	5.3	8.1	6.1	4.3	5.8	7.1	7.9	9.0	16.4	22.5	22.2	16.1
Honduras	5.1	5.0	8.9	3.5	6.4	4.6	6.5	9.4	4.7	7.9	6.6	7.9	13.4	9.0
Jamaica	55.9	83.6	63.9	66.1	84.1	93.6	90.0	95.2	103.1	138.4	93.3	47.9	54.4	38.9
Nicaragua	3.2	5.1	4.1	11.1	4.8	6.9	10.6	10.6	10.3	11.1	11.4	12.5	8.4	12.0
Panama	4.0	11.4	9.8	10.6	14.9	18.6	16.4	11.7	31.3	17.0	31.1	28.9	30.5	18.5
Puerto Rico	85.5	83.6	87.0	120.4	109.9	161.1	149.7	173.7	146.8	143.6	138.0	131.0	142.6	135.2
Saint Kitts and Nevis	0.0	0.0	1.7	1.8	0.6	3.8	1.3	2.4	2.5	3.5	6.8	6.7	8.2	13.3
Saint Lucia	0.0	0.0	0.0	0.5	0.6	0.2	0.0	2.4	2.0	0.0	1.2	0.0	1.1	2.2
Saint Vincent and the Grenadines	0.8	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.1	1.2	0.4	0.5	0.1	0.7
Trinidad and Tobago	39.4	37.1	46.0	42.6	56.6	49.7	74.7	55.8	74.6	65.3	49.7	47.8	42.9	47.8
South America	6,257.8	7,073.8	8,189.4	10,533.4	11,785.6	13,502.7	14,589.2	15,887.1	16,862.4	18,237.9	18,163.4	19,413.7	18,487.5	18,126.7
Argentina	1,005.0	1,009.6	1,038.5	1,136.4	1,088.5	1,139.4	1,341.0	1,519.2	1,556.7	1,480.0	1,592.3	1,754.6	1,658.1	1,535.7
Bolivia	8.1	6.9	11.4	15.4	13.8	22.2	16.4	14.4	10.4	19.0	13.8	19.0	13.7	15.7
Brazil	4,147.0	4,929.8	5,801.8	7,727.9	8,850.5	10,059.7	10,884.1	11,908.9	12,701.8	13,871.8	13,540.9	14,182.0	13,284.3	12,868.6
Chile	505.8	524.2	608.9	763.3	829.9	898.8	910.7	943.1	987.5	1,110.1	1,083.0	1,314.6	1,331.6	1,254.3
Colombia	186.1	212.1	290.3	398.1	479.1	716.1	709.5	736.2	832.8	949.5	1,143.5	1,342.3	1,296.4	1,492.2
Ecuador	42.7	32.5	36.4	37.6	45.3	41.1	47.5	54.2	42.7	75.3	63.0	87.4	92.1	151.2

## CHAPTER 5 | Academic Research and Development

Region, country, or economy	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Guyana	3.0	1.8	0.8	3.5	2.5	1.5	2.3	3.7	2.7	4.0	4.6	3.3	3.7	4.7
Paraguay	5.2	5.5	7.8	6.7	15.4	10.0	13.4	13.8	21.2	16.2	17.9	21.7	35.3	35.4
Peru	75.0	77.4	84.8	101.6	94.8	125.3	186.0	205.4	244.3	265.2	286.2	296.6	378.9	365.9
Suriname	1.9	1.1	0.8	0.3	1.1	0.7	0.6	4.3	0.8	3.4	4.9	2.3	6.5	9.6
Uruguay	64.9	69.8	75.0	85.0	71.1	98.1	77.5	106.3	105.4	89.6	104.0	118.3	114.3	136.2
Venezuela	213.1	203.1	233.0	257.6	293.6	389.9	400.3	377.5	356.0	353.7	309.3	271.5	272.6	257.2
Europe	130,581.8	137,692.9	146,690.8	152,678.4	156,554.5	159,771.9	165,187.3	166,268.1	171,508.8	179,177.8	181,677.7	185,763.5	182,776.8	178,115.9
EU	115,202.8	121,224.4	128,163.3	133,986.9	137,236.3	139,820.5	143,917.0	144,553.2	148,574.4	153,693.6	154,805.6	158,081.5	154,111.2	149,513.5
Austria	2,787.9	2,785.7	2,798.6	2,871.4	2,794.6	2,761.2	2,850.8	2,756.5	2,926.0	2,945.1	2,853.7	3,078.1	2,989.6	2,789.4
Belgium	3,423.6	3,442.2	3,681.1	3,853.3	3,995.1	4,062.9	4,169.3	4,138.9	4,096.9	4,339.0	4,287.5	4,570.0	4,433.9	4,255.3
Bulgaria	467.0	494.9	476.1	426.1	434.9	422.9	413.5	406.8	432.4	492.2	495.6	445.2	482.4	425.6
Croatia	829.3	944.2	942.2	1,007.9	1,045.2	943.2	1,141.2	1,184.9	1,301.4	1,291.5	1,247.4	1,229.9	1,082.8	884.1
Cyprus	17.5	24.1	28.5	28.3	30.6	43.0	86.0	58.5	69.2	87.0	113.6	107.0	107.8	116.4
Czech Republic	2,026.2	2,150.5	2,193.9	2,344.9	2,419.2	2,369.3	2,486.4	2,658.9	2,808.0	2,825.1	2,624.3	2,827.5	2,819.4	2,720.4
Denmark	2,377.2	2,596.5	2,638.1	2,770.3	2,904.8	3,105.9	3,169.1	3,308.9	3,617.5	4,020.4	4,114.9	4,506.7	4,316.2	4,287.0
Estonia	69.9	81.6	75.2	89.1	95.6	97.9	103.0	125.1	114.8	124.8	134.3	132.2	119.2	126.0
Finland	2,089.0	2,199.1	2,154.6	2,086.2	2,018.4	2,033.4	2,152.9	2,117.4	2,073.8	2,175.8	2,092.3	2,205.8	2,082.4	2,160.7
France	13,947.1	14,522.3	15,210.5	15,359.7	15,881.6	16,226.0	16,331.7	16,496.8	16,469.7	17,020.5	16,882.2	16,960.4	16,472.3	16,542.5
Germany	21,129.3	21,865.4	22,967.5	23,823.3	24,137.5	24,276.1	24,477.8	24,602.3	25,079.8	25,646.8	25,708.0	26,425.7	25,666.5	25,150.8

## CHAPTER 5 | Academic Research and Development

Region, country, or economy	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Greece	1,968.1	2,369.9	2,701.4	3,062.2	3,197.6	3,396.4	3,594.1	3,385.8	3,499.1	3,167.6	3,116.2	2,947.6	2,750.3	2,504.3
Hungary	1,176.7	1,300.7	1,474.8	1,457.0	1,465.0	1,532.5	1,437.2	1,419.2	1,490.2	1,418.0	1,321.3	1,502.9	1,365.5	1,318.2
Ireland	850.5	972.9	1,019.3	1,142.5	1,235.4	1,340.7	1,526.3	1,662.2	1,782.8	1,738.3	1,852.1	1,920.6	1,827.6	1,757.7
Italy	13,720.7	14,042.6	14,776.3	15,447.3	16,206.2	16,744.3	16,752.4	16,951.1	17,011.7	19,053.6	19,377.9	19,617.7	19,270.8	18,813.5
Latvia	12.0	17.2	23.0	22.8	27.2	24.6	26.7	32.7	76.3	74.8	85.3	76.5	55.2	51.5
Lithuania	220.7	292.0	287.1	212.4	173.6	218.3	233.5	194.7	200.9	227.5	249.5	271.7	260.0	262.1
Luxembourg	21.9	28.1	38.5	31.7	31.6	49.8	57.4	53.1	57.1	67.8	68.9	85.1	66.2	83.7
Malta	25.6	23.7	18.7	14.2	26.2	58.6	54.2	52.6	66.2	83.6	96.6	98.5	96.2	97.9
Netherlands	6,483.9	7,155.9	7,929.5	8,339.9	8,596.0	8,706.6	9,722.2	9,647.8	10,124.7	10,524.8	10,901.9	10,912.5	10,745.9	10,221.0
Poland	4,911.5	5,625.9	6,148.6	6,742.3	6,308.0	6,264.1	6,287.0	6,489.0	6,683.7	6,602.3	6,749.4	6,665.3	6,492.2	6,110.8
Portugal	653.9	753.2	813.8	942.3	1,000.6	1,219.1	1,363.8	1,574.9	1,919.9	2,107.0	2,266.9	2,397.7	2,440.4	2,381.4
Romania	430.8	502.0	546.3	477.3	588.1	876.5	919.6	1,230.4	1,512.0	1,380.6	1,269.0	1,713.3	1,712.2	1,672.1
Slovakia	541.0	525.5	540.6	580.5	495.6	592.4	608.2	690.3	587.2	622.9	545.6	661.4	646.7	640.0
Slovenia	287.4	299.0	303.7	370.8	317.5	405.1	542.1	522.0	650.0	584.0	565.4	547.9	555.5	573.5
Spain	8,499.2	8,993.2	9,830.2	10,859.8	11,138.7	11,721.5	11,688.8	12,235.7	12,358.7	12,461.4	12,549.3	13,015.5	12,899.0	12,750.2
Sweden	4,397.9	4,409.5	4,725.9	4,698.5	4,836.5	4,722.1	4,942.0	4,834.3	4,893.4	4,958.6	5,062.1	5,409.5	5,402.3	5,088.3
United Kingdom	21,837.3	22,806.6	23,819.2	24,925.0	25,835.1	25,606.2	26,779.8	25,722.0	26,671.0	27,652.7	28,174.3	27,749.1	26,952.8	25,729.2
Other Europe	15,379.0	16,468.5	18,527.5	18,691.4	19,318.2	19,951.3	21,270.3	21,714.9	22,934.4	25,484.2	26,872.0	27,682.0	28,665.6	28,602.4
Albania	4.7	4.1	5.2	7.1	7.2	14.8	15.5	22.8	27.3	34.8	47.8	59.7	40.5	45.0



## CHAPTER 5 | Academic Research and Development

Region, country, or economy	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Andorra	2.5	0.4	3.6	3.1	3.6	0.7	2.3	0.8	0.0	0.2	0.0	0.5	3.6	2.1
Belarus	42.5	36.5	40.4	69.5	50.3	55.8	44.4	39.5	57.3	44.1	51.3	77.0	86.5	82.2
Bosnia and Herzegovina	81.3	132.2	146.3	126.1	98.9	173.2	174.2	202.1	211.3	205.8	150.8	154.4	127.2	142.8
Holy See (Vatican City)	0.0	0.1	0.0	0.0	0.0	0.5	0.1	1.0	1.0	0.9	0.1	2.0	1.5	1.5
Iceland	58.0	80.9	95.4	109.2	78.3	112.2	133.1	160.2	126.5	149.0	139.6	140.5	135.2	137.4
Kosovo	0.0	0.0	0.0	0.0	0.0	17.6	47.9	42.1	28.6	31.7	34.8	35.7	38.4	50.1
Liechtenstein	1.9	3.6	11.6	7.9	4.2	9.0	4.6	9.9	10.9	5.6	3.9	3.1	7.3	3.9
Macedonia	21.0	45.5	54.1	63.9	70.2	94.5	104.5	87.9	86.8	121.2	124.3	136.8	150.4	96.1
Moldova	6.7	8.9	12.9	1.8	2.8	5.6	7.2	12.3	10.4	10.4	14.2	13.9	12.1	22.0
Monaco	7.2	10.5	10.3	9.1	7.6	11.2	11.7	14.4	16.8	10.1	13.3	17.0	14.7	15.9
Montenegro <sup>a</sup>	na	na	na	na	1.6	11.1	13.3	12.2	13.0	17.0	24.9	26.2	21.8	23.2
Norway	1,619.1	1,641.0	1,931.6	1,897.9	2,014.8	2,134.3	2,273.3	2,222.1	2,310.9	2,456.6	2,395.0	2,382.8	2,408.1	2,595.8
Russia	2,121.7	2,025.7	2,237.0	2,071.7	2,105.0	2,134.8	2,249.4	2,219.6	2,578.3	3,247.4	3,626.2	3,791.3	4,271.2	4,883.1
San Marino	0.2	0.3	1.3	0.7	1.8	2.7	0.4	0.1	0.4	0.1	2.3	0.6	5.0	1.6
Serbia <sup>a</sup>	na	na	na	na	703.0	842.0	973.5	1,047.8	1,149.2	1,332.9	1,248.9	1,207.5	1,091.7	1,033.4
Serbia and Montenegro <sup>b</sup>	452.6	598.1	700.4	694.9	na	na	na	na	na	na	na	na	na	na
Switzerland	4,037.5	4,340.2	4,554.1	4,809.0	5,035.8	5,058.0	5,153.6	5,313.5	5,541.4	5,783.4	5,952.5	5,981.3	5,924.2	5,859.0
Turkey	6,769.9	7,385.1	8,578.7	8,658.2	8,997.6	9,117.1	9,886.9	10,176.2	10,581.0	11,850.3	12,774.8	13,333.7	13,952.0	13,170.6
Ukraine	152.4	155.6	144.9	161.3	135.3	156.1	174.2	130.4	183.4	182.7	267.3	317.9	373.9	436.6

## CHAPTER 5 | Academic Research and Development

Region, country, or economy	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Middle East	5,267.6	5,710.3	6,457.5	7,245.5	7,824.2	8,692.7	9,668.3	10,316.1	11,784.2	12,791.1	14,151.7	15,241.2	14,948.8	16,178.8
Armenia	29.9	18.3	33.8	37.4	23.3	32.0	48.7	47.8	57.0	71.4	60.9	74.0	69.0	55.4
Azerbaijan	56.2	127.2	69.6	43.0	179.7	175.5	170.3	132.9	128.4	128.1	88.8	25.8	19.3	52.0
Bahrain	45.2	62.2	73.9	84.7	66.8	61.7	80.5	60.6	67.5	59.4	100.5	112.9	75.0	114.5
Gaza Strip	1.8	4.3	4.2	4.5	7.9	8.9	9.9	7.3	9.2	6.9	13.3	19.2	14.3	5.3
Georgia	14.0	23.1	120.4	60.9	46.2	51.8	64.7	34.1	59.2	59.9	52.4	95.5	93.8	155.2
Iran	626.0	799.4	1,373.5	1,978.4	2,506.8	3,302.0	4,110.6	4,759.7	5,959.7	6,543.3	7,608.7	8,298.0	8,016.4	9,005.2
Iraq	42.7	41.9	61.7	92.5	81.7	109.9	130.6	169.9	154.5	203.9	177.3	136.5	106.0	145.6
Israel	2,985.8	3,106.7	3,110.3	3,160.0	3,177.1	2,962.0	2,966.5	2,805.2	2,795.3	2,995.9	3,035.2	3,117.8	3,094.5	3,070.0
Jordan	137.0	165.2	174.5	235.7	194.9	250.8	254.0	305.6	285.8	265.6	283.5	267.4	252.3	274.0
Kuwait	147.1	159.6	185.8	186.2	193.7	242.5	207.8	214.2	194.3	190.8	199.1	186.3	170.0	161.6
Lebanon	205.9	183.8	231.9	267.1	265.0	300.4	291.9	279.2	295.0	330.9	364.3	368.9	417.4	438.1
Oman	92.7	94.2	85.8	92.3	85.9	91.9	96.6	84.5	182.5	158.2	207.5	179.0	176.7	162.2
Qatar	52.6	58.2	88.8	104.8	118.6	101.3	108.1	125.4	130.0	152.2	167.4	224.1	239.6	265.6
Saudi Arabia	672.3	704.8	655.9	690.2	689.8	760.8	868.8	1,005.6	1,148.6	1,277.2	1,426.4	1,715.6	1,775.0	1,828.9
Syria	18.0	20.4	24.0	14.2	22.4	27.7	27.1	35.9	45.2	69.4	73.4	60.1	68.6	84.3
United Arab Emirates	122.7	116.7	130.1	161.1	135.0	176.1	178.8	192.7	218.3	213.8	236.1	280.1	292.6	281.7
West Bank	4.0	6.7	10.9	12.3	13.5	12.3	23.1	18.4	22.0	28.3	22.1	39.0	29.0	34.1
Yemen	14.0	17.5	22.4	20.2	16.0	25.0	30.5	37.2	31.7	35.9	34.9	41.0	39.3	45.2

## CHAPTER 5 | Academic Research and Development

Region, country, or economy	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Africa	3,503.5	3,826.6	4,288.6	4,667.4	4,953.4	5,444.8	6,468.2	7,143.2	8,056.2	8,850.7	9,158.5	10,345.8	10,541.6	10,502.6
Algeria	24.4	31.0	25.6	34.5	26.5	49.7	76.4	67.0	74.7	114.3	107.6	116.3	136.6	186.8
Angola	0.5	1.5	1.2	4.3	1.9	3.2	5.3	3.4	5.1	5.5	7.3	12.2	15.5	17.7
Benin	9.0	17.4	18.9	22.1	27.5	20.1	33.3	27.4	26.9	37.8	53.4	54.4	50.1	43.3
Botswana	13.8	6.5	14.5	15.7	7.8	8.0	19.6	19.3	18.9	17.9	33.1	47.5	24.7	33.8
Burkina Faso	26.9	27.0	24.6	39.2	41.6	49.6	49.7	51.7	53.1	66.0	67.1	95.5	107.5	98.3
Burundi	1.1	1.0	0.3	1.4	1.5	0.3	0.2	1.0	2.4	4.7	8.1	5.9	4.4	5.4
Cameroon	42.1	52.1	52.9	63.9	62.8	56.1	84.9	86.5	104.2	121.0	160.7	179.2	211.3	214.8
Cape Verde	0.5	0.9	0.0	0.9	0.1	0.1	0.5	0.5	0.0	0.0	0.3	0.2	1.4	0.9
Central African Republic	4.1	3.2	4.5	9.2	3.2	3.8	3.2	6.3	5.1	3.8	4.0	9.5	6.0	17.3
Chad	2.1	6.3	2.9	3.5	2.1	2.8	1.5	2.3	2.0	2.1	3.1	3.9	5.8	4.3
Comoros	0.0	1.0	0.6	0.0	2.5	0.4	0.6	1.1	1.0	0.5	4.0	0.7	0.8	1.8
Congo, Democratic Republic of the	10.2	9.3	12.6	13.1	20.3	22.3	20.3	27.7	22.0	44.0	42.8	72.2	74.2	51.7
Congo, Republic of the	19.6	24.4	21.6	17.7	19.3	19.9	16.7	19.4	23.7	27.7	28.5	45.8	41.4	31.4
Côte d'Ivoire	43.3	65.8	45.3	43.9	49.3	69.6	61.8	51.0	75.0	80.7	69.5	76.0	88.8	70.8
Djibouti	1.0	1.2	2.3	0.7	0.4	2.2	6.5	4.0	1.1	4.9	2.5	3.1	1.4	2.1
Egypt	488.6	524.9	607.3	670.4	756.8	896.6	1,181.6	1,511.2	1,816.9	2,110.0	2,279.1	2,387.3	2,524.5	2,683.2
Equatorial Guinea	0.5	2.2	0.0	2.9	2.0	1.3	1.6	1.0	1.5	1.2	1.1	0.7	1.3	0.6
Eritrea	4.1	2.0	3.0	5.6	4.7	1.7	1.4	2.9	4.2	0.4	2.0	2.0	3.4	2.5

## CHAPTER 5 | Academic Research and Development

Region, country, or economy	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Ethiopia	80.1	89.1	83.7	89.6	84.9	119.2	140.1	176.6	193.5	315.0	342.5	435.7	398.8	428.5
Gabon	9.9	13.8	14.2	16.1	13.4	11.0	23.0	20.2	29.2	16.6	15.3	25.4	25.9	19.2
Gambia, The	15.6	16.0	16.8	21.3	14.3	13.2	16.7	13.2	13.9	11.6	19.1	21.5	20.2	22.1
Ghana	36.8	56.5	63.9	57.4	63.1	56.8	71.0	80.1	113.4	134.0	170.6	216.3	250.0	337.9
Guinea	1.4	5.1	4.5	9.5	8.3	4.6	5.5	6.9	4.7	4.1	4.8	16.4	18.2	20.5
Guinea-Bissau	4.8	5.2	2.7	2.0	7.0	4.3	4.1	1.7	4.4	6.4	6.3	8.6	4.2	4.1
Kenya	126.5	173.9	154.4	146.7	186.1	198.2	209.3	219.9	208.0	239.2	249.0	258.9	269.7	285.3
Lesotho	2.0	0.8	0.9	1.4	1.7	0.7	1.6	1.5	0.9	2.0	2.3	1.3	3.2	2.9
Liberia	0.5	0.2	1.1	1.0	1.0	0.2	0.4	0.9	4.4	3.7	4.5	4.8	9.0	7.0
Libya	11.5	5.3	6.9	20.0	15.2	17.7	90.9	97.4	22.0	24.4	30.7	33.8	28.2	20.4
Madagascar	38.0	17.9	13.4	15.1	31.8	31.4	20.6	21.0	27.5	22.0	20.2	38.7	39.4	33.0
Malawi	41.4	45.6	44.5	37.5	58.6	68.9	60.6	69.5	77.1	68.8	76.1	77.2	87.6	95.4
Mali	15.9	10.1	16.7	20.3	29.4	18.1	31.2	29.7	33.4	44.1	26.9	36.5	29.6	41.9
Mauritania	0.7	0.5	3.2	2.0	2.3	1.7	0.6	2.6	5.4	1.4	4.4	2.7	9.5	10.8
Mauritius	3.7	5.9	5.7	4.7	4.1	2.1	5.2	3.7	3.3	8.6	6.4	6.9	14.2	7.6
Morocco	285.8	227.9	228.0	299.2	332.1	356.2	501.3	580.5	671.6	734.8	789.8	1,032.2	904.0	787.2
Mozambique	6.1	8.8	8.8	17.8	20.8	20.8	23.5	11.8	24.7	17.4	23.2	29.0	33.6	40.4
Namibia	4.0	1.6	1.3	4.0	2.5	2.0	0.5	3.9	5.5	9.2	13.9	11.4	16.8	17.7
Niger	8.0	5.7	6.9	12.2	11.0	8.6	8.5	15.8	4.5	10.1	8.0	12.6	11.8	22.0

## CHAPTER 5 | Academic Research and Development

Region, country, or economy	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Nigeria	467.3	596.2	788.0	796.3	816.0	885.9	1,046.5	1,074.7	1,310.2	1,274.6	1,258.9	1,271.0	1,163.2	1,125.2
Rwanda	1.5	3.2	1.5	8.5	10.2	10.6	12.7	13.8	17.8	20.0	48.5	41.5	54.8	55.1
São Tomé and Príncipe	1.7	0.4	0.0	0.5	1.3	0.0	0.2	1.1	0.0	0.0	0.0	0.0	1.4	0.9
Senegal	107.8	93.2	108.7	91.1	115.6	106.4	82.4	92.2	123.7	104.3	121.3	144.2	170.8	149.1
Seychelles	0.1	0.9	0.4	2.1	2.7	2.9	1.2	1.6	3.3	2.4	2.5	0.3	1.1	1.0
Sierra Leone	0.0	1.3	3.1	2.1	1.9	2.2	2.5	6.3	5.6	6.0	5.2	13.5	17.0	21.4
Somalia	1.5	0.1	0.0	0.8	0.0	0.5	1.0	0.7	1.7	1.0	2.3	1.8	2.4	1.6
South Africa	904.1	953.9	1,028.4	1,049.4	1,099.5	1,228.2	1,392.5	1,372.4	1,512.8	1,768.7	1,759.3	1,993.5	2,043.4	2,034.9
South Sudan	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.4	1.3	4.3	3.9	2.3	1.3
Sudan	39.5	55.8	51.2	40.5	50.1	59.3	67.3	69.5	74.1	91.0	92.1	83.8	68.3	94.9
Swaziland	1.7	1.1	1.3	1.1	0.3	1.2	4.4	3.8	3.9	4.5	6.6	4.3	11.6	4.7
Tanzania	49.5	63.0	63.0	107.6	95.6	110.9	128.2	161.4	197.2	197.0	165.6	231.7	221.2	200.0
Togo	15.5	10.9	13.1	13.2	20.4	23.2	22.0	29.2	24.0	26.3	39.8	56.6	54.6	41.2
Tunisia	434.1	465.2	582.2	670.4	672.7	718.6	751.3	856.4	844.4	785.0	695.1	785.7	850.4	743.0
Uganda	49.4	63.7	79.6	86.1	84.2	90.4	120.7	142.9	172.5	179.8	186.4	231.3	274.6	233.3
Western Sahara	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0
Zambia	10.5	13.2	15.4	26.4	32.7	36.2	32.2	37.2	40.7	36.3	43.3	44.6	69.4	68.8
Zimbabwe	34.7	36.9	36.9	44.6	32.7	24.9	23.4	39.1	37.6	36.6	38.9	55.4	62.1	55.6
Asia	53,587.8	59,224.7	67,673.8	71,261.7	75,547.3	81,101.6	88,415.1	93,142.2	99,434.6	106,902.3	115,238.7	126,643.1	131,283.1	129,915.1

## CHAPTER 5 | Academic Research and Development

Region, country, or economy	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Afghanistan	2.5	5.3	2.8	5.6	3.6	5.0	9.8	10.3	9.9	18.8	11.6	14.5	13.9	16.0
Bangladesh	122.5	135.6	150.1	181.1	192.4	233.7	243.7	283.0	312.6	369.9	368.8	438.8	426.6	349.1
Bhutan	0.0	0.3	0.0	2.2	0.7	0.1	1.8	2.0	5.1	6.9	7.2	7.5	5.8	10.9
Brunei	3.7	3.3	9.0	6.8	7.0	18.8	13.3	20.4	40.6	41.3	51.1	54.4	45.6	24.3
Burma	3.4	5.6	5.5	8.0	6.5	8.2	6.8	7.3	7.7	12.3	10.7	14.1	20.7	19.8
Cambodia	5.7	18.8	12.0	18.9	20.3	20.4	24.7	22.0	27.9	29.8	30.3	28.3	46.5	50.6
China	11,928.9	15,199.4	20,069.8	22,906.6	25,793.2	29,382.9	32,608.7	32,929.5	33,366.4	36,364.7	43,401.1	51,170.6	57,273.1	56,670.3
India	5,555.5	5,599.4	6,363.6	7,134.3	7,593.7	8,476.5	9,617.3	11,213.9	13,268.8	15,384.4	16,771.1	17,529.4	16,937.5	16,897.8
Indonesia	87.4	122.1	141.7	187.4	103.2	114.9	146.2	150.3	146.1	188.4	195.5	239.5	321.4	454.7
Japan	26,506.4	27,487.7	28,048.1	27,032.9	27,076.1	25,963.5	26,919.7	27,554.7	29,525.3	29,691.2	28,619.5	29,914.9	28,051.6	26,953.2
Kazakhstan	15.4	13.7	7.3	16.1	11.1	7.4	6.5	9.5	11.8	21.1	45.0	62.9	73.8	100.9
Kyrgyzstan	1.5	3.2	6.0	3.4	4.9	1.7	6.6	4.8	4.9	11.0	10.5	13.1	7.7	17.7
Laos	7.0	6.8	8.4	13.1	15.2	13.7	8.5	13.6	15.2	17.4	18.2	12.3	23.4	19.6
Malaysia	339.9	392.9	439.1	540.1	561.7	835.9	781.4	1,023.4	1,161.3	1,456.6	1,635.1	1,568.6	1,653.0	1,623.2
Maldives	0.6	0.0	1.2	3.5	0.5	0.1	0.9	0.8	0.8	1.4	2.9	2.3	1.4	0.8
Mongolia	4.1	5.2	4.1	8.9	9.9	8.0	20.9	11.2	11.4	13.2	11.6	11.2	16.4	16.2
Nepal	118.1	143.6	185.7	240.0	246.1	238.0	287.8	279.0	273.7	294.3	319.7	318.3	297.9	272.4
North Korea	0.3	13.1	4.0	6.6	4.6	2.2	12.3	1.6	1.4	0.2	0.0	0.6	1.3	2.1
Pakistan	598.7	659.1	819.6	816.1	907.6	1,096.2	1,360.1	1,474.6	1,783.6	1,913.7	1,921.5	2,025.1	1,926.3	2,134.2

## CHAPTER 5 | Academic Research and Development

Region, country, or economy	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Papua New Guinea	12.8	11.2	15.6	12.5	26.9	14.3	10.5	16.0	14.7	19.3	25.8	20.4	16.6	12.7
Philippines	55.1	49.1	70.2	63.9	74.2	98.0	100.9	117.7	210.8	179.0	196.9	188.9	224.4	185.7
Singapore	750.3	973.3	994.5	1,043.9	1,049.7	1,135.0	1,172.4	1,185.5	1,270.2	1,324.2	1,475.3	1,558.7	1,672.6	1,764.4
South Korea	3,268.1	3,744.4	4,782.6	5,413.6	6,129.9	7,219.3	8,545.1	10,022.8	10,928.0	12,008.6	12,684.7	13,561.4	14,117.4	14,457.9
Sri Lanka	64.1	66.3	106.4	76.5	93.7	110.6	125.7	148.1	183.4	190.5	188.4	240.5	250.5	241.8
Taiwan	3,286.9	3,628.8	4,193.2	4,270.8	4,383.9	4,738.8	4,931.1	5,101.4	5,235.8	5,399.3	5,409.0	5,601.3	5,827.1	5,513.3
Tajikistan	0.3	1.0	2.0	2.4	0.8	4.6	2.6	1.2	2.8	3.4	3.3	3.3	5.0	6.2
Thailand	787.8	874.6	1,161.0	1,164.1	1,152.9	1,253.2	1,350.7	1,426.3	1,505.4	1,808.5	1,684.7	1,872.6	1,862.9	1,907.1
Timor-Leste	0.8	0.0	1.3	1.9	1.6	0.3	1.6	0.1	1.0	0.9	1.5	2.7	4.0	1.6
Turkmenistan	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.7	0.0	0.6	1.9	0.0	0.0
Uzbekistan	11.7	9.9	12.9	4.8	8.6	12.2	11.7	16.6	17.1	18.7	16.9	20.7	10.7	27.1
Vietnam	48.2	51.1	56.1	75.8	66.8	88.1	85.8	93.6	90.2	113.1	120.3	144.2	148.1	163.4
Australia and Oceania	7,437.5	8,221.7	8,725.5	9,521.3	10,032.7	10,532.1	11,231.1	11,611.6	12,584.8	13,274.6	14,083.8	15,030.5	15,035.0	14,926.8
Australia	6,422.6	7,022.0	7,500.7	8,218.8	8,672.1	9,109.5	9,704.3	10,072.4	10,849.9	11,462.5	12,370.4	13,300.1	13,331.6	13,263.3
Cook Islands	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.1	1.3	0.1	0.0	0.3	0.0
Fiji	17.0	11.8	2.1	13.5	8.1	4.1	3.6	7.9	9.7	7.7	8.2	11.3	7.4	11.0
Kiribati	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	1.2	0.6	0.5
Marshall Islands	1.3	0.0	1.3	0.3	0.3	0.0	1.1	0.5	0.4	0.0	0.0	0.4	0.0	0.0
Micronesia, Federated States of	0.5	0.5	1.8	0.1	0.5	0.1	0.7	0.5	0.4	0.4	0.6	1.4	1.7	0.4

## CHAPTER 5 | Academic Research and Development

Region, country, or economy	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Nauru	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.5	0.3	0.3	0.1	0.3
New Zealand	988.5	1,178.4	1,213.5	1,282.8	1,346.3	1,414.6	1,516.8	1,524.9	1,714.0	1,797.0	1,699.3	1,705.9	1,682.4	1,640.5
Niue	0.0	0.0	0.1	0.0	1.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Palau	1.3	0.9	3.0	1.2	1.2	0.9	0.2	1.4	0.4	0.0	0.8	0.0	0.7	1.0
Samoa	0.0	1.2	0.0	1.2	0.1	0.4	1.1	0.0	2.2	0.6	1.2	0.1	1.8	0.5
Solomon Islands	0.2	1.1	0.3	0.8	1.0	1.0	1.4	2.0	3.0	2.5	0.9	4.4	5.1	8.2
Tonga	0.6	2.1	0.0	1.2	0.6	0.5	1.9	0.2	1.1	0.8	1.0	0.5	0.3	0.2
Tuvalu	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0
Vanuatu	5.6	3.5	2.7	0.5	0.8	1.2	0.2	1.8	3.1	0.2	0.9	4.9	3.0	0.9
Unassigned	5,337.1	3,466.5	3,600.7	3,702.2	4,002.9	3,983.0	3,575.1	5,680.8	6,320.7	7,047.4	6,569.1	2,561.4	1,748.9	1,667.3

na = not applicable; country data do not exist.

EU = European Union.

<sup>a</sup> Beginning in 2006, Serbia and Montenegro represented individual countries.

<sup>b</sup> Serbia and Montenegro represented a single country for data purposes from 1992 to 2006.

### Note(s)

Article counts refer to publications from a selection of journals, books, and conference proceedings in S&E from Scopus. Articles are classified by their year of publication and are assigned to a region, country, or economy on the basis of the institutional address(es) listed in the article. Articles are credited on a fractional-count basis. The sum of the regions, countries, or economies may not add to the world total because of rounding. Some publications have incomplete address information for coauthored publications in the Scopus database. The unassigned category count is the sum of fractional counts for publications that cannot be assigned to a region, country, or economy.

### Source(s)

National Science Foundation, National Center for Science and Engineering Statistics; SRI International; Science-Metrix; Elsevier, Scopus abstract and citation database, accessed July 2017.





**CHAPTER 5 | Academic Research and Development**

*Science and Engineering Indicators 2018*

## CHAPTER 5 | Academic Research and Development

APPENDIX TABLE 5-37

## S&amp;E articles in other life sciences, by region, country, or economy: 2003–16

(Number)

Region, country, or economy	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
World	16,238.0	17,092.0	18,983.0	20,199.0	20,920.0	22,071.0	22,982.0	24,275.0	26,716.0	28,679.0	28,942.0	28,894.0	28,943.0	28,656.0
North America	9,114.4	9,511.3	10,290.3	10,753.4	10,590.5	10,784.4	11,125.7	11,289.1	11,982.2	12,725.4	12,626.7	12,472.7	11,976.6	11,416.1
Canada	860.3	901.4	1,075.9	1,107.8	1,141.8	1,210.8	1,354.5	1,342.6	1,367.1	1,472.4	1,542.7	1,448.5	1,376.4	1,282.5
Greenland	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.2	0.0	0.0	0.0
Mexico	101.6	74.3	57.6	106.6	198.1	100.4	149.0	108.6	131.3	119.1	163.5	133.2	138.6	190.2
United States	8,152.5	8,535.7	9,156.7	9,539.0	9,250.6	9,473.2	9,622.2	9,837.3	10,483.9	11,133.9	10,920.3	10,891.1	10,461.6	9,943.4
Central America and Caribbean	8.0	13.1	8.9	41.9	28.7	28.0	33.6	33.4	61.6	37.4	31.0	28.4	41.8	45.8
Antigua and Barbuda	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bahamas, The	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.8	0.0	0.0	1.0	0.0	0.0
Barbados	0.0	0.8	1.0	1.8	1.0	1.0	0.0	0.0	0.0	0.0	0.0	0.2	1.0	0.0
Belize	0.0	0.0	0.0	0.0	0.0	0.5	0.5	0.0	0.3	0.0	0.0	0.4	0.0	0.0
Costa Rica	2.0	0.3	1.5	0.0	2.4	2.9	0.3	1.8	5.9	3.0	0.9	3.1	1.5	3.0
Cuba	3.0	2.8	0.2	27.9	14.2	8.6	15.0	19.2	33.7	20.6	13.5	6.0	19.0	22.4
Dominica	0.0	0.0	0.0	0.3	0.0	0.0	0.1	0.0	0.0	0.0	0.4	0.0	0.5	1.2
Dominican Republic	0.0	0.3	0.0	0.0	0.7	0.7	0.3	0.6	1.7	0.7	0.1	2.8	0.5	0.9
El Salvador	0.0	0.2	0.0	0.8	0.0	0.1	0.0	0.0	0.3	0.2	0.0	0.2	1.3	0.5

## CHAPTER 5 | Academic Research and Development

Region, country, or economy	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Grenada	0.0	1.0	0.0	1.0	0.3	0.0	1.0	0.3	0.0	0.2	1.1	0.1	0.5	0.5
Guatemala	0.0	0.8	0.0	1.3	0.3	1.1	0.3	1.5	2.1	2.3	1.7	0.3	2.8	0.2
Haiti	0.0	0.6	0.1	0.0	0.0	0.6	0.6	1.1	1.0	0.5	1.0	0.4	0.7	0.4
Honduras	0.0	0.7	0.0	0.0	0.0	1.5	0.6	0.0	0.8	0.0	0.1	0.0	1.1	0.0
Jamaica	0.3	1.0	0.8	1.7	1.3	2.0	4.4	0.6	2.1	2.2	3.4	5.3	6.6	7.4
Nicaragua	0.0	0.0	0.9	0.2	0.9	2.8	2.1	0.8	1.8	1.1	0.8	1.0	0.7	0.0
Panama	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.3	0.3	0.1	0.7	2.2
Puerto Rico	2.8	3.6	4.4	4.5	4.8	4.7	6.5	4.9	8.0	6.1	5.0	5.0	4.1	4.0
Saint Kitts and Nevis	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.1	0.0	0.3	0.0	0.0	0.0
Saint Lucia	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.0	0.0	0.0	0.0
Saint Vincent and the Grenadines	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.3	0.0
Trinidad and Tobago	0.0	1.0	0.0	2.6	2.3	1.5	1.9	2.7	1.6	0.3	1.5	2.7	0.4	3.0
South America	266.8	311.7	368.1	520.4	684.0	789.5	1,013.6	1,096.3	1,409.3	1,514.8	1,514.7	1,519.1	1,566.0	1,485.8
Argentina	8.3	4.9	8.3	2.5	15.6	13.7	14.8	21.0	24.4	21.3	16.4	35.0	30.2	56.9
Bolivia	0.0	0.0	1.0	0.0	0.6	0.0	0.0	2.4	3.5	1.3	0.0	0.0	0.7	0.7
Brazil	244.1	291.8	340.7	480.5	617.4	702.7	893.2	972.9	1,252.3	1,343.2	1,331.3	1,323.9	1,309.3	1,131.1
Chile	7.3	7.1	5.2	16.6	28.7	28.7	50.8	41.2	63.5	65.4	86.0	77.4	74.4	78.8
Colombia	1.0	5.9	5.3	11.5	12.9	19.1	24.8	34.3	47.1	46.7	57.5	60.5	102.2	154.8
Ecuador	0.0	0.0	3.8	0.3	0.5	1.2	1.9	2.1	1.3	0.3	0.0	1.5	9.3	20.6

## CHAPTER 5 | Academic Research and Development

Region, country, or economy	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Guyana	0.0	0.0	0.0	0.4	0.0	0.0	0.0	1.0	0.2	0.0	0.0	0.0	0.3	0.1
Paraguay	0.0	0.0	1.0	0.0	0.8	1.0	0.4	0.3	0.0	0.6	0.1	0.1	0.9	0.0
Peru	2.0	1.0	2.0	4.0	2.5	7.3	1.5	3.9	3.8	2.3	2.6	1.8	10.0	10.7
Suriname	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Uruguay	1.9	0.0	0.8	1.5	2.1	0.0	3.7	4.5	0.3	4.0	2.6	3.3	2.9	2.4
Venezuela	2.3	1.0	0.0	3.2	3.0	15.8	22.5	12.7	12.9	29.7	18.1	15.7	26.0	29.7
Europe	4,853.1	4,798.9	5,827.3	6,061.0	6,372.8	6,694.5	6,981.9	7,382.0	8,291.8	8,841.0	9,258.6	9,013.3	9,167.5	9,076.8
EU	4,587.4	4,516.7	5,492.0	5,709.8	5,999.7	6,190.0	6,464.1	6,734.4	7,641.6	8,064.3	8,478.9	8,194.9	8,348.2	8,137.3
Austria	21.8	21.0	25.5	27.9	26.9	26.6	39.6	46.1	61.0	59.7	63.3	65.8	66.9	52.3
Belgium	81.9	76.7	93.6	91.4	124.3	133.7	149.9	167.4	216.2	201.9	240.8	216.4	209.6	200.0
Bulgaria	1.0	3.2	1.4	1.0	1.0	4.4	2.8	1.3	1.8	2.8	2.1	1.7	5.5	6.9
Croatia	23.3	17.7	22.8	15.3	4.2	30.3	20.2	22.5	42.9	37.9	48.3	50.5	25.4	37.1
Cyprus	0.7	1.0	1.0	2.3	2.2	5.3	3.9	11.7	19.3	16.2	17.2	26.1	20.7	18.5
Czech Republic	13.7	19.2	23.6	24.6	14.2	22.7	22.6	29.8	43.5	33.5	43.4	51.4	55.4	83.2
Denmark	31.5	46.6	72.1	55.1	78.0	80.4	109.4	87.9	127.9	147.9	168.2	169.8	211.9	208.6
Estonia	5.3	5.3	3.0	2.4	5.4	3.8	9.2	12.6	9.4	8.6	12.6	9.9	9.0	8.7
Finland	125.9	128.8	100.8	122.4	141.0	143.2	160.9	142.7	169.2	170.2	189.7	202.4	198.9	212.9
France	259.4	255.7	322.2	527.7	535.8	569.8	596.7	653.5	717.0	765.2	789.0	767.3	705.4	747.1
Germany	349.3	381.4	490.5	396.9	413.5	449.9	431.3	479.9	584.9	666.3	580.4	608.6	561.8	558.2

## CHAPTER 5 | Academic Research and Development

Region, country, or economy	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Greece	42.7	40.1	56.7	62.8	49.5	77.1	73.0	103.6	124.7	118.7	111.6	105.9	83.2	94.4
Hungary	10.0	7.0	10.7	10.1	17.8	11.6	15.1	17.9	20.8	19.2	18.9	45.0	22.1	25.8
Ireland	50.6	86.7	107.1	136.2	167.0	170.7	217.0	179.8	199.5	218.2	215.9	231.5	207.4	219.1
Italy	111.2	127.8	172.5	168.7	209.8	256.9	306.1	254.4	365.4	322.9	378.3	431.1	504.7	459.6
Latvia	0.4	2.0	0.3	0.0	0.0	0.0	0.0	0.0	0.7	1.9	1.3	2.9	2.0	1.3
Lithuania	0.5	0.9	4.3	4.0	7.6	2.3	2.2	1.2	9.7	5.9	7.5	5.0	6.5	4.8
Luxembourg	0.0	0.4	1.0	0.2	1.0	1.5	1.0	0.0	0.3	1.0	2.8	6.3	4.1	3.3
Malta	1.0	1.0	2.5	3.0	4.0	4.5	0.0	2.5	3.8	10.1	9.0	10.6	6.3	10.4
Netherlands	200.2	220.1	291.6	312.4	355.4	363.4	479.1	526.2	561.2	512.4	573.9	517.2	567.9	535.5
Poland	6.6	15.3	12.3	14.3	19.4	22.7	25.6	18.5	25.9	36.4	58.3	85.4	79.7	122.6
Portugal	23.9	13.4	33.9	22.4	38.4	46.8	48.9	56.8	82.7	81.3	116.8	120.7	132.1	160.3
Romania	6.5	0.6	1.7	5.9	39.5	31.6	55.7	56.3	53.0	65.3	100.0	52.2	88.6	51.8
Slovakia	18.3	15.7	8.5	10.5	3.1	2.7	7.5	18.4	21.9	19.4	14.3	28.4	16.1	25.0
Slovenia	22.0	5.3	13.3	4.5	11.2	12.0	20.1	24.5	19.0	18.3	14.9	21.2	32.0	24.3
Spain	197.1	182.9	300.3	347.8	325.7	338.5	374.3	430.8	501.5	591.4	614.0	583.1	990.5	928.5
Sweden	325.9	338.4	353.7	400.3	489.7	457.7	499.9	511.4	542.1	560.3	635.6	592.8	600.8	602.6
United Kingdom	2,656.7	2,502.6	2,965.0	2,939.9	2,914.2	2,920.0	2,792.2	2,876.5	3,116.4	3,371.6	3,450.6	3,185.7	2,933.4	2,734.5
Other Europe	265.8	282.2	335.3	351.2	373.1	504.4	517.8	647.6	650.3	776.7	779.7	818.4	819.3	939.5
Albania	0.0	0.1	0.0	0.2	0.2	0.3	1.1	0.4	0.0	2.0	2.2	3.0	0.0	3.8

## CHAPTER 5 | Academic Research and Development

Region, country, or economy	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Andorra	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Belarus	0.0	1.2	1.0	1.9	2.0	1.0	1.7	1.0	2.0	2.0	3.0	1.2	1.0	0.0
Bosnia and Herzegovina	0.0	0.0	0.0	0.0	0.0	1.0	1.7	3.3	1.8	6.3	7.3	12.5	3.5	2.7
Holy See (Vatican City)	0.0	1.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0
Iceland	9.4	7.8	13.7	12.3	9.7	21.9	22.7	18.8	15.9	14.1	20.9	25.8	21.5	29.3
Kosovo	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.9	1.0	0.0	0.0	1.0	0.7
Liechtenstein	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Macedonia	0.0	0.2	0.0	0.5	0.0	0.0	0.5	4.5	6.8	3.0	3.0	2.3	6.2	12.1
Moldova	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.3	1.5	1.1	0.5	0.4	1.0	0.5
Monaco	0.0	1.0	0.0	0.0	0.0	0.0	0.0	1.0	0.8	1.0	0.0	0.0	0.0	0.0
Montenegro <sup>a</sup>	na	na	na	na	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0	1.9	0.0
Norway	90.9	87.1	102.6	100.9	112.3	197.2	169.1	208.7	230.3	269.6	275.9	293.4	277.8	288.7
Russia	10.1	3.4	11.7	4.2	8.4	4.2	6.2	4.2	11.5	9.3	9.0	12.8	15.9	26.9
San Marino	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Serbia <sup>a</sup>	na	na	na	na	3.0	5.6	4.5	21.0	16.4	30.3	33.7	34.9	38.2	21.6
Serbia and Montenegro <sup>b</sup>	2.4	2.0	1.9	1.0	na	na	na	na	na	na	na	na	na	na
Switzerland	99.1	99.4	118.8	123.4	99.3	125.7	141.6	147.4	189.9	200.7	218.3	222.4	196.0	212.4
Turkey	53.9	78.2	84.1	106.2	136.7	147.6	167.6	234.3	172.4	233.7	203.7	206.7	251.9	334.2
Ukraine	0.0	0.0	1.5	0.5	1.6	0.0	1.2	2.9	0.0	2.6	1.9	3.0	2.4	6.5

## CHAPTER 5 | Academic Research and Development

Region, country, or economy	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Middle East	126.5	137.6	159.1	166.3	215.9	238.8	314.3	309.7	403.2	455.1	455.5	590.1	537.6	663.7
Armenia	0.1	0.0	0.0	0.0	0.0	0.0	0.0	1.3	0.0	0.5	0.0	1.5	1.0	0.7
Azerbaijan	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.8	1.0	0.0	0.0	2.5	0.0
Bahrain	1.0	1.7	0.3	0.3	1.2	0.7	2.4	1.5	0.2	2.0	0.0	1.2	1.1	0.2
Gaza Strip	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.2	0.8	1.3	1.0	1.7	2.8
Georgia	2.0	2.0	1.0	2.9	0.7	4.7	5.4	2.5	0.0	0.3	1.5	2.9	3.7	4.8
Iran	9.2	17.5	19.3	33.2	45.0	58.7	82.2	76.7	139.0	184.5	168.2	229.0	190.3	259.1
Iraq	0.0	0.0	2.4	0.3	4.2	0.0	0.3	0.0	0.0	1.8	0.9	4.3	2.0	1.6
Israel	96.0	89.1	97.0	96.9	117.0	117.7	147.3	141.8	174.2	156.9	160.8	178.6	171.6	188.9
Jordan	6.2	10.5	17.9	9.7	18.8	20.6	35.2	29.9	45.8	40.3	43.8	68.9	57.2	72.3
Kuwait	3.6	2.0	3.2	2.8	4.0	7.2	7.0	6.2	2.4	2.2	5.2	5.5	7.5	6.6
Lebanon	3.2	5.8	6.7	6.4	11.9	8.6	10.3	19.0	11.9	18.3	18.9	20.4	18.1	26.4
Oman	0.0	1.4	2.4	0.8	2.1	0.0	1.9	2.1	3.1	1.5	5.1	13.3	11.4	13.6
Qatar	0.0	0.0	0.0	0.8	1.0	0.5	1.7	5.3	3.8	4.7	7.8	17.3	13.2	12.4
Saudi Arabia	0.5	1.7	3.4	6.0	5.5	15.6	9.9	15.4	14.0	29.9	26.3	34.2	40.9	59.3
Syria	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.7	0.5	0.8	0.5	0.6
United Arab Emirates	3.7	4.1	2.5	5.2	3.0	2.3	7.7	6.8	6.4	9.9	10.6	8.8	12.2	11.7
West Bank	1.0	1.1	2.0	0.6	1.3	2.3	2.8	1.4	1.4	0.0	3.1	2.3	2.6	2.4
Yemen	0.0	0.8	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.1	1.3	0.1	0.1	0.3

## CHAPTER 5 | Academic Research and Development

[illegible]



## CHAPTER 5 | Academic Research and Development

Region, country, or economy	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Ethiopia	0.0	0.9	0.5	2.8	3.5	4.0	5.6	5.6	6.4	16.3	19.9	21.4	22.3	25.6
Gabon	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.4	0.0	1.0	0.0
Gambia, The	0.0	0.0	1.5	0.2	1.1	0.0	0.0	0.6	0.6	0.7	0.0	1.0	0.9	0.6
Ghana	4.4	3.0	1.4	1.7	5.5	6.2	3.0	4.6	19.3	17.8	20.4	17.1	30.2	30.4
Guinea	0.0	0.0	0.0	1.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	1.0	0.9
Guinea-Bissau	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.4	0.0	0.0	0.0
Kenya	3.4	2.0	5.2	2.7	8.3	11.3	13.6	13.2	16.1	20.5	24.8	34.1	21.7	25.3
Lesotho	0.7	0.0	1.3	0.1	0.3	0.7	0.4	0.2	0.1	0.9	0.0	0.5	1.5	0.8
Liberia	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.6	2.3	1.6	0.0	0.8	0.0	0.9
Libya	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.4	0.5	0.0	0.0	8.2
Madagascar	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0	1.0	1.1	0.0	0.0
Malawi	2.3	2.7	2.8	2.7	8.2	8.3	1.9	9.4	5.8	8.0	4.2	10.0	5.8	18.6
Mali	0.4	0.0	0.0	0.3	0.0	0.5	0.6	0.4	0.7	0.2	0.9	1.2	2.6	0.4
Mauritania	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mauritius	0.0	0.0	3.3	0.8	0.2	1.5	0.0	0.0	1.0	2.0	0.2	0.2	2.5	0.0
Morocco	0.0	0.4	1.4	0.7	0.0	1.5	2.8	1.4	2.4	3.7	3.9	2.7	8.5	105.3
Mozambique	0.0	0.2	0.0	1.2	0.8	0.5	1.4	1.9	0.1	0.8	4.0	3.5	2.7	2.5
Namibia	1.0	1.0	0.1	0.5	2.2	0.3	1.1	0.7	2.2	1.3	3.7	2.6	1.0	1.9
Niger	0.0	0.5	0.0	0.5	0.2	0.4	1.5	0.2	0.7	0.0	0.8	0.1	2.8	0.0

## CHAPTER 5 | Academic Research and Development

Region, country, or economy	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Nigeria	3.2	7.9	8.9	24.0	31.5	15.9	22.7	33.2	43.8	37.7	39.8	41.6	25.4	54.7
Rwanda	0.0	1.8	0.3	0.6	0.2	1.3	1.8	2.9	3.5	1.7	4.8	3.8	2.0	4.6
São Tomé and Príncipe	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0
Senegal	0.3	1.0	0.0	0.3	0.0	0.1	2.4	2.8	2.1	0.2	0.3	0.4	0.6	2.0
Seychelles	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0
Sierra Leone	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.6	0.2	1.6	3.0
Somalia	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.6	0.0	0.0
South Africa	88.7	79.0	115.1	111.6	123.1	155.5	186.0	182.0	240.2	220.6	246.0	272.2	323.2	362.3
South Sudan	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sudan	0.0	1.6	0.0	1.7	2.4	1.5	1.9	0.4	2.0	0.6	1.2	2.3	2.1	4.6
Swaziland	0.5	1.8	0.5	2.5	0.7	0.5	1.9	2.0	1.2	2.2	1.0	0.6	1.6	1.9
Tanzania	0.1	2.1	2.1	6.8	7.4	10.0	8.9	11.9	10.8	8.5	19.4	16.7	18.9	15.0
Togo	0.0	0.0	0.0	0.0	0.0	1.1	1.0	0.0	0.0	0.0	0.5	0.3	0.1	1.0
Tunisia	2.8	0.6	1.3	3.0	2.5	2.7	6.5	3.4	5.0	5.0	9.0	8.7	13.0	19.7
Uganda	4.2	7.0	4.5	5.5	9.1	9.8	16.7	17.8	15.3	15.6	19.0	23.0	22.6	28.0
Western Sahara	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Zambia	1.8	0.8	0.3	4.6	2.8	3.7	5.2	7.4	5.8	7.5	6.0	7.3	5.6	6.3
Zimbabwe	1.8	2.4	1.9	1.8	3.8	1.0	1.4	3.7	4.5	7.8	4.9	11.5	6.8	7.9
Asia	695.2	1,127.5	1,014.9	1,054.8	1,265.3	1,563.4	1,503.9	1,851.9	1,928.4	2,265.2	2,208.9	2,479.9	2,716.3	3,029.1

## CHAPTER 5 | Academic Research and Development

Region, country, or economy	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Afghanistan	0.0	0.0	0.3	0.0	1.7	1.0	1.1	3.4	3.3	1.2	4.7	0.8	1.7	1.4
Bangladesh	1.0	1.3	2.0	4.2	7.4	3.3	1.7	5.6	10.2	12.5	7.3	9.3	9.5	12.4
Bhutan	0.0	0.0	0.0	0.0	0.0	0.0	0.5	1.3	0.0	0.2	0.0	1.0	0.5	1.0
Brunei	0.0	0.0	1.0	2.0	0.5	0.1	0.1	0.3	1.4	0.9	0.8	1.3	1.0	6.1
Burma	1.1	0.0	0.0	0.0	0.0	0.5	0.0	1.1	0.0	0.5	0.0	0.0	0.3	1.6
Cambodia	0.0	0.1	0.8	0.9	2.7	1.5	2.1	1.3	3.4	3.0	2.8	2.8	1.4	5.6
China	144.5	226.9	167.7	208.0	247.7	335.5	263.6	406.2	359.0	540.6	441.8	631.2	681.6	755.3
India	46.7	77.1	69.8	73.9	88.3	116.4	100.0	112.1	143.9	207.3	194.9	206.5	218.9	432.9
Indonesia	1.3	2.8	2.6	3.4	3.1	1.5	6.3	1.7	6.4	10.0	10.8	7.5	10.0	16.7
Japan	263.4	297.7	271.6	276.8	295.4	361.4	313.1	363.2	392.6	371.3	366.3	358.6	383.1	434.3
Kazakhstan	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.3	1.0	2.7	1.6	1.5
Kyrgyzstan	0.0	0.0	0.0	0.0	0.0	0.4	0.0	1.0	0.0	0.0	0.5	0.5	0.0	0.6
Laos	0.3	0.0	0.0	0.3	0.0	0.1	0.1	1.1	0.7	1.1	1.8	1.4	0.1	1.9
Malaysia	1.0	4.8	7.2	7.3	5.5	12.6	16.1	30.5	35.9	43.0	46.9	55.2	72.6	66.9
Maldives	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.3	0.0	0.0	0.0
Mongolia	0.0	0.0	0.0	0.0	0.0	0.1	0.2	1.0	0.5	1.3	0.8	0.2	0.3	0.5
Nepal	0.3	1.0	0.5	1.1	1.8	1.3	2.8	0.6	4.4	4.8	4.6	3.7	6.5	8.2
North Korea	0.0	0.0	0.2	0.5	0.0	0.1	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0
Pakistan	1.0	4.1	7.9	6.7	5.8	9.3	18.1	7.9	19.8	18.5	21.9	21.0	30.4	20.7

## CHAPTER 5 | Academic Research and Development

Region, country, or economy	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Papua New Guinea	0.0	0.3	0.5	0.0	0.0	0.1	0.8	0.0	0.8	2.2	2.1	2.5	1.2	0.8
Philippines	1.5	1.8	2.4	4.3	12.7	7.6	10.4	14.0	11.4	5.1	6.8	1.5	6.1	9.4
Singapore	18.0	17.3	24.8	26.4	55.4	53.4	38.5	68.2	76.3	107.3	105.0	126.1	138.9	103.9
South Korea	71.9	248.3	201.6	155.5	170.2	236.6	230.1	254.6	264.5	276.2	419.0	475.5	541.1	571.4
Sri Lanka	1.5	1.7	0.3	2.0	2.4	4.7	0.4	3.7	4.0	6.7	9.2	6.2	7.7	6.2
Taiwan	122.5	216.3	222.9	244.4	310.1	361.6	444.7	523.0	540.3	564.0	493.2	497.2	535.3	464.4
Tajikistan	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.5	0.3	0.3	0.5	0.3	0.0	0.5
Thailand	17.0	23.3	26.0	34.8	48.2	48.8	45.6	41.1	42.6	63.2	58.1	57.6	59.5	68.7
Timor-Leste	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.5	0.7
Turkmenistan	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Uzbekistan	0.0	0.0	1.3	0.0	1.0	0.5	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0
Vietnam	2.3	2.6	3.1	2.2	5.4	4.5	7.6	8.5	6.0	23.7	7.9	7.2	6.8	35.3
Australia and Oceania	872.7	922.9	1,006.6	1,195.8	1,249.8	1,425.2	1,418.7	1,519.7	1,654.5	1,806.6	1,907.3	2,096.8	2,183.6	2,011.7
Australia	778.4	813.5	876.2	1,070.6	1,110.0	1,282.0	1,273.3	1,370.3	1,460.6	1,592.9	1,705.0	1,885.3	1,978.8	1,834.0
Cook Islands	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fiji	0.0	0.2	0.0	0.3	0.0	0.4	1.2	0.0	1.5	1.0	0.2	0.0	0.4	0.3
Kiribati	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Marshall Islands	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.8
Micronesia, Federated States of	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.0	0.0

## CHAPTER 5 | Academic Research and Development

Region, country, or economy	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Nauru	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
New Zealand	94.3	108.6	130.5	123.9	139.8	142.7	143.3	149.4	192.1	212.2	199.7	211.2	204.2	176.4
Niue	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Palau	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Samoa	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0
Solomon Islands	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.5	0.0	0.0	0.1	0.2
Tonga	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tuvalu	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0
Vanuatu	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0
Unassigned	181.4	139.2	146.6	208.5	269.9	284.3	276.6	454.1	545.8	605.3	470.4	160.2	166.4	114.0

na = not applicable; country data do not exist.

EU = European Union.

<sup>a</sup> Beginning in 2006, Serbia and Montenegro represented individual countries.

<sup>b</sup> Serbia and Montenegro represented a single country for data purposes from 1992 to 2006.

### Note(s)

Article counts refer to publications from a selection of journals, books, and conference proceedings in S&E from Scopus. Articles are classified by their year of publication and are assigned to a region, country, or economy on the basis of the institutional address(es) listed in the article. Articles are credited on a fractional-count basis. The sum of the regions, countries, or economies may not add to the world total because of rounding. Some publications have incomplete address information for coauthored publications in the Scopus database. The unassigned category count is the sum of fractional counts for publications that cannot be assigned to a region, country, or economy.

### Source(s)

National Science Foundation, National Center for Science and Engineering Statistics; SRI International; Science-Metrix; Elsevier, Scopus abstract and citation database, accessed July 2017.



**CHAPTER 5 | Academic Research and Development**

*Science and Engineering Indicators 2018*

## CHAPTER 5 | Academic Research and Development

APPENDIX TABLE 5-38

## S&amp;E articles in physics, by region, country, or economy: 2003–16

(Number)

Region, country, or economy	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
World	137,020.0	145,615.0	173,882.0	185,311.0	193,442.0	192,815.0	195,836.0	200,131.0	205,086.0	203,728.0	206,146.0	213,107.0	199,795.0	200,106.0
North America	34,890.6	36,392.9	42,580.1	44,953.5	44,415.6	41,695.5	40,528.1	41,125.1	41,235.3	41,302.5	38,650.1	38,929.2	34,954.4	32,215.3
Canada	2,635.4	3,034.6	3,433.1	3,728.5	3,948.4	3,909.4	3,902.1	3,656.5	4,096.9	3,918.1	3,825.1	3,783.5	3,442.8	3,081.7
Greenland	0.0	0.0	0.0	0.0	0.2	0.4	0.3	0.1	0.8	0.0	0.0	0.0	0.0	0.0
Mexico	1,000.7	983.6	1,286.5	1,568.0	1,397.9	1,424.8	1,180.0	1,387.7	1,493.0	1,367.8	1,433.8	1,463.6	1,425.9	1,549.7
United States	31,254.5	32,374.8	37,860.5	39,657.0	39,069.1	36,361.0	35,445.7	36,080.8	35,644.5	36,016.6	33,391.1	33,682.1	30,085.7	27,584.0
Central America and Caribbean	151.1	142.5	176.2	189.7	180.0	164.5	151.1	131.9	136.8	117.2	109.8	115.2	109.9	95.9
Antigua and Barbuda	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bahamas, The	0.3	0.5	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.5	0.0	0.1	0.0
Barbados	9.5	8.0	4.3	2.8	2.2	3.0	3.2	3.5	2.9	4.2	2.0	2.0	5.5	3.0
Belize	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	0.0	0.0	0.0
Costa Rica	6.8	6.8	4.5	6.3	17.6	5.0	6.7	6.1	9.8	9.1	5.0	14.6	15.9	15.9
Cuba	52.2	41.6	71.1	56.9	47.5	56.3	42.5	29.8	36.1	30.1	35.4	35.9	28.5	29.5
Dominica	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Dominican Republic	0.0	0.3	0.0	1.0	1.2	0.7	0.7	1.4	0.3	0.6	0.0	0.1	0.0	0.0
El Salvador	0.0	0.0	0.0	0.0	0.8	0.1	0.0	0.0	0.0	0.5	0.0	0.0	1.0	0.0

## CHAPTER 5 | Academic Research and Development

Region, country, or economy	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Grenada	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0
Guatemala	0.0	0.0	0.5	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.0	0.1	0.0	0.3
Haiti	0.0	0.0	0.0	0.6	0.0	0.0	0.0	0.0	0.4	0.2	0.0	0.0	0.3	0.0
Honduras	0.0	0.3	0.0	0.2	0.2	0.3	0.0	0.3	0.0	0.5	0.0	0.0	0.0	0.0
Jamaica	1.7	0.0	0.0	2.2	2.5	0.7	3.0	5.2	3.7	0.3	0.9	2.0	1.3	4.3
Nicaragua	0.0	0.0	0.0	1.0	0.3	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Panama	2.0	1.0	0.1	0.2	0.8	0.5	3.9	1.0	1.0	3.2	1.5	2.7	2.3	0.9
Puerto Rico	75.2	74.8	89.0	112.5	103.2	96.1	85.5	77.3	75.2	64.0	59.7	57.3	49.7	36.9
Saint Kitts and Nevis	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Saint Lucia	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0
Saint Vincent and the Grenadines	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Trinidad and Tobago	3.3	9.2	6.8	6.0	3.7	1.2	5.4	7.0	6.3	4.5	3.9	0.4	5.2	5.2
South America	2,768.8	3,181.7	3,217.9	3,286.6	3,901.9	3,435.2	3,604.2	3,734.2	3,773.9	3,998.4	4,262.1	4,188.5	4,229.3	4,408.8
Argentina	493.3	535.4	500.0	510.5	712.7	535.6	663.4	534.7	656.7	575.9	598.7	565.7	578.1	535.8
Bolivia	2.9	0.7	0.8	1.6	0.5	0.9	2.4	1.2	1.0	0.1	2.6	2.9	1.3	7.2
Brazil	1,887.7	2,212.9	2,281.9	2,231.0	2,619.5	2,303.9	2,380.6	2,546.0	2,519.4	2,592.4	2,878.4	2,676.8	2,784.2	2,788.9
Chile	122.4	189.0	177.9	256.6	239.4	286.6	251.2	322.6	271.6	434.4	307.4	447.0	393.9	501.8
Colombia	90.8	115.1	119.0	154.5	163.5	182.0	159.4	195.0	220.3	266.0	345.1	362.3	312.7	418.3
Ecuador	3.4	2.1	3.8	4.5	6.1	2.7	5.7	5.5	4.2	11.5	9.3	14.2	30.5	25.4



## CHAPTER 5 | Academic Research and Development

Region, country, or economy	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Guyana	0.0	1.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0
Paraguay	0.0	0.0	0.0	0.7	0.0	0.0	0.0	0.0	0.9	0.8	1.3	0.0	1.4	0.3
Peru	10.0	10.8	9.5	8.6	22.6	7.9	20.6	19.3	19.6	17.6	24.9	19.4	13.0	22.5
Suriname	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.2	0.1	0.4
Uruguay	27.5	26.2	31.3	21.4	41.8	31.5	35.2	33.4	31.1	24.5	29.3	35.6	46.2	52.9
Venezuela	130.8	88.3	93.7	97.2	95.6	84.2	85.7	76.4	49.2	75.1	65.2	64.3	67.8	55.2
Europe	55,722.5	59,045.0	67,243.0	69,281.2	72,035.8	72,466.1	73,658.7	74,061.7	75,558.2	74,895.2	75,047.0	77,519.3	73,119.6	72,552.4
EU	42,615.2	45,632.2	52,467.7	54,195.8	56,688.4	57,046.8	58,037.1	58,119.3	58,666.7	58,370.3	58,318.2	58,736.4	53,181.0	50,883.1
Austria	862.4	771.1	977.0	889.2	1,075.8	1,021.5	1,065.2	1,096.1	1,156.4	1,052.5	1,188.8	1,115.9	995.6	899.4
Belgium	1,280.7	1,305.4	1,493.8	1,541.6	1,524.5	1,640.9	1,530.5	1,610.4	1,526.8	1,689.1	1,508.5	1,646.3	1,418.7	1,466.1
Bulgaria	193.7	229.8	234.6	245.8	420.1	294.3	312.2	466.6	298.1	333.5	270.0	296.9	260.7	293.7
Croatia	117.6	145.8	153.6	144.7	189.6	190.6	198.1	187.6	191.1	179.1	158.1	124.6	133.6	123.1
Cyprus	16.4	14.6	27.8	35.5	36.4	50.8	52.9	63.8	63.7	54.2	95.1	70.6	77.3	80.2
Czech Republic	551.6	785.7	815.3	965.0	982.3	1,017.0	1,108.1	1,069.4	1,123.5	1,140.3	1,240.8	1,253.8	1,419.9	1,390.9
Denmark	635.7	630.3	803.8	770.1	826.6	813.3	852.2	902.3	1,052.3	1,013.8	1,007.3	1,015.9	904.8	861.1
Estonia	75.5	77.4	113.8	93.5	129.3	118.4	108.9	134.5	110.4	101.8	125.1	145.2	119.3	101.1
Finland	705.8	704.6	802.2	851.3	891.6	933.7	910.1	865.8	956.8	881.7	968.0	933.7	739.9	747.0
France	6,510.8	7,126.3	8,013.4	8,316.8	8,613.9	8,922.0	8,854.8	8,633.7	8,843.6	8,648.6	8,578.0	8,627.4	7,645.9	7,300.5
Germany	9,934.1	10,185.2	11,796.6	11,952.2	12,547.3	12,230.0	13,209.5	13,264.3	13,438.7	13,418.6	13,516.5	13,171.7	11,602.9	11,060.6

## CHAPTER 5 | Academic Research and Development

Region, country, or economy	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Greece	546.6	588.6	778.5	900.5	1,038.6	918.3	927.0	866.7	835.2	826.5	827.7	817.7	800.6	760.5
Hungary	489.7	472.8	594.1	520.7	526.9	574.4	495.2	497.0	521.6	540.8	483.8	529.5	504.8	421.9
Ireland	242.6	371.3	653.1	525.8	579.1	578.0	628.0	650.4	706.8	589.8	542.2	548.5	427.5	412.2
Italy	4,824.2	5,410.7	5,759.2	6,225.5	6,683.2	6,486.1	6,190.8	6,196.8	5,945.0	6,048.2	6,135.8	6,552.8	5,763.0	5,765.9
Latvia	43.0	57.9	85.9	55.5	90.1	87.6	79.1	89.7	114.3	105.7	99.7	92.0	139.1	109.6
Lithuania	109.1	192.9	252.2	316.0	234.9	319.8	332.0	321.5	288.9	236.6	308.9	333.2	319.0	212.7
Luxembourg	4.8	10.2	2.7	6.3	10.2	15.0	23.8	22.9	38.1	38.3	52.8	56.7	51.4	60.2
Malta	0.3	1.5	5.8	2.7	3.3	8.7	5.6	1.8	10.8	8.9	11.6	15.7	9.4	12.6
Netherlands	1,638.0	1,800.9	1,961.6	1,963.2	1,910.0	1,894.4	1,929.6	1,931.5	2,090.0	2,028.9	1,956.2	1,901.0	1,618.2	1,638.0
Poland	2,414.1	2,546.5	2,984.9	3,147.8	2,874.8	3,211.4	2,990.6	2,876.0	2,839.1	3,083.0	3,594.7	3,528.3	3,838.3	3,508.3
Portugal	559.7	558.7	691.6	711.5	775.8	812.7	850.0	1,028.9	991.4	999.9	997.2	952.6	846.4	837.2
Romania	382.6	416.5	476.5	475.2	752.9	917.0	1,077.4	1,174.7	975.5	1,106.2	1,014.1	803.0	1,063.3	935.5
Slovakia	236.0	300.7	223.3	318.2	251.4	381.0	263.8	357.1	276.1	345.1	321.3	485.0	335.9	371.3
Slovenia	257.1	203.8	290.4	316.1	311.0	333.9	308.7	340.1	359.8	311.4	323.2	291.9	244.4	231.9
Spain	2,518.5	2,851.5	3,436.0	3,381.6	3,873.3	3,655.1	4,154.0	4,024.0	4,376.3	4,209.0	4,025.4	3,832.4	3,384.3	3,289.3
Sweden	1,392.1	1,474.2	1,566.0	1,603.3	1,502.9	1,469.8	1,471.3	1,569.0	1,621.4	1,601.5	1,486.8	1,606.9	1,412.3	1,312.0
United Kingdom	6,072.4	6,397.2	7,474.0	7,919.9	8,032.6	8,150.9	8,107.8	7,876.7	7,915.2	7,777.1	7,480.5	7,987.1	7,104.3	6,680.3
Other Europe	13,107.2	13,412.8	14,775.3	15,085.5	15,347.5	15,419.3	15,621.5	15,942.4	16,891.5	16,524.8	16,728.8	18,782.9	19,938.6	21,669.2
Albania	1.0	0.8	1.9	2.5	12.4	2.0	6.0	28.5	2.2	2.3	4.3	1.0	5.1	14.5

## CHAPTER 5 | Academic Research and Development

Region, country, or economy	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Andorra	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0
Belarus	480.5	424.0	559.4	476.9	598.9	388.1	404.0	391.3	434.9	329.4	361.7	349.2	325.5	313.4
Bosnia and Herzegovina	3.9	2.7	4.8	9.0	12.6	11.0	12.0	11.5	9.2	13.3	11.7	8.5	17.1	17.2
Holy See (Vatican City)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.2	0.0	0.0	0.1
Iceland	13.7	11.7	15.9	15.5	13.0	28.5	33.4	38.2	33.4	54.7	40.6	34.1	31.2	32.0
Kosovo	0.0	0.0	0.0	0.0	0.0	2.3	2.6	5.9	0.6	1.2	2.7	2.5	4.4	10.0
Liechtenstein	5.2	2.9	5.6	5.3	6.4	2.0	3.1	4.8	7.3	5.7	6.3	8.0	0.3	3.4
Macedonia	16.3	21.4	15.4	16.8	18.2	21.6	20.5	26.9	27.7	11.4	18.5	15.2	17.7	31.8
Moldova	54.5	39.8	79.8	49.6	60.1	44.9	70.0	53.0	66.8	72.5	57.6	48.2	57.9	51.0
Monaco	0.0	1.8	1.0	1.6	0.2	0.0	0.5	0.3	1.3	1.2	1.1	0.8	0.9	2.7
Montenegro <sup>a</sup>	na	na	na	na	16.4	11.0	7.2	17.1	8.0	7.0	15.4	14.5	1.4	18.8
Norway	206.7	254.7	333.8	353.4	394.4	420.1	387.1	455.8	511.9	502.1	470.8	449.6	399.2	392.4
Russia	8,432.8	8,595.0	9,054.7	9,111.1	8,675.7	8,980.3	9,106.6	9,211.3	9,635.2	9,324.0	9,505.2	11,287.2	12,700.2	14,558.9
San Marino	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.3	0.3	0.5	0.1	0.1	0.0
Serbia <sup>a</sup>	na	na	na	na	346.1	324.8	307.4	324.7	291.8	392.9	298.0	305.9	275.1	291.8
Serbia and Montenegro <sup>b</sup>	128.3	138.9	202.5	238.4	na	na	na	na	na	na	na	na	na	na
Switzerland	1,638.7	1,679.6	2,026.2	2,197.0	2,303.3	2,165.4	2,173.6	2,346.6	2,428.0	2,460.1	2,523.9	2,574.5	2,300.8	2,051.7
Turkey	652.8	768.2	810.9	946.4	1,364.1	1,079.0	1,257.8	1,178.1	1,250.8	1,478.0	1,414.4	1,617.8	1,834.7	2,128.8
Ukraine	1,472.9	1,471.4	1,663.4	1,662.1	1,525.5	1,938.4	1,829.8	1,848.4	2,181.8	1,868.9	1,995.9	2,065.3	1,966.8	1,750.8

## CHAPTER 5 | Academic Research and Development

Region, country, or economy	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Middle East	2,052.0	2,181.9	2,487.6	2,789.3	3,235.1	3,609.5	3,768.2	4,096.7	4,781.0	4,928.1	5,160.9	5,511.3	5,657.1	6,168.1
Armenia	130.8	121.7	149.6	117.3	164.3	145.1	163.7	201.8	245.6	229.1	181.3	220.7	163.1	189.3
Azerbaijan	74.2	62.4	69.4	58.9	75.8	82.4	86.9	109.4	129.9	97.5	83.8	90.8	102.3	108.7
Bahrain	6.9	14.9	10.4	17.7	20.8	15.8	8.2	25.3	18.3	11.8	11.2	11.4	9.1	10.5
Gaza Strip	11.0	15.2	7.4	6.4	16.1	14.0	12.7	12.1	23.8	22.6	18.8	16.5	16.1	12.1
Georgia	52.5	68.4	52.9	68.7	62.1	75.4	68.1	54.7	73.1	46.9	51.4	54.6	54.8	47.4
Iran	309.2	425.6	546.1	784.1	972.5	1,372.0	1,615.4	1,848.9	2,165.7	2,321.6	2,545.1	2,752.2	2,908.7	3,326.5
Iraq	9.8	2.8	13.3	15.8	27.5	20.5	32.8	33.7	53.7	81.5	91.2	86.5	86.7	132.3
Israel	1,238.8	1,232.3	1,369.7	1,435.9	1,558.9	1,521.0	1,361.4	1,337.0	1,415.9	1,397.1	1,352.8	1,298.7	1,305.6	1,113.2
Jordan	45.5	55.7	52.2	54.1	55.3	68.3	65.5	67.3	71.3	71.8	63.1	63.4	51.5	66.0
Kuwait	8.8	18.3	13.6	26.6	22.0	23.9	32.4	20.1	25.0	24.9	27.7	33.8	18.4	29.7
Lebanon	9.2	19.0	20.7	23.8	32.7	27.6	30.2	35.4	33.7	31.5	32.4	55.0	43.5	46.7
Oman	19.9	23.3	22.4	19.1	21.4	27.3	19.0	33.0	30.3	26.8	21.4	24.5	28.2	44.3
Qatar	4.4	2.4	3.9	7.9	10.3	13.4	13.0	14.1	23.1	25.3	35.5	38.7	60.5	76.6
Saudi Arabia	92.3	80.8	98.2	104.0	121.2	134.0	173.7	217.9	374.1	419.9	517.6	607.3	644.4	794.8
Syria	6.4	13.4	19.9	12.6	22.3	14.3	23.5	24.2	31.1	19.2	20.0	23.9	26.0	22.2
United Arab Emirates	26.0	21.7	31.3	30.6	42.1	34.2	52.5	45.2	50.4	83.4	81.9	107.0	124.0	129.1
West Bank	5.8	2.0	4.8	1.9	5.2	15.4	4.8	10.1	7.9	6.5	13.2	12.7	8.8	11.8
Yemen	0.4	2.1	2.0	4.0	4.8	4.8	4.6	6.8	8.2	10.6	12.4	13.7	5.4	7.0

## CHAPTER 5 | Academic Research and Development

Region, country, or economy	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Africa	875.4	1,035.2	1,108.1	1,202.9	1,369.8	1,562.5	1,639.5	1,576.7	1,628.6	1,837.8	1,823.9	2,279.1	2,453.4	2,821.6
Algeria	127.4	158.6	173.4	205.1	274.7	372.8	366.5	327.6	294.6	397.0	353.5	450.4	458.8	556.1
Angola	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.1
Benin	4.3	3.3	3.2	7.1	11.3	5.2	5.8	8.2	6.7	5.7	9.8	14.8	15.7	16.2
Botswana	9.0	5.0	2.7	3.7	7.0	4.4	0.7	2.1	0.8	3.1	0.6	3.4	2.6	8.7
Burkina Faso	2.0	1.0	0.6	1.1	0.7	1.1	1.8	0.0	0.6	2.5	2.5	1.7	3.5	0.1
Burundi	1.4	1.3	0.0	0.3	0.7	0.0	0.0	0.1	0.0	0.1	1.0	0.0	0.1	0.1
Cameroon	22.2	29.3	40.7	47.0	33.0	41.7	36.9	27.8	35.4	43.4	43.1	60.7	62.7	69.3
Cape Verde	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Central African Republic	0.8	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	1.0
Chad	0.0	0.0	0.3	0.5	0.0	0.3	0.0	0.0	0.0	0.1	0.0	0.1	0.2	0.3
Comoros	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.1
Congo, Democratic Republic of the	0.1	0.0	0.1	0.1	0.2	0.7	1.3	0.1	0.3	0.2	0.1	0.0	1.0	0.0
Congo, Republic of the	0.2	0.5	0.4	4.9	0.3	0.0	2.0	1.4	0.7	1.3	1.4	0.5	0.5	2.1
Côte d'Ivoire	0.0	0.9	1.0	1.3	1.9	3.3	1.1	1.5	5.7	0.4	1.7	0.1	2.6	1.2
Djibouti	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.2	0.0	0.0	0.0	0.1	0.0	0.0
Egypt	342.5	335.0	375.9	396.3	455.0	435.3	514.9	491.7	456.9	461.3	506.5	589.5	680.5	752.1
Equatorial Guinea	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Eritrea	0.0	0.0	0.0	0.0	0.0	0.8	1.5	0.3	0.0	0.0	0.0	0.0	0.0	0.3

## CHAPTER 5 | Academic Research and Development

Region, country, or economy	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Ethiopia	0.3	4.2	5.0	5.8	11.7	12.9	6.9	9.3	12.3	11.4	11.9	15.6	10.4	18.3
Gabon	0.0	0.0	0.0	0.0	0.8	2.3	0.3	0.2	1.2	1.4	0.6	0.3	0.9	1.3
Gambia, The	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0
Ghana	5.0	2.3	2.7	2.8	4.4	1.6	1.7	6.9	5.0	5.9	3.7	7.3	6.5	15.2
Guinea	0.0	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.8	0.0	0.0	0.0	0.0	0.0
Guinea-Bissau	0.0	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Kenya	2.8	7.1	2.6	0.8	3.5	2.0	5.3	7.0	7.9	13.0	11.6	11.6	9.9	8.9
Lesotho	0.1	0.7	0.3	1.7	0.2	1.8	0.3	0.3	0.0	1.0	1.0	0.0	0.8	1.2
Liberia	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.5
Libya	2.5	2.8	1.7	2.3	0.7	6.8	7.7	9.9	5.4	8.1	14.0	9.9	7.6	5.8
Madagascar	0.0	0.1	0.0	0.6	14.9	1.1	1.2	2.0	6.7	0.5	2.3	0.5	2.7	2.0
Malawi	0.0	0.0	0.1	0.0	0.2	0.1	0.1	0.0	1.2	0.0	0.1	0.6	0.0	0.4
Mali	0.3	0.7	0.3	0.1	0.0	0.3	0.0	0.0	0.0	0.3	0.3	0.0	1.4	0.0
Mauritania	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.0	0.0	0.0	0.0	1.3	0.0	0.0
Mauritius	1.0	0.0	2.3	2.0	2.0	2.7	5.7	3.5	0.6	1.0	3.4	3.2	1.5	2.2
Morocco	107.7	150.0	106.5	106.3	89.7	116.8	95.6	108.4	118.9	131.0	149.7	194.6	191.4	322.9
Mozambique	0.8	0.0	0.3	0.7	0.2	0.5	0.2	0.0	0.0	2.4	0.0	0.1	0.3	0.4
Namibia	0.5	1.2	5.9	2.3	0.6	0.4	0.7	1.0	0.3	0.1	1.9	0.1	1.8	1.8
Niger	2.0	0.2	0.5	0.0	0.2	0.0	1.0	0.5	0.3	0.3	0.1	1.0	0.3	0.0

## CHAPTER 5 | Academic Research and Development

Region, country, or economy	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Nigeria	14.8	15.7	30.9	23.1	16.0	20.5	27.7	43.4	47.5	54.2	59.6	58.3	69.2	91.6
Rwanda	0.1	0.0	0.0	0.1	0.0	0.0	1.9	2.1	0.9	1.2	1.3	0.7	0.6	0.4
São Tomé and Príncipe	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Senegal	4.5	1.5	6.0	2.7	4.3	7.1	3.6	6.4	9.7	2.6	9.9	8.9	7.5	6.2
Seychelles	0.0	0.0	1.2	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.6	0.0
Sierra Leone	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.3	0.4	0.1	0.2	0.0	0.0	0.1
Somalia	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0
South Africa	138.9	191.3	214.8	240.9	259.7	324.9	327.0	319.1	387.9	443.2	401.9	529.9	543.1	556.5
South Sudan	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
Sudan	1.0	2.9	1.4	1.8	1.4	5.8	3.2	6.2	10.3	10.9	12.5	5.3	7.1	7.6
Swaziland	0.0	0.0	0.5	0.0	0.0	0.3	1.0	1.0	1.7	0.4	0.9	0.6	0.3	0.7
Tanzania	1.9	0.0	1.2	2.3	0.0	1.8	1.8	1.0	1.0	1.7	2.0	3.8	11.7	3.7
Togo	0.2	0.7	0.0	1.4	0.0	0.1	0.7	0.1	0.1	0.6	0.8	0.0	0.3	3.0
Tunisia	77.6	115.2	121.5	130.3	172.6	183.1	211.5	182.7	202.2	222.5	209.8	294.7	340.8	355.5
Uganda	0.0	0.3	0.0	0.0	0.5	0.3	0.1	2.2	1.4	0.4	1.4	2.0	1.9	3.0
Western Sahara	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Zambia	0.4	1.3	1.7	1.5	0.3	0.9	0.4	0.2	1.6	1.3	1.3	2.1	0.8	1.1
Zimbabwe	3.1	2.0	1.8	5.1	1.0	2.7	1.1	2.0	1.5	6.3	1.2	5.0	5.7	3.8
Asia	38,646.1	41,500.9	54,400.6	60,647.4	64,986.5	66,981.9	69,681.1	72,265.7	74,661.2	73,441.9	77,639.7	81,047.5	76,598.4	78,970.1

## CHAPTER 5 | Academic Research and Development

Region, country, or economy	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Afghanistan	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	1.0	0.0	1.0
Bangladesh	42.8	33.0	36.2	47.4	55.2	76.0	64.5	88.1	85.1	93.9	125.6	123.2	130.8	276.3
Bhutan	0.0	0.7	0.3	1.3	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.3	1.5	1.0
Brunei	2.1	2.8	3.3	2.3	4.0	1.8	4.5	1.3	2.7	1.0	3.8	7.8	7.5	9.4
Burma	1.3	0.0	1.0	0.9	4.2	7.3	10.2	2.1	1.1	4.5	4.1	5.1	2.6	3.5
Cambodia	0.0	0.1	0.0	1.0	0.2	0.0	0.0	0.3	0.0	1.6	0.4	0.3	0.5	0.8
China	11,397.6	14,416.4	22,076.7	24,332.3	27,617.3	30,829.4	33,998.0	33,855.2	35,396.5	36,081.8	39,915.1	42,601.6	42,323.4	41,980.9
India	2,783.1	2,862.2	3,591.8	4,168.1	4,569.1	5,147.0	5,287.0	6,166.2	7,320.4	7,073.9	8,051.2	9,315.1	7,674.8	9,916.1
Indonesia	20.6	21.4	30.2	31.1	36.3	60.2	59.9	185.3	161.0	127.2	321.2	391.4	567.7	1,624.0
Japan	16,257.0	15,284.4	17,982.2	18,754.9	18,291.4	17,197.9	16,311.0	16,826.0	16,625.2	15,645.1	15,080.0	14,537.6	12,259.3	12,002.2
Kazakhstan	39.0	30.1	55.9	43.5	43.0	43.4	68.0	40.0	92.5	103.2	104.2	159.2	210.2	272.4
Kyrgyzstan	9.2	6.9	19.0	12.0	11.8	19.0	5.6	6.5	4.8	7.4	4.7	5.9	6.9	8.6
Laos	0.0	0.0	0.3	0.0	0.6	0.9	0.0	0.5	0.0	0.7	0.7	0.5	0.3	0.2
Malaysia	75.8	114.3	142.3	318.6	313.6	474.8	626.9	960.7	764.4	1,361.3	1,443.5	1,421.9	1,623.2	1,797.4
Maldives	0.4	0.1	0.0	0.0	0.0	0.1	0.0	0.7	0.1	1.0	0.0	0.2	0.0	0.0
Mongolia	3.9	2.6	5.3	10.7	3.8	2.6	25.5	14.2	22.0	20.8	10.6	17.5	17.6	6.8
Nepal	3.1	2.8	7.0	3.0	1.8	3.3	1.3	4.6	8.6	7.4	8.0	14.1	10.5	12.4
North Korea	0.3	1.0	3.8	4.7	1.7	1.3	2.3	3.1	1.7	3.6	5.2	3.9	12.9	9.3
Pakistan	70.4	70.4	123.5	165.1	241.2	299.8	285.7	328.9	389.4	407.8	494.6	532.7	598.5	725.1



## CHAPTER 5 | Academic Research and Development

[illegible]

## CHAPTER 5 | Academic Research and Development

Region, country, or economy	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Nauru	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
New Zealand	156.8	209.0	243.0	285.2	252.4	257.9	279.6	281.4	325.5	263.3	289.5	284.2	219.5	258.1
Niue	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Palau	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Samoa	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Solomon Islands	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.0	0.0	0.0	0.0
Tonga	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tuvalu	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Vanuatu	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Unassigned	319.6	273.8	330.8	351.7	422.2	314.9	175.3	168.1	132.6	154.3	479.5	132.6	131.7	278.4

na = not applicable; country data do not exist.

EU = European Union.

<sup>a</sup> Beginning in 2006, Serbia and Montenegro represented individual countries.

<sup>b</sup> Serbia and Montenegro represented a single country for data purposes from 1992 to 2006.

### Note(s)

Article counts refer to publications from a selection of journals, books, and conference proceedings in S&E from Scopus. Articles are classified by their year of publication and are assigned to a region, country, or economy on the basis of the institutional address(es) listed in the article. Articles are credited on a fractional-count basis. The sum of the regions, countries, or economies may not add to the world total because of rounding. Some publications have incomplete address information for coauthored publications in the Scopus database. The unassigned category count is the sum of fractional counts for publications that cannot be assigned to a region, country, or economy.

### Source(s)

National Science Foundation, National Center for Science and Engineering Statistics; SRI International; Science-Metrix; Elsevier, Scopus abstract and citation database, accessed July 2017.



CHAPTER 5 | **Academic Research and Development**

*Science and Engineering Indicators 2018*

## CHAPTER 5 | Academic Research and Development

## APPENDIX TABLE 5-39

## S&amp;E articles in psychology, by region, country, or economy: 2003–16

(Number)

Region, country, or economy	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
World	19,476.0	20,821.0	23,082.0	25,186.0	26,698.0	29,058.0	30,740.0	32,030.0	34,502.0	36,688.0	38,529.0	39,974.0	40,539.0	38,925.0
North America	10,620.3	11,153.9	12,433.6	13,445.7	13,512.5	14,310.7	15,115.3	15,598.0	16,227.0	16,990.6	17,331.5	18,272.9	17,818.3	16,679.9
Canada	1,082.8	1,210.3	1,294.0	1,447.7	1,578.7	1,628.6	1,761.1	1,822.6	1,836.7	2,010.7	2,111.5	2,145.9	2,154.4	2,154.6
Greenland	0.0	0.0	0.0	0.4	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mexico	63.0	64.3	63.3	91.8	108.2	99.3	120.9	134.7	155.2	127.1	147.7	138.8	151.4	132.2
United States	9,474.5	9,879.2	11,076.3	11,905.8	11,825.0	12,582.8	13,233.2	13,640.7	14,235.0	14,852.8	15,072.4	15,988.3	15,512.6	14,393.1
Central America and Caribbean	19.2	25.8	31.8	32.2	30.2	28.3	38.6	44.8	46.1	39.1	54.4	39.0	42.8	43.1
Antigua and Barbuda	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bahamas, The	1.4	1.0	1.0	0.2	1.8	1.0	1.7	3.6	0.0	0.8	2.2	0.2	1.1	0.4
Barbados	0.0	0.9	0.0	1.0	0.0	0.0	2.4	2.0	0.3	1.0	0.7	1.1	0.0	1.0
Belize	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Costa Rica	1.0	1.1	2.8	3.4	6.5	3.6	5.4	7.1	7.8	8.3	6.1	9.0	6.5	3.1
Cuba	1.1	3.7	2.7	0.3	4.4	5.1	2.4	3.4	8.3	5.7	8.7	4.7	4.4	5.2
Dominica	0.0	0.0	1.0	0.0	0.0	1.0	0.0	0.5	0.0	2.9	3.2	0.5	1.5	0.2
Dominican Republic	0.0	0.0	0.0	0.0	1.0	0.1	0.0	1.1	0.2	0.5	0.5	0.0	0.9	1.1
El Salvador	0.0	0.0	0.0	0.7	0.0	0.0	0.0	1.0	0.0	1.0	0.0	0.2	0.8	0.3

## CHAPTER 5 | Academic Research and Development

Region, country, or economy	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Grenada	0.0	0.5	0.0	0.2	0.0	0.0	0.0	0.3	0.0	0.0	3.0	0.9	1.0	0.5
Guatemala	0.0	0.4	0.5	1.5	0.7	1.0	0.6	0.5	0.0	1.3	0.2	2.1	2.6	0.5
Haiti	0.0	0.0	0.0	0.3	0.3	0.0	0.0	0.5	0.1	0.3	0.5	1.2	0.5	0.8
Honduras	0.0	0.6	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.3
Jamaica	1.5	1.2	1.3	1.2	1.8	2.4	5.5	2.6	5.3	1.2	5.7	4.3	3.5	3.2
Nicaragua	0.0	0.4	1.0	0.0	0.0	0.0	0.0	0.8	0.0	0.3	0.0	0.3	0.0	0.5
Panama	2.0	0.6	1.6	2.8	2.5	1.3	2.5	3.3	4.3	4.9	4.4	4.0	2.8	4.5
Puerto Rico	10.3	13.0	17.1	19.3	11.3	12.9	16.2	13.6	17.7	10.2	14.5	7.5	12.6	16.7
Saint Kitts and Nevis	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	1.3	0.7
Saint Lucia	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0
Saint Vincent and the Grenadines	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0
Trinidad and Tobago	1.9	1.9	2.0	1.5	0.0	0.0	1.9	4.1	2.1	0.8	4.7	2.8	2.7	4.3
South America	120.5	158.1	201.9	449.7	613.4	790.5	865.5	955.2	979.7	1,280.0	1,221.2	1,209.8	1,489.4	1,461.0
Argentina	25.0	33.9	27.4	34.7	44.9	73.6	92.8	106.5	99.6	140.1	131.4	129.8	152.3	151.1
Bolivia	0.0	0.0	0.8	0.0	1.0	0.3	0.1	0.3	1.6	0.2	0.2	0.7	0.8	1.2
Brazil	64.2	79.8	118.8	341.8	400.6	556.2	584.1	682.2	694.5	894.1	887.5	852.3	1,040.9	1,005.7
Chile	12.4	18.5	19.3	27.4	48.3	57.1	83.4	81.8	74.3	121.2	113.4	128.0	170.5	153.4
Colombia	12.9	13.5	16.0	29.0	98.1	78.2	82.1	60.9	82.1	95.0	71.5	70.2	75.0	103.7
Ecuador	0.0	1.4	0.0	0.4	0.3	0.4	1.1	0.7	0.9	3.0	0.0	0.3	5.2	7.7

## CHAPTER 5 | Academic Research and Development

Region, country, or economy	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Guyana	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.0	1.0
Paraguay	0.0	0.0	1.0	1.0	0.5	2.0	0.0	1.0	1.1	2.0	0.0	0.0	2.0	0.3
Peru	1.2	2.2	3.4	3.7	5.4	5.7	4.3	5.6	7.9	5.4	8.5	11.0	19.2	18.6
Suriname	0.0	0.0	0.8	0.8	1.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Uruguay	0.1	0.8	6.8	6.3	7.7	8.2	6.0	7.5	8.5	9.8	6.5	12.1	14.1	13.4
Venezuela	4.7	8.0	7.6	4.6	5.8	8.8	11.3	8.8	9.3	9.2	2.2	4.8	9.5	4.9
Europe	6,463.7	7,150.0	7,722.4	8,355.6	9,336.2	10,376.2	11,112.3	11,382.6	12,820.0	13,555.2	14,609.5	14,858.3	15,144.9	14,671.6
EU	6,019.3	6,674.8	7,200.4	7,762.1	8,633.5	9,550.0	10,159.7	10,461.1	11,852.5	12,528.6	13,486.6	13,633.7	13,778.9	13,189.4
Austria	73.5	87.7	82.1	86.2	90.5	128.7	136.1	140.9	178.2	203.6	193.5	215.5	242.4	187.1
Belgium	182.7	260.3	264.4	333.3	333.2	407.4	416.4	440.2	453.0	511.7	509.7	540.2	526.1	530.0
Bulgaria	3.4	1.7	1.4	6.3	4.7	4.2	6.7	3.6	5.7	12.8	10.1	10.0	7.7	4.3
Croatia	11.8	3.7	9.6	7.2	23.7	25.8	41.6	32.3	81.9	76.6	108.4	111.1	75.2	83.0
Cyprus	5.3	5.5	3.7	9.2	10.5	14.0	10.8	15.5	18.0	16.6	32.4	29.0	36.7	40.7
Czech Republic	59.8	80.2	76.5	105.1	111.2	106.8	90.7	112.4	110.9	130.8	156.7	124.2	187.1	150.1
Denmark	79.7	83.7	77.9	98.2	99.4	108.2	125.0	126.4	132.8	167.8	174.2	218.2	218.8	214.6
Estonia	13.5	13.6	9.9	8.6	19.3	12.4	16.7	22.5	16.9	40.7	39.5	29.0	32.3	32.3
Finland	128.7	164.5	137.2	149.3	162.9	164.4	198.7	178.5	228.5	213.9	224.5	269.2	282.3	265.8
France	786.9	913.7	936.1	936.0	1,059.5	1,117.2	1,166.7	1,157.1	1,247.3	1,244.7	1,316.4	1,267.6	1,259.1	1,150.9
Germany	1,030.7	1,078.2	1,231.1	1,327.0	1,445.6	1,657.0	1,723.4	1,753.8	1,939.2	2,080.1	2,179.3	2,291.1	2,198.5	2,267.9

## CHAPTER 5 | Academic Research and Development

Region, country, or economy	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Greece	42.0	48.3	62.3	70.9	71.8	88.0	87.6	115.9	124.9	120.5	144.5	129.4	142.4	122.3
Hungary	27.3	31.3	27.2	31.9	57.9	55.9	60.2	49.2	83.9	80.8	104.7	92.8	100.1	113.8
Ireland	35.9	60.3	59.8	59.7	74.9	88.4	90.1	95.8	112.1	142.1	155.3	148.3	149.9	147.3
Italy	293.1	329.8	321.0	397.3	462.1	542.9	620.5	634.5	814.2	914.3	984.6	1,006.1	1,192.4	1,094.6
Latvia	0.9	0.7	1.1	0.0	0.3	2.2	1.8	0.7	0.0	4.0	1.9	3.8	4.8	1.5
Lithuania	0.0	4.1	5.7	2.5	6.2	3.8	4.6	5.1	2.5	20.1	17.5	19.2	19.6	20.0
Luxembourg	2.7	0.0	2.4	3.0	3.5	3.3	3.7	8.8	12.6	11.9	20.7	15.0	14.9	21.0
Malta	0.0	1.1	1.9	2.4	1.6	1.5	4.0	4.9	2.5	6.6	3.9	7.7	6.9	3.5
Netherlands	590.4	655.5	720.0	775.3	885.5	1,066.9	1,121.7	1,207.9	1,252.4	1,270.8	1,199.0	1,320.8	1,218.5	1,156.2
Poland	30.2	32.1	53.1	33.5	62.3	56.7	55.5	62.4	137.7	164.3	274.9	282.7	371.9	325.0
Portugal	34.7	28.5	45.9	57.1	64.8	98.1	119.3	161.0	229.1	269.9	357.7	433.4	400.9	390.3
Romania	2.7	7.9	5.7	2.9	11.6	22.8	21.2	24.1	59.6	91.1	115.5	88.4	90.8	72.5
Slovakia	26.9	36.7	20.9	26.0	26.8	30.8	46.8	42.0	94.9	77.2	120.9	83.3	80.3	92.6
Slovenia	9.5	15.5	12.1	11.2	12.9	19.2	18.8	18.2	30.1	24.2	20.8	45.7	26.7	45.0
Spain	289.2	344.5	376.0	425.2	498.9	645.7	737.7	775.3	965.5	1,042.7	1,166.5	1,228.4	1,180.8	1,086.0
Sweden	255.4	231.1	272.4	314.0	338.2	333.7	332.9	308.6	353.3	385.1	415.2	464.6	495.3	439.9
United Kingdom	2,002.1	2,154.8	2,383.0	2,482.9	2,693.7	2,743.9	2,900.5	2,963.4	3,164.5	3,203.7	3,438.5	3,159.3	3,216.5	3,131.0
Other Europe	444.4	475.2	522.0	593.5	702.7	826.2	952.6	921.5	967.5	1,026.6	1,122.8	1,224.6	1,366.0	1,482.3
Albania	0.0	0.3	0.0	1.2	0.0	0.0	0.3	0.0	0.0	1.6	0.0	0.0	0.1	0.4

## CHAPTER 5 | Academic Research and Development

Region, country, or economy	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Andorra	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0
Belarus	0.0	0.0	1.5	0.0	2.0	2.0	2.2	0.0	0.0	0.0	0.0	1.0	2.7	1.0
Bosnia and Herzegovina	1.2	0.0	0.7	0.6	1.1	1.3	1.7	1.6	2.6	3.4	9.0	8.1	5.0	3.5
Holy See (Vatican City)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Iceland	9.2	13.1	3.0	14.1	9.7	16.8	18.4	17.9	14.3	11.0	19.6	19.1	20.4	17.0
Kosovo	0.0	0.0	0.0	0.0	0.0	0.0	1.0	1.0	1.6	0.0	0.0	0.0	0.5	3.8
Liechtenstein	0.0	0.0	1.0	0.7	0.0	0.0	0.0	0.0	0.0	1.0	0.5	1.1	0.0	0.0
Macedonia	0.0	0.0	1.3	1.2	1.5	2.0	1.2	1.1	1.2	0.3	1.2	2.1	4.8	2.4
Moldova	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	1.0	1.1	0.0	0.0	0.0	0.0
Monaco	0.0	0.0	0.0	0.0	0.5	0.0	0.0	1.0	0.0	2.1	0.0	0.2	0.0	0.1
Montenegro <sup>a</sup>	na	na	na	na	0.0	1.0	0.0	0.0	1.0	0.1	1.0	0.4	1.3	2.0
Norway	124.8	120.0	126.2	160.2	167.3	200.3	233.8	258.5	288.8	277.5	313.0	358.0	376.5	286.8
Russia	77.0	83.8	79.7	86.0	92.3	79.9	101.5	87.2	75.8	102.2	85.7	120.6	173.1	403.3
San Marino	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Serbia <sup>a</sup>	na	na	na	na	39.2	38.6	37.7	27.4	33.7	38.9	39.5	56.9	51.2	60.7
Serbia and Montenegro <sup>b</sup>	2.7	3.9	5.7	3.7	na	na	na	na	na	na	na	na	na	na
Switzerland	164.4	180.6	208.9	216.9	263.2	339.6	363.4	364.0	384.1	413.3	442.8	462.4	484.3	464.6
Turkey	64.1	70.6	92.8	106.7	124.6	142.4	186.5	157.3	155.2	170.0	204.7	186.0	237.5	229.6
Ukraine	1.0	2.4	1.2	2.2	1.2	2.3	4.9	4.7	8.2	4.2	6.0	8.3	8.9	7.2



## CHAPTER 5 | Academic Research and Development

Region, country, or economy	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Middle East	313.8	298.6	342.3	374.6	413.0	480.7	426.7	478.3	552.6	625.2	611.3	692.6	774.7	835.3
Armenia	1.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.7	0.2	0.5	2.6	2.9	0.0
Azerbaijan	0.0	0.1	0.5	0.0	0.0	1.3	0.0	0.5	0.0	0.0	0.0	0.3	0.0	1.8
Bahrain	2.3	0.7	2.0	2.5	1.0	2.5	1.2	1.5	1.0	0.0	0.6	3.7	1.7	0.1
Gaza Strip	0.7	0.3	1.0	0.8	0.0	1.8	0.0	3.0	0.9	1.7	0.5	1.0	0.4	1.2
Georgia	1.0	0.6	0.3	0.4	0.6	1.2	2.3	3.9	2.6	2.2	1.3	2.0	3.4	7.3
Iran	16.7	16.8	18.8	30.6	33.4	43.8	37.5	46.4	61.5	62.1	70.2	93.2	132.7	148.1
Iraq	0.0	1.2	1.8	1.0	1.0	0.5	0.9	0.1	0.2	2.0	0.3	1.6	1.1	2.6
Israel	251.2	236.4	261.3	284.1	325.3	375.1	347.3	358.7	421.4	487.1	440.4	485.0	518.8	573.9
Jordan	4.5	2.8	6.5	6.1	6.5	1.5	6.3	11.2	8.0	7.9	18.1	14.4	15.3	10.7
Kuwait	16.3	19.8	22.4	30.5	16.9	21.8	14.2	12.6	11.4	17.1	11.9	9.3	10.9	4.5
Lebanon	0.9	2.5	9.8	6.3	9.7	9.3	3.4	9.0	10.3	8.3	10.3	17.6	15.0	16.0
Oman	1.5	0.5	0.0	0.0	2.8	3.5	1.3	0.5	6.1	1.0	8.6	2.8	6.9	10.0
Qatar	0.0	1.0	1.5	2.0	1.9	2.0	0.5	2.5	2.2	8.6	5.3	4.2	4.4	6.8
Saudi Arabia	11.3	7.7	9.0	5.5	5.5	5.4	4.5	13.9	12.6	7.5	19.8	33.4	35.5	28.2
Syria	0.0	0.0	0.0	1.3	0.0	0.0	0.0	0.0	0.0	0.0	1.5	1.0	0.0	0.0
United Arab Emirates	6.4	8.2	7.5	2.8	4.5	8.1	6.3	14.6	12.8	16.8	21.0	18.4	24.9	23.1
West Bank	0.1	0.0	0.0	0.7	4.0	1.0	1.0	0.0	1.0	0.8	0.8	2.2	1.0	0.8
Yemen	0.0	0.0	0.0	0.1	0.0	1.0	0.0	0.0	0.0	2.0	0.0	0.0	0.0	0.2

## CHAPTER 5 | Academic Research and Development

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## CHAPTER 5 | Academic Research and Development

Region, country, or economy	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Ethiopia	0.0	1.0	0.0	0.6	0.0	0.6	0.5	1.6	0.7	2.4	0.6	5.0	1.9	4.0
Gabon	0.3	0.4	2.9	1.7	1.1	1.0	0.3	0.8	0.1	0.4	0.0	0.8	0.0	0.9
Gambia, The	0.0	0.0	0.5	0.7	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0
Ghana	2.8	2.0	1.0	2.8	1.2	2.1	2.7	4.9	3.1	3.8	5.5	6.3	8.1	8.8
Guinea	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.8	0.3	0.0	0.0	0.0	0.0	0.0
Guinea-Bissau	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Kenya	2.8	3.8	4.1	6.0	4.2	6.4	7.0	6.7	2.9	10.8	12.1	11.5	8.2	9.3
Lesotho	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.0	0.0	0.6	0.0	0.0	0.0
Liberia	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	1.0	0.0	0.0	0.3
Libya	0.0	0.0	0.3	0.5	0.5	0.0	0.7	0.0	0.0	5.3	1.1	0.1	1.5	0.0
Madagascar	1.2	0.4	0.5	1.9	1.5	0.9	0.3	0.7	2.2	0.7	3.2	5.4	3.6	0.4
Malawi	0.0	0.2	0.0	0.0	0.0	1.7	1.4	0.9	0.5	1.0	0.0	0.0	0.1	1.3
Mali	0.0	0.0	0.3	0.0	0.2	0.0	0.0	0.1	1.0	0.4	0.0	0.2	0.0	1.0
Mauritania	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
Mauritius	0.0	0.0	0.0	1.0	0.0	1.0	1.0	1.3	0.5	1.6	0.6	2.5	3.3	2.0
Morocco	0.0	1.0	1.0	1.2	1.3	2.6	0.6	8.0	6.8	4.8	5.6	3.3	2.9	3.0
Mozambique	1.0	1.0	0.0	0.0	0.2	0.0	0.0	0.2	0.3	0.9	0.0	0.5	0.7	0.6
Namibia	0.0	0.1	0.3	0.0	0.0	0.0	0.0	1.5	0.5	1.8	0.2	0.6	1.7	0.0
Niger	0.2	0.0	0.0	0.0	0.0	1.0	0.3	0.7	0.0	0.1	0.0	0.5	0.5	0.0

## CHAPTER 5 | Academic Research and Development

Region, country, or economy	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Nigeria	5.0	10.3	6.7	18.7	11.0	9.5	18.4	12.7	21.6	19.7	17.5	22.4	27.0	29.8
Rwanda	0.0	0.0	0.8	0.4	0.6	0.5	0.4	1.0	0.8	1.6	0.3	0.3	1.1	2.4
São Tomé and Príncipe	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Senegal	1.0	0.0	1.0	0.0	0.0	0.0	1.3	1.1	1.8	3.3	0.5	0.3	1.1	0.1
Seychelles	0.0	0.2	0.0	0.0	1.5	0.0	0.3	0.1	0.0	0.0	0.2	0.0	0.0	0.0
Sierra Leone	0.0	0.0	0.0	0.0	0.0	0.7	0.0	0.0	0.0	0.0	0.3	0.1	0.5	0.2
Somalia	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.0	0.0	0.0	0.0	0.0	0.0
South Africa	106.9	100.5	105.7	147.2	124.2	186.9	174.1	186.1	217.4	263.4	295.5	196.0	275.4	225.8
South Sudan	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sudan	0.0	0.0	1.0	0.3	0.0	1.8	1.0	0.0	0.5	1.0	1.0	0.1	0.7	0.4
Swaziland	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.3	0.0	2.8	1.1	1.0	0.9	0.0
Tanzania	0.3	0.5	0.3	2.6	0.5	2.2	1.2	4.0	2.7	2.9	2.7	5.0	2.5	1.9
Togo	0.0	0.0	1.9	0.0	0.0	0.0	0.2	0.5	0.0	0.0	2.0	0.2	0.0	0.6
Tunisia	0.8	1.0	3.3	3.3	1.8	3.0	2.4	12.9	4.1	5.6	7.5	11.7	10.4	10.1
Uganda	0.9	1.4	1.3	4.0	2.1	3.3	4.5	4.1	5.1	6.8	5.9	6.9	4.9	8.5
Western Sahara	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Zambia	0.0	0.0	0.0	1.3	2.1	1.9	0.2	1.4	2.3	0.0	0.4	4.2	0.9	2.2
Zimbabwe	0.6	0.0	0.8	2.0	3.3	2.8	1.6	2.7	1.8	4.2	4.3	2.1	2.6	4.3
Asia	685.0	800.7	931.6	963.6	1,188.8	1,245.9	1,447.2	1,679.6	1,872.3	2,077.2	2,191.4	2,438.4	2,736.0	2,790.8

## CHAPTER 5 | Academic Research and Development

Region, country, or economy	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Afghanistan	0.0	0.3	0.0	0.5	0.0	0.0	0.2	0.0	0.5	0.2	0.0	0.3	0.0	0.0
Bangladesh	1.3	1.2	0.2	0.5	2.4	0.8	2.0	4.7	4.3	2.6	2.2	3.5	4.1	6.2
Bhutan	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Brunei	0.0	0.5	0.0	0.0	3.0	0.0	0.0	0.0	1.0	0.2	0.5	0.0	0.0	2.9
Burma	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.7
Cambodia	0.0	0.0	0.0	0.3	0.0	0.5	0.0	0.3	1.6	0.0	0.3	0.8	0.7	1.2
China	149.6	177.0	161.8	197.5	234.7	284.1	385.4	418.7	481.8	634.0	666.3	833.9	1,039.7	1,098.0
India	35.3	47.8	40.6	63.6	63.1	63.0	61.0	89.4	141.2	149.9	145.7	188.9	233.0	214.3
Indonesia	1.3	2.3	1.6	3.9	3.8	3.1	7.9	93.4	3.4	18.3	15.2	13.9	15.9	15.1
Japan	313.0	391.8	499.8	419.7	510.6	477.8	521.0	544.8	543.1	555.5	565.2	546.1	550.8	568.0
Kazakhstan	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.6	0.2	1.1	0.7	6.6	0.8	1.6
Kyrgyzstan	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.3	0.5	0.0	0.0	1.0	0.3	0.7
Laos	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.8	0.0	1.3	0.0	0.6	0.0
Malaysia	7.0	9.0	5.9	14.5	3.1	8.7	12.4	20.5	36.9	54.4	50.2	66.6	64.6	69.9
Maldives	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0
Mongolia	0.0	0.0	0.0	0.1	0.0	0.0	0.3	0.4	0.0	0.0	0.8	0.0	0.2	0.2
Nepal	0.5	1.2	0.9	0.3	0.5	0.2	0.7	0.8	0.3	0.3	0.3	2.2	1.2	1.2
North Korea	0.0	0.0	0.5	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pakistan	1.6	4.1	1.8	6.2	5.5	7.1	5.2	6.8	14.4	6.4	16.2	17.3	23.4	51.5

## CHAPTER 5 | Academic Research and Development

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## CHAPTER 5 | Academic Research and Development

Region, country, or economy	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Nauru	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
New Zealand	145.6	183.6	164.4	210.4	186.7	211.0	210.5	239.5	286.6	249.8	265.3	249.7	237.7	254.7
Niue	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Palau	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Samoa	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0
Solomon Islands	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0
Tonga	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.3	0.0	0.0	0.0
Tuvalu	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Vanuatu	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0
Unassigned	318.5	178.6	229.5	239.1	259.1	256.0	133.6	118.4	111.8	100.3	147.8	90.1	46.2	30.4

na = not applicable; country data do not exist.

EU = European Union.

<sup>a</sup> Beginning in 2006, Serbia and Montenegro represented individual countries.

<sup>b</sup> Serbia and Montenegro represented a single country for data purposes from 1992 to 2006.

### Note(s)

Article counts refer to publications from a selection of journals, books, and conference proceedings in S&E from Scopus. Articles are classified by their year of publication and are assigned to a region, country, or economy on the basis of the institutional address(es) listed in the article. Articles are credited on a fractional-count basis. The sum of the regions, countries, or economies may not add to the world total because of rounding. Some publications have incomplete address information for coauthored publications in the Scopus database. The unassigned category count is the sum of fractional counts for publications that cannot be assigned to a region, country, or economy.

### Source(s)

National Science Foundation, National Center for Science and Engineering Statistics; SRI International; Science-Metrix; Elsevier, Scopus abstract and citation database, accessed July 2017.



**CHAPTER 5 | Academic Research and Development**

*Science and Engineering Indicators 2018*



## CHAPTER 5 | Academic Research and Development

## APPENDIX TABLE 5-40

## S&amp;E articles in social sciences, by region, country, or economy: 2003–16

(Number)

Region, country, or economy	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
World	45,782.0	49,293.0	53,975.0	57,627.0	63,319.0	70,460.0	79,167.0	88,162.0	97,400.0	105,265.0	114,848.0	121,263.0	121,957.0	122,483.0
North America	20,294.2	21,463.1	23,329.4	24,159.4	25,506.6	27,122.4	29,581.3	31,956.8	33,231.3	34,021.6	35,346.8	36,861.0	36,591.1	34,806.8
Canada	2,283.8	2,469.4	2,700.3	2,910.6	3,138.6	3,308.2	3,531.0	4,075.3	4,053.7	4,039.4	4,447.6	4,427.9	4,623.8	4,356.4
Greenland	1.0	0.0	1.0	0.3	0.3	0.0	1.0	1.8	0.3	3.0	2.4	2.0	4.5	2.7
Mexico	169.8	174.1	213.3	230.0	258.1	345.7	430.4	406.9	478.3	636.2	694.2	877.0	866.4	838.7
United States	17,839.6	18,819.5	20,414.7	21,018.5	22,109.6	23,468.5	25,618.8	27,472.8	28,699.0	29,343.0	30,202.5	31,554.1	31,096.5	29,609.0
Central America and Caribbean	62.9	62.0	61.7	86.6	98.4	115.6	115.1	110.7	122.0	132.0	171.3	148.3	132.5	168.7
Antigua and Barbuda	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	1.6	1.1	0.1
Bahamas, The	1.0	0.0	1.0	0.0	0.0	1.5	0.7	1.0	0.0	0.6	0.7	0.2	0.8	2.5
Barbados	4.8	2.8	5.5	8.3	8.1	8.2	9.3	10.0	8.5	11.2	16.5	10.5	12.6	7.8
Belize	1.6	0.0	0.0	0.7	0.3	0.0	1.8	1.2	1.1	0.3	1.9	0.4	0.7	1.3
Costa Rica	6.5	7.8	11.4	10.7	8.3	14.0	11.4	15.6	16.1	24.1	23.8	25.6	26.3	35.1
Cuba	9.4	6.8	11.5	9.5	12.4	10.1	18.2	10.1	19.3	11.2	27.4	24.6	14.9	21.3
Dominica	1.0	0.3	2.0	2.1	1.5	3.0	3.5	2.3	1.0	1.0	0.5	2.3	1.3	0.3
Dominican Republic	1.5	1.1	0.5	1.5	1.5	1.9	0.2	2.3	2.0	4.6	7.3	5.4	3.6	3.3
El Salvador	0.0	0.5	1.9	2.8	0.0	0.0	0.0	1.8	0.5	1.2	0.8	1.0	0.9	2.6

## CHAPTER 5 | Academic Research and Development

Region, country, or economy	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Grenada	1.0	0.0	0.1	0.0	0.0	0.0	0.3	0.0	1.7	0.9	0.3	1.0	1.0	0.0
Guatemala	1.7	2.7	2.0	3.6	4.1	3.6	7.5	4.5	3.7	5.9	12.3	10.2	11.7	13.0
Haiti	0.0	1.2	0.5	3.0	0.0	0.0	0.8	1.2	1.0	1.1	1.0	1.9	2.3	0.5
Honduras	0.4	2.0	0.5	0.9	0.0	1.4	0.3	2.2	3.8	3.1	1.8	4.8	1.0	2.3
Jamaica	8.0	15.6	8.7	14.8	26.1	29.1	15.6	18.8	20.0	19.8	14.6	12.8	17.3	19.3
Nicaragua	2.5	2.5	1.5	2.5	4.9	3.1	1.5	5.6	2.7	4.1	2.9	3.7	3.5	2.8
Panama	2.3	1.3	3.9	2.0	3.9	0.8	1.5	3.6	2.6	4.0	4.5	2.0	4.1	10.0
Puerto Rico	16.0	10.2	5.3	13.2	15.4	21.4	23.1	16.0	14.2	15.9	25.5	25.0	18.5	24.5
Saint Kitts and Nevis	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.5	0.0
Saint Lucia	0.7	0.0	0.3	1.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.2
Saint Vincent and the Grenadines	1.0	0.0	0.0	0.0	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Trinidad and Tobago	3.7	7.3	5.0	10.1	11.2	17.5	19.6	14.8	23.0	23.0	28.2	15.3	10.3	21.8
South America	462.9	627.5	611.9	826.9	1,459.3	1,801.0	2,230.8	2,681.6	3,009.0	3,591.0	4,023.1	4,668.1	4,913.6	5,540.9
Argentina	124.1	131.1	122.1	120.5	181.6	257.1	345.3	376.4	466.7	582.6	604.9	828.2	839.0	793.1
Bolivia	1.6	7.5	4.0	5.0	5.1	8.4	9.4	8.1	11.6	10.7	13.1	7.0	8.1	13.7
Brazil	177.5	251.4	267.2	462.5	804.2	929.7	1,131.6	1,442.9	1,557.2	1,886.4	2,017.8	2,342.6	2,364.1	2,929.4
Chile	70.0	154.8	108.9	143.8	278.2	374.6	405.8	457.7	570.0	597.6	736.2	780.6	945.5	944.5
Colombia	32.5	26.1	31.2	38.3	77.2	87.6	184.2	212.6	234.1	297.5	414.1	448.5	485.0	574.3
Ecuador	1.7	6.0	6.3	4.7	1.9	6.2	11.8	7.5	10.1	14.0	28.5	39.3	67.4	93.2

## CHAPTER 5 | Academic Research and Development

Region, country, or economy	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Guyana	0.5	1.8	1.3	0.0	1.5	3.5	1.8	4.7	2.1	2.0	2.3	1.2	1.9	0.0
Paraguay	1.0	2.0	0.0	1.0	1.0	1.0	0.8	3.2	3.3	7.8	4.3	1.0	4.8	1.2
Peru	8.7	14.7	16.1	15.9	20.2	17.1	24.5	30.4	53.1	56.1	63.5	74.1	71.9	76.4
Suriname	0.0	0.3	1.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	1.1	0.7	2.2	0.0
Uruguay	13.8	10.6	8.5	11.3	16.4	23.6	26.6	25.5	37.3	42.2	44.4	62.0	52.4	67.1
Venezuela	31.6	21.3	45.3	24.0	71.9	92.2	89.1	112.5	62.4	94.0	92.9	83.0	71.3	47.9
Europe	18,448.1	20,010.1	21,977.7	23,538.7	26,289.4	29,288.0	33,935.4	38,016.0	44,062.8	48,417.9	53,301.3	55,406.2	56,179.7	56,761.6
EU	17,263.5	18,676.7	20,384.4	21,865.4	24,284.0	26,970.4	31,193.5	34,667.4	40,078.3	43,910.7	47,438.1	48,953.5	48,874.8	49,245.8
Austria	234.4	301.7	283.3	339.5	343.6	443.0	492.8	533.0	600.0	724.1	786.9	815.4	836.1	888.7
Belgium	513.7	577.1	607.8	617.3	688.0	752.1	921.8	1,067.9	1,218.6	1,335.9	1,531.8	1,474.0	1,381.0	1,365.1
Bulgaria	19.2	14.6	12.2	21.4	27.0	31.4	51.9	45.4	58.5	52.2	72.1	76.3	67.2	107.4
Croatia	207.2	190.4	241.5	261.2	381.6	506.9	549.6	680.9	740.5	632.4	788.5	683.2	696.0	677.0
Cyprus	20.8	22.6	21.5	25.8	31.1	48.7	52.8	52.3	82.1	77.3	105.2	95.7	109.4	106.8
Czech Republic	234.2	227.5	232.5	267.9	319.6	380.7	445.2	530.9	700.2	816.9	952.8	1,146.9	1,431.7	1,305.7
Denmark	285.0	312.6	363.2	354.4	408.0	471.0	557.6	597.8	812.3	818.9	847.9	904.1	1,032.5	997.7
Estonia	34.5	38.0	35.9	39.4	40.0	67.0	96.2	134.0	127.6	114.9	189.6	185.6	229.0	206.3
Finland	295.0	286.7	331.0	322.7	357.7	449.8	491.9	532.9	608.7	657.8	694.9	817.3	787.1	876.9
France	2,541.6	2,808.2	2,795.4	2,936.0	3,216.7	3,429.0	4,044.4	4,359.9	4,707.9	4,955.9	5,179.7	5,113.2	4,995.5	4,990.9
Germany	1,978.2	2,184.4	2,379.3	2,624.3	2,735.7	2,958.3	3,533.8	3,857.2	4,483.0	4,942.8	5,265.8	5,759.9	5,847.9	5,866.7

## CHAPTER 5 | Academic Research and Development

Region, country, or economy	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Greece	258.1	283.8	306.3	327.3	332.8	417.7	469.2	524.2	563.6	566.1	630.8	641.6	535.6	594.3
Hungary	139.2	137.2	110.9	162.9	275.1	339.4	335.5	314.8	403.5	472.6	454.3	517.6	496.7	447.3
Ireland	190.8	234.5	242.9	288.8	353.7	370.1	429.2	518.6	603.5	565.8	611.1	637.5	606.2	649.1
Italy	814.9	937.6	996.1	1,062.7	1,272.9	1,521.3	1,861.2	2,167.9	2,501.2	3,114.1	3,532.7	3,919.5	4,022.5	4,216.1
Latvia	4.3	6.4	7.7	12.5	30.4	22.8	13.0	35.5	32.4	46.6	41.5	65.4	65.9	83.7
Lithuania	18.1	45.0	141.1	168.1	173.9	411.5	379.3	470.7	443.6	421.3	386.1	500.4	363.2	413.0
Luxembourg	4.5	10.2	10.0	20.6	19.8	13.2	33.5	40.3	51.0	50.0	68.7	77.6	67.7	97.3
Malta	7.0	8.6	10.8	12.5	12.8	15.5	12.3	17.6	19.6	28.7	21.5	27.8	29.9	30.6
Netherlands	971.2	1,089.3	1,147.0	1,295.9	1,542.5	1,661.4	1,881.2	2,106.8	2,182.1	2,455.8	2,509.0	2,660.5	2,554.9	2,558.0
Poland	149.5	187.3	175.2	262.0	242.4	334.3	451.4	496.7	611.1	655.6	835.0	1,090.4	1,133.3	1,356.5
Portugal	140.1	157.0	195.7	232.2	293.8	330.6	354.3	428.2	592.3	693.3	775.9	837.4	817.2	969.5
Romania	54.3	33.9	43.4	87.0	73.0	318.6	705.4	805.3	1,305.9	1,263.6	1,467.7	1,301.8	1,338.8	1,024.6
Slovakia	165.7	168.8	153.0	158.0	166.0	206.5	208.9	223.9	219.3	267.3	377.9	414.3	449.9	590.9
Slovenia	150.3	150.5	181.2	193.2	280.8	301.0	353.2	401.9	546.6	596.0	598.2	723.5	554.2	597.8
Spain	878.1	978.4	1,031.1	1,193.3	1,373.8	1,671.5	2,072.7	2,290.9	3,076.9	3,822.3	4,248.0	4,607.0	4,199.5	4,396.7
Sweden	502.5	509.9	605.4	668.7	712.2	875.1	905.7	1,003.3	1,154.3	1,332.1	1,442.3	1,515.5	1,523.6	1,468.8
United Kingdom	6,451.2	6,774.8	7,722.9	7,909.8	8,579.2	8,621.9	9,489.3	10,428.6	11,631.8	12,430.3	13,022.2	12,344.2	12,702.5	12,362.3
Other Europe	1,184.5	1,333.5	1,593.3	1,673.3	2,005.5	2,317.6	2,741.9	3,348.6	3,984.5	4,507.2	5,863.3	6,452.7	7,304.9	7,515.8
Albania	5.0	3.5	2.3	4.6	1.3	3.8	6.0	11.9	20.1	43.8	187.7	188.8	105.7	19.0

## CHAPTER 5 | Academic Research and Development

Region, country, or economy	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Andorra	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.9	1.7	0.3	0.4
Belarus	2.5	6.4	4.8	7.7	7.4	11.1	7.3	12.3	5.0	7.3	8.0	16.9	16.8	12.4
Bosnia and Herzegovina	2.3	5.7	12.2	11.4	14.3	15.5	32.2	43.4	30.0	29.3	46.3	39.0	41.2	43.7
Holy See (Vatican City)	0.0	0.0	0.0	0.0	0.0	1.0	2.0	0.0	0.0	1.0	2.7	1.0	1.5	0.0
Iceland	20.6	16.0	15.0	16.5	23.9	26.4	31.4	34.9	54.0	50.8	49.3	36.6	52.6	49.7
Kosovo	0.0	0.0	0.0	0.0	0.0	0.3	2.8	2.3	5.8	5.2	7.6	8.1	9.9	6.7
Liechtenstein	0.0	0.0	1.5	0.5	0.3	1.0	1.3	1.8	2.0	1.0	1.0	1.8	1.3	3.1
Macedonia	1.2	2.1	3.3	3.9	4.8	7.4	17.3	5.7	20.9	28.9	42.3	36.3	35.8	46.4
Moldova	1.0	0.5	1.5	3.1	4.2	3.0	10.0	2.6	10.3	15.0	24.7	32.6	8.1	22.3
Monaco	0.0	0.3	1.0	0.0	1.5	0.1	1.0	0.0	1.1	0.8	2.3	2.0	0.0	1.2
Montenegro <sup>a</sup>	na	na	na	na	2.8	2.5	1.0	2.8	2.9	3.0	12.5	32.8	15.8	40.6
Norway	339.2	392.3	471.1	514.3	575.8	639.6	685.6	776.1	947.7	934.5	962.4	1,028.2	1,047.1	1,016.8
Russia	158.3	157.7	179.3	212.5	218.2	257.9	328.2	392.7	568.9	862.1	1,645.8	1,968.8	2,737.9	3,082.8
San Marino	0.0	0.0	0.0	0.0	0.0	1.3	0.5	0.7	0.0	2.5	0.6	0.5	1.0	0.0
Serbia <sup>a</sup>	na	na	na	na	53.3	62.6	87.7	118.4	179.3	192.5	215.6	283.8	280.7	290.9
Serbia and Montenegro <sup>b</sup>	11.0	16.6	12.9	17.7	na	na	na	na	na	na	na	na	na	na
Switzerland	385.0	420.9	497.2	489.6	606.1	710.3	785.9	938.6	998.1	1,123.5	1,117.7	1,273.6	1,294.1	1,285.4
Turkey	244.1	267.5	366.5	359.1	472.8	549.5	704.9	961.9	1,080.1	1,135.8	1,205.9	1,177.1	1,284.4	1,359.5
Ukraine	14.3	44.0	24.7	32.5	19.0	24.3	36.8	42.6	58.2	70.4	330.2	323.2	370.5	235.0

## CHAPTER 5 | Academic Research and Development

Region, country, or economy	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Middle East	673.2	765.2	747.2	857.2	924.2	1,083.7	1,290.5	1,412.4	2,023.5	2,254.7	2,454.7	2,110.5	2,450.7	2,414.1
Armenia	8.3	8.1	7.5	16.8	18.7	4.3	20.8	13.5	19.0	17.5	24.8	19.5	18.9	40.2
Azerbaijan	2.0	1.0	2.7	1.0	2.5	3.0	1.2	7.7	5.9	11.3	18.7	18.9	27.4	18.1
Bahrain	1.5	2.9	2.0	6.3	1.0	5.2	4.5	6.5	9.0	8.3	10.7	12.3	9.1	11.4
Gaza Strip	0.0	0.5	0.0	1.0	2.0	1.5	0.7	1.4	2.8	2.0	0.7	4.3	0.0	2.3
Georgia	10.6	3.9	8.5	9.3	5.5	16.4	15.1	15.9	14.3	16.0	22.1	20.4	22.0	29.4
Iran	18.1	34.8	37.1	49.4	72.7	84.7	132.4	191.3	653.9	786.8	800.6	408.2	623.5	420.5
Iraq	0.5	4.5	3.3	3.9	3.3	8.0	9.2	4.4	9.2	10.7	15.1	14.2	21.4	14.3
Israel	535.1	593.7	548.3	635.5	671.1	753.9	874.0	888.5	924.9	983.0	1,029.6	1,077.1	1,157.0	1,176.4
Jordan	20.8	18.8	20.9	20.1	30.9	32.1	38.8	53.9	76.2	74.9	81.4	78.5	76.4	75.7
Kuwait	9.4	20.3	11.6	17.7	20.3	25.0	22.4	24.5	26.3	28.9	31.7	33.4	28.3	42.3
Lebanon	33.2	28.4	26.7	29.0	23.6	40.8	44.0	52.8	49.8	60.6	80.7	90.1	93.6	79.8
Oman	5.2	2.5	4.5	5.1	3.1	8.0	15.5	14.6	20.8	13.5	25.9	27.2	47.2	83.5
Qatar	0.0	2.3	3.9	2.3	7.9	5.5	10.7	14.0	28.3	31.9	50.0	57.9	61.0	79.3
Saudi Arabia	9.5	19.3	16.8	14.0	21.5	14.7	31.4	37.2	65.4	101.0	137.9	131.0	108.6	152.8
Syria	0.8	1.9	4.2	3.0	3.4	3.5	4.5	8.9	10.4	7.3	12.7	1.6	11.3	9.4
United Arab Emirates	15.6	18.1	40.9	38.9	31.8	65.8	56.2	70.7	99.6	87.3	98.8	104.2	137.2	167.6
West Bank	2.5	2.6	6.8	3.0	4.5	9.4	7.0	4.1	6.3	10.4	7.9	7.5	4.5	9.2
Yemen	0.0	1.5	1.5	1.0	0.5	2.0	2.1	2.5	1.4	3.5	5.5	4.1	3.2	2.0

## CHAPTER 5 | Academic Research and Development

Region, country, or economy	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Africa	779.9	994.1	1,043.4	1,084.5	1,133.3	1,431.1	1,540.6	1,887.3	2,206.7	2,512.4	3,368.0	4,733.1	3,361.3	3,311.0
Algeria	4.0	10.8	8.4	10.4	13.2	17.3	18.9	11.6	26.8	29.5	40.9	43.1	45.3	49.0
Angola	0.0	2.0	2.7	1.5	1.8	0.0	0.0	2.5	0.0	0.9	2.0	3.5	2.9	4.5
Benin	3.5	6.4	0.9	1.6	5.2	5.3	5.0	7.5	3.6	6.7	7.8	4.8	14.9	7.1
Botswana	21.2	20.9	23.8	31.0	19.0	26.6	18.2	24.4	34.9	29.6	32.4	28.8	28.9	16.1
Burkina Faso	5.8	7.5	5.2	5.9	9.4	3.3	3.9	7.1	12.2	12.0	7.7	7.1	9.5	15.5
Burundi	0.0	1.0	0.0	1.8	1.0	0.6	0.5	1.8	2.1	1.5	2.2	3.4	0.7	0.2
Cameroon	10.2	17.6	23.0	26.1	31.8	24.7	24.8	12.1	40.7	29.8	42.7	51.0	37.0	41.6
Cape Verde	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.5	0.0	2.9	0.2	1.3	0.0
Central African Republic	0.0	0.0	1.2	0.0	1.0	0.8	2.0	0.1	1.2	0.0	0.7	1.7	2.0	0.8
Chad	1.0	0.0	0.7	0.0	0.0	0.3	1.0	0.3	1.3	0.0	0.0	0.2	0.8	1.0
Comoros	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.3
Congo, Democratic Republic of the	0.0	0.8	0.5	1.4	1.0	1.7	3.4	4.8	1.6	3.9	6.2	6.1	5.9	8.5
Congo, Republic of the	0.0	0.0	2.5	1.0	1.5	4.5	0.2	4.3	3.3	2.0	2.8	1.3	5.6	3.6
Côte d'Ivoire	3.8	2.2	2.3	5.7	5.5	3.0	4.3	10.8	8.3	12.7	9.0	5.0	15.6	16.7
Djibouti	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.6	0.0
Egypt	24.0	24.6	32.4	26.6	42.1	46.2	59.7	81.0	138.8	168.4	283.1	205.5	148.3	161.5
Equatorial Guinea	0.0	0.3	0.0	0.0	0.3	0.0	1.0	1.5	0.0	0.0	0.0	0.0	0.3	3.0
Eritrea	3.0	1.6	2.7	1.2	4.6	2.3	1.2	1.5	2.0	1.0	2.1	1.3	0.0	1.6

## CHAPTER 5 | Academic Research and Development

Region, country, or economy	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Ethiopia	15.0	18.7	11.2	21.6	22.4	34.9	35.1	37.8	37.8	41.6	66.0	73.3	58.5	72.8
Gabon	1.3	1.0	2.0	1.4	1.2	4.9	1.0	1.6	1.2	1.7	0.0	0.0	2.3	0.3
Gambia, The	0.2	2.3	1.5	1.6	1.0	0.5	1.0	2.4	0.3	0.7	0.4	2.1	1.4	0.0
Ghana	13.9	35.3	29.3	24.0	46.2	40.3	41.4	48.0	64.6	85.7	117.5	125.7	127.8	153.6
Guinea	0.0	0.2	0.0	0.5	0.3	0.5	0.2	0.0	0.0	0.5	0.9	0.3	0.2	0.3
Guinea-Bissau	0.0	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.0	0.1	0.0	0.2	0.5
Kenya	36.4	33.2	49.5	39.8	53.2	69.8	66.4	72.6	85.0	86.4	114.3	136.8	105.0	86.1
Lesotho	2.0	2.5	0.7	4.5	3.0	4.0	2.0	2.0	1.7	5.7	3.8	2.4	6.4	11.1
Liberia	0.0	0.0	0.0	1.4	1.0	1.5	2.0	0.0	0.3	3.0	1.6	3.8	2.9	2.6
Libya	2.0	0.5	4.0	3.5	5.7	5.2	1.3	2.5	6.0	4.7	5.8	5.3	1.0	3.4
Madagascar	1.5	5.6	3.0	3.6	0.8	1.9	1.8	2.8	3.1	2.8	4.6	6.9	4.7	4.0
Malawi	5.2	7.5	8.8	7.2	18.4	11.1	13.2	12.0	15.1	17.4	19.8	21.7	24.2	14.8
Mali	3.4	3.3	1.8	2.8	1.5	1.6	3.5	6.7	6.4	4.3	6.5	4.5	4.5	4.1
Mauritania	0.0	0.0	0.6	0.0	0.0	0.0	1.5	0.0	1.0	3.0	1.5	1.4	0.4	0.0
Mauritius	2.8	7.5	3.2	3.5	5.5	7.9	15.8	9.2	8.5	14.3	11.2	12.5	10.8	16.7
Morocco	9.6	15.7	16.6	17.3	6.7	22.4	29.0	17.6	27.6	33.0	55.2	50.2	57.8	66.4
Mozambique	1.5	3.9	0.6	6.1	2.3	7.4	7.3	7.6	7.0	4.3	8.0	6.1	10.7	9.1
Namibia	1.7	2.5	3.0	0.7	2.2	4.8	2.6	3.4	2.5	7.8	5.6	5.5	8.0	8.3
Niger	1.5	7.0	2.8	1.0	1.6	1.4	7.3	7.5	3.0	2.4	2.3	5.6	4.2	2.6



## CHAPTER 5 | Academic Research and Development

Region, country, or economy	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Nigeria	54.1	75.9	79.8	76.9	93.9	115.5	174.2	223.3	273.3	306.9	522.0	475.4	320.2	239.7
Rwanda	0.0	0.3	1.4	2.8	0.0	0.8	1.8	7.2	5.8	6.5	5.6	7.9	7.1	10.7
São Tomé and Príncipe	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Senegal	13.7	10.8	18.6	9.6	13.1	10.6	12.9	9.4	14.2	29.8	17.0	24.0	20.2	14.3
Seychelles	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.3	0.0	0.1	0.5	1.5
Sierra Leone	1.0	0.5	2.0	1.0	0.5	1.5	0.0	0.0	0.6	0.8	3.6	1.8	1.3	6.6
Somalia	0.3	1.0	0.0	0.0	0.0	0.5	1.0	0.5	0.8	0.2	2.5	3.0	1.0	1.0
South Africa	467.9	600.2	571.6	652.0	623.7	827.0	842.1	1,043.9	1,150.9	1,289.2	1,644.6	3,001.3	1,916.3	1,874.8
South Sudan	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	3.5	1.3	2.0	0.0
Sudan	0.0	0.3	1.5	3.7	3.8	5.1	12.0	10.6	9.1	6.6	15.2	14.6	15.1	15.2
Swaziland	1.3	2.5	3.3	1.0	0.5	2.1	2.9	5.0	9.2	4.3	3.7	11.5	8.0	8.1
Tanzania	14.7	13.4	23.4	15.7	18.6	30.3	24.7	37.4	27.6	31.6	25.1	51.1	37.0	43.8
Togo	2.0	1.0	0.0	2.3	1.1	1.1	1.0	3.5	1.0	1.0	2.0	5.1	1.7	3.6
Tunisia	14.0	13.6	25.8	22.2	31.5	41.6	59.9	77.4	97.0	129.8	143.6	181.7	157.8	165.8
Uganda	12.8	13.8	53.3	20.4	18.0	18.0	18.9	33.6	32.3	43.8	49.5	47.1	52.3	55.5
Western Sahara	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	2.0	0.0
Zambia	4.9	4.5	7.3	4.3	3.2	9.7	3.2	4.4	8.4	8.4	12.9	17.5	14.8	24.3
Zimbabwe	18.1	13.5	10.5	17.5	15.2	9.7	9.6	25.7	28.3	34.2	49.4	62.7	52.6	58.5
Asia	2,583.8	2,813.2	3,323.7	3,900.2	4,502.0	5,444.4	6,278.4	7,489.8	8,131.6	9,193.4	10,740.7	11,605.9	12,388.4	13,814.6

## CHAPTER 5 | Academic Research and Development

Region, country, or economy	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Afghanistan	1.5	0.2	5.2	1.4	6.3	1.8	9.4	11.0	11.6	4.8	4.2	7.7	4.7	2.3
Bangladesh	37.1	31.9	33.8	35.6	37.9	42.9	61.3	56.2	79.3	83.2	98.4	94.1	96.8	85.6
Bhutan	0.0	2.0	1.0	0.0	1.7	1.1	0.3	4.3	2.4	0.0	1.2	2.6	2.6	3.0
Brunei	1.2	1.0	2.5	5.3	1.5	1.3	6.0	2.5	6.5	8.0	11.5	18.4	23.0	16.3
Burma	0.0	0.7	1.1	0.5	5.2	1.4	0.0	0.0	0.3	4.4	4.5	4.8	3.9	5.0
Cambodia	4.6	3.4	4.0	7.6	5.0	5.3	2.6	6.3	7.9	5.9	9.5	9.7	8.4	8.9
China	442.6	571.5	744.1	1,026.9	1,306.1	1,518.6	1,804.6	2,111.2	2,246.2	2,406.5	2,843.0	3,272.9	3,380.4	4,057.8
India	499.3	536.7	501.1	590.8	734.6	1,033.6	1,186.3	1,333.5	1,464.0	1,678.7	1,864.6	2,280.4	2,300.4	2,612.7
Indonesia	27.9	28.1	41.7	42.7	47.3	33.4	61.3	84.4	93.9	116.8	155.5	217.5	442.2	695.5
Japan	752.8	680.6	868.2	818.2	924.1	942.5	1,003.8	1,254.6	1,163.9	1,275.6	1,365.4	1,286.6	1,316.3	1,457.5
Kazakhstan	3.1	4.0	5.7	5.2	4.7	8.3	10.0	12.0	15.4	53.9	249.0	174.2	188.9	239.2
Kyrgyzstan	4.0	0.5	1.0	2.4	1.2	5.0	2.5	3.3	3.3	5.3	12.0	6.0	9.3	12.9
Laos	1.6	2.9	2.2	2.8	0.8	1.8	4.5	3.3	6.3	6.1	8.8	8.0	9.7	13.0
Malaysia	57.9	42.8	65.9	108.7	141.7	223.8	316.8	402.0	676.9	695.5	997.1	950.1	1,261.3	1,027.4
Maldives	0.0	0.7	0.0	0.5	0.0	0.0	0.0	0.5	0.0	0.0	0.3	2.3	0.0	0.0
Mongolia	4.7	3.0	2.2	3.5	4.5	7.1	2.3	2.2	3.4	9.0	5.8	10.3	6.2	6.3
Nepal	10.7	11.0	9.7	6.1	12.1	12.1	17.5	12.8	17.8	21.2	20.6	34.0	28.1	35.9
North Korea	1.0	0.3	0.8	1.3	0.5	2.0	1.6	0.0	0.0	0.0	0.0	0.3	1.0	0.5
Pakistan	48.7	52.1	67.2	102.5	122.6	94.1	105.7	131.7	212.1	301.0	404.0	349.3	231.2	201.5

## CHAPTER 5 | Academic Research and Development

Region, country, or economy	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Papua New Guinea	2.5	2.8	6.4	5.0	2.3	7.2	1.9	5.7	2.9	6.5	3.5	5.3	4.4	2.9
Philippines	43.3	31.5	50.6	56.7	54.3	69.5	105.1	125.7	118.6	164.6	158.9	136.3	174.7	214.6
Singapore	213.6	214.9	252.2	269.5	245.1	263.5	308.7	352.6	333.5	416.0	412.3	436.9	513.0	535.4
South Korea	194.6	272.8	253.0	300.6	324.2	454.7	525.5	708.9	720.1	837.6	942.2	1,065.6	1,242.9	1,319.5
Sri Lanka	17.9	23.8	18.4	24.2	17.7	27.6	38.0	36.4	26.4	26.5	46.3	30.1	38.2	37.2
Taiwan	167.3	229.2	315.3	384.1	412.4	566.2	581.0	679.6	747.7	853.3	895.9	931.8	780.8	820.3
Tajikistan	1.0	0.0	2.0	1.5	1.8	0.0	0.0	3.1	3.8	4.0	10.3	0.9	6.2	2.4
Thailand	34.8	50.4	50.7	77.1	63.5	80.3	92.4	111.1	127.3	151.9	171.7	212.7	234.5	286.2
Timor-Leste	0.0	0.0	0.0	0.0	1.0	0.5	1.0	0.0	0.3	0.3	1.3	1.8	1.9	0.3
Turkmenistan	0.0	0.5	0.0	0.0	0.0	0.0	1.0	0.0	0.0	1.0	1.0	0.0	0.0	0.0
Uzbekistan	1.7	1.8	4.1	2.6	5.2	2.2	1.8	5.2	3.6	22.0	9.7	7.0	11.4	10.2
Vietnam	8.5	12.2	14.0	16.8	16.8	36.7	25.5	29.7	36.1	33.7	32.4	48.6	66.2	104.1
Australia and Oceania	2,023.4	2,171.5	2,377.0	2,566.5	2,752.8	3,433.2	3,778.2	4,313.6	4,321.0	4,836.2	5,140.6	5,426.6	5,680.2	5,425.5
Australia	1,671.0	1,838.8	1,975.6	2,129.3	2,275.6	2,913.5	3,208.9	3,658.4	3,656.2	4,122.8	4,479.2	4,671.0	4,919.6	4,651.0
Cook Islands	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fiji	12.5	24.5	12.2	19.3	30.1	21.6	20.9	17.6	8.2	12.7	17.9	29.0	18.2	23.7
Kiribati	0.0	0.0	0.0	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Marshall Islands	0.0	0.1	0.0	0.0	0.3	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.0
Micronesia, Federated States of	0.0	0.0	0.0	0.0	0.2	0.0	0.2	0.0	0.0	0.0	0.0	0.3	0.0	0.2

## CHAPTER 5 | Academic Research and Development

Region, country, or economy	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Nauru	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0
New Zealand	338.3	305.6	386.9	412.6	443.2	495.6	545.2	632.0	654.5	698.7	640.9	723.0	736.0	747.8
Niue	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0
Palau	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.3	0.0	1.0	0.0
Samoa	0.5	0.5	1.5	1.3	0.2	0.0	0.3	1.5	1.1	0.4	1.2	1.7	0.4	0.1
Solomon Islands	1.0	0.5	0.0	1.0	1.5	0.3	1.2	2.0	0.1	0.7	0.0	0.0	0.6	0.4
Tonga	0.0	0.0	0.5	1.2	1.0	0.0	0.5	0.1	0.0	0.0	0.0	0.0	0.5	0.3
Tuvalu	0.0	0.0	0.0	0.0	0.3	0.3	0.0	1.0	0.0	0.0	0.0	0.0	1.0	0.0
Vanuatu	0.0	1.5	0.3	0.3	0.3	0.8	1.0	0.0	0.7	1.0	1.0	1.3	2.4	2.0
Unassigned	453.6	386.2	503.1	607.2	653.1	740.6	416.9	293.8	292.0	305.9	301.5	303.2	259.5	239.7

na = not applicable; country data do not exist.

EU = European Union.

<sup>a</sup> Beginning in 2006, Serbia and Montenegro represented individual countries.

<sup>b</sup> Serbia and Montenegro represented a single country for data purposes from 1992 to 2006.

### Note(s)

Article counts refer to publications from a selection of journals, books, and conference proceedings in S&E from Scopus. Articles are classified by their year of publication and are assigned to a region, country, or economy on the basis of the institutional address(es) listed in the article. Articles are credited on a fractional-count basis. The sum of the regions, countries, or economies may not add to the world total because of rounding. Some publications have incomplete address information for coauthored publications in the Scopus database. The unassigned category count is the sum of fractional counts for publications that cannot be assigned to a region, country, or economy.

### Source(s)

National Science Foundation, National Center for Science and Engineering Statistics; SRI International; Science-Metrix; Elsevier, Scopus abstract and citation database, accessed July 2017.



**CHAPTER 5 | Academic Research and Development**

*Science and Engineering Indicators 2018*

## CHAPTER 5 | Academic Research and Development

APPENDIX TABLE 5-41

## U.S. S&amp;E articles, by field and sector: 2003–16

(Number)

Field and sector	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
All fields														
Total	321,766	347,874	379,701	383,115	389,452	391,933	398,871	409,853	424,938	432,312	435,212	440,230	429,139	408,985
Federal government	18,725	20,739	21,682	21,666	21,463	21,697	21,240	21,594	22,455	22,580	21,485	21,334	20,217	19,556
Industry	27,793	31,158	33,498	32,240	32,671	31,730	31,140	32,074	31,157	31,226	29,401	28,569	26,276	24,565
Academic	224,593	244,335	265,505	271,502	279,219	284,535	290,836	298,648	312,139	317,712	323,433	328,562	322,101	307,413
Academic public	138,916	150,882	166,446	169,816	175,613	178,563	181,981	186,673	194,286	196,689	199,741	200,075	193,921	180,871
Academic private	76,278	82,470	89,221	92,026	93,937	96,195	97,940	100,674	107,018	110,276	111,566	114,168	110,690	103,422
Academic undefined	9,399	10,982	9,838	9,659	9,669	9,777	10,915	11,301	10,835	10,748	12,127	14,318	17,489	23,119
FFRDCs	8,621	8,999	10,600	10,413	10,281	9,782	9,456	9,780	10,398	10,927	10,344	10,215	9,643	9,107
Private nonprofit	15,692	17,070	19,662	21,555	21,288	19,757	19,269	19,430	20,588	21,566	21,236	21,986	21,973	21,248
State and local government	1,238	1,472	1,733	1,639	1,657	1,684	1,648	1,682	1,722	1,757	1,679	1,759	1,576	1,537
Unassigned	25,103	24,102	27,020	24,100	22,872	22,748	25,281	26,645	26,480	26,544	27,634	27,806	27,352	25,560
Engineering														
Total	40,057	43,168	50,668	48,623	48,674	48,336	49,867	53,592	53,875	53,485	54,267	51,220	50,720	50,158
Federal government	2,807	2,770	3,163	2,699	2,783	2,993	2,927	3,143	3,084	2,981	2,760	2,575	2,608	2,567
Industry	8,068	8,623	9,832	8,741	9,104	8,849	8,713	9,355	9,060	8,735	8,458	7,708	7,393	6,923

## CHAPTER 5 | Academic Research and Development

[illegible]

## CHAPTER 5 | Academic Research and Development

Field and sector	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Unassigned	61	69	79	131	59	54	245	53	81	64	76	68	73	91
Chemistry														
Total	16,912	20,118	22,678	21,593	21,083	23,348	20,884	22,791	25,006	23,144	23,608	23,381	22,622	20,980
Federal government	728	951	831	879	878	945	867	929	1,070	976	888	825	826	727
Industry	2,409	3,120	2,735	3,091	2,881	2,818	2,465	2,705	2,688	2,581	2,270	2,047	1,836	1,785
Academic	12,272	14,041	14,755	15,375	15,321	17,438	15,458	16,719	18,609	17,067	17,952	17,829	17,519	16,258
Academic public	8,658	9,887	10,385	10,921	10,917	12,326	10,850	11,693	13,177	12,026	12,627	12,487	12,267	11,093
Academic private	3,419	3,821	4,129	4,245	4,192	4,876	4,352	4,727	5,172	4,805	5,050	5,001	4,739	4,473
Academic undefined	196	333	240	209	213	235	256	299	260	236	275	341	513	693
FFRDCs	770	970	1,127	1,082	1,053	1,134	1,110	1,324	1,495	1,345	1,449	1,483	1,405	1,280
Private nonprofit	225	259	270	334	303	318	284	263	330	285	291	252	221	237
State and local government	13	12	8	13	18	18	25	14	19	23	21	17	10	15
Unassigned	495	766	2,952	818	629	678	674	837	795	867	737	926	804	678
Physics														
Total	31,255	32,375	37,860	39,657	39,069	36,361	35,446	36,081	35,645	36,017	33,391	33,682	30,086	27,584
Federal government	1,809	2,118	2,162	2,305	2,233	1,987	2,013	1,949	2,132	2,101	1,744	1,858	1,557	1,638
Industry	4,805	4,882	5,096	5,328	5,057	4,573	4,297	4,491	4,105	4,086	3,434	3,610	2,990	2,772
Academic	19,565	20,581	24,758	25,911	25,806	24,591	24,252	24,228	24,377	24,379	23,272	23,246	21,038	19,081
Academic public	12,689	13,405	16,377	16,889	16,931	16,178	15,953	15,748	15,754	15,928	15,177	15,195	13,705	12,372



## CHAPTER 5 | Academic Research and Development

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## CHAPTER 5 | Academic Research and Development

Field and sector	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Total	6,167	6,303	7,068	7,213	7,504	7,827	8,237	7,913	8,275	8,650	8,535	8,799	8,704	8,369
Federal government	111	114	156	116	122	151	144	137	165	162	160	147	135	158
Industry	232	238	222	245	218	224	223	217	274	253	254	249	285	222
Academic	5,514	5,572	6,283	6,416	6,787	7,094	7,544	7,210	7,474	7,887	7,747	8,038	7,912	7,588
Academic public	3,851	3,778	4,346	4,332	4,600	4,829	5,132	4,834	4,975	5,268	5,189	5,315	5,179	4,892
Academic private	1,532	1,644	1,789	1,929	2,032	2,113	2,180	2,150	2,282	2,426	2,330	2,461	2,414	2,344
Academic undefined	131	150	148	156	155	152	231	225	217	193	228	262	319	352
FFRDCs	67	95	110	117	95	103	88	89	71	105	97	82	70	86
Private nonprofit	46	49	52	64	42	52	48	50	58	62	53	60	60	60
State and local government	3	0	3	1	1	5	2	1	2	4	2	4	3	1
Unassigned	194	234	242	253	239	198	188	208	231	178	221	220	240	253
Computer sciences														
Total	19,584	22,663	27,171	27,178	28,771	27,854	28,610	29,009	29,653	28,608	28,776	27,855	28,526	26,117
Federal government	480	520	561	605	575	609	578	606	539	572	535	514	538	569
Industry	2,765	3,087	3,576	3,595	3,914	3,810	3,901	3,802	3,714	3,590	3,422	3,123	3,176	2,787
Academic	15,038	17,704	21,182	20,932	22,527	21,771	22,311	22,868	23,332	22,486	22,886	22,023	22,640	20,460
Academic public	9,779	11,808	14,324	14,088	15,267	14,635	14,953	15,335	15,830	15,084	15,232	14,289	14,692	13,350
Academic private	4,700	5,385	6,210	6,248	6,617	6,467	6,546	6,821	6,871	6,797	6,913	6,915	7,018	6,186
Academic undefined	559	512	648	595	643	669	811	712	631	605	742	819	931	924

## CHAPTER 5 | Academic Research and Development

Field and sector	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
FFRDCs	326	407	496	499	441	514	474	475	639	572	573	555	596	524
Private nonprofit	137	159	284	521	451	301	200	185	189	228	192	202	221	212
State and local government	8	5	6	12	7	13	28	11	18	14	11	16	14	10
Unassigned	830	781	1,067	1,015	856	837	1,118	1,062	1,223	1,147	1,158	1,422	1,342	1,557
Agricultural sciences														
Total	4,343	4,976	4,877	4,958	5,442	5,319	5,191	5,179	5,021	5,107	4,976	4,963	5,343	5,085
Federal government	695	822	824	867	911	969	876	864	813	804	717	688	694	593
Industry	197	227	230	255	251	242	254	210	246	251	253	236	242	200
Academic	3,103	3,573	3,477	3,492	3,874	3,733	3,657	3,717	3,625	3,718	3,658	3,689	3,838	3,912
Academic public	2,820	3,203	3,131	3,127	3,511	3,337	3,281	3,248	3,231	3,323	3,254	3,270	3,407	3,310
Academic private	195	232	220	243	242	245	224	272	233	240	261	259	257	274
Academic undefined	88	137	126	122	121	152	151	196	160	156	143	159	174	328
FFRDCs	22	13	20	25	23	16	16	19	19	23	24	22	21	17
Private nonprofit	32	35	37	55	46	42	53	40	47	49	46	44	39	48
State and local government	8	16	20	22	21	23	22	21	20	14	20	15	19	18
Unassigned	287	290	268	243	316	294	313	307	251	247	258	270	490	297
Biological sciences														
Total	63,319	67,255	68,457	68,391	70,633	70,911	71,818	72,553	76,505	80,425	81,146	81,777	78,557	73,330
Federal government	4,806	5,132	5,149	5,168	5,127	5,212	5,166	5,259	5,685	5,791	5,704	5,553	5,281	5,131

## CHAPTER 5 | Academic Research and Development

Field and sector	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Industry	4,150	4,369	4,188	4,092	4,134	4,295	4,107	4,034	3,980	4,171	3,915	4,026	3,729	3,495
Academic	46,340	49,985	51,292	51,446	53,239	53,468	54,385	54,608	57,677	61,024	61,906	62,450	59,697	55,682
Academic public	27,949	30,122	31,250	31,803	32,954	32,957	33,520	33,553	35,482	37,410	37,863	37,999	35,823	32,418
Academic private	16,353	17,457	18,112	17,897	18,493	18,737	18,935	19,013	20,186	21,532	21,778	21,806	20,641	18,682
Academic undefined	2,039	2,406	1,931	1,747	1,792	1,774	1,929	2,042	2,009	2,081	2,265	2,645	3,234	4,583
FFRDCs	545	626	711	660	622	647	658	609	680	729	768	751	768	705
Private nonprofit	3,654	3,867	3,922	3,917	4,040	3,983	3,992	4,162	4,432	4,628	4,653	4,724	4,486	4,199
State and local government	332	403	456	464	469	469	429	437	443	466	455	464	452	410
Unassigned	3,492	2,873	2,739	2,643	3,001	2,838	3,081	3,445	3,608	3,616	3,745	3,809	4,144	3,708
Medical sciences														
Total	85,957	91,142	96,249	99,601	101,068	103,704	107,288	108,929	113,893	117,532	119,454	124,365	123,702	119,642
Federal government	4,078	4,300	4,590	4,969	4,869	5,091	5,012	5,041	5,109	5,247	5,139	5,275	5,074	4,792
Industry	2,928	3,502	3,757	3,682	3,734	3,799	3,902	3,903	3,828	4,077	3,842	3,906	3,708	3,631
Academic	58,455	63,328	67,736	70,931	72,775	75,090	77,462	78,634	82,996	85,882	87,144	92,107	91,462	88,436
Academic public	29,687	31,756	34,868	36,543	37,649	38,602	39,892	40,591	42,432	43,544	43,874	45,451	44,528	41,108
Academic private	25,371	27,495	29,713	31,186	31,796	33,099	33,805	34,488	36,958	38,856	39,119	41,544	40,492	38,478
Academic undefined	3,397	4,078	3,155	3,203	3,330	3,389	3,765	3,555	3,606	3,482	4,151	5,111	6,441	8,850
FFRDCs	290	302	300	255	318	287	320	206	160	402	191	252	141	413
Private nonprofit	8,831	9,499	10,124	10,573	10,848	11,032	11,208	11,090	11,838	12,241	12,274	12,945	13,502	13,397

## CHAPTER 5 | Academic Research and Development

Field and sector	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
State and local government	427	469	539	540	498	520	555	565	615	618	582	644	591	596
Unassigned	10,949	9,741	9,202	8,651	8,025	7,884	8,828	9,489	9,347	9,067	10,282	9,237	9,223	8,378
Other life sciences														
Total	8,152	8,536	9,157	9,539	9,251	9,473	9,622	9,837	10,484	11,134	10,920	10,891	10,462	9,943
Federal government	232	247	266	300	268	274	285	282	295	322	303	296	304	257
Industry	534	534	619	564	506	475	456	488	529	579	543	485	454	425
Academic	5,012	5,384	5,800	6,019	5,940	6,223	6,332	6,579	7,088	7,430	7,435	7,444	7,272	7,054
Academic public	2,981	3,239	3,513	3,664	3,654	3,854	3,891	4,004	4,264	4,368	4,330	4,305	4,135	3,869
Academic private	1,657	1,749	1,838	1,969	1,901	2,007	2,037	2,162	2,404	2,592	2,627	2,616	2,508	2,459
Academic undefined	374	395	450	386	386	362	403	413	421	469	478	522	629	726
FFRDCs	17	25	13	25	23	22	19	11	18	16	11	14	10	12
Private nonprofit	892	922	1,057	1,145	1,094	1,027	1,051	1,071	1,149	1,343	1,160	1,055	973	866
State and local government	46	48	60	70	57	77	69	59	69	91	78	77	61	58
Unassigned	1,419	1,374	1,342	1,416	1,362	1,375	1,411	1,347	1,335	1,353	1,390	1,519	1,388	1,271
Psychology														
Total	9,475	9,879	11,076	11,906	11,825	12,583	13,233	13,641	14,235	14,853	15,072	15,988	15,513	14,393
Federal government	184	186	268	292	264	310	268	315	359	443	350	378	343	279
Industry	173	180	281	304	237	243	245	258	243	266	241	227	263	169
Academic	7,716	8,381	9,231	9,913	10,171	10,884	11,330	11,721	12,273	12,868	13,230	14,067	13,579	12,715

## CHAPTER 5 | Academic Research and Development

Field and sector	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Academic public	4,987	5,323	5,976	6,411	6,686	7,143	7,468	7,554	7,929	8,303	8,501	8,915	8,520	7,841
Academic private	2,446	2,691	2,938	3,197	3,165	3,456	3,521	3,756	3,934	4,220	4,300	4,604	4,435	4,074
Academic undefined	282	368	317	306	320	286	341	410	409	345	429	549	624	800
FFRDCs	2	6	12	7	16	10	9	8	12	8	12	19	16	5
Private nonprofit	265	274	306	345	327	301	335	330	351	336	366	379	368	335
State and local government	24	18	32	43	27	31	43	29	41	34	27	40	26	29
Unassigned	1,112	833	947	1,001	782	802	1,002	979	957	897	846	879	919	861
Social sciences														
Total	17,840	18,819	20,415	21,018	22,110	23,468	25,619	27,473	28,699	29,343	30,203	31,554	31,096	29,609
Federal government	399	475	520	507	537	499	556	578	634	616	631	628	567	566
Industry	209	242	307	256	247	279	317	270	346	347	388	374	352	364
Academic	14,995	15,949	17,156	17,751	18,754	20,170	21,923	23,581	24,815	25,377	26,123	27,341	26,950	25,654
Academic public	9,061	9,507	10,301	10,630	11,190	12,152	13,055	14,019	14,601	14,739	15,353	15,850	15,299	14,549
Academic private	5,411	5,880	6,275	6,488	6,933	7,280	8,025	8,459	9,157	9,570	9,585	10,096	10,000	9,195
Academic undefined	523	563	580	634	631	739	843	1,103	1,057	1,068	1,185	1,395	1,651	1,910
FFRDCs	22	30	42	39	68	42	34	39	49	62	57	68	46	55
Private nonprofit	573	654	771	802	789	710	741	810	813	907	884	812	809	732
State and local government	35	37	45	48	41	43	51	55	64	58	63	66	45	56
Unassigned	1,606	1,433	1,573	1,616	1,674	1,725	1,997	2,140	1,977	1,976	2,057	2,265	2,328	2,182

CHAPTER 5 | Academic Research and Development

FFRDC = federally funded research and development center.

**Note(s)**

Article counts refer to publications from a selection of journals, books, and conference proceedings in S&E from Scopus. Articles are assigned to a sector on the basis of the institutional address(es) listed in the article. Articles are credited on a fractional-count basis (i.e., for articles with collaborating institutions from multiple sectors, each sector receives fractional credit on the basis of the proportion of its participating institutions). The unassigned category count is the sum of fractional counts for publications that cannot be assigned to a sector.

**Source(s)**

National Science Foundation, National Center for Science and Engineering Statistics; SRI International; Science-Metrix; Elsevier, Scopus abstract and citation database, accessed July 2017.

*Science and Engineering Indicators 2018*

## CHAPTER 5 | Academic Research and Development

APPENDIX TABLE 5-42 

S&E articles in all fields combined, by coauthorship attribute and selected region, country, or economy: 2003–16

(Number)

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## CHAPTER 5 | Academic Research and Development

Region, country, or economy and coauthorship attribute	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Total articles	370,659	400,854	438,680	445,992	456,396	461,110	472,035	487,243	507,758	521,924	531,288	543,169	536,010	519,289
with multiple institutions	239,293	268,226	294,570	303,407	311,730	314,905	311,931	316,862	337,919	353,210	366,132	379,613	381,730	379,826
with domestic institutions only	277,880	300,150	326,698	327,273	329,953	330,973	335,552	343,251	354,235	357,116	356,448	357,747	345,601	325,017
with international institutions	86,408	95,644	106,108	112,317	119,442	124,094	132,441	140,195	149,422	160,755	170,710	183,101	188,528	192,375
Argentina														
Total articles	5,920	6,259	6,709	7,435	7,728	8,536	9,359	9,963	10,597	11,082	11,122	12,090	11,901	11,920
with multiple institutions	4,158	4,731	4,977	5,439	5,887	6,492	6,887	7,365	7,838	8,287	8,369	9,084	8,997	9,189
with domestic institutions only	3,517	3,482	3,732	4,257	4,263	4,754	5,310	5,728	6,121	6,218	6,295	6,782	6,588	6,496
with international institutions	2,321	2,705	2,903	3,086	3,361	3,668	3,975	4,123	4,401	4,765	4,773	5,240	5,281	5,397
Brazil														
Total articles	19,953	22,883	25,815	32,613	35,955	40,962	44,145	47,841	51,346	56,780	59,466	63,236	63,917	64,878
with multiple institutions	14,440	16,923	19,256	24,841	27,849	31,844	33,167	35,877	39,195	43,353	45,309	48,706	49,708	51,293
with domestic institutions only	13,985	16,104	18,324	23,802	26,141	29,959	33,080	36,086	38,403	42,480	43,638	45,137	44,644	43,620
with international institutions	5,427	6,350	7,042	8,080	8,838	9,889	10,384	10,939	12,249	13,619	15,158	17,674	19,037	21,061
Chile														
Total articles	3,070	3,411	3,833	4,668	5,052	5,744	6,100	6,536	7,169	8,057	8,390	9,910	10,362	11,193
with multiple institutions	2,380	2,692	3,116	3,781	4,073	4,447	4,670	5,063	5,627	6,423	6,680	8,009	8,399	9,307
with domestic institutions only	1,395	1,530	1,637	2,074	2,261	2,635	2,892	2,980	3,273	3,603	3,574	4,031	4,273	4,255
with international institutions	1,617	1,827	2,139	2,523	2,712	2,987	3,162	3,516	3,857	4,406	4,757	5,841	6,064	6,911

## CHAPTER 5 | Academic Research and Development

Region, country, or economy and coauthorship attribute	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Austria														
Total articles	10,762	11,545	12,890	13,303	14,651	15,566	16,431	17,194	18,510	19,664	20,375	21,257	21,635	21,511
with multiple institutions	7,905	8,893	9,853	10,089	11,197	11,877	12,119	12,672	13,885	14,930	15,612	16,550	16,884	17,269
with domestic institutions only	5,600	5,656	6,234	6,407	6,770	6,998	7,409	7,517	7,841	8,129	8,122	8,220	8,209	7,539
with international institutions	4,992	5,766	6,510	6,743	7,733	8,401	8,919	9,592	10,609	11,450	12,178	12,982	13,402	13,937
Belgium														
Total articles	15,267	16,471	18,522	18,953	20,374	21,571	22,690	23,678	25,179	26,687	27,489	28,706	28,711	28,423
with multiple institutions	11,187	12,375	14,090	14,517	15,801	16,818	17,468	18,230	19,665	21,032	21,841	23,187	23,667	23,761
with domestic institutions only	7,581	8,060	8,907	8,995	9,373	9,685	9,957	10,142	10,406	10,882	10,860	10,718	10,053	9,593
with international institutions	7,480	8,295	9,476	9,775	10,831	11,690	12,599	13,406	14,646	15,676	16,527	17,940	18,613	18,792
Czech Republic														
Total articles	8,136	9,036	10,281	11,429	12,778	13,668	14,424	16,161	17,259	18,150	18,898	20,923	22,500	21,663
with multiple institutions	5,624	6,488	7,106	8,002	8,812	9,274	9,426	10,092	10,638	11,600	12,151	13,674	14,599	14,392
with domestic institutions only	5,135	5,652	6,499	7,162	8,067	8,640	9,087	10,369	11,178	11,426	11,676	12,513	13,443	12,565
with international institutions	2,912	3,316	3,718	4,194	4,611	4,910	5,266	5,702	5,970	6,599	7,167	8,381	9,022	9,069
Denmark														
Total articles	10,403	11,131	12,110	12,660	13,546	14,068	15,075	16,089	17,905	19,663	20,583	22,421	23,212	22,943
with multiple institutions	7,914	8,569	9,300	9,901	10,759	11,245	11,315	12,259	13,841	15,276	16,216	17,709	18,741	19,012
with domestic institutions only	5,206	5,570	5,908	6,011	6,246	6,386	6,786	7,064	7,870	8,595	8,755	9,301	9,030	8,381

## CHAPTER 5 | Academic Research and Development

Region, country, or economy and coauthorship attribute	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
with international institutions	4,959	5,478	6,080	6,534	7,159	7,544	8,239	8,938	9,946	10,964	11,703	13,062	14,113	14,514
Finland														
Total articles	10,238	11,165	11,984	12,379	12,994	13,270	13,892	14,239	14,943	15,489	16,269	17,163	17,094	17,113
with multiple institutions	7,376	8,035	8,574	9,120	9,755	9,966	10,267	10,591	11,240	11,857	12,572	13,307	13,577	13,800
with domestic institutions only	5,935	6,541	6,979	6,999	6,995	7,033	7,309	7,126	7,359	7,249	7,302	7,489	7,003	6,751
with international institutions	4,219	4,571	4,935	5,312	5,904	6,167	6,540	7,026	7,474	8,145	8,845	9,646	10,069	10,343
France														
Total articles	67,123	71,872	78,763	82,801	86,548	90,479	94,575	96,456	99,934	104,339	106,771	108,368	106,215	104,116
with multiple institutions	46,271	50,708	56,043	59,247	62,909	66,101	69,502	71,925	75,964	80,525	83,555	86,155	85,785	85,298
with domestic institutions only	39,810	41,844	45,117	47,136	48,270	50,065	51,059	51,504	52,380	53,588	53,495	52,321	49,470	46,554
with international institutions	26,587	29,419	32,999	34,963	37,416	39,633	43,073	44,515	47,096	50,294	52,870	55,728	56,398	57,076
Germany														
Total articles	91,211	97,103	108,403	111,070	117,259	121,047	126,932	131,061	136,925	144,466	146,207	152,210	149,929	148,211
with multiple institutions	62,735	69,839	77,294	79,736	84,531	87,126	87,630	89,893	94,946	101,228	104,180	108,426	109,040	109,664
with domestic institutions only	53,707	55,954	62,627	63,399	65,589	67,785	70,350	71,595	74,133	77,052	76,160	78,686	75,038	72,198
with international institutions	35,960	39,692	44,432	46,377	50,250	51,666	55,743	58,707	62,125	66,645	69,414	73,073	74,524	75,629
Greece														
Total articles	8,431	9,760	11,565	13,351	13,990	14,857	15,641	15,584	15,929	16,361	16,380	16,551	16,175	15,852
with multiple institutions	5,814	6,877	8,160	9,364	9,922	10,452	10,847	10,658	11,267	11,557	11,776	12,058	12,036	11,987

## CHAPTER 5 | Academic Research and Development

Region, country, or economy and coauthorship attribute	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
with domestic institutions only	5,358	6,276	7,487	8,576	8,808	9,474	9,602	9,451	9,300	9,156	8,876	8,607	8,086	7,537
with international institutions	2,992	3,429	3,987	4,684	5,064	5,290	5,961	6,027	6,521	7,119	7,428	7,890	8,058	8,284
Hungary														
Total articles	6,234	6,617	7,546	7,547	8,064	8,628	8,320	8,228	9,043	9,492	9,402	10,002	9,718	9,556
with multiple institutions	4,212	4,669	5,397	5,462	5,710	5,931	5,754	5,798	6,339	6,860	6,787	7,368	7,193	7,358
with domestic institutions only	3,404	3,591	4,208	4,188	4,451	4,996	4,573	4,415	4,870	4,877	4,832	5,074	4,860	4,445
with international institutions	2,803	2,972	3,262	3,248	3,524	3,545	3,699	3,749	4,112	4,540	4,523	4,866	4,830	5,085
Ireland														
Total articles	4,296	5,310	6,558	6,882	7,840	8,401	9,383	10,247	10,841	10,781	11,052	11,358	11,002	11,332
with multiple institutions	2,885	3,545	4,373	4,650	5,307	5,843	6,509	7,143	7,593	7,838	8,192	8,481	8,529	8,930
with domestic institutions only	2,263	2,820	3,494	3,553	4,038	4,185	4,647	5,096	5,363	5,055	4,978	5,006	4,501	4,420
with international institutions	1,982	2,455	3,013	3,234	3,701	4,149	4,684	5,056	5,350	5,583	5,941	6,308	6,486	6,897
Italy														
Total articles	50,599	54,198	59,213	62,880	68,106	70,965	74,519	76,108	79,440	85,503	90,470	94,409	95,318	94,685
with multiple institutions	36,244	39,834	43,530	46,603	50,444	52,202	53,378	54,762	58,133	62,838	66,983	71,139	72,784	73,820
with domestic institutions only	33,303	34,933	37,696	39,697	42,149	43,652	45,527	45,283	46,490	49,625	51,836	52,534	51,737	49,489
with international institutions	16,763	18,923	21,122	22,732	25,416	26,744	28,624	30,393	32,499	35,446	38,207	41,512	43,201	44,826
Netherlands														
Total articles	26,773	29,456	32,815	34,253	36,053	37,612	40,937	42,548	44,358	47,638	48,872	50,257	49,415	49,271

## CHAPTER 5 | Academic Research and Development

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## CHAPTER 5 | Academic Research and Development

Region, country, or economy and coauthorship attribute	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Total articles	19,934	21,048	22,921	23,409	24,267	24,359	25,776	26,949	28,419	30,556	31,945	34,181	34,537	34,589
with multiple institutions	14,612	15,605	17,198	17,715	18,735	18,814	19,537	20,490	21,798	23,737	25,258	27,104	28,122	28,749
with domestic institutions only	10,627	11,085	11,892	11,898	11,656	11,566	11,962	12,086	12,450	13,015	13,298	13,860	13,087	12,268
with international institutions	9,063	9,777	10,837	11,333	12,419	12,587	13,708	14,709	15,823	17,424	18,498	20,228	21,317	22,255
United Kingdom														
Total articles	95,095	101,534	111,170	116,395	122,357	124,782	129,742	132,258	137,921	143,909	149,506	153,527	154,851	153,292
with multiple institutions	60,617	67,046	74,196	77,805	82,839	85,092	86,782	87,959	93,804	99,457	106,009	111,094	114,522	116,576
with domestic institutions only	58,897	61,074	65,954	68,053	69,972	69,642	71,084	70,748	72,387	73,449	73,393	72,037	69,593	65,203
with international institutions	35,056	39,678	44,245	47,268	51,124	53,936	57,798	60,319	64,191	69,042	74,622	80,871	84,770	87,577
Norway														
Total articles	7,151	8,021	9,371	10,200	11,140	11,700	12,941	13,485	14,583	15,798	16,070	17,138	17,157	17,953
with multiple institutions	5,422	6,141	7,157	7,827	8,680	9,090	9,977	10,434	11,334	12,474	12,758	13,749	13,858	14,713
with domestic institutions only	3,771	4,112	4,936	5,157	5,527	5,648	6,191	6,344	6,881	7,146	7,105	7,168	6,900	6,884
with international institutions	3,263	3,825	4,342	4,932	5,489	5,919	6,683	7,084	7,621	8,575	8,883	9,937	10,228	11,030
Russia														
Total articles	39,300	39,676	41,070	36,347	37,431	38,690	39,452	40,528	43,204	43,643	47,614	53,612	62,618	69,214
with multiple institutions	18,240	19,804	21,245	18,311	18,940	18,954	19,471	20,017	21,701	22,543	25,083	29,117	35,748	40,659
with domestic institutions only	27,426	26,994	27,489	24,391	25,294	27,118	27,793	29,360	31,232	31,203	34,225	38,978	46,076	51,708
with international institutions	10,577	11,197	12,311	11,706	11,889	11,319	11,515	11,096	11,917	12,348	13,296	14,567	16,396	17,345

## CHAPTER 5 | Academic Research and Development

Region, country, or economy and coauthorship attribute	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Switzerland														
Total articles	19,604	21,578	23,780	25,508	27,120	28,158	29,477	31,364	33,420	36,036	37,380	39,207	39,230	38,857
with multiple institutions	14,346	16,088	17,842	19,301	20,966	21,741	22,385	23,927	25,706	28,055	29,478	31,077	31,718	32,106
with domestic institutions only	8,610	9,284	10,174	10,728	10,735	11,022	11,363	11,807	12,317	12,947	13,103	13,357	12,663	11,856
with international institutions	10,690	12,096	13,367	14,543	16,125	16,863	17,963	19,334	20,917	22,836	24,047	25,756	26,460	26,892
Turkey														
Total articles	14,739	17,491	19,593	21,482	23,677	24,040	27,042	28,467	29,962	32,291	35,299	36,036	37,901	39,151
with multiple institutions	9,745	12,119	13,801	14,846	16,095	16,401	17,540	18,258	19,677	21,778	24,209	25,249	26,883	28,148
with domestic institutions only	12,217	14,427	16,374	17,964	19,799	19,883	22,312	23,366	24,505	25,860	28,257	28,770	29,969	30,349
with international institutions	2,400	2,931	3,079	3,380	3,715	4,006	4,565	4,936	5,304	6,292	6,905	7,148	7,873	8,687
Iran														
Total articles	4,352	5,742	8,066	11,230	14,718	18,621	22,627	27,653	34,419	35,484	37,457	40,287	40,846	45,516
with multiple institutions	2,625	3,508	5,042	6,960	9,244	11,513	14,062	17,194	21,898	23,496	25,566	27,539	27,861	31,343
with domestic institutions only	3,264	4,348	6,188	8,931	11,698	15,030	18,376	22,503	28,100	28,554	29,740	31,884	32,236	35,952
with international institutions	1,054	1,347	1,780	2,184	2,795	3,354	4,086	4,927	6,081	6,707	7,539	8,259	8,533	9,475
Israel														
Total articles	12,651	13,283	13,666	14,438	14,896	15,137	15,083	15,201	15,911	16,588	16,599	17,361	17,717	17,388
with multiple institutions	8,895	9,383	9,813	10,223	10,608	10,622	10,410	10,656	11,221	11,771	12,008	12,381	12,921	12,895
with domestic institutions only	7,421	7,911	7,937	8,469	8,630	8,682	8,623	8,217	8,419	8,940	8,710	9,124	8,887	8,538

## CHAPTER 5 | Academic Research and Development

Region, country, or economy and coauthorship attribute	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
with international institutions	5,047	5,240	5,609	5,836	6,159	6,325	6,393	6,850	7,330	7,522	7,774	8,199	8,805	8,818
Saudi Arabia														
Total articles	2,189	2,161	2,237	2,446	2,655	3,023	3,959	5,705	8,538	10,976	13,440	16,223	17,847	18,594
with multiple institutions	1,256	1,317	1,420	1,526	1,660	1,936	2,472	3,952	6,464	8,655	10,633	13,399	15,088	15,905
with domestic institutions only	1,392	1,403	1,362	1,503	1,548	1,689	2,117	2,470	2,955	3,328	4,024	4,243	4,244	4,296
with international institutions	756	730	811	898	1,030	1,275	1,805	3,187	5,522	7,594	9,355	11,943	13,584	14,288
Egypt														
Total articles	4,117	4,405	4,592	5,038	5,716	6,344	7,982	8,841	10,157	11,753	12,845	13,969	14,840	16,268
with multiple institutions	2,415	2,558	2,855	3,207	3,615	4,057	5,212	5,980	7,173	8,446	9,501	10,678	11,441	12,770
with domestic institutions only	2,731	2,941	2,929	3,240	3,722	3,984	4,923	5,269	5,777	6,595	6,661	6,730	7,116	7,846
with international institutions	1,347	1,419	1,621	1,731	1,904	2,277	2,978	3,462	4,266	5,044	6,108	7,212	7,707	8,403
South Africa														
Total articles	5,499	6,322	6,856	7,551	8,007	8,722	9,673	10,483	11,831	13,235	14,597	17,097	16,799	17,848
with multiple institutions	3,402	4,052	4,508	4,895	5,389	5,783	6,365	6,784	7,767	8,795	9,800	11,279	11,605	12,726
with domestic institutions only	3,230	3,667	3,853	4,242	4,325	4,782	5,230	5,726	6,300	6,922	7,522	8,976	8,284	8,503
with international institutions	2,207	2,602	2,927	3,232	3,545	3,853	4,384	4,671	5,444	6,188	6,972	8,059	8,454	9,295
China														
Total articles	94,583	129,446	176,622	203,435	231,718	268,240	311,551	342,147	362,426	363,316	397,852	431,489	451,763	469,771
with multiple institutions	40,976	59,142	87,788	104,351	122,804	143,337	168,294	188,958	204,917	216,047	242,356	269,626	291,625	312,490



## CHAPTER 5 | Academic Research and Development

Region, country, or economy and coauthorship attribute	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
with domestic institutions only	79,508	110,720	153,301	176,197	199,655	231,426	268,609	292,124	306,139	300,631	325,997	351,013	363,057	373,125
with international institutions	14,460	18,076	21,929	25,646	29,825	34,699	40,747	46,644	52,660	58,709	68,559	78,634	87,254	95,476
India														
Total articles	29,773	32,233	37,032	43,006	48,413	54,168	60,600	69,593	83,189	90,828	98,415	110,853	117,349	121,720
with multiple institutions	15,384	17,436	20,481	23,885	27,110	30,609	33,915	38,657	46,826	51,422	56,069	62,922	65,621	69,133
with domestic institutions only	24,034	25,905	29,762	34,548	39,144	43,927	49,197	56,610	68,285	74,589	80,703	91,556	97,367	100,332
with international institutions	5,392	5,980	6,884	7,967	8,737	9,668	10,924	12,436	14,255	15,573	16,928	18,856	19,729	21,124
Japan														
Total articles	108,194	112,166	122,415	124,170	122,560	120,855	122,650	123,310	126,488	126,157	126,463	123,535	117,525	115,117
with multiple institutions	69,130	74,224	81,129	83,144	82,607	81,313	80,778	81,972	84,831	85,604	86,710	84,713	81,493	82,340
with domestic institutions only	86,454	89,069	97,290	97,581	95,782	93,915	95,242	95,091	96,965	95,492	95,170	92,195	86,249	82,551
with international institutions	20,452	22,086	24,116	25,382	25,542	25,775	26,698	27,282	28,506	29,677	30,440	30,996	30,954	32,074
Malaysia														
Total articles	2,234	2,593	3,132	4,100	4,924	7,289	9,628	13,391	16,946	18,272	20,208	21,786	23,819	25,346
with multiple institutions	1,356	1,638	2,043	2,750	3,227	4,208	5,713	8,109	10,662	12,227	13,713	15,191	16,646	18,094
with domestic institutions only	1,404	1,608	1,982	2,578	3,134	5,135	6,752	9,211	11,528	11,750	12,761	13,246	14,748	15,552
with international institutions	796	937	1,115	1,423	1,709	2,088	2,814	4,111	5,351	6,457	7,367	8,498	9,033	9,731
Pakistan														
Total articles	1,704	1,980	2,683	3,314	4,032	4,908	5,966	7,001	8,093	9,102	10,520	10,837	11,429	12,823

## CHAPTER 5 | Academic Research and Development

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## CHAPTER 5 | Academic Research and Development

Region, country, or economy and coauthorship attribute	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Total articles	3,184	3,758	4,673	5,696	6,408	7,267	7,775	8,813	9,552	10,259	10,453	11,307	11,672	12,863
with multiple institutions	2,386	2,817	3,481	4,309	4,866	5,342	5,619	6,329	6,987	7,754	7,778	8,221	8,688	9,572
with domestic institutions only	1,612	1,949	2,512	3,155	3,602	4,221	4,593	5,331	5,725	6,030	6,215	6,675	6,823	7,589
with international institutions	1,549	1,766	2,138	2,500	2,763	3,010	3,146	3,424	3,679	4,019	4,186	4,613	4,830	5,231
Australia														
Total articles	31,556	34,729	39,780	42,704	46,632	48,732	52,253	56,331	60,555	64,607	70,276	75,316	76,448	76,738
with multiple institutions	21,182	24,263	27,420	29,823	32,839	34,447	36,714	39,752	43,689	47,637	52,757	57,452	59,623	61,861
with domestic institutions only	19,484	20,952	24,418	25,775	27,735	28,084	29,499	31,111	32,936	34,146	36,162	37,564	36,245	34,455
with international institutions	11,638	13,502	15,048	16,585	18,424	20,177	22,468	24,828	27,237	29,988	33,660	37,556	39,996	42,096
New Zealand														
Total articles	5,969	6,579	7,410	7,890	8,468	8,894	9,380	9,914	10,827	11,263	11,580	12,043	11,756	11,920
with multiple institutions	4,063	4,657	5,338	5,701	6,114	6,371	6,559	6,917	7,635	8,118	8,577	8,948	8,909	9,215
with domestic institutions only	3,252	3,494	3,843	4,015	4,319	4,511	4,713	4,847	5,208	5,365	5,186	5,286	5,025	4,946
with international institutions	2,653	3,057	3,518	3,804	4,061	4,322	4,614	4,986	5,520	5,785	6,293	6,715	6,712	6,932

### Note(s)

Article counts refer to publications from a selection of journals, books, and conference proceedings in S&E from Scopus. Articles are classified by their year of publication and are assigned to a region, country, or economy on the basis of the institutional address(es) listed in the article. Articles are credited on a whole-count basis (i.e., each collaborating region, country, or economy is credited with one count). Regions, countries, or economies with less than 1% of internationally coauthored articles in 2016 are omitted. Articles with multiple institutions are counts of articles with two or more institutional addresses. Articles with domestic institutions only are counts of articles with one or more institutional addresses all within a single region, country, or economy. Articles with international institutions are counts of articles with institutional addresses from more than one region, country, or economy.

### Source(s)



CHAPTER 5 | **Academic Research and Development**

National Science Foundation, National Center for Science and Engineering Statistics; SRI International; Science-Metrix; Elsevier, Scopus abstract and citation database, accessed July 2017.

*Science and Engineering Indicators 2018*

## CHAPTER 5 | Academic Research and Development

APPENDIX TABLE 5-43 

Indexes of internationally coauthored S&E publications, by selected region, country, or economy pairs: 2006 and 2016

(International collaboration index

Region, country, or economy and year	Canada	Mexico	United States	Argentina	Brazil	Chile	Austria	Belgium	Czech Republic	Denmark	Finland	France	Germany	Greece	Hungary	Ireland	Italy	Netherlands	Poland	Portugal	Spain	Sweden	United Kingdom	Norway	Russia	Switzerland	Turkey	Iran	Israel	Saudi Arabia	Egypt	South Africa	China	India	Japan	Malaysia	Pakistan	Singapore	South Korea	Taiwan	Thailand	Australia	New Zealand
Canada																																											
2006	na	0.65	1.14	0.67	0.65	0.60	0.44	0.55	0.46	0.59	0.63	0.69	0.48	0.43	0.45	0.57	0.49	0.62	0.54	0.35	0.45	0.54	0.68	0.84	0.45	0.64	0.44	1.78	0.72	0.68	0.54	0.63	0.77	0.54	0.51	0.32	0.77	0.47	0.50	0.56	0.41	0.82	0.85
2016	na	0.92	1.13	1.12	0.96	1.09	0.73	0.77	0.77	0.98	0.84	0.90	0.67	0.66	0.90	0.98	0.68	0.90	0.83	0.61	0.63	0.81	0.84	1.02	0.57	0.87	0.79	1.23	1.14	0.66	0.69	1.15	0.84	0.64	0.64	0.47	0.62	0.53	0.57	0.71	0.49	0.99	1.21
Mexico																																											
2006	0.65	na	0.98	2.89	1.57	2.38	0.28	0.52	0.97	0.36	0.47	0.84	0.39	0.58	0.34	0.79	0.57	0.44	0.53	0.41	2.43	0.46	0.48	0.27	0.94	0.42	0.30	0.15	0.50	0.25	0.26	0.57	0.24	0.71	0.25	0.31	0.41	0.13	0.48	0.24	0.36	0.41	0.37
2016	0.92	na	1.04	4.64	2.20	4.09	1.19	1.02	1.77	0.82	1.56	1.06	0.75	1.91	2.54	1.74	1.04	0.74	1.49	1.69	2.94	0.64	0.67	0.70	1.55	0.99	1.80	1.29	0.71	0.64	1.23	1.41	0.35	1.20	0.66	0.96	1.99	0.45	0.98	1.22	2.31	0.62	1.88
United States																																											
2006	1.14	0.98	na	0.77	0.87	0.81	0.51	0.53	0.51	0.60	0.61	0.58	0.69	0.70	0.69	0.62	0.75	0.67	0.57	0.47	0.60	0.63	0.71	0.68	0.63	0.69	1.03	0.51	1.28	0.57	0.59	0.78	0.88	0.86	0.89	0.31	0.57	0.76	1.23	1.29	0.83	0.76	0.68
2016	1.13	1.04	na	0.86	0.94	0.91	0.67	0.65	0.59	0.78	0.70	0.66	0.74	0.72	0.77	0.72	0.74	0.77	0.64	0.52	0.65	0.74	0.77	0.73	0.65	0.81	0.91	0.65	1.33	0.54	0.51	0.86	1.19	0.83	0.85	0.32	0.45	0.72	1.23	1.05	0.84	0.75	0.81
Argentina																																											
2006	0.67	2.89	0.77	na	4.76	8.15	0.63	0.55	0.99	0.58	0.70	0.81	0.59	0.47	0.65	0.92	0.84	0.60	0.55	1.09	2.95	0.53	0.47	0.39	0.44	0.69	0.45	0.31	0.57	0.75	0.20	1.26	0.20	0.70	0.21	0.65	0.27	0.25	0.36	0.22	0.54	0.56	0.58
2016	1.12	4.64	0.86	na	4.78	8.31	1.72	1.06	2.51	1.56	0.78	1.22	1.03	2.30	3.40	0.83	1.28	1.16	1.86	2.37	2.99	1.13	0.71	1.72	1.23	1.32	2.25	0.48	2.26	0.28	0.46	2.84	0.34	0.76	0.96	1.54	0.64	0.37	0.47	1.68	0.92	1.06	1.31
Brazil																																											
2006	0.65	1.57	0.87	4.76	na	2.78	0.46	0.62	1.00	0.52	0.47	0.97	0.62	0.32	0.58	0.60	0.78	0.55	0.39	2.89	1.03	0.58	0.66	0.47	0.57	0.49	0.43	0.15	0.47	0.29	0.17	0.62	0.22	0.72	0.42	0.20	0.27	0.13	0.30	0.31	0.28	0.49	0.34
2016	0.96	2.20	0.94	4.78	na	2.81	1.00	0.99	1.37	1.03	1.01	1.08	0.78	1.37	2.04	1.27	1.06	0.94	1.29	4.19	1.61	0.86	0.83	0.95	1.04	0.92	1.35	0.70	0.90	0.42	0.59	1.44	0.28	0.85	0.58	0.84	1.16	0.32	0.52	0.93	1.33	0.79	0.99
Chile																																											

## CHAPTER 5 | Academic Research and Development

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## CHAPTER 5 | Academic Research and Development

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## CHAPTER 5 | Academic Research and Development

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## CHAPTER 5 | Academic Research and Development

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## CHAPTER 5 | Academic Research and Development

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## CHAPTER 5 | Academic Research and Development

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CHAPTER 5 | Academic Research and Development

Region, country, or economy and year	Canada	Mexico	United States	Argentina	Brazil	Chile	Austria	Belgium	Czech Republic	Denmark	Finland	France	Germany	Greece	Hungary	Ireland	Italy	Netherlands	Poland	Portugal	Spain	Sweden	United Kingdom	Norway	Russia	Switzerland	Turkey	Iran	Israel	Saudi Arabia	Egypt	South Africa	China	India	Japan	Malaysia	Pakistan	Singapore	South Korea	Taiwan	Thailand	Australia	New Zealand
2006	0.82	0.41	0.76	0.56	0.49	0.65	0.65	0.48	0.46	0.80	0.52	0.49	0.54	0.31	0.40	0.92	0.47	0.62	0.46	0.28	0.33	0.68	1.07	0.61	0.31	0.61	0.40	1.03	0.52	0.39	0.15	1.48	1.08	0.67	0.61	1.37	0.42	1.53	0.48	0.72	1.35	na	3.72
2016	0.99	0.62	0.75	1.06	0.79	1.19	0.79	0.82	0.73	1.11	0.83	0.68	0.72	0.72	0.98	1.10	0.66	1.08	0.71	0.65	0.67	0.93	1.19	0.99	0.54	0.80	0.64	1.00	0.82	0.57	0.28	1.54	1.15	0.85	0.80	1.54	0.65	1.27	0.60	0.83	1.26	na	3.38
New Zealand																																											
2006	0.85	0.37	0.68	0.58	0.34	0.46	0.60	0.52	0.33	0.72	0.57	0.40	0.46	0.22	0.30	1.27	0.37	0.60	0.39	0.22	0.30	0.56	1.25	0.79	0.16	0.48	0.28	0.19	0.39	0.31	0.48	0.96	0.49	0.26	0.39	1.30	0.07	0.95	0.28	0.33	0.91	3.72	na
2016	1.21	1.88	0.81	1.31	0.99	1.35	1.21	1.20	1.49	1.09	1.65	0.74	0.85	1.42	2.15	2.51	0.77	0.99	1.14	1.34	0.75	1.06	1.35	1.02	0.85	1.01	1.37	1.59	0.83	0.73	1.37	1.76	0.65	1.02	0.74	2.19	1.98	1.37	1.03	1.28	2.69	3.38	na

na = not applicable.

Note(s)

Article counts refer to publications from a selection of journals, books, and conference proceedings in S&E from Scopus. Articles are classified by their year of publication and are assigned to a region, country, or economy on the basis of the institutional address(es) listed in the article. Articles are credited on a whole-count basis (i.e., each collaborating region, country, or economy is credited with one count). Regions, countries, or economies with less than 1% of internationally coauthored articles in 2016 are omitted. The index of collaboration is calculated as follows:  $IC_{xy} = (C_{xy}/C_x)/(C_y/C_w)$ , where  $IC_{xy}$  = index of collaboration between country  $x$  and country  $y$ ,  $C_{xy}$  = number of papers coauthored between country  $x$  and country  $y$ ,  $C_x$  = total number of international coauthorships by country  $x$ ,  $C_y$  = total number of international coauthorships by country  $y$ , and  $C_w$  = total number of international coauthorships in the database.

Source(s)

National Science Foundation, National Center for Science and Engineering Statistics; SRI International; Science-Metrix; Elsevier, Scopus abstract and citation database, accessed July 2017.

Science and Engineering Indicators 2018

CHAPTER 5 | Academic Research and Development

APPENDIX TABLE 5-44

Internationally coauthored S&E publications, by selected region, country, or economy pairs: 2003 and 2016

(Number)

Region, country, or economy, and year	World	Canada	Mexico	United States	Argentina	Brazil	Chile	Austria	Belgium	Czech Republic	Denmark	Finland	France	Germany	Greece	Hungary	Ireland	Italy	Netherlands	Poland	Portugal	Spain	Sweden	United Kingdom	Norway	Russia	Switzerland	Turkey	Iran	Israel	Saudi Arabia	Egypt	South Africa	China	India	Japan	Malaysia	Pakistan	Singapore	South Korea	Taiwan	Thailand	Australia	New Zealand
World																																												
2003	194,398	19,131	3,408	86,408	2,321	5,427	1,617	4,992	7,480	2,912	4,959	4,219	26,587	35,960	2,992	2,803	1,982	16,763	11,969	5,833	2,744	11,811	9,063	35,056	3,263	10,577	10,690	2,400	1,054	5,047	756	1,347	2,207	14,460	5,392	20,452	796	481	2,610	6,776	3,084	1,549	11,638	2,653
2016	498,465	45,287	8,208	192,375	5,397	21,061	6,911	13,937	18,792	9,069	14,514	10,343	57,076	75,629	8,284	5,085	6,897	44,826	30,423	12,835	11,088	38,088	22,255	87,577	11,030	17,345	26,892	8,687	9,475	8,818	14,288	8,403	9,295	95,476	21,124	32,074	9,731	6,327	11,352	20,064	9,843	5,231	42,096	6,932
Canada																																												
2003	19,131	na	188	9,655	104	343	73	187	372	112	258	242	1,613	1,536	141	176	101	744	643	330	73	496	460	2,203	217	384	597	126	208	289	69	60	120	993	257	1,039	26	25	153	278	167	71	881	228
2016	45,287	na	684	19,704	547	1,846	684	928	1,307	635	1,287	787	4,669	4,616	497	414	614	2,778	2,483	972	619	2,164	1,644	6,685	1,025	904	2,136	621	1,059	917	861	524	970	7,245	1,234	1,875	418	357	542	1,038	634	235	3,768	760
Mexico																																												
2003	3,408	188	na	1,513	98	115	61	20	69	41	32	17	354	220	20	19	4	135	78	58	26	475	43	307	19	139	40	11	2	54	4	2	18	58	43	110	4	2	8	40	10	8	55	20
2016	8,208	684	na	3,287	412	763	466	274	317	264	196	265	997	930	260	213	198	771	373	314	309	1,841	235	970	127	444	437	257	202	103	150	170	216	544	418	350	154	207	84	324	198	199	433	215
United States																																												
2003	86,408	9,655	1,513	na	760	2,125	609	1,175	1,748	657	1,361	1,147	6,842	10,750	950	835	494	5,288	3,470	1,553	537	3,257	2,563	10,769	924	2,741	3,353	1,136	295	2,771	186	372	718	5,406	2,040	8,302	117	152	876	3,762	1,713	579	3,819	880
2016	192,375	19,704	3,287	na	1,787	7,606	2,421	3,618	4,703	2,081	4,385	2,788	14,440	21,584	2,295	1,510	1,907	12,784	9,078	3,192	2,245	9,530	6,383	25,858	3,118	4,336	8,455	3,046	2,375	4,543	2,964	1,653	3,084	43,968	6,759	10,484	1,192	1,106	3,133	9,553	3,990	1,686	12,127	2,175
Argentina																																												
2003	2,321	104	98	760	na	284	125	38	37	23	29	14	232	236	12	26	6	156	53	29	34	422	45	180	11	26	61	12	4	33	3	1	21	25	21	64	6	2	4	8	9	8	61	18

## CHAPTER 5 | Academic Research and Development

Region, country, or economy, and year	World	Canada	Mexico	United States	Argentina	Brazil	Chile	Austria	Belgium	Czech Republic	Denmark	Finland	France	Germany	Greece	Hungary	Ireland	Italy	Netherlands	Poland	Portugal	Spain	Sweden	United Kingdom	Norway	Russia	Switzerland	Turkey	Iran	Israel	Saudi Arabia	Egypt	South Africa	China	India	Japan	Malaysia	Pakistan	Singapore	South Korea	Taiwan	Thailand	Australia	New Zealand
2016	5,397	547	412	1,787	na	1,089	622	259	215	246	245	87	753	847	206	187	62	620	381	259	285	1,232	273	677	205	231	384	212	49	216	44	42	286	350	173	334	162	44	45	103	179	52	481	98
Brazil																																												
2003	5,427	343	115	2,125	284	na	106	50	137	47	53	48	721	570	36	33	12	363	151	107	198	283	115	587	52	198	132	21	2	61	5	7	41	120	104	212	6	3	8	45	21	15	141	33
2016	21,061	1,846	763	7,606	1,089	na	820	586	783	524	629	443	2,603	2,479	478	438	369	2,008	1,205	699	1,965	2,593	804	3,074	445	759	1,047	496	282	334	251	208	566	1,133	761	787	347	310	155	442	388	293	1,401	289
Chile																																												
2003	1,617	73	61	609	125	106	na	25	47	5	33	24	208	234	5	8	4	95	47	20	16	249	37	185	11	32	33	7	1	29	1	2	19	21	17	42	4	1	7	17	5	6	42	17
2016	6,911	684	466	2,421	622	820	na	255	275	206	318	172	1,167	1,232	242	184	102	789	476	290	300	1,777	363	1,222	263	314	498	213	70	227	81	34	341	451	193	411	169	41	45	169	214	44	692	130
Austria																																												
2003	4,992	187	20	1,175	38	50	25	na	214	167	124	139	496	1,759	86	129	44	498	313	234	95	294	216	570	96	197	462	36	12	72	5	22	52	114	63	200	5	9	19	44	39	27	167	28
2016	13,937	928	274	3,618	259	586	255	na	946	924	742	629	1,979	5,561	622	701	341	2,205	1,454	852	597	1,513	1,120	2,514	635	738	1,888	494	235	385	238	206	361	990	410	719	277	229	123	334	323	263	929	235
Belgium																																												
2003	7,480	372	69	1,748	37	137	47	214	na	120	243	177	1,703	1,234	176	176	88	731	1,172	246	147	538	347	1,337	132	332	495	52	10	137	15	42	85	181	67	310	6	2	17	52	30	18	199	39
2016	18,792	1,307	317	4,703	215	783	275	946	na	649	904	678	4,239	3,854	722	512	525	2,870	3,547	903	790	2,175	1,250	4,174	625	690	1,729	434	290	349	232	232	493	1,281	491	777	193	167	180	452	266	192	1,294	313
Czech Republic																																												
2003	2,912	112	41	657	23	47	5	167	120	na	55	83	415	631	67	98	31	244	170	216	72	159	133	356	56	213	159	17	5	68	2	10	14	42	36	199	3	2	8	17	16	11	60	13
2016	9,069	635	264	2,081	246	524	206	924	649	na	502	475	1,497	2,074	561	598	259	1,332	789	1,185	526	1,155	742	1,535	447	964	940	491	185	327	172	187	314	728	453	597	313	184	110	359	354	189	560	188
Denmark																																												

CHAPTER 5 | Academic Research and Development

Region, country, or economy, and year	World	Canada	Mexico	United States	Argentina	Brazil	Chile	Austria	Belgium	Czech Republic	Denmark	Finland	France	Germany	Greece	Hungary	Ireland	Italy	Netherlands	Poland	Portugal	Spain	Sweden	United Kingdom	Norway	Russia	Switzerland	Turkey	Iran	Israel	Saudi Arabia	Egypt	South Africa	China	India	Japan	Malaysia	Pakistan	Singapore	South Korea	Taiwan	Thailand	Australia	New Zealand
2003	4,959	258	32	1,361	29	53	33	124	243	55	na	257	511	885	87	58	64	423	442	160	99	345	775	992	365	181	324	26	7	85	6	18	40	118	55	156	3	7	12	34	6	15	207	49
2016	14,514	1,287	196	4,385	245	629	318	742	904	502	na	952	1,896	3,319	579	408	389	1,893	1,977	766	589	1,629	2,364	3,658	1,586	546	1,342	386	184	424	120	67	463	1,446	358	713	261	113	216	316	235	137	1,363	219
Finland																																												
2003	4,219	242	17	1,147	14	48	24	139	177	83	257	na	401	643	71	108	59	322	374	141	92	258	719	765	219	312	213	29	7	59	0	7	20	89	26	182	3	0	23	41	11	10	125	13
2016	10,343	787	265	2,788	87	443	172	629	678	475	952	na	1,463	2,260	522	388	399	1,419	1,160	710	424	1,232	1,917	2,317	868	1,020	961	324	230	204	198	192	306	1,122	486	651	201	221	162	391	226	183	721	238
France																																												
2003	26,587	1,613	354	6,842	232	721	208	496	1,703	415	511	401	na	3,977	450	331	191	2,845	1,447	874	479	1,934	815	3,756	411	1,258	1,826	130	49	422	19	43	178	720	358	1,150	17	12	53	204	91	65	637	111
2016	57,076	4,669	997	14,440	753	2,603	1,167	1,979	4,239	1,497	1,896	1,463	na	10,084	1,537	981	1,015	8,182	4,370	2,195	1,693	6,305	2,821	10,079	1,526	2,522	5,131	946	486	1,064	789	422	1,100	4,182	1,441	2,873	494	408	591	1,020	725	487	3,293	590
Germany																																												
2003	35,960	1,536	220	10,750	236	570	234	1,759	1,234	631	885	643	3,977	na	547	641	265	2,736	2,542	1,362	359	1,679	1,481	4,877	492	2,755	2,858	229	69	785	23	183	267	1,313	736	1,885	18	49	125	363	165	62	1,107	199
2016	75,629	4,616	930	21,584	847	2,479	1,232	5,561	3,854	2,074	3,319	2,260	10,084	na	1,912	1,470	1,364	8,821	7,746	3,171	1,817	6,871	4,671	14,200	2,104	4,099	8,310	1,319	825	1,757	909	852	1,327	6,419	1,975	3,776	516	538	756	1,708	909	489	4,570	890
Greece																																												
2003	2,992	141	20	950	12	36	5	86	176	67	87	71	450	547	na	64	36	370	217	128	77	205	128	717	81	134	186	30	3	62	3	8	21	42	17	95	5	2	6	30	11	4	63	8
2016	8,284	497	260	2,295	206	478	242	622	722	561	579	522	1,537	1,912	na	437	337	1,830	1,042	721	595	1,388	768	2,531	524	563	941	593	205	348	302	183	286	641	325	423	307	184	100	290	295	215	507	164
Hungary																																												
2003	2,803	176	19	835	26	33	8	129	176	98	58	108	331	641	64	na	27	243	158	140	46	147	144	355	37	117	157	31	4	85	0	15	22	55	52	178	3	1	14	41	25	3	45	11
2016	5,085	414	213	1,510	187	438	184	701	512	598	408	388	981	1,470	437	na	204	969	614	648	426	847	572	1,274	357	555	654	404	152	282	119	152	249	606	324	514	278	187	51	318	307	163	419	152

CHAPTER 5 | Academic Research and Development

Region, country, or economy, and year	World	Canada	Mexico	United States	Argentina	Brazil	Chile	Austria	Belgium	Czech Republic	Denmark	Finland	France	Germany	Greece	Hungary	Ireland	Italy	Netherlands	Poland	Portugal	Spain	Sweden	United Kingdom	Norway	Russia	Switzerland	Turkey	Iran	Israel	Saudi Arabia	Egypt	South Africa	China	India	Japan	Malaysia	Pakistan	Singapore	South Korea	Taiwan	Thailand	Australia	New Zealand
Ireland																																												
2003	1,982	101	4	494	6	12	4	44	88	31	64	59	191	265	36	27	na	142	158	28	51	117	84	750	49	61	82	11	9	18	6	9	18	43	30	58	4	5	17	10	5	5	78	27
2016	6,897	614	198	1,907	62	369	102	341	525	259	389	399	1,015	1,364	337	204	na	1,014	770	449	329	921	479	2,621	310	396	592	225	166	138	168	165	187	693	324	216	171	158	115	217	164	141	643	241
Italy																																												
2003	16,763	744	135	5,288	156	363	95	498	731	244	423	322	2,845	2,736	370	243	142	na	1,207	473	303	1,537	695	2,892	255	838	1,303	116	41	306	13	43	78	297	218	615	10	20	34	148	60	17	454	79
2016	44,826	2,778	771	12,784	620	2,008	789	2,205	2,870	1,332	1,893	1,419	8,182	8,821	1,830	969	1,014	na	4,378	2,135	1,684	6,481	2,700	10,023	1,395	1,776	4,292	1,182	782	1,157	606	411	766	2,517	1,255	1,975	431	384	366	926	651	334	2,486	479
Netherlands																																												
2003	11,969	643	78	3,470	53	151	47	313	1,172	170	442	374	1,447	2,542	217	158	158	1,207	na	290	213	796	620	2,395	307	502	737	64	16	201	6	22	128	296	143	479	17	9	32	91	34	28	440	86
2016	30,423	2,483	373	9,078	381	1,205	476	1,454	3,547	789	1,977	1,160	4,370	7,746	1,042	614	770	4,378	na	1,279	1,019	3,283	2,427	8,039	1,519	1,007	2,806	688	358	660	302	141	1,070	2,377	721	1,277	345	190	374	486	381	245	2,780	417
Poland																																												
2003	5,833	330	58	1,553	29	107	20	234	246	216	160	141	874	1,362	128	140	28	473	290	na	100	289	307	629	110	543	320	24	3	118	5	18	52	136	95	402	3	2	17	108	60	6	127	25
2016	12,835	972	314	3,192	259	699	290	852	903	1,185	766	710	2,195	3,171	721	648	449	2,135	1,279	na	670	1,741	1,048	2,533	705	1,304	1,281	558	309	423	247	217	428	1,016	606	840	315	196	146	465	450	212	773	204
Portugal																																												
2003	2,744	73	26	537	34	198	16	95	147	72	99	92	479	359	77	46	51	303	213	100	na	462	168	563	77	148	156	11	1	44	1	4	28	67	32	68	3	0	5	14	8	8	47	11
2016	11,088	619	309	2,245	285	1,965	300	597	790	526	589	424	1,693	1,817	595	426	329	1,684	1,019	670	na	2,903	636	2,309	457	555	891	439	253	301	214	182	318	765	399	400	298	146	92	242	281	170	609	206
Spain																																												
2003	11,811	496	475	3,257	422	283	249	294	538	159	345	258	1,934	1,679	205	147	117	1,537	796	289	462	na	464	1,980	220	388	549	54	6	181	10	22	61	189	107	274	7	5	21	80	40	14	259	51



## CHAPTER 5 | Academic Research and Development

Region, country, or economy, and year	World	Canada	Mexico	United States	Argentina	Brazil	Chile	Austria	Belgium	Czech Republic	Denmark	Finland	France	Germany	Greece	Hungary	Ireland	Italy	Netherlands	Poland	Portugal	Spain	Sweden	United Kingdom	Norway	Russia	Switzerland	Turkey	Iran	Israel	Saudi Arabia	Egypt	South Africa	China	India	Japan	Malaysia	Pakistan	Singapore	South Korea	Taiwan	Thailand	Australia	New Zealand
2016	38,088	2,164	1,841	9,530	1,232	2,593	1,777	1,513	2,175	1,155	1,629	1,232	6,305	6,871	1,388	847	921	6,481	3,283	1,741	2,903	na	2,276	7,789	1,272	1,433	2,795	874	491	792	606	362	711	2,043	914	1,533	420	265	285	722	557	293	2,148	395
Sweden																																												
2003	9,063	460	43	2,563	45	115	37	216	347	133	775	719	815	1,481	128	144	84	695	620	307	168	464	na	1,482	610	505	394	43	19	113	8	13	64	269	97	429	9	3	29	73	33	31	399	59
2016	22,255	1,644	235	6,383	273	804	363	1,120	1,250	742	2,364	1,917	2,821	4,671	768	572	479	2,700	2,427	1,048	636	2,276	na	4,967	2,178	955	1,780	483	331	509	204	150	632	2,284	669	1,102	284	243	299	437	314	183	1,754	327
United Kingdom																																												
2003	35,056	2,203	307	10,769	180	587	185	570	1,337	356	992	765	3,756	4,877	717	355	750	2,892	2,395	629	563	1,980	1,482	na	641	987	1,596	379	189	436	88	110	502	1,347	557	1,681	149	115	280	306	199	202	2,278	610
2016	87,577	6,685	970	25,858	677	3,074	1,222	2,514	4,174	1,535	3,658	2,317	10,079	14,200	2,531	1,274	2,621	10,023	8,039	2,533	2,309	7,789	4,967	na	2,720	2,335	5,720	1,322	920	1,371	1,246	703	2,170	10,472	2,494	3,659	1,428	847	1,541	1,589	981	862	8,838	1,640
Norway																																												
2003	3,263	217	19	924	11	52	11	96	132	56	365	219	411	492	81	37	49	255	307	110	77	220	610	641	na	175	153	25	2	51	6	7	43	101	38	103	5	0	11	18	11	5	112	44
2016	11,030	1,025	127	3,118	205	445	263	635	625	447	1,586	868	1,526	2,104	524	357	310	1,395	1,519	705	457	1,272	2,178	2,720	na	637	940	328	104	307	119	66	481	901	330	530	229	127	115	190	217	109	919	157
Russia																																												
2003	10,577	384	139	2,741	26	198	32	197	332	213	181	312	1,258	2,755	134	117	61	838	502	543	148	388	505	987	175	na	465	51	12	206	2	9	26	301	124	882								

CHAPTER 5 | Academic Research and Development

Region, country, or economy, and year	World	Canada	Mexico	United States	Argentina	Brazil	Chile	Austria	Belgium	Czech Republic	Denmark	Finland	France	Germany	Greece	Hungary	Ireland	Italy	Netherlands	Poland	Portugal	Spain	Sweden	United Kingdom	Norway	Russia	Switzerland	Turkey	Iran	Israel	Saudi Arabia	Egypt	South Africa	China	India	Japan	Malaysia	Pakistan	Singapore	South Korea	Taiwan	Thailand	Australia	New Zealand
2003	2,400	126	11	1,136	12	21	7	36	52	17	26	29	130	229	30	31	11	116	64	24	11	54	43	379	25	51	65	na	8	56	28	13	14	28	18	117	17	11	4	27	18	9	49	10
2016	8,687	621	257	3,046	212	496	213	494	434	491	386	324	946	1,319	593	404	225	1,182	688	558	439	874	483	1,322	328	555	632	na	538	319	564	281	345	759	463	508	351	406	122	338	314	203	466	165
Iran																																												
2003	1,054	208	2	295	4	2	1	12	10	5	7	7	49	69	3	4	9	41	16	3	1	6	19	189	2	12	14	8	na	0	4	1	4	17	22	47	14	6	4	9	9	4	66	4
2016	9,475	1,059	202	2,375	49	282	70	235	290	185	184	230	486	825	205	152	166	782	358	309	253	491	331	920	104	203	325	538	na	44	292	212	226	586	423	277	917	246	111	390	175	160	799	209
Israel																																												
2003	5,047	289	54	2,771	33	61	29	72	137	68	85	59	422	785	62	85	18	306	201	118	44	181	113	436	51	206	189	56	0	na	1	1	45	136	67	207	4	1	13	59	32	10	135	19
2016	8,818	917	103	4,543	216	334	227	385	349	327	424	204	1,064	1,757	348	282	138	1,157	660	423	301	792	509	1,371	307	525	627	319	44	na	68	41	250	703	340	448	164	40	147	211	237	45	613	102
Saudi Arabia																																												
2003	756	69	4	186	3	5	1	5	15	2	6	0	19	23	3	0	6	13	6	5	1	10	8	88	6	2	4	28	4	1	na	194	17	15	25	12	7	29	4	1	3	1	19	4
2016	14,288	861	150	2,964	44	251	81	238	232	172	120	198	789	909	302	119	168	606	302	247	214	606	204	1,246	119	282	323	564	292	68	na	3,297	205	1,562	1,568	435	855	1,313	197	589	275	203	693	146
Egypt																																												
2003	1,347	60	2	372	1	7	2	22	42	10	18	7	43	183	8	15	9	43	22	18	4	22	13	110	7	9	25	13	1	1	194	na	8	21	11	137	2	3	6	14	5	7	14	3
2016	8,403	524	170	1,653	42	208	34	206	232	187	67	192	422	852	183	152	165	411	141	217	182	362	150	703	66	241	222	281	212	41	3,297	na	109	538	385	602	276	244	41	363	168	148	199	160
South Africa																																												
2003	2,207	120	18	718	21	41	19	52	85	14	40	20	178	267	21	22	18	78	128	52	28	61	64	502	43	26	87	14	4	45	17	8	na	42	52	61	6	9	25	12	9	8	213	53
2016	9,295	970	216	3,084	286	566	341	361	493	314	463	306	1,100	1,327	286	249	187	766	1,070	428	318	711	632	2,170	481	454	749	345	226	250	205	109	na	723	897	472	242	154	113	174	214	172	1,212	228

CHAPTER 5 | Academic Research and Development

Region, country, or economy, and year	World	Canada	Mexico	United States	Argentina	Brazil	Chile	Austria	Belgium	Czech Republic	Denmark	Finland	France	Germany	Greece	Hungary	Ireland	Italy	Netherlands	Poland	Portugal	Spain	Sweden	United Kingdom	Norway	Russia	Switzerland	Turkey	Iran	Israel	Saudi Arabia	Egypt	South Africa	China	India	Japan	Malaysia	Pakistan	Singapore	South Korea	Taiwan	Thailand	Australia	New Zealand
China																																												
2003	14,460	993	58	5,406	25	120	21	114	181	42	118	89	720	1,313	42	55	43	297	296	136	67	189	269	1,347	101	301	197	28	17	136	15	21	42	na	187	2,385	136	14	632	514	450	62	1,017	110
2016	95,476	7,245	544	43,968	350	1,133	451	990	1,281	728	1,446	1,122	4,182	6,419	641	606	693	2,517	2,377	1,016	765	2,043	2,284	10,472	901	1,693	1,716	759	586	703	1,562	538	723	na	1,585	6,706	841	1,488	4,413	3,476	3,271	790	9,246	864
India																																												
2003	5,392	257	43	2,040	21	104	17	63	67	36	55	26	358	736	17	52	30	218	143	95	32	107	97	557	38	124	164	18	22	67	25	11	52	187	na	607	113	15	107	208	180	29	202	35
2016	21,124	1,234	418	6,759	173	761	193	410	491	453	358	486	1,441	1,975	325	324	324	1,255	721	606	399	914	669	2,494	330	783	775	463	423	340	1,568	385	897	1,585	na	1,337	895	430	605	1,839	727	438	1,515	301
Japan																																												
2003	20,452	1,039	110	8,302	64	212	42	200	310	199	156	182	1,150	1,885	95	178	58	615	479	402	68	274	429	1,681	103	882	486	117	47	207	12	137	61	2,385	607	na	80	26	145	1,387	341	370	745	108
2016	32,074	1,875	350	10,484	334	787	411	719	777	597	713	651	2,873	3,776	423	514	216	1,975	1,277	840	400	1,533	1,102	3,659	530	1,235	1,337	508	277	448	435	602	472	6,706	1,337	na	975	197	696	2,360	1,367	1,105	2,157	329
Malaysia																																												
2003	796	26	4	117	6	6	4	5	6	3	3	3	17	18	5	3	4	10	17	3	3	7	9	149	5	2	10	17	14	4	7	2	6	136	113	80	na	14	45	10	15	30	90	12
2016	9,731	418	154	1,192	162	347	169	277	193	313	261	201	494	516	307	278	171	431	345	315	298	420	284	1,428	229	296	317	351	917	164	855	276	242	841	895	975	na	738	364	400	450	382	1,262	296
Pakistan																																												
2003	481	25	2	152	2	3	1	9	2	2	7	0	12	49	2	1	5	20	9	2	0	5	3	115	0	2	14	11	6	1	29	3	9	14	15	26	14	na	3	16	3	5	17	1
2016	6,327	357	207	1,106	44	310	41	229	167	184	113	221	408	538	184	187	158	384	190	196	146	265	243	847	127	247	253	406	246	40	1,313	244	154	1,488	430	197	738	na	74	579	161	227	347	174
Singapore																																												
2003	2,610	153	8	876	4	8	7	19	17	8	12	23	53	125	6	14	17	34	32	17	5	21	29	280	11	10	32	4	4	13	4	6	25	632	107	145	45	3	na	38	110	27	323	45

CHAPTER 5 | Academic Research and Development

Region, country, or economy, and year	World	Canada	Mexico	United States	Argentina	Brazil	Chile	Austria	Belgium	Czech Republic	Denmark	Finland	France	Germany	Greece	Hungary	Ireland	Italy	Netherlands	Poland	Portugal	Spain	Sweden	United Kingdom	Norway	Russia	Switzerland	Turkey	Iran	Israel	Saudi Arabia	Egypt	South Africa	China	India	Japan	Malaysia	Pakistan	Singapore	South Korea	Taiwan	Thailand	Australia	New Zealand
2016	11,352	542	84	3,133	45	155	45	123	180	110	216	162	591	756	100	51	115	366	374	146	92	285	299	1,541	115	159	279	122	111	147	197	41	113	4,413	605	696	364	74	na	508	364	215	1,222	216
South Korea																																												
2003	6,776	278	40	3,762	8	45	17	44	52	17	34	41	204	363	30	41	10	148	91	108	14	80	73	306	18	315	117	27	9	59	1	14	12	514	208	1,387	10	16	38	na	139	29	187	34
2016	20,064	1,038	324	9,553	103	442	169	334	452	359	316	391	1,020	1,708	290	318	217	926	486	465	242	722	437	1,589	190	709	619	338	390	211	589	363	174	3,476	1,839	2,360	400	579	508	na	695	442	1,017	286
Taiwan																																												
2003	3,084	167	10	1,713	9	21	5	39	30	16	6	11	91	165	11	25	5	60	34	60	8	40	33	199	11	127	74	18	9	32	3	5	9	450	180	341	15	3	110	139	na	25	92	18
2016	9,843	634	198	3,990	179	388	214	323	266	354	235	226	725	909	295	307	164	651	381	450	281	557	314	981	217	552	489	314	175	237	275	168	214	3,271	727	1,367	450	161	364	695	na	347	689	175
Thailand																																												
2003	1,549	71	8	579	8	15	6	27	18	11	15	10	65	62	4	3	5	17	28	6	8	14	31	202	5	7	30	9	4	10	1	7	8	62	29	370	30	5	27	29	25	na	150	21
2016	5,231	235	199	1,686	52	293	44	263	192	189	137	183	487	489	215	163	141	334	245	212	170	293	183	862	109	213	288	203	160	45	203	148	172	790	438	1,105	382	227	215	442	347	na	556	196
Australia																																												
2003	11,638	881	55	3,819	61	141	42	167	199	60	207	125	637	1,107	63	45	78	454	440	127	47	259	399	2,278	112	165	374	49	66	135	19	14	213	1,017	202	745	90	17	323	187	92	150	na	658
2016	42,096	3,768	433	12,127	481	1,401	692	929	1,294	560	1,363	721	3,293	4,570	507	419	643	2,486	2,780	773	609	2,148	1,754	8,838	919	794	1,819	466	799	613	693	199	1,212	9,246	1,515	2,157	1,262	347	1,222	1,017	689	556	na	1,977
New Zealand																																												
2003	2,653	228	20	880	18	33	17	28	39	13	49	13	111	199	8	11	27	79	86	25	11	51	59	610	44	14	68	10	4	19	4	3	53	110	35	108	12	1	45	34	18	21	658	na
2016	6,932	760	215	2,175	98	289	130	235	313	188	219	238	590	890	164	152	241	479	417	204	206	395	327	1,640	157	204	379	165	209	102	146	160	228	864	301	329	296	174	216	286	175	196	1,977	na

CHAPTER 5 | Academic Research and Development

na = not applicable.

**Note(s)**

Article counts refer to publications from a selection of journals, books, and conference proceedings in S&E from Scopus. Articles are classified by their year of publication and are assigned to a region, country, or economy on the basis of the institutional address(es) listed in the article. Articles are credited on a whole-count basis (i.e., each collaborating region, country, or economy is credited with one count). Regions, countries, or economies with less than 1% of internationally coauthored articles in 2016 are omitted.

**Source(s)**

National Science Foundation, National Center for Science and Engineering Statistics; SRI International; Science-Metrix; Elsevier, Scopus abstract and citation database, accessed July 2017.

*Science and Engineering Indicators 2018*

## CHAPTER 5 | Academic Research and Development

APPENDIX TABLE 5-45

### U.S. sector publications coauthored with other U.S. sectors and foreign institutions: 2006 and 2016

(Number)

Year and publications authored	U.S. sector					
	Academic	Federal government	Industry	FFRDCs	Private nonprofit	State and local government
2006						
All publications	355,041	43,086	57,340	19,414	46,395	3,954
Total coauthored	253,508	36,569	43,462	14,975	40,769	3,559
Total coauthored with another U.S. sector or foreign institution	146,943	32,283	37,012	13,920	35,209	3,209
Coauthored with another U.S. sector	74,796	28,120	29,602	11,182	30,010	3,059
Coauthored with academic sector	na	23,435	24,310	9,611	26,501	2,524
Coauthored with nonacademic sector	74,796	11,108	11,605	3,831	9,633	1,479
Coauthored with foreign institution	88,383	10,354	12,903	6,463	11,201	555
2016						
All publications	437,682	45,214	50,889	20,650	50,146	4,298
Total coauthored	332,539	40,059	41,485	17,887	44,724	3,943
Total coauthored with another U.S. sector and/ or foreign institution	223,244	37,039	37,268	17,036	40,753	3,750
Coauthored with another U.S. sector	89,132	32,096	28,321	13,663	35,404	3,594
Coauthored with academic sector	na	28,693	24,964	12,548	33,451	3,182
Coauthored with nonacademic sector	89,132	11,662	9,857	3,892	9,270	1,597

## CHAPTER 5 | Academic Research and Development

Year and publications authored	U.S. sector					
	Academic	Federal government	Industry	FFRDCs	Private nonprofit	State and local government
Coauthored with foreign institution	162,906	15,137	17,775	9,410	16,501	819

na = not applicable

FFRDC = federally funded research and development center.

### Note(s)

Article counts refer to publications from a selection of journals, books, and conference proceedings in S&E from Scopus. Articles are classified by their year of publication and are assigned to a sector on the basis of the institutional address(es) listed in the article. Articles are credited on a whole-count basis (i.e., each collaborating institution type is credited one count in each qualifying group). The sum of articles coauthored with various sectors could exceed the total number of articles coauthored with another sector and/or foreign sector because of articles coauthored by multiple sectors. Articles from unknown U.S. sectors, approximately 7% of the total, are not shown. Counts of publications coauthored with another U.S. sector are limited to copublications involving the U.S. sector at stake and another different sector. For instance, the number of coauthored publications with the nonacademic sector for FFRDCs does not include publications coauthored by two FFRDCs.

### Source(s)

National Science Foundation, National Center for Science and Engineering Statistics; SRI International; Science-Metrix; Elsevier, Scopus abstract and citation database, accessed July 2017.

*Science and Engineering Indicators 2018*

## CHAPTER 5 | Academic Research and Development

APPENDIX TABLE 5-46 

U.S. S&E articles, by field and coauthorship attribute: 2003–16

(Number)

[illegible]



## CHAPTER 5 | Academic Research and Development

Field and coauthorship attribute	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Total articles	19,674	23,390	26,003	25,003	24,620	27,113	24,897	27,196	29,948	28,422	29,197	29,623	29,480	27,833
with multiple institutions	10,401	12,748	13,243	13,772	13,902	15,323	14,592	16,060	17,877	17,988	18,763	19,697	20,362	19,821
with domestic institutions only	14,562	17,425	19,883	18,682	18,088	20,123	17,523	19,006	20,796	18,848	18,934	18,460	17,516	15,980
with international institutions	5,048	5,853	6,023	6,179	6,410	6,852	7,286	8,132	9,092	9,528	10,134	11,081	11,940	11,824
Computer sciences														
Total articles	21,944	25,357	30,533	30,900	33,096	32,480	33,740	34,409	35,344	34,559	35,165	34,665	35,525	33,005
with multiple institutions	10,825	12,225	15,262	16,273	17,679	17,909	18,925	19,284	20,077	20,302	21,086	21,545	22,051	20,993
with domestic institutions only	17,354	20,137	23,983	23,744	24,788	23,716	24,240	24,381	24,875	23,713	23,721	22,566	23,125	20,975
with international institutions	4,401	5,016	6,283	6,773	7,722	8,277	9,239	9,889	10,368	10,758	11,386	12,050	12,351	11,987
Engineering														
Total articles	45,047	48,822	58,175	57,006	57,143	56,394	58,359	62,437	63,013	63,182	65,017	62,670	63,222	63,304
with multiple institutions	23,908	27,534	34,749	36,593	36,157	34,280	34,666	36,473	37,082	37,587	39,379	38,908	40,291	40,821
with domestic institutions only	35,382	37,880	43,975	41,308	41,033	41,171	42,603	46,031	46,090	45,329	45,511	42,431	41,461	40,678
with international institutions	9,068	10,105	13,015	13,929	14,026	13,707	14,892	16,012	16,423	17,436	19,218	20,006	21,620	22,516
Geosciences														
Total articles	18,537	22,657	24,264	23,432	24,675	24,181	24,667	24,817	25,748	26,069	28,041	29,616	27,943	28,551
with multiple institutions	12,906	16,097	17,566	16,819	17,823	17,803	18,100	18,292	19,008	19,415	21,217	22,445	22,040	22,790
with domestic institutions only	12,611	15,926	16,644	15,474	16,267	15,392	15,257	15,202	15,459	15,498	16,060	16,848	15,101	14,888
with international institutions	5,796	6,509	7,257	7,682	8,047	8,516	9,196	9,483	10,163	10,483	11,870	12,690	12,808	13,617

## CHAPTER 5 | Academic Research and Development

Field and coauthorship attribute	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Mathematics														
Total articles	7,609	7,744	8,690	8,889	9,319	9,754	10,288	9,901	10,481	10,987	11,070	11,536	11,370	11,063
with multiple institutions	4,538	4,847	5,343	5,538	5,903	6,197	6,319	6,018	6,510	6,934	7,193	7,663	7,610	7,527
with domestic institutions only	4,828	4,963	5,558	5,677	5,869	6,089	6,399	6,180	6,332	6,560	6,334	6,510	6,455	6,073
with international institutions	2,746	2,722	3,091	3,133	3,370	3,599	3,856	3,697	4,119	4,406	4,716	5,004	4,907	4,965
Medical sciences														
Total articles	97,043	103,011	109,110	113,141	115,646	119,283	123,785	126,748	132,655	137,856	141,318	147,916	148,932	145,950
with multiple institutions	72,706	80,073	86,194	87,233	89,958	92,446	90,513	90,393	97,857	102,227	106,694	112,524	115,749	116,384
with domestic institutions only	76,147	80,536	84,727	87,594	87,955	89,751	92,615	93,206	97,313	99,964	101,012	104,449	102,853	98,315
with international institutions	17,752	20,200	22,036	23,479	25,739	27,697	29,727	31,784	33,408	35,845	38,159	42,352	45,018	46,613
Other life sciences														
Total articles	8,507	8,916	9,576	10,058	9,868	10,154	10,405	10,684	11,459	12,129	11,993	11,872	11,451	10,973
with multiple institutions	3,836	4,547	4,993	5,892	5,986	6,067	5,808	5,881	6,553	6,973	7,046	7,175	7,219	6,986
with domestic institutions only	7,775	8,116	8,672	9,020	8,599	8,774	8,897	9,081	9,668	10,285	9,994	10,049	9,640	9,113
with international institutions	498	601	685	789	957	1,052	1,255	1,261	1,398	1,421	1,638	1,681	1,679	1,768
Physics														
Total articles	38,172	39,615	45,902	48,154	47,825	45,073	44,161	45,080	44,925	46,108	43,217	44,313	39,884	37,472
with multiple institutions	23,133	24,351	27,493	29,271	29,595	28,243	27,890	28,846	29,312	30,902	29,253	30,173	27,383	26,836
with domestic institutions only	25,361	26,265	31,008	32,403	31,688	29,111	28,218	28,656	28,020	27,903	25,735	25,662	22,792	20,455

## CHAPTER 5 | Academic Research and Development

Field and coauthorship attribute	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
with international institutions	12,654	13,209	14,752	15,530	15,871	15,776	15,862	16,339	16,840	18,135	17,255	18,579	17,053	16,921
Psychology														
Total articles	10,363	10,740	12,056	12,975	13,028	13,866	14,524	15,088	15,753	16,572	16,886	18,025	17,560	16,419
with multiple institutions	7,379	8,328	9,354	9,868	9,499	9,685	9,117	8,908	9,498	10,099	10,527	11,491	11,340	10,941
with domestic institutions only	8,566	8,957	10,043	10,776	10,597	11,266	11,958	12,315	12,786	13,250	13,441	14,152	13,678	12,655
with international institutions	1,391	1,571	1,714	1,927	2,143	2,343	2,419	2,643	2,844	3,220	3,321	3,795	3,840	3,742
Social sciences														
Total articles	19,104	20,235	21,921	22,774	24,018	25,603	27,827	29,754	31,152	32,145	33,252	34,901	34,581	33,293
with multiple institutions	7,013	8,742	9,484	10,060	10,299	11,120	10,806	10,798	11,549	12,293	13,084	13,832	14,088	14,255
with domestic institutions only	16,597	17,426	18,935	19,271	20,272	21,453	23,497	25,322	26,430	26,781	27,498	28,596	28,088	26,458
with international institutions	2,104	2,498	2,610	3,059	3,292	3,667	4,063	4,275	4,551	5,209	5,622	6,168	6,399	6,727

### Note(s)

Article counts refer to publications from a selection of journals, books, and conference proceedings in S&E from Scopus. Articles are classified by their year of publication and are assigned to a region, country, or economy on the basis of the institutional address(es) listed in the article. Articles are credited on a whole-count basis (i.e., each collaborating region, country, or economy is credited with one count). Articles with multiple institutions are counts of articles with two or more institutional addresses. Articles with domestic institutions only are counts of articles with one or more institutional addresses all within a single region, country, or economy. Articles with international institutions are counts of articles with institutional addresses from more than one region, country, or economy.

### Source(s)

National Science Foundation, National Center for Science and Engineering Statistics; SRI International; Science-Metrix; Elsevier, Scopus abstract and citation database, accessed July 2017.

*Science and Engineering Indicators 2018*

CHAPTER 5 | Academic Research and Development

APPENDIX TABLE 5-47 

Citations from international S&E publications, by region, country, or economy: 1996–2014

(Percent)

Region, country, or economy	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
North America	39.2	39.9	40.7	41.2	41.7	41.9	42.3	42.9	43.6	44.2	45.4	46.7	47.8	48.6	49.2	50.1	51.1	51.8	52.9
Canada	70.7	71.6	72.9	73.2	74.2	74.0	74.1	74.4	74.5	74.6	75.0	75.8	76.1	76.8	76.8	76.9	77.3	77.6	78.2
Greenland	95.3	93.3	89.7	95.3	69.6	89.4	79.7	87.2	82.1	95.6	91.7	91.2	93.5	81.1	89.9	89.7	91.7	90.2	91.1
Mexico	63.7	63.2	64.4	67.3	67.4	67.1	68.3	67.7	69.3	70.0	71.7	71.6	72.4	74.3	72.7	72.5	73.0	72.5	74.3
United States	42.3	43.2	44.0	44.5	45.0	45.2	45.6	46.3	47.0	47.7	48.8	50.1	51.1	51.8	52.4	53.2	54.2	54.7	55.7
Central America and Caribbean	75.0	75.0	74.2	75.5	75.0	74.4	75.3	76.0	78.4	79.9	81.3	82.9	83.6	83.5	84.0	85.4	84.7	85.4	86.2
Antigua and Barbuda	na	100.0	na	55.9	na	na	100.0	53.3	100.0	100.0	100.0	75.0	100.0	100.0	100.0	100.0	98.9	100.0	100.0
Bahamas, The	71.3	67.5	94.8	91.6	68.8	100.0	68.0	96.9	67.6	74.9	97.2	79.5	77.5	90.9	70.1	97.1	97.2	95.1	94.8
Barbados	93.8	85.9	73.7	69.9	90.0	85.1	90.7	82.9	88.3	94.3	90.2	92.6	94.8	95.4	84.0	91.6	86.4	91.1	95.9
Belize	94.6	95.8	100.0	100.0	94.4	100.0	85.8	94.9	100.0	95.9	99.2	99.3	87.1	96.1	99.7	98.2	98.4	97.5	97.4
Costa Rica	78.8	81.9	79.6	86.3	80.7	75.0	82.2	82.4	84.6	86.3	87.9	90.3	85.7	87.5	87.4	87.3	79.9	86.2	85.9
Cuba	56.3	51.8	57.3	58.2	58.5	65.1	63.5	64.8	69.3	71.4	73.5	76.3	79.7	75.9	77.5	77.6	76.6	76.8	80.8
Dominica	100.0	22.2	100.0	na	na	91.9	100.0	58.1	100.0	83.9	64.0	79.5	80.7	95.6	82.0	100.0	90.5	97.5	98.9
Dominican Republic	96.8	93.6	95.2	98.8	98.7	99.0	91.3	97.0	97.9	98.7	97.6	97.6	97.3	97.1	97.3	97.2	97.6	98.2	97.2
El Salvador	87.5	96.7	100.0	100.0	73.7	95.8	95.4	73.7	93.6	97.8	99.8	93.6	98.5	98.2	96.5	96.0	93.5	93.1	88.3
Grenada	63.9	100.0	100.0	100.0	100.0	100.0	100.0	94.8	94.4	99.1	92.9	89.3	98.3	97.4	98.5	96.8	99.4	97.1	95.4

CHAPTER 5 | Academic Research and Development

Region, country, or economy	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Guatemala	78.9	89.4	90.7	98.1	96.9	98.2	90.0	87.1	93.6	95.7	95.5	93.5	92.9	91.6	89.6	90.3	94.4	89.8	92.1
Haiti	85.2	98.8	100.0	100.0	100.0	92.9	89.6	87.7	92.4	92.8	93.9	93.0	98.6	98.2	97.7	93.6	89.1	87.7	89.7
Honduras	99.4	90.2	79.2	82.1	96.0	99.2	95.5	99.7	92.5	95.3	99.5	94.0	94.5	96.6	94.3	93.2	95.8	95.2	89.6
Jamaica	87.7	86.8	89.4	81.2	71.7	75.2	62.4	65.2	65.3	83.6	85.6	80.3	71.4	74.6	81.9	82.2	87.7	90.6	88.0
Nicaragua	92.1	94.8	92.3	96.8	95.3	92.3	95.0	94.3	90.9	90.1	93.3	94.7	93.8	89.9	92.8	93.1	95.7	96.4	95.6
Panama	89.8	93.4	90.4	89.5	93.3	92.8	91.8	89.1	88.9	90.1	91.5	91.9	92.8	90.8	91.5	90.3	90.6	89.5	92.4
Puerto Rico	80.5	82.9	81.9	82.8	79.2	74.6	77.2	81.1	82.4	81.0	82.2	83.4	84.1	85.9	86.2	89.0	89.5	88.9	87.5
Saint Kitts and Nevis	100.0	100.0	100.0	99.3	na	na	100.0	na	100.0	96.5	100.0	100.0	87.6	98.2	97.7	94.4	93.8	91.2	97.7
Saint Lucia	76.4	100.0	94.4	100.0	na	100.0	na	100.0	100.0	100.0	97.3	100.0	na	na	99.1	96.5	100.0	100.0	100.0
Saint Vincent and the Grenadines	na	100.0	100.0	100.0	100.0	na	100.0	100.0	100.0	100.0	95.2	100.0	na	na	100.0	na	100.0	100.0	100.0
Trinidad and Tobago	78.1	73.3	81.2	72.3	79.0	72.0	88.2	79.7	87.0	79.0	78.4	83.0	87.4	82.6	84.0	87.3	89.4	89.3	88.7
South America	59.2	59.2	59.0	60.0	60.2	60.7	61.6	62.7	62.4	61.9	59.7	59.3	58.8	58.5	59.1	58.8	60.2	61.7	62.5
Argentina	60.0	62.6	62.5	65.4	66.4	70.1	70.4	72.7	73.0	73.6	73.9	74.0	72.2	72.5	73.3	72.4	74.2	74.5	75.3
Bolivia	89.4	77.8	76.6	83.6	80.2	90.4	93.6	91.6	91.7	91.1	88.6	89.0	91.7	92.2	93.3	88.0	91.1	94.9	94.0
Brazil	58.8	58.3	57.9	57.7	58.8	57.8	59.4	60.2	60.3	59.6	57.1	57.1	56.8	56.5	56.9	56.8	58.4	60.7	62.0
Chile	68.4	69.3	71.9	71.3	72.3	71.9	71.1	75.1	75.2	75.0	74.8	74.7	75.0	75.4	75.8	75.4	76.3	76.1	76.2
Colombia	86.2	76.6	77.1	81.6	75.9	77.4	76.5	72.7	75.0	77.0	77.1	77.0	75.7	74.9	74.2	74.3	75.8	75.5	75.6
Ecuador	88.4	92.0	88.9	90.5	65.2	56.9	72.6	85.8	91.1	86.2	86.4	84.6	83.0	86.1	86.4	90.3	85.4	85.7	80.7
Guyana	100.0	93.2	78.4	97.4	84.5	86.6	96.6	100.0	85.3	97.1	98.2	100.0	97.5	96.4	84.9	100.0	97.5	98.0	96.8

CHAPTER 5 | Academic Research and Development

Region, country, or economy	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Paraguay	98.6	97.7	95.1	96.7	99.2	97.9	99.1	88.9	85.0	91.4	93.2	91.9	88.3	91.6	88.8	91.9	92.4	90.2	86.6
Peru	85.1	82.2	90.4	91.2	92.0	89.1	92.3	87.5	86.7	87.0	87.3	89.2	88.1	87.3	88.8	88.1	87.5	85.1	84.0
Suriname	53.1	88.4	83.4	91.7	100.0	94.4	98.0	91.9	98.8	88.4	95.7	98.5	97.7	100.0	84.3	90.3	86.5	90.4	97.9
Uruguay	77.6	75.2	80.2	83.5	83.4	79.3	79.7	80.2	81.3	82.2	81.7	81.3	81.5	79.4	81.0	81.9	81.4	81.9	82.6
Venezuela	70.1	67.8	70.7	70.8	68.9	73.2	72.0	78.5	77.9	79.0	78.4	79.9	79.5	81.6	80.7	80.0	82.9	83.7	84.3
Europe	34.0	35.2	36.1	36.9	37.6	38.4	39.2	39.7	40.0	40.4	40.8	41.2	41.4	41.8	41.8	42.1	42.7	43.2	44.0
EU	37.4	38.7	39.7	40.5	41.3	42.1	43.0	43.5	43.7	44.0	44.4	44.9	44.9	45.3	45.4	45.8	46.5	47.2	48.1
Austria	72.6	73.7	75.5	77.3	77.7	78.8	78.0	79.0	79.8	79.8	80.3	80.3	80.0	80.0	80.3	80.3	80.6	80.5	81.2
Belgium	72.8	73.7	75.2	76.4	77.3	77.3	77.0	78.1	77.8	78.7	78.9	79.3	79.8	80.4	80.5	80.4	81.3	81.8	82.2
Bulgaria	62.0	66.5	66.8	68.1	69.0	71.4	71.7	71.9	74.3	73.5	73.7	73.4	73.3	74.2	72.7	73.0	72.6	74.2	74.4
Croatia	55.1	55.5	57.1	58.2	58.3	59.7	60.1	61.4	63.2	63.1	67.8	65.7	65.0	66.1	68.9	71.1	70.9	73.8	75.6
Cyprus	77.7	80.9	78.5	79.8	81.9	82.1	82.7	80.7	81.4	78.2	80.3	79.1	80.5	79.9	80.6	80.3	80.9	83.4	84.1
Czech Republic	58.5	61.0	62.2	61.3	62.0	61.0	62.5	64.9	63.8	63.8	64.1	64.6	63.7	62.3	62.7	63.4	64.7	64.9	66.3
Denmark	72.2	74.5	74.9	76.5	77.4	77.3	77.7	79.3	79.8	80.3	80.8	81.1	81.2	80.6	80.5	79.2	80.2	80.2	80.6
Estonia	68.5	71.9	64.4	66.8	72.2	72.9	71.2	71.0	73.0	68.6	67.7	71.9	69.9	70.0	72.0	73.8	74.2	76.4	76.9
Finland	66.8	70.2	71.5	72.4	74.3	73.8	74.8	74.7	75.5	74.6	76.4	76.4	77.3	76.9	77.1	77.3	77.7	77.6	79.0
France	64.7	65.6	67.4	68.7	69.8	70.8	71.4	71.9	72.2	72.4	72.3	72.3	72.5	73.1	73.3	73.9	74.3	75.2	76.0
Germany	60.8	61.8	63.6	65.3	66.0	66.8	67.9	68.2	68.4	68.9	69.2	69.8	69.1	69.3	69.7	69.9	70.6	71.4	71.9
Greece	64.0	66.1	68.2	69.4	70.2	71.6	72.4	74.7	74.4	75.2	75.6	76.4	78.4	80.1	79.8	79.9	79.8	80.8	81.3

CHAPTER 5 | Academic Research and Development

Region, country, or economy	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Hungary	68.0	65.8	67.1	68.9	69.6	70.5	72.9	73.8	74.4	73.7	75.0	74.3	75.5	76.1	74.9	75.9	75.6	74.4	74.5
Ireland	76.9	79.0	78.8	80.3	80.5	81.3	80.4	81.1	80.9	79.2	81.0	81.2	80.7	79.9	80.8	81.8	82.0	82.9	83.3
Italy	64.7	66.5	67.9	68.5	68.9	68.8	69.8	70.7	71.2	71.6	71.3	72.0	72.2	72.6	72.1	70.2	69.1	68.2	69.1
Latvia	58.6	56.8	71.7	65.8	67.9	67.6	70.1	79.4	76.3	79.4	73.5	70.0	67.3	62.1	55.1	54.8	60.8	68.9	63.8
Lithuania	64.1	57.4	59.3	67.0	70.1	61.7	61.4	64.6	61.5	60.9	59.5	55.0	44.3	45.9	49.9	58.0	64.6	66.0	67.9
Luxembourg	84.2	83.6	85.4	81.6	91.9	92.3	87.5	79.3	86.3	90.9	85.0	82.7	85.3	85.3	82.0	82.9	81.9	80.4	83.4
Malta	88.5	78.7	56.4	75.2	72.4	90.0	92.1	94.5	89.5	82.2	77.5	69.3	73.9	79.0	72.7	78.4	80.8	83.6	85.1
Netherlands	70.3	72.3	73.8	75.3	75.5	75.9	77.1	77.6	77.9	77.7	78.4	78.6	78.6	79.4	79.2	79.4	80.2	80.5	80.8
Poland	52.6	53.3	53.1	55.5	56.2	56.5	56.7	59.9	60.7	61.6	62.2	63.5	62.2	62.8	60.2	58.9	58.1	59.1	60.0
Portugal	63.7	67.6	66.0	65.2	69.0	67.5	69.3	70.7	71.4	70.4	71.0	71.7	72.5	73.3	73.2	73.3	74.1	74.5	76.1
Romania	53.1	59.0	59.2	58.4	61.8	59.6	64.2	63.4	64.9	61.7	60.9	58.4	51.0	50.4	53.7	57.2	59.7	61.7	64.1
Slovakia	56.5	57.0	57.2	61.8	58.2	62.8	64.6	66.4	67.6	66.3	69.7	71.0	70.5	69.8	67.4	66.2	64.2	62.6	63.1
Slovenia	59.3	56.7	57.3	62.3	64.2	64.7	65.7	69.5	69.0	68.9	73.1	72.9	71.1	73.0	73.7	73.6	75.7	76.0	78.0
Spain	60.2	61.8	64.2	64.5	65.2	66.4	66.7	67.8	67.8	67.7	68.4	69.2	69.7	70.6	70.7	71.7	73.1	73.7	75.2
Sweden	68.9	71.4	72.0	73.9	75.2	75.8	77.0	77.2	77.6	78.3	78.8	79.6	79.6	79.8	80.0	79.2	79.7	80.0	80.9
United Kingdom	63.8	65.6	66.6	67.6	69.0	70.2	71.6	72.1	72.6	73.3	73.4	74.1	74.7	75.2	75.3	75.8	76.4	76.6	77.2
Other Europe	65.4	66.3	67.2	68.1	69.0	69.1	69.1	68.9	70.1	70.6	72.2	72.1	72.8	72.4	71.6	71.1	70.9	69.4	68.4
Albania	72.9	90.9	95.0	91.8	93.8	94.4	88.3	84.9	97.9	89.3	96.8	83.4	92.1	90.3	86.9	83.9	80.5	78.3	87.7
Andorra	na	100.0	100.0	na	na	100.0	na	98.5	100.0	96.1	88.4	100.0	99.2	99.0	99.8	85.0	97.1	99.2	88.8

# CHAPTER 5 | Academic Research and Development

Region, country, or economy	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Belarus	53.6	55.9	58.5	61.5	65.0	66.7	62.9	59.8	62.2	66.9	68.2	73.3	75.5	74.0	75.6	73.5	70.4	69.4	70.8
Bosnia and Herzegovina	77.7	93.4	74.3	81.2	79.5	92.1	87.3	84.3	86.1	78.3	80.6	79.2	73.1	78.9	80.5	83.7	84.0	85.7	85.7
Holy See (Vatican City)	100.0	86.5	na	na	na	na	na	na	100.0	na	na	100.0	100.0	100.0	95.3	99.2	85.8	100.0	91.0
Iceland	81.0	85.6	82.0	86.7	82.6	84.2	86.5	84.3	84.1	87.3	87.1	89.9	89.2	88.2	84.9	83.7	84.6	85.2	84.6
Kosovo	na	na	na	na	na	na	na	na	na	na	na	na	78.6	90.2	85.4	88.5	89.8	89.3	84.1
Liechtenstein	58.8	42.3	46.3	73.7	83.6	80.9	61.6	70.2	86.2	78.0	83.4	85.2	84.6	94.8	93.4	94.8	91.3	89.7	87.6
Macedonia	83.6	72.5	59.3	55.2	56.8	77.1	70.7	74.9	86.1	85.0	83.3	80.2	78.6	78.8	74.6	79.1	73.9	70.1	77.9
Moldova	69.6	70.2	79.5	74.3	64.4	76.2	76.5	79.9	85.0	79.9	85.6	79.1	83.5	82.5	82.5	72.8	79.2	80.4	73.7
Monaco	66.0	93.0	82.0	82.5	81.8	86.6	82.0	72.9	87.3	90.8	77.8	89.6	85.7	86.8	87.1	90.9	94.3	94.6	92.9
Montenegro <sup>a</sup>	na	na	na	na	na	na	na	na	na	na	na	77.2	70.8	68.6	66.5	71.1	74.5	66.0	62.7
Norway	66.5	68.4	69.4	71.4	73.8	74.7	75.6	76.3	77.1	75.5	76.6	76.3	77.6	78.2	77.4	77.4	77.7	78.6	79.0
Russia	50.8	50.2	53.1	54.7	54.9	54.1	55.3	54.9	57.1	58.2	61.7	62.1	61.7	58.9	57.7	54.3	53.0	47.1	43.4
San Marino	100.0	100.0	100.0	100.0	100.0	100.0	na	na	100.0	100.0	100.0	na	100.0	95.0	89.4	89.4	94.1	97.6	93.9
Serbia <sup>a</sup>	na	na	na	na	na	na	na	na	na	na	na	64.0	64.5	64.6	62.9	62.3	67.7	70.5	74.0
Serbia and Montenegro <sup>b</sup>	54.9	54.9	56.3	63.2	61.9	64.8	64.8	63.7	64.2	82.0	96.9	na	na	na	na	na	na	na	na
Switzerland	77.6	78.5	79.0	79.3	80.2	81.0	81.2	81.1	81.4	81.6	82.3	82.3	82.6	82.5	82.6	82.7	82.7	82.9	83.7
Turkey	57.1	59.2	60.3	63.0	63.4	62.6	61.7	62.2	64.4	65.6	67.2	68.7	69.6	70.1	69.3	69.9	70.3	70.2	70.7
Ukraine	51.0	54.0	51.1	52.5	52.9	51.8	52.9	56.5	56.1	55.1	58.8	57.0	60.8	58.1	59.6	57.1	56.2	55.7	56.0
Middle East	72.3	72.6	73.7	74.1	74.2	74.3	74.0	74.9	73.5	72.4	72.0	70.8	70.1	68.9	67.7	68.0	68.1	68.5	68.2



CHAPTER 5 | Academic Research and Development

Region, country, or economy	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Armenia	63.2	64.0	70.5	73.6	61.3	71.9	66.3	65.6	69.0	71.3	69.6	72.7	66.8	62.8	58.3	55.5	60.5	58.0	60.0
Azerbaijan	68.3	66.1	82.9	82.9	63.4	60.9	62.2	63.1	54.2	62.3	74.9	79.0	78.6	73.2	71.4	71.0	71.8	69.5	72.7
Bahrain	73.7	68.9	52.4	80.7	66.1	74.1	92.0	66.5	81.3	75.4	83.1	89.2	87.9	85.8	85.5	87.4	89.3	90.4	91.1
Gaza Strip	89.2	71.9	80.2	49.9	28.2	76.5	49.0	51.0	78.6	67.5	75.7	75.2	79.8	84.6	74.4	69.2	66.9	76.7	64.5
Georgia	72.5	71.5	70.6	82.0	86.8	82.7	76.4	73.1	79.9	76.2	81.7	75.0	77.3	79.2	80.6	75.6	80.2	73.2	83.3
Iran	55.1	47.3	51.8	51.9	47.5	46.1	47.4	52.9	50.3	50.5	52.3	55.3	55.8	56.4	57.0	57.4	58.7	60.2	59.8
Iraq	68.3	51.9	85.4	77.7	91.5	66.6	80.8	85.1	80.3	76.3	82.3	75.7	83.2	82.2	81.9	80.0	86.2	86.5	83.3
Israel	74.5	74.9	75.7	76.5	77.0	77.7	78.2	79.5	79.2	79.8	80.7	80.7	81.2	82.0	81.7	82.5	82.4	82.8	82.5
Jordan	56.7	62.8	69.6	67.7	70.6	71.0	71.7	74.7	78.6	78.0	81.3	79.1	78.0	83.6	83.9	82.3	81.6	81.4	79.5
Kuwait	57.4	61.6	61.2	66.2	75.7	71.5	74.8	77.2	77.0	78.2	76.4	81.4	77.6	81.4	81.2	82.8	82.9	84.3	87.5
Lebanon	72.7	75.5	83.6	80.9	79.5	81.5	82.5	82.2	83.1	86.2	86.9	87.6	87.5	87.2	85.7	85.2	85.3	86.9	86.7
Oman	76.9	79.9	79.6	79.8	76.1	69.5	75.0	79.4	75.3	75.7	79.1	80.0	84.9	81.9	83.2	80.2	79.7	82.3	82.6
Qatar	91.2	85.1	98.7	95.6	84.9	90.7	82.3	86.3	80.7	82.9	87.4	89.2	85.9	85.9	85.5	87.1	83.2	86.0	87.1
Saudi Arabia	62.4	66.1	72.3	71.9	74.8	72.6	71.6	77.5	76.2	79.5	80.7	80.5	81.5	81.0	78.6	79.0	79.4	79.8	81.3
Syria	79.5	65.5	70.0	68.4	74.1	71.9	80.1	73.1	69.6	78.0	85.0	79.3	81.1	77.6	79.2	82.1	85.6	89.2	79.4
United Arab Emirates	50.4	60.9	73.2	76.2	74.2	77.6	73.8	71.2	77.8	76.5	82.1	84.0	86.8	86.0	84.2	84.0	80.5	81.1	85.5
West Bank	88.4	76.1	80.6	75.5	79.8	82.7	90.4	84.0	79.8	82.7	78.6	80.2	64.2	66.3	75.1	84.6	92.2	90.7	72.7
Yemen	95.9	49.8	83.4	74.9	81.4	79.4	85.6	89.1	83.5	87.1	89.5	93.9	90.5	92.0	90.4	89.2	90.3	92.0	92.1
Africa	62.7	61.9	66.5	65.7	66.0	67.1	66.7	68.6	68.7	69.7	69.3	70.3	70.6	71.3	70.7	70.7	70.6	69.7	69.7

CHAPTER 5 | Academic Research and Development

Region, country, or economy	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Algeria	77.6	73.1	72.2	64.2	69.6	67.4	69.7	66.2	72.8	68.7	73.1	72.3	76.8	79.5	78.8	77.0	75.7	72.8	73.4
Angola	58.9	100.0	100.0	98.6	99.8	100.0	87.8	98.3	97.7	99.9	91.9	97.5	95.8	96.1	97.0	96.2	91.2	95.3	87.2
Benin	76.6	70.3	75.0	87.1	77.6	76.0	84.6	83.1	87.0	87.7	87.6	80.0	81.8	78.2	80.1	84.2	81.0	83.8	86.6
Botswana	67.2	74.3	61.7	84.2	74.3	68.4	65.9	77.0	80.8	83.7	81.9	89.5	85.3	88.8	90.4	90.8	93.4	89.8	86.9
Burkina Faso	77.3	77.5	86.0	90.7	89.0	85.0	79.2	89.6	91.6	88.1	87.7	91.8	87.0	87.3	86.1	86.7	88.4	89.8	91.6
Burundi	96.2	78.6	100.0	97.4	100.0	89.1	91.2	97.7	98.2	97.6	97.7	97.7	99.0	96.7	99.3	96.7	94.5	88.2	93.7
Cameroon	75.7	73.6	73.3	83.0	82.6	81.7	76.0	79.2	80.3	76.0	76.7	81.5	80.7	82.4	83.4	81.4	80.8	78.5	77.5
Cape Verde	93.3	100.0	88.9	98.8	na	100.0	na	96.5	na	100.0	100.0	89.7	97.6	98.2	99.0	100.0	95.5	97.8	97.1
Central African Republic	87.8	99.2	88.6	99.3	97.0	99.6	96.5	79.9	78.1	92.3	95.9	98.5	91.4	97.5	90.8	96.6	94.8	94.1	97.6
Chad	100.0	100.0	96.1	100.0	100.0	100.0	99.6	90.2	94.5	93.6	98.1	95.0	89.8	96.5	97.9	98.8	97.6	92.2	97.8
Comoros	na	na	na	100.0	100.0	100.0	na	100.0	91.7	96.7	na	97.9	100.0	100.0	96.0	98.1	100.0	100.0	85.7
Congo, Democratic Republic of the	96.1	87.9	89.7	89.9	98.3	95.2	90.7	92.4	92.5	84.4	94.2	84.1	91.5	94.8	90.2	93.2	90.3	88.6	89.8
Congo, Republic of the	91.8	91.3	95.9	96.8	86.8	89.2	92.1	88.8	91.2	92.5	92.5	92.2	91.7	93.4	96.8	91.6	93.1	97.3	88.6
Côte d'Ivoire	91.0	76.1	82.1	89.8	89.1	85.1	84.5	83.8	93.7	87.5	91.7	88.4	84.6	85.9	86.0	88.9	89.4	88.3	89.2
Djibouti	100.0	100.0	100.0	100.0	na	100.0	na	na	100.0	99.1	100.0	100.0	98.3	95.7	91.6	88.2	97.1	96.0	96.5
Egypt	58.7	58.0	62.2	62.6	61.4	64.2	64.5	69.3	70.7	72.8	74.0	76.5	77.1	77.9	76.9	78.2	78.4	76.9	75.9
Equatorial Guinea	93.9	97.6	100.0	92.9	na	100.0	46.7	95.5	89.4	100.0	80.8	72.6	96.6	97.1	100.0	94.1	95.5	91.4	93.2
Eritrea	100.0	100.0	95.8	98.1	93.7	56.5	81.8	86.2	79.3	92.6	95.6	95.3	98.6	98.6	99.7	98.7	99.4	97.9	98.1
Ethiopia	76.8	74.8	79.6	83.6	77.9	77.6	71.8	80.8	85.8	89.6	82.9	79.6	79.4	81.3	80.2	78.7	79.9	78.6	80.0

CHAPTER 5 | Academic Research and Development

Region, country, or economy	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Gabon	84.6	81.7	90.3	87.3	90.1	89.6	91.8	91.6	88.3	89.3	88.9	92.0	91.2	92.2	92.2	95.7	90.2	85.7	94.7
Gambia, The	88.2	82.0	92.7	90.0	91.5	89.3	93.7	91.9	87.9	92.0	87.4	93.4	91.1	92.6	91.4	94.4	94.6	93.9	92.1
Ghana	80.4	81.9	89.2	84.7	85.6	87.6	89.7	88.8	88.2	87.0	88.9	89.9	89.4	89.6	85.7	86.1	84.0	85.6	83.1
Guinea	96.3	96.6	99.2	96.0	99.3	99.6	91.3	99.9	99.3	97.9	96.6	94.7	99.4	96.8	96.9	97.2	94.6	92.5	96.8
Guinea-Bissau	95.3	82.6	79.9	94.2	96.9	81.3	86.1	80.2	81.6	78.7	66.2	90.5	90.7	91.8	86.2	86.8	79.1	83.4	83.4
Kenya	79.4	78.0	78.9	82.7	82.7	84.5	85.4	83.3	85.5	85.8	83.3	85.3	85.9	86.3	88.4	86.7	88.1	87.2	85.9
Lesotho	81.3	60.0	61.9	100.0	100.0	98.3	100.0	99.5	100.0	94.6	91.9	98.7	98.5	98.3	99.3	97.3	92.6	98.7	91.6
Liberia	100.0	100.0	na	na	100.0	100.0	98.6	77.8	87.8	100.0	100.0	100.0	98.6	100.0	98.2	90.8	89.8	96.5	98.7
Libya	59.1	94.2	96.4	83.6	93.3	97.6	88.8	92.1	85.6	83.9	92.7	89.6	88.9	83.7	96.2	96.0	93.1	92.5	92.2
Madagascar	73.4	85.0	79.6	87.2	84.0	80.9	84.6	91.2	83.5	80.9	76.8	85.7	86.8	91.6	87.5	88.8	92.1	88.9	87.1
Malawi	85.3	82.4	81.9	90.7	87.6	80.9	80.7	82.5	85.0	83.1	82.1	87.6	88.7	91.5	90.3	89.7	89.9	90.9	89.4
Mali	84.9	93.6	93.6	96.6	96.9	95.8	91.9	93.9	88.6	90.1	92.2	93.1	89.9	92.9	92.6	92.9	94.6	95.6	94.4
Mauritania	86.2	100.0	82.5	96.0	99.1	95.4	99.3	99.4	96.4	97.1	97.7	98.1	100.0	94.4	96.9	94.6	92.7	90.9	93.1
Mauritius	71.9	66.8	86.6	69.3	71.9	81.9	86.1	84.1	78.5	87.1	86.4	87.9	86.4	82.3	87.4	88.0	76.2	88.0	84.6
Morocco	76.5	67.8	69.7	62.5	64.5	65.6	69.9	73.4	72.9	77.9	77.7	79.1	80.8	80.9	73.9	73.1	71.1	72.5	70.4
Mozambique	95.9	79.8	93.9	94.7	81.2	87.6	90.3	92.1	82.4	91.8	91.8	95.6	87.6	90.7	91.6	91.9	92.8	90.7	92.2
Namibia	80.8	78.8	59.9	61.7	67.3	58.1	66.8	71.1	85.8	92.2	93.3	89.2	93.9	92.8	91.0	91.7	90.9	88.4	93.1
Niger	92.9	83.1	85.1	91.7	90.2	96.9	91.8	84.5	92.2	78.3	89.7	97.0	95.4	95.4	96.6	95.7	90.4	90.0	95.4
Nigeria	56.4	59.4	65.1	69.2	70.8	68.7	69.3	67.1	66.8	67.5	67.1	67.7	69.6	70.2	73.8	76.2	75.0	73.5	74.6

CHAPTER 5 | Academic Research and Development

Region, country, or economy	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Rwanda	89.4	94.1	97.0	98.3	99.5	100.0	100.0	97.1	93.3	91.2	95.4	94.1	97.3	95.7	92.6	95.1	91.7	90.4	88.4
São Tomé and Príncipe	90.6	na	100.0	na	88.3	82.8	85.5	96.1	100.0	na	88.7	94.2	na	95.8	97.5	na	100.0	100.0	98.4
Senegal	77.8	68.0	75.2	83.0	88.3	86.7	79.4	85.6	85.3	92.2	87.7	93.7	90.8	89.4	91.5	86.4	86.2	84.4	87.8
Seychelles	92.4	100.0	91.3	98.0	93.4	100.0	62.2	49.7	99.8	93.5	92.8	94.7	96.1	96.3	94.3	93.4	95.3	93.0	88.9
Sierra Leone	93.9	62.4	94.9	100.0	100.0	100.0	100.0	100.0	100.0	99.7	100.0	94.5	95.6	97.7	83.1	82.2	87.8	93.7	94.8
Somalia	100.0	100.0	na	100.0	100.0	na	100.0	na	100.0	na	100.0	na	100.0	100.0	99.2	86.5	99.1	87.6	97.3
South Africa	61.4	62.4	68.2	65.1	65.8	69.1	67.9	69.9	69.9	71.1	70.4	71.4	72.1	72.8	71.9	70.8	71.8	71.9	72.5
South Sudan	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	99.8	99.0	71.2	99.0
Sudan	77.5	64.4	85.0	89.5	85.9	87.5	78.8	82.5	68.5	75.3	80.6	84.4	83.5	79.2	81.3	80.4	85.3	89.1	89.4
Swaziland	87.1	67.3	100.0	100.0	99.5	100.0	87.5	94.3	87.9	91.2	99.3	91.0	86.1	96.0	94.4	98.2	99.4	96.8	98.9
Tanzania	83.1	81.8	88.2	80.0	87.6	88.5	87.0	89.3	85.7	87.5	86.6	87.1	87.6	88.1	85.9	87.4	84.8	86.0	86.1
Togo	61.3	90.3	62.6	88.3	88.3	78.1	94.6	88.4	86.7	85.2	92.0	84.6	83.7	93.9	93.5	87.8	89.5	88.7	89.1
Tunisia	64.8	70.7	63.3	71.0	68.7	72.2	70.2	73.6	69.7	70.4	72.1	72.6	72.3	72.7	74.8	76.7	73.3	72.0	72.0
Uganda	86.9	81.6	79.9	89.5	86.3	88.3	85.1	89.2	87.2	89.5	88.2	87.5	87.5	85.6	86.8	87.2	87.9	85.6	87.0
Western Sahara	na	na	na	na	na	na	na	na	na	na	na	na	na	100.0	100.0	na	na	na	na
Zambia	87.9	88.3	92.4	88.8	94.8	90.9	90.6	87.8	91.6	90.1	86.9	92.2	91.1	91.8	90.5	91.6	92.9	89.5	92.0
Zimbabwe	71.9	75.6	80.0	74.8	82.9	86.4	84.5	84.1	81.8	86.4	85.2	90.7	93.1	92.2	89.9	86.6	79.9	85.6	86.0
Asia	47.7	49.3	49.9	49.3	48.4	47.4	45.9	45.0	43.9	42.3	41.1	39.6	38.8	38.3	37.3	35.9	34.6	33.5	32.3
Afghanistan	na	na	100.0	100.0	100.0	na	100.0	83.6	100.0	95.7	98.6	92.7	92.5	92.2	98.2	93.7	93.7	95.7	92.5

CHAPTER 5 | Academic Research and Development

Region, country, or economy	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Bangladesh	70.5	69.0	79.0	79.0	74.0	76.7	76.4	79.1	82.1	82.2	83.1	79.5	79.2	79.6	78.3	76.8	78.1	74.8	75.9
Bhutan	25.0	92.8	58.3	100.0	70.0	na	79.1	100.0	82.6	94.2	91.5	95.6	89.6	90.0	94.5	82.5	90.3	96.2	92.3
Brunei	82.1	79.7	74.8	82.4	81.3	70.3	77.1	81.2	79.1	88.5	95.1	89.8	94.2	86.0	91.8	85.0	82.7	71.4	72.9
Burma	37.7	100.0	78.8	95.0	90.2	83.9	84.9	97.6	90.7	94.9	96.0	93.5	88.7	96.6	97.8	97.4	93.2	95.3	90.5
Cambodia	94.9	91.1	90.9	96.1	97.0	99.2	81.8	82.3	92.5	93.3	93.0	90.0	89.2	93.9	92.6	92.3	90.0	88.3	91.7
China	51.6	51.4	49.9	47.9	45.2	45.1	43.5	43.8	42.2	41.2	41.4	40.9	41.0	41.9	41.5	40.3	39.4	38.6	37.7
India	48.5	49.5	52.4	53.0	55.7	55.2	56.5	58.5	58.9	59.8	60.5	62.4	63.3	62.8	61.2	61.4	60.9	61.1	61.9
Indonesia	83.1	78.7	76.8	85.8	86.9	86.4	88.6	89.7	91.1	89.8	89.1	88.4	87.4	86.6	83.9	80.3	81.3	79.0	71.4
Japan	52.6	55.1	56.5	57.4	57.8	58.0	58.7	59.8	60.4	60.8	61.7	62.1	62.9	63.4	64.0	64.5	65.4	66.5	67.0
Kazakhstan	74.5	66.7	58.6	71.8	60.8	59.6	53.7	69.0	76.7	75.0	79.8	76.6	78.6	73.5	77.6	62.2	64.8	66.5	67.5
Kyrgyzstan	99.0	73.1	54.1	68.3	63.1	88.7	75.8	85.4	86.6	98.7	88.4	91.4	85.8	92.0	95.3	90.8	87.5	94.9	91.9
Laos	86.2	81.5	88.4	100.0	87.3	86.9	97.5	82.6	92.5	84.3	91.2	89.2	94.0	88.9	90.9	88.4	91.6	91.8	91.2
Malaysia	66.8	68.7	71.8	68.4	68.4	69.8	70.4	74.5	76.2	76.0	72.6	68.1	65.5	65.0	62.3	62.9	65.2	67.0	69.5
Maldives	92.7	na	100.0	100.0	na	90.0	na	100.0	100.0	100.0	97.1	98.9	98.2	99.9	99.2	95.4	78.5	94.8	96.6
Mongolia	93.4	92.4	84.3	88.1	88.8	85.6	88.6	95.3	91.9	93.9	94.1	93.1	91.9	92.8	93.8	91.9	90.9	93.4	93.9
Nepal	82.0	80.4	79.6	87.3	86.0	85.1	86.7	88.1	82.6	82.6	88.4	86.7	85.3	88.1	87.4	85.3	87.2	86.5	87.4
North Korea	100.0	100.0	100.0	98.2	99.6	99.5	100.0	100.0	99.6	99.2	99.3	99.2	98.4	99.3	98.4	93.5	97.1	99.4	91.6
Pakistan	61.5	56.7	62.9	57.3	60.5	62.3	54.3	61.0	59.5	61.2	58.2	60.8	59.5	62.7	63.4	63.8	62.6	67.1	67.3
Papua New Guinea	69.5	85.4	71.2	80.8	86.9	71.9	87.3	88.7	92.3	92.9	92.7	94.2	91.6	91.7	89.1	90.2	87.6	94.0	88.6

CHAPTER 5 | Academic Research and Development

Region, country, or economy	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Philippines	74.6	77.3	77.4	83.5	75.0	79.2	86.0	85.7	86.9	86.0	86.3	84.6	84.1	84.7	83.1	83.3	83.5	83.9	81.5
Singapore	65.9	63.4	69.5	66.8	67.6	69.6	70.7	71.7	74.5	77.2	77.8	79.1	78.8	79.5	80.9	81.2	83.3	83.6	84.8
South Korea	56.6	57.9	58.8	61.3	63.5	63.1	63.4	65.5	66.6	67.0	67.0	66.8	67.7	69.5	69.6	70.0	71.8	71.4	72.0
Sri Lanka	71.8	65.8	77.9	76.3	74.5	79.2	80.8	83.2	84.6	83.7	83.3	84.7	87.4	86.6	86.3	83.8	83.1	84.9	84.0
Taiwan	56.5	60.2	61.2	62.5	63.9	65.0	64.6	66.8	67.4	66.6	67.1	68.1	69.1	69.3	69.5	71.4	72.9	75.1	76.8
Tajikistan	74.8	70.6	100.0	66.2	47.1	89.3	63.1	76.4	71.3	86.1	95.2	94.8	91.6	82.4	82.1	82.7	93.4	92.1	89.6
Thailand	74.5	69.9	70.5	75.4	75.0	72.3	76.2	77.6	77.6	77.2	75.9	75.6	75.3	75.2	75.4	76.4	77.4	77.7	78.4
Timor-Leste	na	na	na	na	na	na	na	100.0	na	54.4	92.1	100.0	99.4	94.5	99.0	97.6	77.5	93.1	96.1
Turkmenistan	100.0	87.4	90.7	94.4	95.2	100.0	100.0	95.8	88.1	92.5	94.6	93.1	100.0	92.4	90.3	88.4	87.7	88.0	84.2
Uzbekistan	72.7	58.7	57.5	80.4	72.4	59.6	64.4	71.1	78.3	73.0	77.1	80.5	79.1	81.1	74.2	71.7	67.3	69.1	74.9
Vietnam	76.6	74.0	74.4	82.0	85.4	84.1	84.6	86.5	86.6	87.6	82.5	81.3	80.3	78.6	79.7	81.4	78.2	77.6	77.4
Australia and Oceania	64.0	65.3	68.0	68.2	69.4	69.7	71.2	70.7	71.1	70.8	71.1	71.4	71.9	71.8	72.0	71.6	71.9	72.6	73.7
Australia	65.3	66.6	69.0	69.6	70.3	71.0	72.3	71.5	71.9	71.7	72.0	72.3	72.8	72.7	72.9	72.3	72.8	73.3	74.5
Cook Islands	98.0	na	100.0	100.0	na	na	100.0	na	na	na	100.0	100.0	na	100.0	97.1	98.0	93.8	95.6	99.1
Fiji	95.7	89.3	79.3	84.2	76.8	76.5	86.8	85.4	75.9	78.0	78.5	77.2	90.4	87.6	91.0	89.3	83.3	90.6	88.1
Kiribati	na	na	na	na	na	100.0	na	100.0	na	na	100.0	100.0	na	na	100.0	na	na	95.8	100.0
Marshall Islands	78.6	73.7	100.0	100.0	100.0	100.0	na	100.0	100.0	100.0	94.4	100.0	100.0	92.5	91.5	100.0	100.0	100.0	98.6
Micronesia, Federated States of	100.0	100.0	53.1	100.0	97.1	93.0	na	98.6	99.5	100.0	93.8	77.9	83.8	99.9	53.8	5.0	84.6	92.8	99.2
Nauru	na	na	100.0	na	na	na	na	na	100.0	na	na	na	na	100.0	na	100.0	na	94.3	94.8

CHAPTER 5 | Academic Research and Development

Region, country, or economy	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
New Zealand	67.2	68.5	72.4	70.9	74.4	73.6	74.8	76.9	76.7	77.6	77.4	77.1	77.7	77.6	77.6	77.9	78.2	79.0	79.6
Niue	na	na	na	na	na	na	na	na	na	na	100.0	100.0	na	na	na	na	na	na	100.0
Palau	100.0	100.0	100.0	na	100.0	93.4	99.5	90.6	98.7	88.7	97.5	90.4	99.6	93.3	100.0	82.2	97.4	87.9	96.6
Samoa	na	100.0	100.0	97.1	50.0	85.2	100.0	89.3	68.7	100.0	98.8	99.1	97.5	96.9	99.8	97.8	97.4	98.0	99.1
Solomon Islands	82.8	41.9	62.3	79.3	82.8	94.8	86.7	96.4	99.2	92.9	99.7	98.6	97.6	94.5	93.2	96.6	87.0	92.4	93.0
Tonga	na	na	100.0	56.3	100.0	98.3	90.0	100.0	97.2	93.3	100.0	95.8	99.3	96.5	97.8	96.4	100.0	100.0	98.7
Tuvalu	na	na	na	na	na	na	na	na	100.0	na	100.0	100.0	100.0	100.0	na	na	100.0	50.0	100.0
Vanuatu	96.4	100.0	71.7	95.3	100.0	80.2	98.9	78.4	85.7	93.6	98.3	96.0	94.2	99.5	96.3	94.8	89.4	90.2	97.7

na = not applicable; no citation to this country was made.

EU = European Union.

<sup>a</sup> Beginning in 2006, Serbia and Montenegro represented individual countries.

<sup>b</sup> Serbia and Montenegro represented a single country for data purposes from 1992 to 2006.

**Note(s)**

Article counts refer to publications from a selection of journals, books, and conference proceedings in S&E from Scopus. Articles are classified by their year of publication and are assigned to a region, country, or economy on the basis of the institutional address(es) listed in the article. Articles are credited on a fractional-count basis (i.e., for articles with collaborating institutions from multiple regions or countries, each region or country receives fractional credit on the basis of the proportion of its participating institutions). Citation counts are based on all citations made to articles in their publication year and in the following 2 years (i.e., a 3-year citation window; e.g., scores in 2010 are based on citations to articles published in 2010 that were made in articles published in 2010–12). This indicator cannot be computed past 2014 because the citation window is incomplete for more recent years.

**Source(s)**

National Science Foundation, National Center for Science and Engineering Statistics; SRI International; Science-Metrix; Elsevier, Scopus abstract and citation database, accessed July 2017.

*Science and Engineering Indicators 2018*

## CHAPTER 5 | Academic Research and Development

APPENDIX TABLE 5-48 

## Share of S&amp;E articles, by field, citation percentile, and country or economy of institutional author: 2004 and 2014

(Percent share)

Field and citation percentile	United States		EU		China		Japan	
	2004	2014	2004	2014	2004	2014	2004	2014
All fields								
99th (top 1%)	1.79	1.90	1.05	1.28	0.49	1.01	0.65	0.78
95th (top 5%)	8.04	8.27	5.33	6.15	2.75	4.96	3.56	3.75
90th (top 10%)	15.01	15.36	10.79	12.14	5.76	9.72	7.51	7.68
75th (top 25%)	33.59	33.90	27.10	29.20	15.69	23.64	20.98	20.96
50th (top 50%)	59.74	59.72	53.01	55.18	36.44	47.23	46.43	46.02
< 50th (bottom 50%)	40.26	40.28	46.99	44.82	63.56	52.77	53.57	53.98
Engineering								
99th (top 1%)	1.93	1.79	1.26	1.15	0.42	1.09	0.63	0.65
95th (top 5%)	8.11	7.63	6.26	5.65	2.47	5.23	3.54	3.20
90th (top 10%)	14.50	14.03	12.57	11.49	5.44	10.17	7.74	6.55
75th (top 25%)	31.56	30.66	30.52	28.50	16.32	24.53	21.87	18.59
50th (top 50%)	55.54	53.84	56.94	54.65	41.15	48.85	47.76	42.93
< 50th (bottom 50%)	44.46	46.16	43.06	45.35	58.85	51.15	52.24	57.07
Astronomy								



## CHAPTER 5 | Academic Research and Development

Field and citation percentile	United States		EU		China		Japan	
	2004	2014	2004	2014	2004	2014	2004	2014
99th (top 1%)	1.79	2.18	1.18	1.25	0.23	1.08	1.12	1.89
95th (top 5%)	8.03	9.44	5.47	6.08	2.32	3.46	5.03	9.11
90th (top 10%)	15.35	17.72	10.74	12.08	5.51	6.82	10.00	15.19
75th (top 25%)	36.12	39.04	26.05	29.36	17.68	20.69	23.49	33.48
50th (top 50%)	65.48	66.84	50.32	54.71	43.66	48.92	49.37	61.11
< 50th (bottom 50%)	34.52	33.16	49.68	45.29	56.34	51.08	50.63	38.89
Chemistry								
99th (top 1%)	1.87	1.47	1.03	0.97	0.69	1.36	0.87	0.68
95th (top 5%)	8.23	7.36	5.29	4.69	4.06	6.84	4.94	3.91
90th (top 10%)	15.22	13.98	10.76	10.12	8.28	12.76	9.98	7.95
75th (top 25%)	34.03	32.58	28.68	27.27	19.16	28.34	26.13	21.74
50th (top 50%)	58.22	58.53	57.71	56.00	38.67	51.98	54.28	47.78
< 50th (bottom 50%)	41.78	41.47	42.29	44.00	61.33	48.02	45.72	52.22
Physics								
99th (top 1%)	1.89	2.07	1.10	1.41	0.67	0.88	0.76	1.03
95th (top 5%)	8.18	8.22	5.69	6.45	3.47	4.85	4.05	4.79
90th (top 10%)	15.01	14.69	11.57	12.55	7.48	9.95	8.66	9.45
75th (top 25%)	32.82	31.80	28.72	29.24	20.55	25.44	23.29	23.80

## CHAPTER 5 | Academic Research and Development

Field and citation percentile	United States		EU		China		Japan	
	2004	2014	2004	2014	2004	2014	2004	2014
50th (top 50%)	57.47	55.86	55.09	54.06	45.84	52.00	49.31	48.56
< 50th (bottom 50%)	42.53	44.14	44.91	45.94	54.16	48.00	50.69	51.44
Geosciences								
99th (top 1%)	1.47	1.92	1.30	1.46	0.62	1.07	0.68	1.13
95th (top 5%)	7.00	8.43	6.14	6.99	3.17	4.86	4.61	4.38
90th (top 10%)	13.26	15.81	12.59	13.84	5.80	9.41	8.79	8.53
75th (top 25%)	30.40	35.14	31.50	32.84	13.60	22.44	24.60	23.07
50th (top 50%)	54.53	60.18	60.44	59.78	32.24	46.48	53.94	49.37
< 50th (bottom 50%)	45.47	39.82	39.56	40.22	67.76	53.52	46.06	50.63
Mathematics								
99th (top 1%)	1.78	1.40	1.01	1.25	1.28	1.30	0.73	1.04
95th (top 5%)	7.96	6.51	5.11	5.95	6.48	5.84	4.66	4.78
90th (top 10%)	15.08	13.15	10.27	12.01	12.44	10.90	8.38	9.95
75th (top 25%)	33.39	30.95	26.64	29.34	29.03	25.24	21.88	24.01
50th (top 50%)	59.25	56.62	53.77	56.03	54.38	48.99	45.59	48.59
< 50th (bottom 50%)	40.75	43.38	46.23	43.97	45.62	51.01	54.41	51.41
Computer sciences								
99th (top 1%)	2.10	2.21	0.77	0.96	0.46	1.45	0.36	0.36

## CHAPTER 5 | Academic Research and Development

Field and citation percentile	United States		EU		China		Japan	
	2004	2014	2004	2014	2004	2014	2004	2014
95th (top 5%)	9.07	9.90	4.35	5.39	2.26	5.63	2.39	2.10
90th (top 10%)	16.53	18.50	9.40	11.35	4.86	9.95	5.70	5.29
75th (top 25%)	35.07	38.32	25.72	29.40	14.22	21.92	17.94	17.75
50th (top 50%)	59.40	63.23	53.05	56.30	36.15	43.66	43.08	43.93
< 50th (bottom 50%)	40.60	36.77	46.95	43.70	63.85	56.34	56.92	56.07
Agricultural sciences								
99th (top 1%)	1.51	1.91	1.32	1.53	0.70	1.03	0.49	0.21
95th (top 5%)	6.47	7.37	6.51	7.65	3.53	5.73	2.61	2.63
90th (top 10%)	12.29	14.79	13.50	14.58	6.38	11.31	4.89	5.51
75th (top 25%)	29.55	33.69	31.78	34.71	16.00	26.10	16.14	18.40
50th (top 50%)	56.70	61.25	58.17	62.32	36.90	50.06	39.86	46.61
< 50th (bottom 50%)	43.30	38.75	41.83	37.68	63.10	49.94	60.14	53.39
Biological sciences								
99th (top 1%)	1.67	2.00	1.09	1.38	0.21	0.63	0.80	0.98
95th (top 5%)	7.85	8.69	5.45	6.78	1.70	3.61	3.97	4.60
90th (top 10%)	14.90	15.97	11.02	13.10	3.43	7.62	8.31	9.32
75th (top 25%)	33.97	35.08	27.69	30.79	9.65	20.40	22.47	24.12
50th (top 50%)	61.72	61.80	54.27	57.53	22.63	42.21	48.42	51.07

## CHAPTER 5 | Academic Research and Development

Field and citation percentile	United States		EU		China		Japan	
	2004	2014	2004	2014	2004	2014	2004	2014
< 50th (bottom 50%)	38.28	38.20	45.73	42.47	77.37	57.79	51.58	48.93
Medical sciences								
99th (top 1%)	1.93	2.10	0.97	1.44	0.33	0.56	0.49	0.70
95th (top 5%)	8.71	8.98	4.95	6.58	1.58	3.23	2.57	3.23
90th (top 10%)	16.35	16.51	9.91	12.58	3.57	7.14	5.55	6.70
75th (top 25%)	36.51	35.97	24.52	28.99	10.61	19.89	16.65	18.88
50th (top 50%)	64.04	62.89	48.43	53.82	25.11	42.17	39.98	42.29
< 50th (bottom 50%)	35.96	37.11	51.57	46.18	74.89	57.83	60.02	57.71
Other life sciences								
99th (top 1%)	1.05	1.10	1.08	1.17	0.37	1.81	0.61	0.00
95th (top 5%)	5.21	5.36	5.41	5.36	4.03	7.91	4.57	2.47
90th (top 10%)	10.21	10.73	11.08	10.67	7.83	13.37	5.69	6.56
75th (top 25%)	25.16	26.82	26.33	25.30	26.94	31.41	11.88	20.62
50th (top 50%)	51.27	52.59	49.58	49.13	54.45	59.18	33.62	46.40
< 50th (bottom 50%)	48.73	47.41	50.42	50.87	45.55	40.82	66.38	53.60
Psychology								
99th (top 1%)	1.34	1.26	0.97	1.12	0.64	0.85	0.22	0.15
95th (top 5%)	6.32	6.39	4.47	5.27	3.70	4.97	1.16	1.72

## CHAPTER 5 | Academic Research and Development

Field and citation percentile	United States		EU		China		Japan	
	2004	2014	2004	2014	2004	2014	2004	2014
90th (top 10%)	12.32	12.22	8.95	10.52	9.47	9.37	2.90	4.23
75th (top 25%)	29.31	28.56	23.13	26.04	20.93	24.00	11.28	13.86
50th (top 50%)	55.72	54.25	46.57	50.85	47.15	51.39	29.80	36.84
< 50th (bottom 50%)	44.28	45.75	53.43	49.15	52.85	48.61	70.20	63.16
Social sciences								
99th (top 1%)	1.56	1.56	0.82	1.15	1.63	1.86	0.26	0.84
95th (top 5%)	7.16	6.82	4.39	5.56	6.61	9.12	3.11	3.64
90th (top 10%)	13.73	13.21	8.77	10.86	12.00	17.10	5.54	8.50
75th (top 25%)	31.31	31.00	22.67	26.33	30.70	34.15	19.50	25.04
50th (top 50%)	58.04	57.36	45.94	51.28	58.03	58.16	44.51	51.99
< 50th (bottom 50%)	41.96	42.64	54.06	48.72	41.97	41.84	55.49	48.01

EU = European Union.

### Note(s)

The citation percentile is the share of publications that are in the top 1% of the world's citations, relative to all the country's or economy's publications in that period and field. It is computed as follows:  $Sx = HCPx/Px$ , where  $Sx$  is the share of output from country or economy  $x$  in the top 1% most-cited articles,  $HCPx$  is the number of articles from country or economy  $x$  that are among the top 1% most-cited articles in the world, and  $Px$  is the total number of papers from country or economy  $x$  in the database that were published in 2014 or earlier. Citations are presented for the year of publication, showing the counts of subsequent citations from peer-reviewed literature. At least 2 years of data after publication are needed for a meaningful measure. Publications that cannot be classified by country or economy or by field are excluded. Articles are classified by the publication year and are assigned to a country or economy on the basis of the institutional address(es) listed in the article. See Appendix Table 5-26 for countries and economies included in the EU. The world average stands at 1.00% for each period and field.

## CHAPTER 5 | Academic Research and Development

### Source(s)

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National Science Foundation, National Center for Science and Engineering Statistics; SRI International; Science-Metrix; Elsevier, Scopus abstract and citation database, accessed July 2017.

*Science and Engineering Indicators 2018*

## CHAPTER 5 | Academic Research and Development

APPENDIX TABLE 5-49 

### Average relative citations for the United States, by scientific field: 1996–2014

(Average relative citation)

Field	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
All fields	1.41	1.41	1.43	1.42	1.41	1.44	1.42	1.42	1.41	1.42	1.43	1.43	1.46	1.47	1.48	1.47	1.44	1.42	1.44
Engineering	1.32	1.36	1.47	1.36	1.37	1.48	1.42	1.44	1.45	1.41	1.44	1.47	1.47	1.40	1.43	1.42	1.37	1.33	1.33
Astronomy	1.45	1.56	1.47	1.44	1.46	1.58	1.57	1.50	1.45	1.55	1.57	1.52	1.55	1.49	1.48	1.54	1.52	1.51	1.55
Chemistry	1.60	1.51	1.61	1.54	1.54	1.62	1.46	1.47	1.38	1.36	1.37	1.32	1.27	1.40	1.43	1.28	1.34	1.32	1.29
Physics	1.53	1.46	1.48	1.45	1.44	1.46	1.41	1.40	1.42	1.41	1.34	1.41	1.46	1.46	1.47	1.46	1.44	1.44	1.44
Geosciences	1.37	1.34	1.34	1.31	1.31	1.36	1.29	1.31	1.23	1.24	1.32	1.27	1.34	1.37	1.40	1.45	1.39	1.42	1.33
Mathematics	1.48	1.37	1.47	1.42	1.43	1.40	1.36	1.42	1.40	1.31	1.38	1.29	1.36	1.33	1.32	1.30	1.25	1.25	1.29
Computer sciences	1.47	1.59	1.47	1.55	1.58	1.75	1.67	1.61	1.61	1.69	1.78	1.67	1.82	1.97	2.14	1.94	1.85	1.74	1.69
Agricultural sciences	1.37	1.31	1.31	1.31	1.25	1.36	1.36	1.29	1.19	1.20	1.30	1.21	1.30	1.27	1.33	1.32	1.33	1.38	1.33
Biological sciences	1.34	1.35	1.37	1.38	1.36	1.36	1.35	1.35	1.36	1.38	1.39	1.40	1.42	1.42	1.41	1.43	1.42	1.40	1.44
Medical sciences	1.47	1.53	1.52	1.52	1.51	1.51	1.53	1.52	1.52	1.53	1.54	1.55	1.56	1.57	1.55	1.55	1.54	1.53	1.55
Other life sciences	1.02	1.00	1.04	1.03	1.04	1.04	1.01	1.00	1.00	1.07	1.01	1.07	1.06	1.07	1.07	1.06	1.08	1.08	1.09
Psychology	1.15	1.14	1.13	1.14	1.13	1.13	1.17	1.20	1.20	1.15	1.14	1.18	1.19	1.17	1.17	1.21	1.21	1.19	1.19
Social sciences	1.33	1.33	1.33	1.37	1.33	1.36	1.33	1.32	1.30	1.28	1.23	1.26	1.25	1.24	1.26	1.31	1.29	1.26	1.29

**Note(s)**

CHAPTER 5 | Academic Research and Development

An average relative citation (ARC) value greater than 1.00 has more citations than average, and an ARC value less than 1.00 has fewer citations than average. The ARC is the average across a given area of geography or a sector of the relative citations for each publication. The relative citation divides each publication's citation count by the average citation count of all of the same type of publications in that subfield and year. ARC values are presented for the year in which the cited article was published, showing the counts of subsequent citations from peer-reviewed literature. At least 2 years of data after publication are needed for a meaningful measure. Publications that cannot be classified by country or field are excluded.

Source(s)

National Science Foundation, National Center for Science and Engineering Statistics; SRI International; Science-Metrix; Elsevier, Scopus abstract and citation database, accessed July 2017.

*Science and Engineering Indicators 2018*



## CHAPTER 5 | Academic Research and Development

APPENDIX TABLE 5-50

## Average relative citations in the Scopus database, by region, country, or economy: 1996–2014

(Average relative citation)

Region, country, or economy	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
World	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Not United States	0.79	0.79	0.79	0.80	0.81	0.81	0.82	0.81	0.82	0.83	0.83	0.84	0.84	0.84	0.85	0.85	0.86	0.87	0.87
North America	1.38	1.38	1.40	1.38	1.38	1.41	1.38	1.38	1.38	1.38	1.39	1.39	1.41	1.42	1.43	1.42	1.40	1.38	1.38
Canada	1.31	1.32	1.35	1.31	1.28	1.32	1.25	1.31	1.35	1.37	1.38	1.36	1.43	1.46	1.47	1.50	1.49	1.47	1.46
Greenland	ne	ne	ne	ne	ne	ne	ne	1.11	0.71	1.26	1.28	0.98	1.84	1.72	1.66	1.91	1.66	1.79	1.64
Mexico	0.73	0.73	0.73	0.76	0.77	0.78	0.73	0.72	0.79	0.78	0.77	0.77	0.81	0.79	0.80	0.87	0.94	0.85	0.85
United States	1.41	1.41	1.43	1.42	1.41	1.44	1.42	1.42	1.41	1.42	1.43	1.43	1.46	1.47	1.48	1.47	1.44	1.42	1.42
Central America and Caribbean	0.83	0.73	0.85	0.78	0.63	0.67	0.71	0.76	0.76	0.84	0.81	0.80	0.87	0.89	0.85	0.94	1.16	1.01	1.06
Antigua and Barbuda	na	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne
Bahamas, The	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	1.06	1.17	0.81	1.21
Barbados	1.13	1.28	0.40	0.80	0.69	0.72	1.13	1.01	1.04	0.83	0.63	0.56	0.78	1.02	1.05	1.21	1.06	0.95	6.56
Belize	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne
Costa Rica	0.73	0.93	0.78	0.74	0.95	1.03	1.30	1.61	0.87	1.11	0.98	1.00	1.14	1.30	1.22	1.10	1.24	1.19	1.12
Cuba	0.44	0.31	0.59	0.39	0.35	0.41	0.36	0.46	0.47	0.50	0.44	0.45	0.53	0.41	0.52	0.49	0.44	0.53	0.47
Dominica	ne	ne	ne	na	na	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne
Dominican Republic	0.64	ne	ne	ne	1.38	ne	ne	ne	0.75	0.50	0.94	0.78	1.19	0.93	0.92	1.11	1.10	1.22	0.85

CHAPTER 5 | Academic Research and Development

Region, country, or economy	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
El Salvador	ne	ne	ne	ne	ne	ne	ne	ne	0.52	0.84	0.63	ne	0.78	1.11	1.07	1.39	1.45	0.74	1.01
Grenada	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	0.71	0.70	0.55	0.86	0.64	1.04	0.71	1.05	1.07
Guatemala	0.83	0.80	0.77	1.60	0.75	1.20	1.11	1.01	0.98	0.84	0.87	1.16	1.01	0.76	1.18	1.04	1.35	1.26	2.05
Haiti	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	1.58	ne	3.15	1.44	1.56	2.06	1.17	1.09	1.10
Honduras	ne	ne	0.96	0.94	ne	ne	1.05	0.82	0.65	1.04	0.95	1.05	1.10	0.74	1.27	1.32	0.78	1.08	0.74
Jamaica	0.83	0.86	0.60	1.50	0.59	0.61	0.54	0.38	0.52	0.68	1.14	0.71	0.73	0.58	0.66	0.83	0.49	1.33	0.78
Nicaragua	1.15	0.89	ne	ne	ne	ne	ne	0.83	0.71	1.23	1.31	0.96	1.39	1.08	0.87	1.30	1.06	1.27	0.85
Panama	1.66	1.69	2.08	1.42	1.69	1.62	2.00	1.50	1.57	1.47	1.78	1.86	1.63	1.48	1.43	1.76	3.60	1.39	2.39
Puerto Rico	1.23	1.06	1.08	1.25	0.89	0.91	0.88	0.82	1.00	1.16	1.07	1.03	1.07	1.50	1.19	1.46	1.92	1.63	1.58
Saint Kitts and Nevis	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	0.97
Saint Lucia	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	na	ne	ne	ne	ne	ne
Saint Vincent and the Grenadines	ne	ne	ne	ne	ne	na	ne	ne	ne	ne	ne	ne	na	ne	ne	ne	ne	ne	ne
Trinidad and Tobago	0.67	0.64	0.96	0.59	0.63	0.71	0.74	0.66	0.59	0.63	0.68	0.69	1.15	0.67	0.64	0.71	0.57	0.75	0.57
South America	0.75	0.74	0.79	0.75	0.76	0.76	0.79	0.80	0.82	0.87	0.80	0.82	0.82	0.82	0.81	0.83	0.83	0.82	0.81
Argentina	0.68	0.76	0.81	0.72	0.73	0.76	0.76	0.84	0.89	0.89	0.93	0.91	1.00	0.97	0.98	1.02	1.10	0.96	1.01
Bolivia	1.11	0.93	1.14	1.22	1.07	0.89	1.09	0.97	1.55	0.95	1.21	1.10	1.44	1.22	1.38	1.26	5.49	1.35	1.08
Brazil	0.77	0.72	0.76	0.74	0.78	0.75	0.78	0.78	0.80	0.87	0.78	0.79	0.81	0.80	0.78	0.81	0.80	0.81	0.79
Chile	0.81	0.84	0.99	0.97	0.89	0.94	1.00	1.01	1.00	1.01	0.95	0.98	0.98	1.02	1.05	1.10	1.17	1.13	1.10
Colombia	0.81	0.84	0.81	0.72	0.79	0.81	0.70	0.80	0.80	1.02	0.88	0.84	0.86	0.74	0.83	0.88	0.99	0.80	0.82

CHAPTER 5 | Academic Research and Development

Region, country, or economy	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Ecuador	1.03	0.83	0.92	0.96	1.00	1.15	1.01	0.85	1.26	1.25	1.31	1.09	1.71	1.22	1.56	1.29	1.27	1.29	1.05
Guyana	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	0.34	ne	ne	ne	ne
Paraguay	1.21	ne	0.59	ne	ne	0.81	ne	1.13	1.09	1.15	1.58	0.86	0.94	1.09	1.69	1.04	1.00	1.22	0.68
Peru	0.80	0.88	0.98	1.16	1.14	0.94	0.88	1.25	1.13	1.11	1.12	1.25	1.27	1.11	1.53	1.32	1.28	1.29	1.48
Suriname	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	0.84	ne
Uruguay	1.00	0.93	0.93	1.14	0.93	0.89	0.91	0.90	1.03	0.96	0.98	1.05	1.13	1.07	1.07	1.07	1.88	1.08	1.01
Venezuela	0.65	0.69	0.78	0.64	0.57	0.65	0.63	0.70	0.68	0.65	0.59	0.62	0.56	0.54	0.61	0.56	0.59	0.58	0.60
Europe	0.93	0.94	0.94	0.96	0.97	0.96	0.96	0.98	1.00	1.03	1.05	1.06	1.06	1.09	1.10	1.11	1.10	1.10	1.10
EU	1.01	1.01	1.02	1.02	1.03	1.03	1.03	1.05	1.06	1.09	1.10	1.11	1.11	1.14	1.16	1.17	1.16	1.17	1.16
Austria	1.34	1.08	1.07	1.19	1.15	1.12	1.12	1.22	1.25	1.28	1.27	1.30	1.31	1.33	1.47	1.46	1.50	1.46	1.47
Belgium	1.19	1.18	1.14	1.16	1.16	1.17	1.22	1.27	1.32	1.42	1.41	1.46	1.50	1.55	1.56	1.60	1.62	1.64	1.63
Bulgaria	0.58	0.55	0.60	0.53	0.63	0.56	0.58	0.55	0.65	0.62	0.77	0.67	0.69	0.62	0.74	0.73	0.88	0.72	0.97
Croatia	0.40	0.45	0.50	0.44	0.41	0.46	0.45	0.49	0.55	0.62	0.55	0.58	0.57	0.64	0.81	0.74	0.92	0.80	0.86
Cyprus	0.82	0.84	1.21	0.81	1.03	0.95	1.24	1.21	1.29	0.95	1.10	1.27	1.29	1.16	1.42	1.41	1.81	1.35	1.62
Czech Republic	0.57	0.59	0.59	0.58	0.63	0.61	0.61	0.68	0.71	0.73	0.78	0.76	0.81	0.84	0.89	0.88	0.96	0.98	0.94
Denmark	1.32	1.38	1.39	1.40	1.44	1.48	1.39	1.50	1.56	1.57	1.63	1.61	1.68	1.72	1.72	1.75	1.79	1.71	1.79
Estonia	0.86	0.90	0.95	0.82	0.82	0.84	0.81	0.91	1.01	1.12	0.97	1.11	1.15	1.18	1.22	1.25	1.58	1.52	1.69
Finland	1.19	1.26	1.23	1.21	1.22	1.22	1.28	1.27	1.17	1.23	1.32	1.34	1.37	1.34	1.45	1.41	1.53	1.48	1.60
France	1.05	1.04	1.07	1.04	1.05	1.05	1.06	1.08	1.09	1.17	1.17	1.17	1.21	1.23	1.27	1.29	1.28	1.30	1.28

## CHAPTER 5 | Academic Research and Development

Region, country, or economy	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Germany	1.05	1.04	1.05	1.07	1.08	1.11	1.10	1.14	1.14	1.20	1.20	1.25	1.25	1.29	1.33	1.35	1.33	1.35	1.34
Greece	0.88	0.88	0.95	0.88	0.93	0.96	0.97	1.01	1.02	1.09	1.10	1.13	1.15	1.22	1.21	1.21	1.37	1.29	1.36
Hungary	0.72	0.69	0.72	0.71	0.71	0.77	0.80	0.91	0.87	0.87	0.91	0.91	0.89	0.92	0.99	0.97	1.18	1.05	1.08
Ireland	1.04	1.19	1.15	1.17	1.10	1.23	1.15	1.17	1.17	1.23	1.36	1.38	1.40	1.46	1.43	1.43	1.60	1.50	1.53
Italy	0.93	0.93	1.00	0.99	1.00	1.02	1.06	1.03	1.09	1.17	1.17	1.18	1.23	1.26	1.31	1.33	1.37	1.37	1.41
Latvia	0.52	0.49	0.74	0.56	0.61	0.55	0.48	0.60	0.79	0.77	0.73	0.59	0.65	0.55	0.71	0.50	0.70	0.65	0.78
Lithuania	0.59	0.57	0.61	0.66	0.65	0.60	0.52	0.61	0.63	0.59	0.65	0.64	0.57	0.61	0.70	0.77	1.00	0.88	0.95
Luxembourg	0.52	0.85	0.65	0.82	0.67	0.95	0.75	0.78	0.92	1.10	1.01	0.99	1.19	1.42	1.44	1.32	1.42	1.59	1.58
Malta	0.87	1.41	0.80	0.66	0.52	1.07	1.21	1.16	0.60	1.08	1.69	1.13	1.00	0.80	0.92	0.93	0.77	0.99	1.28
Netherlands	1.33	1.40	1.40	1.41	1.40	1.41	1.37	1.49	1.45	1.52	1.55	1.60	1.60	1.64	1.72	1.72	1.75	1.70	1.68
Poland	0.55	0.55	0.58	0.56	0.57	0.57	0.55	0.59	0.61	0.63	0.64	0.69	0.66	0.71	0.73	0.79	0.86	0.85	0.91
Portugal	0.88	0.86	0.87	1.04	0.92	0.97	1.02	0.98	1.08	1.13	1.18	1.18	1.18	1.25	1.16	1.20	1.27	1.24	1.23
Romania	0.45	0.49	0.53	0.49	0.53	0.51	0.57	0.55	0.63	0.63	0.63	0.60	0.58	0.48	0.52	0.61	0.67	0.76	0.77
Slovakia	0.55	0.59	0.46	0.57	0.46	0.54	0.51	0.56	0.60	0.62	0.70	0.71	0.73	0.70	0.73	0.73	0.85	0.80	0.80
Slovenia	0.70	0.77	0.79	0.77	0.64	0.73	0.75	0.84	0.83	0.88	1.09	0.96	0.98	1.10	1.02	0.99	1.16	1.12	1.14
Spain	0.89	0.90	0.94	0.95	0.95	0.96	0.98	1.01	1.04	1.11	1.11	1.14	1.18	1.22	1.24	1.28	1.30	1.30	1.32
Sweden	1.32	1.33	1.36	1.32	1.29	1.39	1.34	1.40	1.40	1.41	1.45	1.46	1.49	1.52	1.56	1.58	1.62	1.59	1.64
United Kingdom	1.22	1.25	1.25	1.25	1.27	1.26	1.29	1.31	1.33	1.37	1.39	1.41	1.43	1.46	1.49	1.50	1.52	1.52	1.53
Other Europe	0.64	0.70	0.67	0.70	0.71	0.70	0.70	0.76	0.81	0.86	0.92	0.94	0.96	0.97	0.96	0.99	1.00	0.98	0.97

## CHAPTER 5 | Academic Research and Development

Region, country, or economy	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Albania	0.61	0.32	0.65	0.59	0.59	0.42	0.57	0.58	1.09	0.83	0.65	0.76	1.02	0.49	0.62	0.46	0.38	0.22	0.35
Andorra	ne	ne	ne	na	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne
Belarus	0.29	0.38	0.37	0.48	0.41	0.49	0.43	0.38	0.45	0.46	0.44	0.46	0.65	0.48	0.72	0.73	1.34	1.02	0.89
Bosnia and Herzegovina	0.56	0.71	0.40	0.16	0.52	0.51	0.54	0.39	0.37	0.45	0.51	0.54	0.43	0.45	0.56	0.40	0.45	0.57	0.64
Holy See (Vatican City)	ne	ne	ne	ne	ne	na	ne	na	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne
Iceland	1.67	1.54	1.44	1.47	1.49	1.57	1.62	1.58	1.78	1.69	1.83	1.82	1.61	1.73	2.01	1.81	2.09	1.97	2.12
Kosovo	na	na	na	na	na	na	na	na	na	na	na	na	0.49	0.38	0.45	0.45	0.56	0.46	0.59
Liechtenstein	ne	1.21	ne	ne	1.30	ne	ne	0.97	1.19	1.18	1.78	1.27	1.07	1.97	1.69	1.27	1.14	1.26	1.10
Macedonia	1.06	0.68	0.59	0.44	0.39	0.67	0.45	0.54	0.54	0.52	0.57	0.51	0.51	0.60	0.57	0.60	0.71	0.73	1.12
Moldova	0.29	0.36	0.39	0.54	0.31	0.50	0.57	0.59	0.78	0.76	0.79	0.95	1.14	0.93	1.02	0.65	0.75	0.72	0.92
Monaco	1.99	1.07	1.55	1.05	ne	1.63	1.28	0.89	1.60	1.30	1.17	1.26	2.03	1.77	1.22	1.86	2.34	1.68	1.15
Montenegro <sup>a</sup>	na	na	na	na	na	na	na	na	na	na	na	0.71	1.06	0.81	0.96	0.74	0.80	0.68	0.83
Norway	1.11	1.12	1.19	1.19	1.16	1.28	1.31	1.35	1.34	1.37	1.37	1.35	1.46	1.44	1.41	1.53	1.56	1.56	1.48
Russia	0.34	0.39	0.37	0.38	0.39	0.38	0.36	0.41	0.42	0.46	0.53	0.52	0.52	0.49	0.53	0.54	0.63	0.61	0.65
San Marino	ne	ne	ne	ne	ne	ne	na	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne
Serbia <sup>a</sup>	na	na	na	na	na	na	na	na	na	na	na	0.72	0.78	0.76	0.82	0.79	0.86	0.84	1.01
Serbia and Montenegro <sup>b</sup>	0.45	0.43	0.51	0.49	0.45	0.46	0.53	0.53	0.55	0.51	0.65	na	na	na	na	na	na	na	na
Switzerland	1.38	1.51	1.44	1.46	1.47	1.48	1.50	1.54	1.60	1.68	1.66	1.67	1.74	1.77	1.76	1.83	1.87	1.77	1.75
Turkey	0.65	0.64	0.65	0.64	0.73	0.70	0.70	0.70	0.77	0.81	0.79	0.87	0.88	0.87	0.80	0.82	0.81	0.79	0.80

## CHAPTER 5 | Academic Research and Development

Region, country, or economy	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Ukraine	0.27	0.28	0.28	0.34	0.32	0.31	0.33	0.35	0.40	0.43	0.45	0.51	0.50	0.46	0.48	0.62	0.60	0.56	0.61
Middle East	1.00	1.01	1.03	0.98	0.97	1.04	0.98	0.97	0.99	0.98	1.00	0.98	0.99	1.00	1.02	1.01	1.04	1.06	1.13
Armenia	0.36	0.56	0.56	0.53	0.71	0.73	0.55	0.70	0.68	0.78	1.07	0.94	1.27	0.75	1.09	1.07	2.09	1.56	1.33
Azerbaijan	0.18	0.25	0.23	0.27	0.29	0.21	0.28	0.28	0.17	0.29	0.44	0.25	0.55	0.30	0.49	0.55	1.09	0.92	1.32
Bahrain	0.32	0.53	0.35	0.81	0.38	0.66	0.56	0.34	0.41	0.49	0.49	0.55	0.53	0.56	0.69	0.55	0.67	0.67	1.23
Gaza Strip	ne	ne	ne	0.28	ne	ne	0.39	0.38	0.28	0.86	0.64	0.66	0.66	0.62	0.57	0.68	0.89	0.86	0.89
Georgia	0.46	0.59	0.40	0.50	0.65	0.68	0.64	0.52	0.66	0.52	0.68	0.79	1.06	0.66	1.27	1.07	2.37	1.47	2.40
Iran	0.74	0.71	0.91	0.79	0.71	0.75	0.72	0.78	0.73	0.75	0.77	0.82	0.81	0.88	0.89	0.83	0.91	0.93	0.98
Iraq	1.02	0.44	0.40	0.47	0.53	0.40	0.36	0.46	0.43	0.46	0.47	0.59	0.48	0.43	0.49	0.54	0.55	0.74	0.83
Israel	1.21	1.22	1.25	1.20	1.19	1.29	1.21	1.23	1.27	1.34	1.37	1.31	1.41	1.37	1.48	1.52	1.50	1.42	1.48
Jordan	0.64	0.75	0.66	0.61	0.74	0.73	0.63	0.70	0.96	0.72	0.78	0.72	0.90	0.83	0.78	0.82	0.83	0.75	1.05
Kuwait	0.66	0.75	0.66	0.67	0.66	0.68	0.70	0.67	0.88	0.75	0.67	0.72	0.72	0.70	0.75	0.85	0.78	0.76	1.01
Lebanon	0.95	0.93	0.64	0.64	0.66	0.69	0.68	0.66	0.74	0.70	0.86	0.87	0.84	0.97	1.04	0.95	0.92	0.96	1.20
Oman	0.71	0.67	0.58	0.52	0.54	0.67	0.79	0.63	0.74	0.84	0.74	0.71	0.79	0.72	0.84	0.77	0.76	0.89	0.92
Qatar	0.30	0.46	0.30	0.58	0.34	0.43	0.40	0.90	1.14	0.56	0.87	0.98	0.83	1.01	1.18	1.14	1.03	1.35	1.63
Saudi Arabia	0.58	0.59	0.65	0.58	0.59	0.65	0.74	0.64	0.65	0.66	0.66	0.76	0.74	0.86	1.00	1.16	1.30	1.26	1.40
Syria	0.79	0.66	0.85	0.73	0.84	0.90	0.85	0.80	0.85	0.74	0.88	0.86	1.08	1.03	0.97	0.75	0.81	0.78	0.78
United Arab Emirates	0.86	0.65	0.58	0.53	0.54	0.63	0.65	0.62	0.73	0.61	0.76	0.80	0.90	0.91	0.84	0.98	0.88	1.16	1.08
West Bank	0.76	0.79	0.68	0.85	0.59	0.70	0.95	0.78	1.10	0.73	0.84	0.79	0.85	0.81	0.70	0.59	0.71	0.79	2.43

## CHAPTER 5 | Academic Research and Development

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## CHAPTER 5 | Academic Research and Development

Region, country, or economy	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Eritrea	ne	ne	ne	ne	ne	ne	ne	ne	ne	0.79	1.13	0.76	ne	ne	ne	ne	ne	ne	ne
Ethiopia	0.84	0.75	0.82	0.79	0.92	0.81	0.69	0.84	0.87	0.92	0.98	1.06	0.94	1.07	0.94	0.95	0.92	0.94	1.24
Gabon	1.14	1.35	0.96	0.91	1.38	0.69	0.95	0.92	0.83	0.96	1.10	1.02	0.95	0.96	0.82	1.39	1.54	0.98	1.37
Gambia, The	1.22	1.88	2.47	1.69	1.71	1.50	1.18	1.53	1.30	1.81	1.51	1.64	1.50	1.30	1.44	1.57	1.65	2.53	1.33
Ghana	0.88	0.79	0.78	0.78	0.75	0.92	0.74	0.84	1.01	0.88	0.93	0.87	1.20	0.92	1.13	0.95	2.02	1.08	1.33
Guinea	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	0.74	1.21	0.86	1.10	1.00	0.60	0.88	1.20	4.67
Guinea-Bissau	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	1.34	1.03	1.17
Kenya	1.10	1.27	0.99	1.31	1.27	1.05	1.08	1.14	1.16	1.15	1.14	1.21	1.33	1.22	1.51	1.48	1.71	1.26	1.53
Lesotho	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	0.79	0.75	ne
Liberia	ne	ne	ne	na	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	5.39
Libya	0.33	0.72	0.54	0.59	0.39	0.37	0.43	0.65	0.41	0.42	0.70	0.57	0.66	0.36	0.46	0.47	0.68	0.58	0.70
Madagascar	0.59	1.10	0.97	0.72	0.70	0.60	0.61	0.78	0.59	0.74	1.10	0.87	0.95	0.89	1.03	1.09	1.02	0.78	0.88
Malawi	1.74	0.79	1.36	1.39	1.62	0.89	0.97	1.20	1.10	1.11	1.30	1.27	1.17	1.35	1.45	2.09	1.51	1.38	1.37
Mali	0.50	1.47	0.83	0.70	1.12	1.27	0.84	0.77	0.92	0.99	0.81	0.77	0.99	1.37	1.12	1.14	1.06	1.84	1.16
Mauritania	ne	ne	ne	ne	ne	ne	ne	ne	ne	0.62	ne	ne	ne	ne	ne	0.79	0.86	0.63	0.89
Mauritius	ne	ne	0.50	0.64	0.32	0.44	0.58	0.50	0.63	0.75	1.00	0.57	0.65	0.48	0.68	1.09	0.57	0.86	0.91
Morocco	0.63	0.56	0.62	0.54	0.56	0.58	0.66	0.59	0.67	0.70	0.76	0.69	0.79	0.63	0.68	0.66	0.87	0.74	0.72
Mozambique	ne	0.76	0.92	0.77	1.25	0.63	0.73	0.98	1.23	1.04	1.02	1.44	1.73	1.33	2.39	1.68	6.38	1.62	1.22
Namibia	1.31	0.81	0.91	1.03	0.91	0.76	0.62	0.70	1.41	1.22	1.73	1.22	1.21	1.43	0.95	1.13	0.84	1.12	1.19



## CHAPTER 5 | Academic Research and Development

Region, country, or economy	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Niger	0.76	1.17	1.17	0.88	0.81	0.46	0.64	0.75	0.63	0.69	1.11	0.87	1.36	0.99	0.81	1.12	1.16	1.30	0.99
Nigeria	0.46	0.52	0.51	0.51	0.47	0.50	0.43	0.51	0.53	0.53	0.49	0.56	0.59	0.49	0.50	0.51	0.67	0.45	0.59
Rwanda	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	1.22	0.90	1.09	1.14	0.90	1.17	1.00	1.33	1.55
São Tomé and Príncipe	ne	na	ne	na	ne	ne	ne	ne	ne	ne	ne	ne	na	ne	ne	na	ne	ne	ne
Senegal	0.76	0.75	0.61	0.54	0.74	0.84	0.63	0.72	0.67	0.80	0.75	0.58	0.74	0.81	0.73	0.80	0.86	0.76	0.86
Seychelles	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	1.69	1.11	ne	0.97	1.49	1.06	1.10	2.16
Sierra Leone	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	1.13	0.74	1.54	1.56	5.34
Somalia	ne	ne	ne	ne	ne	na	ne	ne	ne	na	ne	na	ne	ne	ne	ne	ne	ne	ne
South Africa	0.75	0.76	0.83	0.94	0.82	0.84	0.81	0.85	0.94	1.03	1.03	1.00	1.09	1.06	1.15	1.14	1.25	1.17	1.10
South Sudan	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	ne	ne	ne	ne
Sudan	0.68	0.63	0.80	0.88	0.89	0.88	0.59	0.79	0.66	0.59	0.64	0.83	0.66	0.80	0.69	0.64	2.60	0.67	0.72
Swaziland	ne	ne	ne	ne	ne	ne	ne	ne	ne	0.72	1.00	ne	0.82	1.00	1.24	1.27	0.73	0.86	0.90
Tanzania	1.11	1.59	1.02	0.87	1.06	1.09	0.97	1.16	1.11	1.12	1.17	1.25	1.27	1.53	1.30	1.30	1.27	1.34	1.22
Togo	0.36	0.64	0.28	0.28	0.46	0.52	ne	0.61	0.59	0.60	0.58	0.49	0.41	0.50	0.56	0.57	0.39	0.50	0.45
Tunisia	0.44	0.61	0.60	0.47	0.53	0.63	0.56	0.52	0.53	0.64	0.60	0.69	0.71	0.71	0.70	0.74	0.75	0.68	0.78
Uganda	0.90	1.14	0.82	1.43	1.41	1.25	0.88	1.15	1.12	0.98	1.32	1.24	1.44	1.29	1.49	1.34	2.23	1.24	1.29
Western Sahara	na	na	na	na	na	na	ne	na	ne	na	na	na	ne	ne	ne	na	ne	na	na
Zambia	0.60	0.85	0.94	0.77	1.11	0.99	0.94	1.04	1.12	0.85	1.33	1.43	1.34	1.44	1.57	1.75	1.28	1.40	1.65
Zimbabwe	0.72	0.60	0.86	0.67	0.62	0.87	0.78	1.01	0.93	0.99	1.13	1.03	1.24	1.23	0.96	2.22	1.06	1.32	1.26

## CHAPTER 5 | Academic Research and Development

Region, country, or economy	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Asia	0.69	0.69	0.70	0.70	0.71	0.70	0.73	0.74	0.75	0.74	0.75	0.76	0.77	0.78	0.79	0.82	0.86	0.88	0.90
Afghanistan	ne	na	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	0.93	0.54	0.89	0.65	0.66	1.19	6.81
Bangladesh	0.72	0.55	0.59	0.58	0.66	0.62	0.70	0.72	0.86	0.82	0.79	0.72	0.71	0.70	0.74	0.74	0.76	0.82	0.98
Bhutan	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	1.34	ne	ne	ne	0.73	0.91	0.79	0.96	0.85
Brunei	1.11	0.62	0.63	0.80	1.12	1.10	0.97	0.72	0.63	0.75	0.82	0.86	0.90	0.68	0.72	0.64	0.73	0.66	0.79
Burma	ne	ne	ne	ne	ne	ne	ne	1.12	1.05	0.91	0.66	0.79	0.55	0.49	0.83	0.48	0.66	0.74	1.58
Cambodia	ne	ne	ne	ne	ne	ne	0.76	0.77	0.89	1.46	1.01	1.42	1.00	2.23	1.52	1.37	1.56	1.46	1.67
China	0.46	0.49	0.48	0.52	0.54	0.50	0.58	0.62	0.62	0.61	0.64	0.67	0.69	0.70	0.73	0.78	0.88	0.91	0.96
India	0.61	0.60	0.61	0.61	0.68	0.67	0.69	0.73	0.77	0.81	0.83	0.83	0.83	0.84	0.81	0.78	0.77	0.78	0.76
Indonesia	0.95	0.85	0.80	0.76	0.90	0.81	0.77	0.78	0.80	0.83	0.83	0.92	0.95	1.08	0.76	0.79	0.80	0.70	0.79
Japan	0.77	0.77	0.80	0.78	0.77	0.80	0.79	0.80	0.82	0.81	0.82	0.83	0.84	0.83	0.84	0.86	0.85	0.86	0.87
Kazakhstan	0.28	0.35	0.29	0.45	0.39	0.48	0.32	0.38	0.42	0.37	0.43	0.51	0.49	0.43	0.51	0.49	0.68	0.38	0.60
Kyrgyzstan	0.29	ne	0.14	0.40	0.16	0.75	0.74	0.53	0.30	0.34	0.68	0.78	0.53	0.77	0.99	0.60	0.84	1.13	2.34
Laos	ne	ne	ne	ne	ne	ne	ne	1.47	0.84	1.25	1.25	1.49	1.03	1.14	1.31	1.04	1.24	1.10	1.65
Malaysia	0.70	0.63	0.70	0.70	0.66	0.74	0.67	0.68	0.78	0.70	0.70	0.77	0.67	0.75	0.74	0.78	0.81	0.82	0.88
Maldives	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne
Mongolia	1.63	0.84	0.80	0.63	1.37	0.94	1.24	1.07	1.36	1.00	0.96	1.14	0.73	0.78	0.90	0.77	0.78	0.79	0.85
Nepal	0.70	0.72	0.74	0.99	0.82	0.94	0.60	0.77	0.70	0.54	0.83	0.70	0.65	0.64	0.68	0.70	1.87	0.96	0.89
North Korea	ne	ne	0.93	ne	ne	1.65	2.05	ne	0.81	1.43	1.42	1.05	1.09	0.75	1.07	ne	0.44	0.74	0.76

## CHAPTER 5 | Academic Research and Development

[illegible]

CHAPTER 5 | Academic Research and Development

Region, country, or economy	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Micronesia, Federated States of	ne	ne	ne	ne	ne	ne	na	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne
Nauru	na	ne	ne	na	na	ne	na	na	ne	ne	ne	na	na	ne	na	ne	ne	ne	ne
New Zealand	1.28	1.16	1.21	1.09	1.19	1.08	1.07	1.18	1.14	1.20	1.29	1.24	1.31	1.33	1.38	1.35	1.49	1.44	1.36
Niue	na	na	na	na	na	na	na	na	na	ne	ne	ne	na	na	na	na	na	na	ne
Palau	ne	ne	ne	na	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne
Samoa	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne
Solomon Islands	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne
Tonga	na	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne
Tuvalu	na	na	na	na	na	ne	na	ne	ne	na	ne	ne	ne	ne	ne	na	ne	ne	ne
Vanuatu	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	0.93

na = not applicable; no articles are assigned to the entity. ne = not eligible; there are fewer than 30 articles available to make a calculation.

EU = European Union.

<sup>a</sup> Beginning in 2006, Serbia and Montenegro represented individual countries.

<sup>b</sup> Serbia and Montenegro represented a single country for data purposes from 1992 to 2006.

**Note(s)**

An average relative citation (ARC) value greater than 1.00 has more citations than average, and an ARC value less than 1.00 has fewer citations than average. The ARC is the average across a given area of geography or sector of the relative citations for each publication. The relative citation divides each publication's citation count by the average citation count of all of the same type of publications in that subfield and year. ARC values are presented for the year in which the cited article was published, showing the counts of subsequent citations from peer-reviewed literature. At least 2 years of data after publication are needed for a meaningful measure. Publications that cannot be classified by region, country, or economy or field are excluded.

**Source(s)**

National Science Foundation, National Center for Science and Engineering Statistics; SRI International; Science-Metrix; Elsevier, Scopus abstract and citation database, accessed July 2017.



CHAPTER 5 | Academic Research and Development

*Science and Engineering Indicators 2018*

## CHAPTER 5 | Academic Research and Development

APPENDIX TABLE 5-51

## Share of S&amp;E publications in the top 1% of most-cited articles in the Scopus database, by region, country, or economy: 1996–2014

(Index)

Region, country, or economy	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
World	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Not United States	0.62	0.62	0.62	0.63	0.65	0.64	0.64	0.63	0.65	0.67	0.66	0.69	0.68	0.69	0.68	0.69	0.70	0.71	0.72
North America	1.65	1.67	1.70	1.70	1.66	1.73	1.71	1.71	1.70	1.69	1.75	1.73	1.79	1.82	1.85	1.86	1.83	1.81	1.79
Canada	1.48	1.52	1.49	1.42	1.33	1.41	1.30	1.41	1.48	1.58	1.57	1.67	1.71	1.73	1.84	1.96	1.95	1.92	1.97
Greenland	ne	ne	ne	ne	ne	ne	ne	0.00	0.00	2.17	0.00	0.00	3.92	0.00	4.41	5.00	2.86	4.39	1.90
Mexico	0.50	0.40	0.45	0.67	0.60	0.60	0.45	0.40	0.50	0.48	0.63	0.54	0.68	0.64	0.75	0.85	0.82	0.93	0.79
United States	1.72	1.75	1.77	1.78	1.76	1.81	1.81	1.81	1.79	1.78	1.85	1.83	1.90	1.93	1.96	1.97	1.95	1.93	1.90
Central America and Caribbean	0.88	0.38	0.62	0.65	0.36	0.50	0.56	0.45	0.57	0.83	0.77	0.72	0.95	0.95	0.86	1.20	1.24	1.25	1.31
Antigua and Barbuda	na	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne
Bahamas, The	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	0.00	0.00	0.00	0.00
Barbados	0.00	2.56	0.00	0.00	0.00	0.00	1.92	1.56	1.30	0.00	0.00	0.00	1.37	3.03	0.00	1.25	1.04	1.10	3.57
Belize	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne
Costa Rica	0.00	0.37	0.39	0.46	0.59	1.45	1.74	1.71	0.53	1.66	0.94	1.03	1.26	1.34	1.65	1.23	1.37	1.13	1.25
Cuba	0.39	0.00	0.36	0.24	0.16	0.23	0.08	0.29	0.37	0.19	0.30	0.42	0.43	0.27	0.73	0.52	0.28	0.77	0.39
Dominica	ne	ne	ne	na	na	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne
Dominican Republic	0.00	ne	ne	ne	0.00	ne	ne	ne	0.00	0.00	0.00	0.00	1.72	0.00	0.00	1.41	1.27	1.77	0.00

## CHAPTER 5 | Academic Research and Development

Region, country, or economy	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
El Salvador	ne	ne	ne	ne	ne	ne	ne	ne	0.00	0.00	0.00	ne	2.63	5.26	4.65	2.00	1.82	0.00	0.00
Grenada	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	0.00	0.00	1.28	0.00	0.00	1.30	0.00	2.06	1.48
Guatemala	1.69	0.00	0.00	3.51	0.00	0.00	0.00	1.52	0.00	0.89	0.00	0.00	0.00	0.75	0.79	1.56	2.14	1.62	1.62
Haiti	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	0.00	ne	3.33	2.94	2.56	3.17	1.92	0.00	1.89
Honduras	ne	ne	0.00	0.00	ne	ne	0.00	0.00	0.00	0.00	0.00	2.78	2.38	0.00	3.03	1.49	0.00	0.00	0.00
Jamaica	1.25	0.69	0.69	2.13	0.00	0.00	0.00	0.00	0.00	0.00	1.05	0.83	0.72	0.71	0.36	1.34	0.00	1.69	0.60
Nicaragua	2.94	0.00	ne	ne	ne	ne	ne	0.00	0.00	3.70	2.41	0.00	2.47	1.11	0.00	1.09	0.93	1.22	0.00
Panama	2.22	1.20	2.30	0.90	3.06	1.80	2.83	0.66	1.09	1.59	2.65	1.89	3.32	2.22	1.46	3.53	3.39	1.33	2.89
Puerto Rico	1.53	0.81	0.94	1.49	0.69	1.05	0.79	0.37	1.13	1.56	1.28	1.15	1.28	1.68	1.37	2.27	3.08	2.49	2.81
Saint Kitts and Nevis	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	0.00
Saint Lucia	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	na	ne	ne	ne	ne	ne
Saint Vincent and the Grenadines	ne	ne	ne	ne	ne	na	ne	ne	ne	ne	ne	ne	na	ne	ne	ne	ne	ne	ne
Trinidad and Tobago	0.00	1.04	0.80	0.00	0.00	0.00	0.62	0.00	0.00	0.00	0.49	0.39	1.56	0.61	0.00	0.27	0.31	1.03	0.58
South America	0.50	0.48	0.54	0.50	0.49	0.47	0.48	0.50	0.56	0.58	0.56	0.59	0.59	0.62	0.62	0.60	0.63	0.70	0.70
Argentina	0.30	0.56	0.48	0.36	0.50	0.41	0.45	0.49	0.80	0.57	0.73	0.70	0.82	0.79	0.80	0.90	0.99	1.07	1.19
Bolivia	1.56	0.00	1.04	0.84	0.00	0.00	0.99	0.00	1.57	0.00	1.74	0.93	2.53	0.44	2.26	1.30	3.62	3.47	1.06
Brazil	0.52	0.49	0.49	0.48	0.50	0.45	0.48	0.50	0.51	0.58	0.54	0.52	0.54	0.54	0.61	0.53	0.57	0.67	0.65
Chile	0.73	0.36	1.12	0.72	0.86	0.66	0.85	0.91	0.73	0.81	0.64	0.79	0.91	1.08	0.87	1.26	1.20	1.55	1.34
Colombia	0.70	0.47	0.48	0.67	0.12	0.62	0.20	0.65	0.72	0.73	0.73	0.67	0.96	0.81	1.00	1.03	1.06	1.05	0.95

CHAPTER 5 | Academic Research and Development

Region, country, or economy	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Ecuador	1.02	0.00	0.68	0.00	0.75	1.71	1.20	0.00	1.49	1.43	1.38	0.91	2.05	0.86	1.67	1.15	2.34	1.47	1.20
Guyana	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	0.00	ne	ne	ne	ne
Paraguay	1.21	ne	0.00	ne	ne	3.13	ne	0.00	1.85	1.67	3.39	0.00	1.39	2.41	4.49	1.72	1.55	2.26	1.36
Peru	0.00	0.47	0.52	2.21	0.79	0.75	0.00	0.75	0.94	0.78	1.16	1.35	1.52	1.55	2.51	1.80	1.85	2.70	2.57
Suriname	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	0.00	ne
Uruguay	0.92	0.30	0.63	0.91	0.28	0.87	0.41	0.00	0.79	0.53	0.51	1.89	1.06	0.84	1.02	1.09	1.65	1.40	0.93
Venezuela	0.60	0.77	0.80	0.49	0.26	0.67	0.22	0.52	0.59	0.48	0.38	0.57	0.54	0.60	0.73	0.60	0.72	0.68	0.78
Europe	0.87	0.88	0.88	0.90	0.92	0.91	0.90	0.94	0.98	1.03	1.05	1.07	1.07	1.12	1.13	1.16	1.17	1.17	1.18
EU	0.94	0.95	0.95	0.97	0.98	0.98	0.97	1.01	1.05	1.10	1.12	1.14	1.14	1.18	1.21	1.23	1.25	1.27	1.28
Austria	0.97	1.26	1.08	1.08	1.26	1.16	0.97	1.20	1.31	1.34	1.48	1.61	1.59	1.57	2.04	2.04	2.08	2.13	2.22
Belgium	1.22	1.03	1.28	1.32	1.12	1.30	1.23	1.39	1.59	1.77	1.76	1.88	1.90	2.02	2.07	2.14	2.26	2.50	2.42
Bulgaria	0.51	0.18	0.27	0.43	0.52	0.42	0.36	0.42	0.35	0.31	0.63	0.54	0.54	0.49	0.47	0.72	0.64	0.89	0.95
Croatia	0.24	0.25	0.29	0.17	0.05	0.07	0.25	0.34	0.47	0.59	0.38	0.48	0.60	0.53	0.89	0.71	0.98	0.93	1.15
Cyprus	0.00	0.55	2.19	0.55	1.39	0.00	2.21	0.76	1.02	0.82	0.71	1.65	1.20	1.27	1.60	1.84	2.70	1.62	2.48
Czech Republic	0.45	0.35	0.44	0.31	0.45	0.54	0.42	0.47	0.69	0.54	0.77	0.67	0.80	0.66	0.93	0.89	0.95	1.15	1.17
Denmark	1.40	1.70	1.39	1.45	1.78	1.72	1.61	1.81	1.95	2.05	2.21	2.36	2.16	2.24	2.41	2.74	2.65	2.81	2.93
Estonia	0.71	0.75	0.64	0.60	0.47	0.29	0.29	0.79	0.66	0.96	0.94	1.14	1.32	1.27	1.59	1.65	2.28	2.28	2.49
Finland	0.90	1.16	1.10	0.96	1.30	1.22	1.19	1.32	1.02	1.22	1.28	1.48	1.66	1.65	1.78	1.80	1.88	2.02	2.01
France	1.03	1.00	1.01	1.00	1.01	1.07	1.04	1.05	1.15	1.21	1.23	1.26	1.28	1.41	1.45	1.48	1.53	1.65	1.61



CHAPTER 5 | Academic Research and Development

Region, country, or economy	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Germany	1.00	1.02	1.03	1.09	1.09	1.10	1.09	1.19	1.24	1.29	1.30	1.40	1.44	1.49	1.65	1.66	1.67	1.71	1.76
Greece	0.65	0.59	0.68	0.55	0.80	0.84	0.78	0.87	0.86	1.01	1.10	0.92	1.14	1.21	1.42	1.41	1.59	1.81	2.06
Hungary	0.54	0.45	0.65	0.48	0.54	0.82	0.67	0.75	0.85	0.86	0.95	0.87	0.95	0.95	1.07	1.06	1.34	1.54	1.39
Ireland	0.87	1.19	1.31	1.20	0.84	0.94	1.10	1.20	1.49	1.32	1.66	1.52	1.86	1.67	1.87	2.08	2.21	2.25	1.99
Italy	0.80	0.85	0.92	0.86	0.83	0.97	1.03	0.89	1.02	1.15	1.19	1.27	1.29	1.37	1.48	1.44	1.51	1.59	1.72
Latvia	0.24	0.19	0.69	0.44	0.25	0.00	0.41	0.00	0.67	0.79	1.39	0.61	0.49	0.34	0.72	0.39	0.74	0.95	0.59
Lithuania	0.20	0.00	0.33	0.57	0.14	0.28	0.38	0.27	0.27	0.55	0.44	0.45	0.27	0.42	0.59	0.81	1.52	1.18	1.24
Luxembourg	0.00	2.15	0.00	0.00	0.00	0.90	0.79	0.59	1.21	1.90	0.75	0.71	1.63	2.12	2.00	2.22	1.64	1.73	2.43
Malta	0.00	3.33	0.00	1.47	0.00	4.41	1.39	2.99	0.00	1.41	2.14	1.88	2.43	0.91	1.83	1.00	0.00	1.61	1.67
Netherlands	1.54	1.66	1.50	1.62	1.65	1.56	1.63	1.80	1.82	1.91	2.09	2.18	2.21	2.13	2.41	2.54	2.55	2.62	2.55
Poland	0.29	0.39	0.36	0.36	0.39	0.36	0.35	0.40	0.47	0.49	0.52	0.54	0.50	0.59	0.61	0.69	0.77	0.83	0.88
Portugal	0.63	0.72	0.70	0.80	0.63	0.74	0.90	0.75	1.08	1.01	1.20	1.35	1.18	1.18	1.24	1.26	1.41	1.42	1.52
Romania	0.27	0.31	0.34	0.26	0.33	0.27	0.51	0.28	0.63	0.47	0.54	0.42	0.44	0.33	0.40	0.59	0.63	0.96	0.95
Slovakia	0.42	0.39	0.13	0.24	0.19	0.39	0.26	0.39	0.54	0.44	0.55	0.69	0.58	0.45	0.80	0.62	0.73	0.89	0.83
Slovenia	0.53	0.67	0.62	0.51	0.19	0.61	0.55	0.79	0.64	0.68	1.36	0.88	0.97	0.94	1.22	0.73	1.41	1.52	1.72
Spain	0.74	0.65	0.75	0.79	0.80	0.79	0.87	0.91	1.02	1.10	0.99	1.23	1.13	1.30	1.40	1.44	1.53	1.59	1.62
Sweden	1.22	1.38	1.40	1.36	1.24	1.51	1.31	1.57	1.69	1.64	1.62	1.73	1.78	1.84	2.12	2.03	2.13	2.17	2.32
United Kingdom	1.30	1.35	1.32	1.38	1.41	1.38	1.43	1.54	1.58	1.66	1.68	1.76	1.86	1.88	1.94	2.04	2.12	2.19	2.25
Other Europe	0.61	0.67	0.66	0.67	0.73	0.68	0.72	0.76	0.84	0.88	0.97	1.01	1.02	1.11	1.06	1.14	1.16	1.16	1.12

## CHAPTER 5 | Academic Research and Development

Region, country, or economy	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Albania	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.89	0.00	0.00	1.33	2.11	0.00	0.46	0.80	0.00	0.00	0.21
Andorra	ne	ne	ne	na	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne
Belarus	0.07	0.38	0.14	0.59	0.35	0.65	0.51	0.19	0.37	0.18	0.19	0.45	0.42	0.56	0.60	0.84	1.42	1.76	1.49
Bosnia and Herzegovina	0.00	0.00	0.00	0.00	0.00	0.00	1.45	0.00	0.44	0.57	0.66	0.28	0.40	0.18	0.43	0.00	0.46	0.53	0.48
Holy See (Vatican City)	ne	ne	ne	ne	ne	na	ne	na	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne
Iceland	2.97	2.68	2.22	1.06	2.06	2.14	2.66	1.76	2.76	2.79	2.07	3.27	2.99	3.45	3.88	3.07	4.28	3.20	3.48
Kosovo	na	na	na	na	na	na	na	na	na	na	na	na	0.00	0.00	0.48	0.00	0.88	0.00	0.41
Liechtenstein	ne	0.00	ne	ne	0.00	ne	ne	0.00	2.08	1.56	3.17	1.79	0.00	4.55	2.20	0.00	1.19	1.23	1.00
Macedonia	1.68	0.53	0.70	0.00	0.00	0.50	0.00	0.48	0.28	0.25	0.56	0.48	0.00	0.55	0.58	0.32	1.28	0.55	1.31
Moldova	0.00	0.00	0.00	0.45	0.00	0.00	0.43	0.00	0.00	0.57	1.02	1.10	1.33	1.70	1.68	0.28	1.48	0.25	1.48
Monaco	0.00	0.00	4.35	0.00	ne	0.00	2.78	0.00	4.00	0.00	1.35	1.37	2.44	4.00	1.12	5.61	5.62	2.75	0.94
Montenegro <sup>a</sup>	na	na	na	na	na	na	na	na	na	na	na	0.79	0.00	0.70	0.52	0.44	1.46	0.62	1.10
Norway	1.14	1.07	1.21	1.16	1.57	1.42	1.37	1.34	1.61	1.53	1.69	1.50	1.67	1.62	1.84	1.84	2.06	2.25	2.12
Russia	0.25	0.31	0.26	0.26	0.26	0.25	0.24	0.28	0.30	0.35	0.43	0.38	0.37	0.37	0.40	0.46	0.52	0.54	0.57
San Marino	ne	ne	ne	ne	ne	ne	na	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne
Serbia <sup>a</sup>	na	na	na	na	na	na	na	na	na	na	na	0.59	0.90	0.75	0.93	0.97	0.78	0.94	1.36
Serbia and Montenegro <sup>b</sup>	0.26	0.11	0.23	0.30	0.31	0.19	0.58	0.28	0.38	0.33	0.45	na	na	na	na	na	na	na	na
Switzerland	1.70	1.88	1.85	1.81	1.93	1.99	2.12	2.12	2.21	2.29	2.28	2.40	2.44	2.65	2.53	2.75	2.87	2.88	2.65
Turkey	0.36	0.34	0.29	0.29	0.40	0.34	0.42	0.45	0.58	0.48	0.51	0.68	0.61	0.77	0.61	0.73	0.65	0.75	0.78

CHAPTER 5 | Academic Research and Development

Region, country, or economy	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Ukraine	0.10	0.09	0.13	0.21	0.11	0.06	0.17	0.17	0.15	0.21	0.22	0.27	0.35	0.31	0.41	0.52	0.52	0.58	0.69
Middle East	0.91	0.87	0.87	0.79	0.85	0.94	0.82	0.86	0.87	0.87	0.91	0.87	0.91	0.97	1.03	0.97	0.99	1.11	1.34
Armenia	0.24	0.55	0.84	0.00	1.28	0.45	0.44	0.81	0.94	1.63	2.05	1.27	0.98	0.74	1.83	2.06	2.66	4.11	2.73
Azerbaijan	0.00	0.00	0.00	0.00	0.00	0.00	0.34	0.00	0.00	0.46	0.26	0.20	0.52	0.00	0.65	0.94	1.03	1.86	2.88
Bahrain	0.00	0.00	0.00	1.01	0.00	0.00	0.00	0.00	0.00	0.48	0.40	0.00	0.00	0.00	0.69	0.33	0.00	0.51	1.92
Gaza Strip	ne	ne	ne	0.00	ne	ne	0.00	0.00	0.00	1.54	0.00	0.97	0.00	0.00	0.00	0.00	1.49	0.00	0.00
Georgia	0.38	0.76	0.00	0.00	0.30	0.30	0.29	0.00	0.91	0.18	0.55	0.81	0.73	0.32	2.34	1.56	3.33	2.95	4.30
Iran	0.24	0.19	0.85	0.14	0.28	0.58	0.39	0.61	0.38	0.35	0.50	0.61	0.53	0.61	0.60	0.53	0.64	0.75	0.93
Iraq	1.05	0.00	0.00	0.00	1.01	0.00	0.00	0.74	0.00	0.56	0.00	0.67	0.00	0.21	0.57	0.47	0.33	0.96	0.84
Israel	1.20	1.20	1.19	1.16	1.22	1.32	1.14	1.20	1.31	1.50	1.46	1.35	1.66	1.70	1.93	1.96	1.78	1.89	2.06
Jordan	0.23	0.40	0.00	0.00	0.31	0.32	0.28	0.36	0.75	0.29	0.49	0.49	0.86	0.61	0.61	0.73	0.67	0.59	0.73
Kuwait	0.17	0.17	0.31	0.58	0.17	0.00	0.17	0.29	0.68	0.49	0.24	0.75	0.45	0.47	0.81	0.88	0.97	0.62	1.27
Lebanon	2.26	1.32	0.65	0.00	0.42	0.59	0.59	0.48	0.29	0.51	0.86	0.71	0.46	1.47	1.63	0.93	0.67	0.66	1.11
Oman	0.00	0.00	0.00	0.00	0.00	0.33	0.00	0.75	0.94	1.09	0.40	0.52	1.17	0.43	0.77	0.43	0.41	0.79	0.77
Qatar	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.66	1.06	0.40	0.71	1.00	0.40	1.82	1.93	1.48	0.99	1.83	2.38
Saudi Arabia	0.32	0.21	0.27	0.40	0.22	0.33	0.59	0.46	0.42	0.36	0.45	0.53	0.68	0.87	1.30	1.50	1.53	1.71	2.17
Syria	0.88	0.00	0.00	0.76	0.71	1.65	0.77	0.00	1.00	0.41	0.43	0.40	0.92	0.36	1.50	0.00	0.72	0.81	0.50
United Arab Emirates	1.44	0.53	0.00	0.00	0.00	0.40	0.19	0.38	0.48	0.25	0.94	0.39	0.74	1.25	0.90	1.00	0.82	1.17	1.30
West Bank	0.00	0.00	0.00	0.00	0.00	0.00	1.45	0.00	1.23	0.00	0.00	0.00	0.67	0.00	0.47	0.00	0.00	0.37	1.52

## CHAPTER 5 | Academic Research and Development

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## CHAPTER 5 | Academic Research and Development

Region, country, or economy	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Eritrea	ne	ne	ne	ne	ne	ne	ne	ne	ne	0.00	2.47	0.00	ne	ne	ne	ne	ne	ne	ne
Ethiopia	0.42	0.00	0.00	0.00	0.42	0.00	0.00	0.57	0.85	0.74	0.73	0.54	0.17	0.59	0.27	0.33	0.53	0.92	0.82
Gabon	0.00	3.57	1.45	0.00	2.08	0.00	0.00	0.00	0.00	0.00	0.89	0.00	0.97	0.90	0.92	1.99	3.94	0.65	2.69
Gambia, The	0.00	1.54	4.48	1.39	0.19	0.00	0.00	0.00	0.00	2.38	1.82	1.08	1.85	0.90	0.90	1.09	2.48	6.57	1.21
Ghana	0.61	0.48	1.01	0.00	0.47	0.00	0.99	0.00	0.34	0.30	0.28	0.00	0.64	0.27	1.44	0.93	1.58	0.77	0.90
Guinea	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.15
Guinea-Bissau	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	0.00	0.00	0.00
Kenya	0.49	1.73	0.35	2.45	1.18	1.23	1.42	0.76	0.86	0.59	0.63	0.92	1.67	1.31	2.29	1.66	1.48	1.64	1.72
Lesotho	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	0.00	0.00	ne
Liberia	ne	ne	ne	na	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	6.45
Libya	0.00	0.00	0.00	1.75	0.00	0.00	0.00	1.22	0.00	0.00	1.42	0.00	0.47	0.00	0.44	0.00	1.07	0.25	0.99
Madagascar	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.78	0.00	0.00	2.13	1.02	0.00	1.03	1.01	1.15	1.07	0.36	1.20
Malawi	3.09	0.00	2.60	0.95	0.92	0.85	0.00	0.73	0.00	0.63	1.10	0.81	0.74	0.77	1.29	2.25	1.76	1.52	2.64
Mali	0.00	5.26	1.25	0.00	0.00	1.67	1.61	0.00	0.00	0.00	0.00	0.00	0.68	2.94	1.71	1.49	0.89	1.99	0.98
Mauritania	ne	ne	ne	ne	ne	ne	ne	ne	ne	0.00	ne	ne	ne	ne	ne	0.00	0.00	0.00	0.00
Mauritius	ne	ne	0.00	0.00	0.00	0.00	1.27	0.00	0.00	1.08	2.33	0.00	0.00	0.00	0.00	1.96	0.00	1.08	1.09
Morocco	0.36	0.44	0.47	0.34	0.08	0.38	0.54	0.31	0.14	0.15	0.56	0.32	0.28	0.20	0.61	0.41	0.79	0.85	0.79
Mozambique	ne	0.00	0.00	0.00	2.78	0.00	0.00	1.72	2.90	0.00	1.01	1.66	0.79	1.35	2.21	2.49	5.26	1.48	0.88
Namibia	2.38	0.00	1.39	2.27	0.00	0.00	0.00	0.00	4.84	0.89	2.83	2.00	1.12	0.99	1.09	2.26	0.00	1.48	1.39

CHAPTER 5 | Academic Research and Development

Region, country, or economy	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Niger	0.00	0.00	1.49	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.56	0.00	0.00	1.82	0.78	0.00	0.00	3.13	0.76
Nigeria	0.00	0.19	0.29	0.09	0.17	0.18	0.08	0.21	0.24	0.12	0.17	0.34	0.55	0.32	0.42	0.40	0.32	0.09	0.48
Rwanda	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	0.00	0.00	1.56	1.22	0.79	1.43	0.65	0.94	1.32
São Tomé and Príncipe	ne	na	ne	na	ne	ne	ne	ne	ne	ne	ne	ne	na	ne	ne	na	ne	ne	ne
Senegal	1.80	0.46	0.00	0.36	0.00	1.42	0.00	0.30	0.00	0.58	0.68	0.00	0.27	1.04	0.00	0.75	1.06	0.53	0.84
Seychelles	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	0.00	0.00	ne	0.00	0.00	0.00	2.22	2.44
Sierra Leone	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	0.00	0.00	2.44	2.50	7.94
Somalia	ne	ne	ne	ne	ne	na	ne	ne	ne	na	ne	na	ne	ne	ne	ne	ne	ne	ne
South Africa	0.49	0.45	0.57	0.43	0.62	0.73	0.69	0.64	0.97	1.02	0.97	1.00	1.25	1.18	1.32	1.32	1.28	1.63	1.37
South Sudan	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	ne	ne	ne	ne
Sudan	1.05	0.00	0.00	0.00	1.98	0.00	0.00	1.46	0.00	0.00	0.00	1.19	0.00	0.81	0.24	0.20	1.47	0.32	0.54
Swaziland	ne	ne	ne	ne	ne	ne	ne	ne	ne	0.00	0.00	ne	3.03	1.75	0.00	1.41	0.00	0.00	1.30
Tanzania	1.22	1.18	0.00	0.41	0.82	1.33	0.37	0.58	0.54	0.46	0.36	1.35	1.21	1.19	1.02	1.77	1.03	1.58	1.00
Togo	0.00	0.00	0.00	0.00	0.00	0.00	ne	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tunisia	0.00	0.80	0.40	0.13	0.12	0.10	0.33	0.15	0.23	0.23	0.04	0.44	0.37	0.43	0.40	0.47	0.51	0.28	0.44
Uganda	0.00	0.64	0.00	1.60	1.42	0.98	0.54	0.00	1.66	0.50	0.94	0.96	1.32	1.45	1.34	1.24	1.42	1.40	0.88
Western Sahara	na	na	na	na	na	na	ne	na	ne	na	na	na	ne	ne	ne	na	ne	na	na
Zambia	0.00	0.00	0.97	0.00	2.63	0.00	1.04	0.00	0.00	0.00	1.94	1.16	1.92	2.06	0.43	2.57	0.66	2.14	1.79
Zimbabwe	0.30	0.00	0.32	0.54	0.29	0.96	0.38	0.55	0.00	0.41	1.41	0.94	1.46	2.42	0.00	2.50	0.78	2.49	2.03

CHAPTER 5 | Academic Research and Development

Region, country, or economy	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Asia	0.48	0.51	0.51	0.49	0.50	0.51	0.55	0.57	0.60	0.58	0.58	0.62	0.62	0.64	0.66	0.70	0.78	0.82	0.85
Afghanistan	ne	na	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	0.00	0.00	0.00	0.00	0.00	1.59	5.49
Bangladesh	0.61	0.00	0.39	0.18	0.51	0.33	0.00	0.61	1.21	0.64	0.65	0.74	0.44	0.42	0.42	0.40	0.79	0.78	0.78
Bhutan	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	2.94	ne	ne	ne	0.00	0.00	0.00	1.56	0.00
Brunei	2.70	0.00	0.00	0.00	2.04	0.00	2.86	0.00	0.00	0.00	1.43	0.00	2.44	0.00	0.00	0.81	1.10	0.45	1.31
Burma	ne	ne	ne	ne	ne	ne	ne	2.94	0.00	1.12	0.00	0.00	0.00	0.00	0.93	0.00	0.95	0.00	0.81
Cambodia	ne	ne	ne	ne	ne	ne	0.00	0.00	0.00	2.41	0.92	2.13	0.00	4.38	1.72	1.07	3.03	3.18	1.83
China	0.31	0.40	0.38	0.38	0.38	0.35	0.47	0.52	0.49	0.49	0.51	0.55	0.56	0.60	0.64	0.73	0.85	0.94	1.01
India	0.33	0.31	0.40	0.38	0.42	0.48	0.45	0.59	0.63	0.61	0.68	0.68	0.67	0.65	0.60	0.58	0.59	0.61	0.61
Indonesia	0.89	0.52	0.53	0.34	0.73	0.83	0.61	0.27	0.54	0.56	0.42	0.75	1.04	1.47	0.65	0.66	0.82	0.61	0.73
Japan	0.59	0.61	0.63	0.56	0.55	0.62	0.61	0.58	0.65	0.62	0.63	0.67	0.65	0.68	0.68	0.72	0.72	0.76	0.78
Kazakhstan	0.75	0.53	0.00	0.48	0.00	0.84	0.00	0.00	0.30	0.00	0.64	0.00	0.29	0.00	0.44	0.19	0.58	0.21	0.46
Kyrgyzstan	0.00	ne	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.28	1.39	0.00	0.00	1.52	0.00	1.01	2.08	3.25
Laos	ne	ne	ne	ne	ne	ne	ne	2.63	0.00	1.52	2.22	1.37	0.83	0.99	1.65	0.00	2.12	0.53	0.55
Malaysia	0.62	0.27	0.45	0.39	0.37	0.36	0.46	0.54	0.81	0.36	0.34	0.67	0.63	0.64	0.63	0.69	0.71	0.82	0.95
Maldives	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne
Mongolia	2.22	0.00	0.00	0.00	3.70	0.00	1.92	0.00	3.41	1.02	1.68	1.43	0.00	0.40	0.78	0.00	0.66	0.30	0.93
Nepal	0.00	0.00	0.68	0.00	0.65	1.08	0.00	1.04	0.31	0.00	1.01	0.72	0.00	0.17	0.45	0.28	1.12	1.40	1.17
North Korea	ne	ne	0.00	ne	ne	0.00	2.56	ne	0.80	2.16	1.40	0.00	1.61	0.00	0.00	ne	0.00	0.00	0.00

## CHAPTER 5 | Academic Research and Development

[illegible]



CHAPTER 5 | Academic Research and Development

Region, country, or economy	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Micronesia, Federated States of	ne	ne	ne	ne	ne	ne	na	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne
Nauru	na	ne	ne	na	na	ne	na	na	ne	ne	ne	na	na	ne	na	ne	ne	ne	ne
New Zealand	1.18	1.11	1.24	0.95	1.19	0.99	1.00	1.26	1.04	1.20	1.33	1.40	1.44	1.49	1.73	1.71	1.81	1.97	1.69
Niue	na	na	na	na	na	na	na	na	na	ne	ne	ne	na	na	na	na	na	na	ne
Palau	ne	ne	ne	na	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne
Samoa	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne
Solomon Islands	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne
Tonga	na	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne
Tuvalu	na	na	na	na	na	ne	na	ne	ne	na	ne	ne	ne	ne	ne	na	ne	ne	ne
Vanuatu	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	ne	0.00

na = not applicable; no articles are assigned to the entity. ne = not eligible; there are fewer than 30 articles available to make a calculation.

EU = European Union.

<sup>a</sup> Beginning in 2006, Serbia and Montenegro represented individual countries.

<sup>b</sup> Serbia and Montenegro represented a single country for data purposes from 1992 to 2006.

**Note(s)**

Articles are classified by the publication year and are assigned to a region, country, or economy on the basis of the institutional address(es) listed in the article. Citation data are based on all citations made to articles in their publication year and all following years and are normalized by subfield and publication year to allow for comparisons across subfields and over time, resulting in the world-level standing at 1.00% for each subfield and year. A minimum 2-year citation window is needed for a relative citation (RC) score to be computed. This results in scores regarding highly cited articles not being computed after 2014 because the citation window for more recent years is not yet complete. The share of articles in the top 1% is computed as follows:  $Sx = \frac{HCPx}{Px}$ , where  $Sx$  is the share of output from country  $x$  in the top 1% most-cited articles;  $HCPx$  is the number of articles from country  $x$  that are among the top 1% of most-cited articles (using full counting, with the exception of papers at the limit of the top 1%, which are fractioned so the world average can stand at 1.00%); and  $Px$  is the total number of papers from country  $x$  with an RC score, which excludes articles released after 2014 and unclassified publications.

**Source(s)**



## CHAPTER 5 | Academic Research and Development

National Science Foundation, National Center for Science and Engineering Statistics; SRI International; Science-Metrix; Elsevier, Scopus abstract and citation database, accessed July 2017.

*Science and Engineering Indicators 2018*

## CHAPTER 6

# Industry, Technology, and the Global Marketplace

## List of Appendix Tables

Appendix Table 6-1	Regions, countries, or economies in world industry data .....	6-5
Appendix Table 6-2	Value added of KTI industries, by region, country, or economy: 2001–16.....	6-7
Appendix Table 6-3	Nominal GDP, by region, country, or economy: Selected years, 2001–16.....	6-13
Appendix Table 6-4	Value added of commercial KI services, by region, country, or economy: 2001–16.....	6-18
Appendix Table 6-5	Value added of education services, by region, country, or economy: 2001–16.....	6-23
Appendix Table 6-6	Value added of health care, by region, country, or economy: 2001–16 .....	6-28
Appendix Table 6-7	Value added of MHT manufacturing industries, by region, country, or economy: 2001–16.....	6-33
Appendix Table 6-8	Value added of HT manufacturing industries, by region, country, or economy: 2001–16.....	6-38
Appendix Table 6-9	Value added of financial services, by region, country, or economy: 2001–16.....	6-43
Appendix Table 6-10	Value added of business services, by region, country, or economy: 2001–16.....	6-48
Appendix Table 6-11	Value added of information services, by region, country, or economy: 2001–16.....	6-53
Appendix Table 6-12	Value added of computer programming and related services, by region, country, or economy: 2001–2016 .....	6-58
Appendix Table 6-13	Value added of all manufacturing industries, by region, country, or economy: 2001–16.....	6-63
Appendix Table 6-14	Value added of semiconductor industry, by region, country, or economy: 2001–16.....	6-68
Appendix Table 6-15	Value added of computers and office machinery, by region, country, or economy: 2001–16.....	6-73
Appendix Table 6-16	Value added of communications, by region, country, or economy: 2001–16.....	6-78
Appendix Table 6-17	Value added of pharmaceuticals industry, by region, country, or economy: 2001–16.....	6-83
Appendix Table 6-18	Value added of testing, measuring, and control instruments industry, by region, country, or economy: 2001–16.....	6-88
Appendix Table 6-19	Value added of aircraft and spacecraft, by region, country, or economy: 2001–16.....	6-93
Appendix Table 6-20	Value added of motor vehicles, trailers, and parts, by region, country, or economy: 2001–16.....	6-98
Appendix Table 6-21	Value added of chemicals excluding pharmaceuticals, by region, country, or economy: 2001–16.....	6-103
Appendix Table 6-22	Value added of machinery and equipment, by region, country, or economy: 2001–16.....	6-108

Appendix Table 6-23	Value added of electrical machinery, by region, country, or economy: 2001-16.....	6-113
Appendix Table 6-24	Value added of railroad and other transportation equipment, by region, country, or economy: 2001-16.....	6-118
Appendix Table 6-25	Exports and imports of commercial KI services, by selected region, country, or economy: 2008-16.....	6-123
Appendix Table 6-26	Exports and imports of high-technology products, by region, country, or economy: 2001-16.....	6-126
Appendix Table 6-27	Exports and imports of medium-high technology products, by region, country, or economy: 2001-16.....	6-131
Appendix Table 6-28	Exports and imports of other business services, by selected region, country, or economy: 2008-16.....	6-136
Appendix Table 6-29	Exports and imports of telecommunications and computer and information services, by selected region, country, or economy: 2008-16.....	6-139
Appendix Table 6-30	Exports and imports of financial services, by selected region, country, or economy: 2008-16.....	6-142
Appendix Table 6-31	Exports and imports of ICT products, by region, country, or economy: 2001-16.....	6-145
Appendix Table 6-32	Exports and imports of communications products, by region, country, or economy: 2001-16.....	6-150
Appendix Table 6-33	Exports and imports of computer products, by region, country, or economy: 2001-16.....	6-155
Appendix Table 6-34	Exports and imports of semiconductor products, by region, country, or economy: 2001-16.....	6-160
Appendix Table 6-35	Exports and imports of testing, measuring, and control instrument products, by region, country, or economy: 2001-16 .....	6-165
Appendix Table 6-36	Exports and imports of pharmaceutical products, by region, country, or economy: 2001-16.....	6-170
Appendix Table 6-37	Exports and imports of aircraft and spacecraft, by region, country, or economy: 2001-16.....	6-175
Appendix Table 6-38	Regions, countries, or economies in world trade data .....	6-180
Appendix Table 6-39	Exports and imports of motor vehicles and parts, by region, country, or economy: 2001-16.....	6-183
Appendix Table 6-40	Exports and imports of chemicals excluding pharmaceuticals, by region, country, or economy: 2001-16.....	6-188
Appendix Table 6-41	Exports and imports of machinery, equipment, and appliances, by region, country, or economy: 2001-16.....	6-193
Appendix Table 6-42	Exports and imports of electrical machinery, by region, country, or economy: 2001-16.....	6-198
Appendix Table 6-43	Exports and imports of railroad equipment and other transportation products, by region, country, or economy: 2001-16 .....	6-203
Appendix Table 6-44	Later-stage sustainable energy investment in all technologies and solar, by region, country, or economy: 2006-16 .....	6-208
Appendix Table 6-45	Later-stage sustainable energy investment in wind and energy smart technologies, by region, country, or economy: 2004-16 .....	6-210

Appendix Table 6-46	Government RD&D in sustainable energy technologies, by region, country, or economy: 2005–14.....	6-212
Appendix Table 6-47	Government RD&D in nuclear energy, by region, country, or economy: 2005–14.....	6-215
Appendix Table 6-48	Government RD&D in energy efficiency technology, by region, country, or economy: 2005–14.....	6-218
Appendix Table 6-49	Government RD&D in other power and storage technologies, by region, country, or economy: 2005–14.....	6-220
Appendix Table 6-50	Government RD&D in renewable energy, by region, country, or economy: 2005–14.....	6-222
Appendix Table 6-51	Government RD&D in solar energy, by region, country, or economy: 2005–14.....	6-225
Appendix Table 6-52	Government RD&D in wind energy, by region, country, or economy: 2005–14.....	6-227
Appendix Table 6-53	Government RD&D in biofuels, by region, country, or economy: 2005–14.....	6-229
Appendix Table 6-54	Government RD&D in carbon capture and storage, by region, country, or economy: 2005–14.....	6-231
Appendix Table 6-55	Government RD&D in hydrogen and fuel cells, by region, country, or economy: 2005–14.....	6-233
Appendix Table 6-56	USPTO patents granted in sustainable energy technologies, by region, country, or economy: 1998–2016 .....	6-235
Appendix Table 6-57	USPTO patents granted in alternative energy technologies, by region, country, or economy: 1998–2016 .....	6-239
Appendix Table 6-58	USPTO patents granted in energy storage technologies, by region, country, or economy: 1998–2016 .....	6-243
Appendix Table 6-59	USPTO patents granted in smart grid technology, by region, country, or economy: 1998–2016.....	6-247
Appendix Table 6-60	USPTO patents granted in pollution mitigation technologies, by region, country, or economy: 1998–2016 .....	6-251
Appendix Table 6-61	USPTO patents granted in fuel cell technology, by region, country, or economy: 1998–2016 .....	6-255
Appendix Table 6-62	USPTO patents granted in bioenergy technology, by region, country, or economy: 1998–2016 .....	6-259
Appendix Table 6-63	USPTO patents granted in solar energy technology, by region, country, or economy: 1998–2016.....	6-263
Appendix Table 6-64	USPTO patents granted in hybrid and electric vehicle technology, by region, country, or economy: 1998–2016 .....	6-267
Appendix Table 6-65	USPTO patents granted in wind energy technology, by region, country, or economy: 1998–2016.....	6-271
Appendix Table 6-66	USPTO patents granted in nuclear energy technology, by region, country, or economy: 1998–2016 .....	6-275
Appendix Table 6-67	USPTO patents granted in battery technology, by region, country, or economy: 1998–2016 .....	6-279
Appendix Table 6-68	USPTO patents granted in hydrogen production and storage technology, by region, country, or economy: 1998–2016 .....	6-283

Appendix Table 6-69	USPTO patents granted in cleaner coal technology, by region, country, or economy: 1998–2016.....	6-287
Appendix Table 6-70	USPTO patents granted in capture and storage of carbon and other greenhouse gases technologies, by region, country, or economy: 1998–2016.....	6-291
Appendix Table 6-71	USPTO patents granted in air pollution control technology, by region, country, or economy: 1998–2016 .....	6-295
Appendix Table 6-72	USPTO patents granted in solid waste control technology, by region, country, or economy: 1998–2016 .....	6-299
Appendix Table 6-73	USPTO patents granted in water pollution control technology, by region, country, or economy: 1998–2016 .....	6-303
Appendix Table 6-74	USPTO patents granted in recycling technology, by region, country, or economy: 1998–2016 .....	6-307

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

APPENDIX TABLE 6-1



### Regions, countries, or economies in world industry data

(Regions, countries, or economies)

North America	Central and South America	Europe	Middle East	Africa	Asia	Australia and Oceania
Canada	Argentina	EU	Bahrain	Cameroon	Bangladesh	Australia
Mexico	Bolivia	Austria	Iran	Egypt	China	New Zealand
United States	Brazil	Belgium	Israel	Kenya	India	
	Chile	Bulgaria	Jordan	Morocco	Indonesia	
	Colombia	Czech Republic	Kuwait	Nigeria	Japan	
	Costa Rica	Denmark	Qatar	Senegal	Malaysia	
	Ecuador	Finland	Saudi Arabia	South Africa	Pakistan	
	Honduras	France	United Arab Emirates	Tunisia	Philippines	
	Jamaica	Germany		Zimbabwe	Singapore	
	Panama	Greece			South Korea	
	Peru	Hungary			Sri Lanka	
	Uruguay	Ireland			Taiwan	
	Venezuela	Italy			Thailand	
		Netherlands			Vietnam	
		Poland				
		Portugal				
		Romania				
		Slovakia				
		Spain				
		Sweden				

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

North America	Central and South America	Europe	Middle East	Africa	Asia	Australia and Oceania
		United Kingdom				
		Other Europe				
		Norway				
		Russia				
		Switzerland				
		Turkey				
		Ukraine				

EU = European Union.

### Note(s)

Data are not available for EU members Cyprus, Estonia, Latvia, Lithuania, Luxembourg, Malta, and Slovenia. China includes Hong Kong.

### Source(s)

IHS Global Insight, World Industry Service database.

*Science and Engineering Indicators 2018*



## CHAPTER 6 | Industry, Technology, and the Global Marketplace

APPENDIX TABLE 6-2

### Value added of KTI industries, by region, country, or economy: 2001–16

(Millions of current dollars)

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
World	10,471,598	10,967,075	12,282,767	13,619,901	14,576,052	15,693,496	17,559,135	18,881,112	18,354,076	19,790,306	21,467,731	22,207,724	22,819,057	23,635,692	22,976,292	23,583,274
North America																
Canada	231,704	238,200	277,279	313,754	350,829	397,739	438,623	454,557	423,139	491,510	541,188	551,595	552,470	539,922	484,375	485,276
Mexico	135,041	146,194	143,068	151,978	174,400	195,317	214,277	225,615	186,820	218,888	236,117	243,754	266,306	268,945	248,150	232,613
United States	3,953,352	4,130,076	4,308,094	4,526,178	4,814,632	5,111,909	5,327,687	5,401,433	5,411,631	5,599,561	5,788,823	6,083,829	6,238,223	6,544,914	6,887,573	7,111,451
Central and South America																
Argentina	86,535	28,755	31,812	35,903	44,926	55,664	71,038	92,743	93,859	110,878	136,429	153,460	158,375	134,725	146,350	130,034
Bolivia	1,286	1,197	1,141	1,152	1,204	1,320	1,478	1,833	2,053	2,258	2,456	2,901	3,276	3,620	4,066	4,971
Brazil	164,184	152,688	160,858	189,243	248,166	312,660	399,992	477,621	467,744	604,651	710,288	666,822	674,600	682,588	505,741	509,499
Chile	22,891	20,068	18,712	23,204	27,938	32,231	37,910	42,463	43,224	52,723	62,285	68,202	73,737	68,794	66,328	69,256
Colombia	21,177	21,282	20,375	25,000	31,213	34,289	44,070	52,056	50,813	61,919	68,611	76,639	79,476	79,963	65,313	63,513
Costa Rica	3,737	3,990	4,230	4,519	4,954	5,666	6,701	7,968	8,707	10,921	12,671	14,394	15,847	15,677	17,098	18,211
Ecuador	5,314	6,052	7,119	8,039	9,109	10,134	11,157	13,124	14,513	15,982	17,486	19,875	21,146	23,324	23,542	22,696
Honduras	1,756	1,843	1,957	2,084	2,340	2,622	3,038	3,524	3,914	4,128	4,355	4,635	4,782	5,009	5,104	5,238
Panama	3,501	3,673	3,759	3,857	4,241	4,546	5,183	5,769	6,583	7,048	7,706	8,580	9,610	10,728	11,429	12,610
Peru	11,931	12,729	13,901	15,232	16,948	19,269	21,805	25,447	25,812	30,648	34,523	40,212	42,401	43,959	42,054	43,329

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Uruguay	6,253	4,037	3,176	3,308	4,216	4,748	5,536	7,328	7,910	10,247	12,250	13,484	15,238	15,394	14,512	14,330
Venezuela	29,053	21,192	18,171	20,452	23,788	31,105	42,644	55,630	69,056	42,082	55,984	72,277	69,948	54,679	89,485	16,948
Europe																
EU	2,732,162	3,012,884	3,688,951	4,268,442	4,456,285	4,738,035	5,474,827	5,833,684	5,323,383	5,319,806	5,695,235	5,400,690	5,626,960	5,837,474	5,174,521	5,200,041
Austria	56,227	61,892	75,901	85,796	91,310	98,768	114,585	127,640	116,272	116,556	127,990	121,593	128,130	131,682	115,543	118,851
Belgium	82,278	90,028	109,695	126,034	131,885	139,066	158,029	175,813	168,956	170,472	184,916	176,389	186,974	193,262	168,176	171,165
Bulgaria	2,515	3,130	3,892	4,869	5,873	6,203	8,890	10,919	10,596	11,564	13,250	12,258	12,670	13,451	11,547	11,734
Czech Republic	16,713	20,830	25,854	30,964	36,277	41,813	52,241	65,903	58,083	60,784	67,929	62,017	62,638	63,928	57,274	58,397
Denmark	49,890	54,436	67,690	77,419	80,253	85,320	97,290	111,486	108,518	108,859	115,234	110,485	117,373	121,240	107,588	109,382
Finland	37,701	41,281	48,756	56,705	58,384	62,811	76,064	83,366	73,228	72,317	79,044	73,885	77,415	79,737	69,189	69,885
France	413,688	456,308	564,994	643,762	667,122	704,363	803,823	874,027	835,384	824,222	878,606	837,376	862,748	871,315	755,723	770,161
Germany	674,669	732,738	889,676	1,010,505	1,016,107	1,066,131	1,209,815	1,294,471	1,161,269	1,192,633	1,296,044	1,232,184	1,314,240	1,369,593	1,184,468	1,218,021
Greece	28,015	33,039	42,301	53,287	55,725	62,191	72,226	79,899	76,969	67,926	64,634	52,636	50,726	48,684	41,512	41,901
Hungary	14,081	18,346	24,812	30,138	33,856	35,036	40,535	45,260	38,026	39,598	41,798	37,648	40,282	41,974	37,838	37,932
Ireland	42,596	49,752	65,977	76,922	83,623	90,906	109,295	120,383	114,162	111,501	120,094	113,347	117,520	128,457	127,973	135,444
Italy	324,680	353,277	439,987	497,337	515,001	533,498	610,022	663,792	610,900	594,196	626,082	572,598	590,198	598,985	515,780	519,635
Netherlands	125,770	141,419	180,113	205,354	214,946	221,900	251,610	278,546	271,035	273,773	291,656	272,208	280,872	286,409	249,500	252,889
Poland	47,904	49,840	55,798	65,762	78,506	83,938	106,599	133,009	108,380	116,684	128,308	118,199	128,209	135,172	114,997	115,507
Portugal	32,396	35,703	44,220	51,278	53,273	56,539	65,386	73,163	66,956	63,768	65,097	56,071	56,996	56,443	48,698	49,558

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Romania	7,596	8,482	10,494	13,621	17,464	21,893	31,991	40,626	32,213	34,522	39,805	37,169	47,187	49,763	44,136	46,884
Slovakia	4,653	5,908	7,773	9,204	10,118	11,723	16,445	20,073	20,212	21,490	23,507	22,848	24,345	24,599	20,886	21,436
Spain	164,020	184,098	234,983	275,061	294,482	322,736	386,892	439,584	418,871	382,116	393,000	354,629	355,415	360,049	307,502	319,879
Sweden	81,104	89,552	113,323	132,778	136,209	144,838	165,890	171,881	145,174	167,076	196,079	189,456	202,537	201,003	176,572	181,558
United Kingdom	525,667	582,826	682,713	821,644	875,871	948,360	1,097,198	1,023,844	888,178	889,749	942,161	947,694	970,488	1,061,728	1,019,618	949,823
Other Europe																
Norway	38,951	46,420	57,294	65,003	72,760	77,809	95,682	108,561	102,688	111,792	127,788	132,752	136,942	132,685	111,435	109,248
Russia	57,609	66,148	80,972	113,577	148,433	195,027	267,561	342,530	268,047	306,215	361,485	388,010	427,207	398,503	272,011	269,543
Switzerland	108,597	118,036	139,870	157,044	164,175	175,156	198,266	223,663	218,781	231,858	279,093	270,108	281,988	285,965	272,892	270,749
Turkey	41,102	39,912	49,573	62,515	76,730	85,160	109,855	127,453	115,420	129,224	130,820	136,370	143,024	139,064	132,971	136,052
Ukraine	6,900	8,244	10,565	14,970	18,112	22,936	32,238	42,734	29,050	33,047	36,629	41,865	45,094	30,672	16,616	16,630
Middle East																
Bahrain	2,902	3,031	3,671	4,485	5,312	5,946	7,118	7,778	7,870	8,477	8,771	9,524	10,070	10,646	10,343	10,935
Iran	15,992	20,574	25,568	31,152	35,972	45,352	57,010	67,883	75,440	85,220	112,079	83,564	62,237	71,116	67,543	73,412
Israel	52,569	48,351	49,827	53,673	57,481	61,427	71,098	87,070	86,454	94,748	105,232	106,296	117,899	122,943	118,795	125,305
Jordan	2,175	2,466	2,551	2,913	3,436	3,991	4,625	5,824	6,059	6,593	6,996	7,676	8,440	8,675	8,938	9,237
Kuwait	6,761	7,915	9,880	11,926	16,261	19,916	27,029	29,168	24,838	27,855	26,669	28,838	29,386	31,114	22,191	22,045
Oman	3,221	3,729	4,078	4,693	5,182	5,917	7,010	8,312	9,698	10,490	13,151	16,069	17,301	18,800	18,848	17,764
Qatar	1,584	1,847	2,186	3,954	5,884	8,512	11,826	14,905	19,142	18,721	23,080	26,362	28,412	31,321	33,794	34,883

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Saudi Arabia	28,821	30,177	32,756	36,906	41,868	47,394	57,533	63,989	71,198	80,014	87,118	97,372	104,993	114,164	100,375	92,456
United Arab Emirates	15,954	18,079	20,374	24,326	29,726	34,907	45,492	51,478	50,137	51,136	56,089	61,200	67,490	69,693	66,179	68,158
Africa																
Cameroon	958	1,124	1,269	1,495	1,616	1,681	1,991	2,297	2,382	2,530	2,848	2,798	3,115	3,447	3,055	3,347
Egypt	25,351	22,339	18,738	20,467	23,325	25,648	25,154	30,253	33,929	38,071	42,622	46,538	45,001	50,254	54,426	48,309
Ghana	1,286	1,496	1,846	2,130	2,579	3,074	3,722	4,203	3,966	5,167	5,895	6,588	7,454	6,979	7,503	8,469
Kenya	2,782	2,954	3,608	3,616	4,062	4,912	6,028	6,969	7,020	7,182	7,138	8,518	9,472	10,484	10,522	11,712
Morocco	9,113	9,814	11,706	13,291	15,082	16,263	19,749	21,841	22,150	22,929	25,547	25,209	27,302	28,558	25,586	25,381
Nigeria	13,733	15,834	17,762	23,643	30,595	42,534	51,960	66,459	68,341	79,401	86,013	99,973	117,645	135,627	124,413	103,463
Senegal	729	823	1,058	1,283	1,414	1,578	1,915	2,277	2,167	2,195	2,478	2,415	2,546	2,658	2,393	2,813
South Africa	26,289	24,979	38,917	50,751	57,163	58,540	65,082	60,004	59,758	74,867	82,107	85,058	77,529	75,291	67,782	63,956
Tunisia	3,658	3,843	4,601	5,242	5,590	6,214	7,323	8,616	8,319	9,082	9,326	9,141	9,222	9,586	8,429	8,200
Asia																
Bangladesh	6,447	6,753	7,277	7,758	8,080	10,233	11,590	13,306	15,224	17,081	18,194	19,491	23,474	27,403	32,145	36,840
China	406,983	449,991	522,588	589,472	685,285	838,768	1,106,436	1,406,106	1,567,581	1,885,590	2,321,508	2,670,926	3,102,519	3,473,913	3,838,023	4,048,955
India	93,351	100,771	119,467	143,384	166,630	187,297	235,205	258,321	267,706	326,613	376,266	370,715	392,620	424,271	436,092	478,936
Indonesia	29,466	36,976	46,189	51,231	54,772	65,604	79,324	93,399	97,754	128,335	149,763	158,674	165,178	162,377	160,402	176,173
Japan	1,551,268	1,497,397	1,635,628	1,762,280	1,757,709	1,717,416	1,738,756	1,912,565	1,916,850	2,115,737	2,100,546	2,326,197	1,891,833	1,765,036	1,598,669	1,780,742
Malaysia	26,893	29,108	32,042	35,822	36,574	42,263	47,360	51,643	47,404	59,460	66,961	73,384	77,138	79,830	71,168	71,615

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Pakistan	8,113	9,490	11,085	13,430	16,629	21,227	23,955	25,014	24,802	26,822	32,006	33,573	33,039	38,623	41,216	44,676
Philippines	15,523	16,870	17,273	19,012	21,410	25,330	31,659	34,366	37,046	42,524	47,578	53,422	59,696	62,795	66,613	69,021
Singapore	32,450	34,654	36,780	43,328	47,293	55,559	64,775	64,208	65,535	81,407	94,075	99,563	104,059	108,150	98,719	99,609
South Korea	159,767	188,641	212,926	242,277	287,682	328,527	366,779	329,064	297,313	369,052	413,390	426,400	461,405	498,150	491,964	488,448
Sri Lanka	2,110	2,803	2,638	2,664	3,167	6,384	5,018	4,933	6,343	7,853	8,308	8,654	9,382	10,300	10,997	11,254
Taiwan	103,321	110,460	118,710	131,091	141,661	147,212	154,373	157,582	144,989	170,513	185,612	188,552	196,008	210,291	207,329	203,580
Thailand	26,778	31,499	36,507	42,108	47,091	55,238	65,812	72,975	69,872	80,645	86,127	91,531	98,499	95,962	93,120	96,143
Vietnam	4,373	4,866	5,474	6,436	7,559	9,156	10,941	13,770	14,386	20,534	23,958	28,943	33,900	37,062	39,514	42,625
Australia and Oceania																
Australia	113,290	126,585	163,585	199,632	224,251	244,846	297,726	320,641	313,653	396,180	471,463	494,732	475,243	456,141	387,945	399,810
New Zealand	14,551	17,212	23,325	28,576	32,317	31,286	38,192	38,160	35,598	41,894	46,598	49,373	62,897	67,425	59,695	62,768

EU = European Union; KTI = knowledge and technology intensive.

### Note(s)

Value added is the amount contributed by a country, firm, or other entity to the value of a good or service and excludes purchases of domestic and imported materials and inputs. KTI industries include knowledge-intensive (KI) services, high-technology (HT) manufacturing, and medium-high-technology (MHT) industries formerly classified by the Organisation for Economic Co-operation and Development. KI services include business, financial, communications, education, and health. HT manufacturing industries include aerospace, communications and semiconductors, computers and office machinery, pharmaceuticals, and scientific instruments and measuring equipment. MHT manufacturing industries include motor vehicles; electrical machinery and apparatus; chemicals excluding pharmaceuticals; railroad and other transportation equipment; and machinery and equipment. Data are not available for EU members Cyprus, Estonia, Latvia, Lithuania, Luxembourg, Malta, and Slovenia. China includes Hong Kong. Detail may not add to total because of rounding or minor discrepancies. See Appendix Table 6-1 for a full list of countries and economies in each region.

### Source(s)



CHAPTER 6 | **Industry, Technology, and the Global Marketplace**

IHS Global Insight, World Industry Service database, accessed 17 July 2017.  
*Science and Engineering Indicators 2018*

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

APPENDIX TABLE 6-3

### Nominal GDP, by region, country, or economy: Selected years, 2001–16

(Millions of current dollars)

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
World	33,426,298	34,747,461	39,008,247	43,872,998	47,526,170	51,499,461	58,055,630	63,650,676	60,318,709	65,882,580	73,300,980	74,687,452	76,794,376	78,636,761	74,347,718	75,154,437
North America																
Canada	736,361	757,447	892,435	1,022,975	1,169,739	1,315,479	1,465,051	1,549,005	1,373,032	1,613,542	1,789,140	1,823,967	1,842,017	1,795,087	1,553,186	1,528,975
Mexico	729,668	752,382	713,263	770,012	865,869	966,244	1,042,659	1,100,718	894,569	1,050,898	1,169,618	1,187,121	1,261,527	1,296,617	1,149,278	1,044,027
United States	10,621,825	10,977,525	11,510,675	12,274,925	13,093,700	13,855,900	14,477,625	14,718,575	14,418,725	14,964,400	15,517,925	16,155,250	16,691,500	17,393,100	18,036,650	18,569,100
Central and South America																
Argentina	325,930	123,210	156,938	166,019	200,640	234,518	289,748	365,398	336,359	426,270	527,357	579,745	611,298	563,358	631,487	544,880
Bolivia	8,142	7,905	8,082	8,773	9,549	11,452	13,120	16,674	17,340	19,650	23,962	27,084	30,659	32,996	37,632	44,722
Brazil	559,992	509,382	557,698	668,436	890,680	1,106,380	1,396,116	1,696,510	1,664,792	2,206,623	2,616,109	2,465,614	2,471,951	2,455,658	1,803,513	1,794,467
Chile	84,092	73,785	75,645	99,223	122,923	154,801	173,468	179,506	172,504	218,271	252,120	267,033	278,406	261,049	242,606	247,142
Colombia	98,212	97,963	94,641	117,082	146,566	162,590	207,417	243,983	232,901	287,018	335,509	369,468	380,175	378,447	291,551	282,543
Costa Rica	15,913	16,505	17,196	18,529	19,952	22,600	26,744	30,613	30,562	37,269	42,714	46,981	50,324	51,238	55,476	58,109
Ecuador	24,468	28,549	32,433	36,592	41,507	46,802	51,008	61,763	62,520	69,555	79,277	87,925	95,130	102,292	100,177	97,802
Honduras	7,653	7,860	8,234	8,871	9,757	10,917	12,361	13,882	14,587	15,839	17,711	18,529	18,499	19,756	20,845	21,518
Panama	11,808	12,272	12,933	14,179	15,465	17,137	20,958	24,522	26,594	28,917	34,374	39,955	44,856	49,166	52,132	55,188
Peru	51,620	54,469	59,060	66,663	74,877	87,714	101,985	121,372	120,749	147,702	168,607	188,883	197,904	203,090	192,483	195,020

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Uruguay	20,899	13,607	12,046	13,686	17,363	19,579	23,411	30,366	31,661	40,285	47,978	51,275	57,534	57,236	53,290	52,432
Venezuela	122,911	92,890	83,529	112,451	145,513	183,478	230,364	315,600	329,419	239,916	316,479	381,286	371,124	279,384	482,650	63,517
Europe																
EU	8,881,977	9,680,848	11,776,794	13,570,942	14,184,857	15,139,194	17,483,034	18,756,290	16,795,297	16,688,500	18,030,569	16,993,595	17,704,697	18,275,129	16,044,992	16,105,209
Austria	196,646	212,488	260,496	298,823	314,292	335,255	386,542	424,976	398,487	391,013	429,017	406,999	428,496	438,798	377,218	386,794
Belgium	237,887	259,095	319,070	371,005	387,128	409,826	471,794	518,157	484,690	483,520	527,120	497,897	520,116	531,751	454,995	466,365
Bulgaria	14,119	16,354	21,039	26,046	29,735	34,151	44,617	54,510	51,839	49,794	57,054	53,485	55,597	56,540	50,172	52,313
Czech Republic	67,413	81,668	99,264	118,757	135,839	155,320	188,917	234,938	205,817	206,790	227,740	207,421	209,346	207,771	185,287	192,822
Denmark	164,791	178,635	218,097	251,375	264,467	282,886	319,423	353,359	321,243	321,996	344,556	327,130	343,565	351,977	301,293	306,122
Finland	129,276	139,681	171,109	196,836	204,306	216,552	255,373	283,494	251,570	247,785	273,733	256,712	269,979	272,609	232,362	236,786
France	1,383,660	1,502,254	1,849,544	2,121,713	2,200,389	2,326,436	2,664,140	2,918,849	2,694,954	2,644,898	2,862,098	2,681,462	2,809,653	2,841,070	2,419,003	2,458,924
Germany	1,953,584	2,084,304	2,510,077	2,811,211	2,855,338	3,003,174	3,444,275	3,743,962	3,416,192	3,409,640	3,753,087	3,545,602	3,758,336	3,885,109	3,360,612	3,459,221
Greece	136,350	154,168	202,153	240,682	247,831	273,419	318,596	353,767	330,219	300,068	288,124	245,802	239,656	235,886	194,526	194,169
Hungary	53,696	67,555	85,050	103,695	112,589	114,801	139,198	157,291	129,965	130,256	140,055	127,345	134,661	139,288	121,723	124,363
Ireland	109,106	128,022	164,296	193,952	211,549	232,240	270,057	274,684	235,795	221,256	240,533	225,680	238,988	255,896	283,424	293,605
Italy	1,162,058	1,267,130	1,570,670	1,795,976	1,852,137	1,945,082	2,202,644	2,387,922	2,184,253	2,122,658	2,277,555	2,072,841	2,130,051	2,152,967	1,823,775	1,850,917
Netherlands	426,710	465,854	572,271	650,358	677,694	726,755	839,485	935,529	858,283	836,106	893,726	828,753	866,795	879,755	750,409	771,036
Poland	190,667	198,700	217,456	253,337	304,188	342,934	428,408	530,153	436,044	478,616	527,690	500,005	523,697	544,926	475,511	468,844
Portugal	121,570	134,352	165,001	189,253	197,179	208,567	240,158	261,778	243,815	238,289	244,948	216,373	226,073	229,630	199,122	204,677



## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Romania	40,241	45,646	59,203	75,452	99,019	122,662	170,179	206,966	166,849	167,706	185,111	171,303	190,932	199,181	177,247	187,116
Slovakia	14,874	17,496	24,636	32,417	38,221	46,235	68,641	93,162	88,971	89,496	98,202	93,416	98,478	100,761	87,268	89,552
Spain	626,099	705,793	907,054	1,069,927	1,156,540	1,264,550	1,479,272	1,633,558	1,499,498	1,431,502	1,488,336	1,335,976	1,361,770	1,375,856	1,192,956	1,232,091
Sweden	240,092	264,141	331,728	381,036	388,306	420,004	488,136	513,594	429,757	487,430	562,179	544,418	579,294	575,139	495,701	510,607
United Kingdom	1,613,139	1,757,510	2,028,579	2,389,092	2,508,111	2,678,344	3,063,179	2,875,642	2,367,056	2,429,681	2,609,705	2,654,971	2,719,215	3,000,218	2,862,387	2,618,885
Other Europe																
Norway	174,447	195,240	228,498	264,072	308,550	345,538	400,191	462,226	386,617	428,127	498,012	509,358	522,751	498,234	386,694	369,395
Russia	328,411	369,756	461,094	632,272	817,211	1,060,419	1,389,810	1,781,730	1,310,488	1,634,623	2,025,722	2,150,676	2,226,119	2,061,656	1,360,936	1,280,021
Switzerland	278,767	301,283	352,285	393,022	407,544	429,447	477,752	550,925	539,686	580,607	696,303	664,851	685,053	703,463	670,656	659,850
Turkey	198,688	236,930	310,664	403,329	500,060	550,673	674,742	764,076	643,218	769,556	830,384	872,079	948,519	932,964	856,978	856,108
Ukraine	39,309	43,956	52,010	67,218	89,239	111,885	148,734	188,110	121,552	136,012	163,161	175,781	183,310	133,344	90,921	93,292
Middle East																
Bahrain	7,821	8,333	9,615	11,083	13,301	18,323	21,517	25,449	22,717	25,445	28,532	30,446	32,233	33,152	30,835	31,561
Iran	92,233	129,115	153,833	183,306	219,422	258,760	338,426	397,658	398,656	467,657	592,161	438,304	345,580	377,824	366,929	402,073
Israel	130,771	121,111	126,748	135,387	142,783	154,475	179,519	216,719	208,020	234,270	261,349	257,607	293,302	308,771	299,393	318,711
Jordan	8,976	9,582	10,195	11,411	12,589	15,057	17,111	21,989	23,827	26,425	28,840	30,937	33,594	35,827	37,517	39,416
Kuwait	34,890	38,136	47,875	59,439	80,799	101,557	114,634	147,380	105,969	115,416	154,033	174,015	174,157	162,665	114,054	109,425
Oman	19,452	20,143	21,634	24,764	31,082	37,216	42,085	60,905	48,388	58,642	67,937	76,689	78,939	81,034	69,832	67,129
Qatar	17,538	19,364	23,534	31,734	44,530	60,882	79,712	115,270	97,798	125,122	167,775	186,834	198,728	206,225	164,641	160,205

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Saudi Arabia	184,137	189,606	215,808	258,742	328,206	376,398	415,687	519,797	429,098	526,811	671,239	735,975	746,647	756,350	651,757	639,617
United Arab Emirates	103,312	109,816	124,346	147,824	180,617	222,117	257,916	315,475	253,547	286,185	348,526	373,432	388,598	401,958	370,296	371,396
Africa																
Cameroon	9,633	10,880	13,622	15,775	16,588	17,953	20,432	23,322	23,381	23,622	26,588	26,470	29,565	32,050	28,411	30,605
Egypt	90,284	84,206	71,357	78,322	93,185	107,742	132,164	164,841	187,968	214,623	230,579	272,879	267,823	296,232	315,474	266,007
Ghana	8,518	9,882	12,232	14,233	17,199	20,411	24,758	28,528	25,978	32,174	39,600	40,971	47,147	39,122	37,685	42,768
Kenya	14,900	15,092	17,105	18,471	21,506	25,826	31,959	35,897	37,022	40,000	41,953	50,401	55,102	61,395	63,394	68,906
Morocco	39,639	42,469	52,351	59,838	62,545	68,972	79,041	92,507	92,897	93,217	101,378	98,263	107,234	110,030	100,381	102,371
Nigeria	73,128	93,983	102,935	130,345	169,645	222,791	262,267	330,318	297,415	369,062	419,654	467,048	521,794	576,019	495,246	407,146
Senegal	4,878	5,334	6,860	8,031	8,708	9,359	11,285	13,386	12,778	12,926	14,375	14,216	14,826	15,309	13,630	15,686
South Africa	121,515	115,482	175,256	228,590	257,772	271,637	299,417	286,769	295,937	375,348	416,262	396,335	366,645	350,981	317,406	294,840
Tunisia	22,066	23,142	27,454	31,184	32,272	34,377	38,910	44,855	43,456	44,051	45,846	45,046	46,257	47,633	43,028	41,251
Asia																
Bangladesh	52,205	54,291	59,900	64,405	66,391	69,972	79,826	91,647	102,126	114,508	123,547	128,961	153,519	173,121	194,455	220,415
China	1,508,398	1,635,423	1,819,112	2,120,111	2,462,718	2,938,221	3,752,043	4,808,477	5,307,384	6,310,494	7,799,578	8,810,039	9,934,841	10,724,304	11,259,637	11,500,986
India	489,416	511,476	597,952	701,347	820,980	929,215	1,182,321	1,268,588	1,311,852	1,668,768	1,872,206	1,861,571	1,917,783	2,037,230	2,131,831	2,243,733
Indonesia	174,413	212,615	255,060	279,119	310,709	396,118	469,685	557,881	578,433	754,951	892,259	917,965	912,829	890,124	861,184	932,337
Japan	4,305,765	4,116,011	4,447,621	4,816,186	4,756,928	4,530,383	4,515,169	5,038,324	5,231,569	5,701,853	6,160,225	6,204,744	5,157,011	4,851,964	4,378,994	4,934,246
Malaysia	92,784	100,846	110,202	124,749	143,534	162,692	193,550	230,812	202,257	255,018	297,989	314,412	323,280	338,073	296,285	296,359

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Pakistan	67,981	74,554	84,424	96,821	109,213	136,320	152,124	151,087	161,538	174,508	211,732	214,639	220,321	248,961	267,543	286,055
Philippines	76,262	81,358	83,908	91,371	103,072	122,211	149,360	174,195	168,335	199,591	224,138	250,079	271,831	284,615	292,730	304,941
Singapore	89,285	91,942	97,002	114,187	127,418	147,794	179,981	192,231	192,406	236,420	275,570	289,168	302,506	308,154	296,833	296,966
South Korea	533,050	609,021	680,518	764,881	898,137	1,011,797	1,122,679	1,002,219	901,935	1,094,499	1,202,615	1,222,279	1,305,519	1,411,404	1,382,624	1,411,201
Sri Lanka	15,746	17,102	18,882	20,662	24,406	28,280	32,350	40,714	42,066	56,726	65,293	68,467	74,319	80,026	82,329	83,873
Taiwan	300,192	308,755	318,328	348,614	375,546	388,561	408,202	417,748	392,236	446,405	485,696	495,806	511,497	530,590	525,279	529,394
Thailand	120,297	134,301	152,281	172,895	189,318	221,758	262,943	291,383	281,710	341,105	370,819	397,560	420,529	406,522	399,235	406,858
Vietnam	35,291	37,948	42,717	49,424	57,633	66,372	77,414	99,130	106,015	115,349	135,722	155,820	171,227	186,208	193,444	207,944
Australia and Oceania																
Australia	376,584	424,019	537,608	656,264	733,036	781,576	946,990	1,032,549	982,802	1,246,698	1,502,120	1,560,495	1,504,816	1,447,399	1,227,967	1,257,714
New Zealand	53,073	61,816	82,246	101,402	113,161	109,592	134,728	133,306	119,967	145,201	166,820	174,951	186,675	198,717	172,518	181,750

EU = European Union; GDP = gross domestic product.

### Note(s)

GDP for selected regions, countries, or economies is from IHS Global Insight. Data are not available for EU members Cyprus, Estonia, Latvia, Lithuania, Luxembourg, Malta, and Slovenia. China includes Hong Kong. Detail does not add to total because some countries/economies are not included.

### Source(s)

IHS Global Insight, Global Economy database, accessed 17 July 2017.

*Science and Engineering Indicators 2018*

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

APPENDIX TABLE 6-4

### Value added of commercial KI services, by region, country, or economy: 2001–16

(Millions of current dollars)

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
World	5,144,488	5,384,004	5,987,024	6,631,846	7,164,483	7,715,196	8,685,581	9,211,631	9,021,000	9,538,473	10,364,505	10,694,121	11,015,690	11,453,772	11,214,091	11,603,987
North America																
Canada	104,990	107,700	127,304	147,879	168,208	193,736	215,324	225,364	204,720	238,423	263,054	266,241	267,933	259,668	231,821	234,076
Mexico	43,752	53,846	51,877	57,079	69,933	77,180	88,590	93,763	79,301	89,173	93,408	91,546	101,711	101,977	90,558	87,234
United States	2,093,129	2,176,045	2,242,879	2,360,336	2,554,458	2,700,102	2,798,520	2,782,103	2,744,513	2,808,594	2,896,087	3,073,178	3,145,323	3,329,223	3,511,380	3,651,827
Central and South America																
Argentina	49,976	16,426	17,160	18,968	23,089	28,621	36,211	45,502	44,512	52,031	60,100	66,561	67,443	56,861	63,416	56,489
Bolivia	880	797	731	724	761	840	956	1,182	1,309	1,469	1,604	1,971	2,256	2,532	2,858	3,542
Brazil	79,070	74,752	77,459	89,047	124,919	156,705	198,410	228,426	235,247	301,756	350,272	332,363	324,495	330,688	243,225	245,755
Chile	10,258	8,902	8,610	10,935	13,505	15,822	19,345	21,786	21,723	26,246	31,665	34,921	37,070	34,285	32,653	33,724
Colombia	11,052	11,163	10,620	13,149	16,543	18,288	24,166	29,099	28,395	34,076	37,996	42,131	43,167	43,064	33,517	32,765
Costa Rica	1,611	1,735	1,869	2,040	2,321	2,750	3,294	3,922	4,209	5,102	5,955	7,053	7,703	7,648	8,537	9,429
Ecuador	2,209	2,750	3,111	3,446	4,082	4,534	4,983	5,610	6,078	6,887	7,939	9,014	9,516	10,440	9,898	9,502
Honduras	772	782	837	932	1,032	1,153	1,325	1,541	1,682	1,781	1,854	1,966	2,055	2,164	2,243	2,301
Panama	2,540	2,645	2,668	2,725	3,064	3,327	3,653	4,145	4,798	5,095	5,625	6,285	6,876	7,696	8,200	9,027
Peru	4,541	5,098	5,347	5,782	6,456	7,448	8,704	10,604	11,484	13,782	15,778	18,188	19,542	20,701	20,303	21,195

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Uruguay	3,861	2,561	1,983	2,006	2,567	2,862	3,321	4,169	4,483	5,848	6,937	7,711	8,690	8,733	8,231	8,242
Venezuela	11,300	8,704	7,259	7,901	8,899	12,547	18,174	23,089	27,932	17,332	23,337	31,148	30,598	23,996	39,421	7,521
Europe																
EU	1,286,811	1,425,377	1,754,195	2,039,676	2,134,222	2,273,043	2,652,480	2,796,762	2,588,107	2,515,130	2,672,954	2,553,884	2,657,593	2,756,970	2,441,890	2,467,507
Austria	24,757	27,731	33,476	37,741	40,119	43,341	49,929	56,062	49,929	49,610	53,667	50,627	53,507	54,681	46,846	48,203
Belgium	39,155	43,047	52,358	61,354	64,102	68,001	78,016	85,951	83,898	84,449	90,431	86,211	90,948	93,841	81,323	83,492
Bulgaria	1,087	1,363	1,870	2,402	2,937	3,233	5,078	6,911	6,744	7,550	8,628	7,812	7,941	8,129	7,023	7,225
Czech Republic	6,976	8,999	11,376	13,128	15,207	17,509	22,347	29,741	26,737	27,520	30,177	27,175	27,762	27,395	23,842	24,170
Denmark	19,398	21,148	26,882	30,951	32,438	34,506	39,823	47,101	45,492	44,410	48,662	45,552	48,318	49,623	43,751	44,859
Finland	14,155	15,379	16,922	20,404	19,931	21,671	26,983	29,466	27,096	26,285	28,885	27,969	29,084	30,650	26,577	27,481
France	192,714	215,404	268,957	308,490	320,349	343,568	393,070	423,387	408,078	404,507	433,196	421,344	422,021	422,244	366,750	376,478
Germany	296,234	322,053	387,258	437,795	433,275	449,196	503,946	536,286	498,180	480,863	510,280	486,454	529,290	544,705	467,235	485,160
Greece	13,608	16,364	21,321	27,363	28,017	32,151	37,212	39,088	38,500	33,554	30,918	26,380	25,189	23,704	19,615	19,795
Hungary	5,895	7,910	10,179	12,453	14,046	14,861	17,147	19,533	17,531	17,385	18,155	16,301	16,962	17,316	15,049	15,547
Ireland	18,320	20,183	29,001	35,915	40,667	44,532	53,581	57,208	52,273	53,579	57,476	55,688	59,196	62,851	56,390	60,914
Italy	163,010	178,041	225,726	252,800	261,160	264,715	308,303	336,831	310,938	299,634	317,946	291,841	298,828	302,635	257,774	259,393
Netherlands	66,193	73,371	93,939	106,457	113,080	115,034	128,265	140,460	140,304	139,148	143,977	134,094	138,564	141,070	122,606	124,710
Poland	23,163	23,651	25,832	30,300	36,474	40,024	51,992	65,386	53,291	56,767	61,951	57,952	63,089	67,399	55,912	57,063
Portugal	15,064	16,459	20,640	24,064	25,007	27,779	32,989	37,704	33,369	30,651	32,134	26,603	26,042	25,703	21,985	22,473

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Romania	4,197	4,576	5,453	7,024	8,825	11,548	18,123	22,274	17,415	18,585	22,635	20,248	28,494	29,655	28,098	30,228
Slovakia	1,937	2,667	3,552	4,539	5,410	6,251	8,517	10,784	11,327	11,260	12,268	11,860	12,158	12,518	10,679	10,982
Spain	77,761	88,578	112,949	131,436	141,499	157,024	192,362	218,440	210,881	178,552	180,586	165,104	158,896	165,417	140,992	148,355
Sweden	31,874	33,756	42,269	50,769	52,657	55,717	64,715	68,893	58,895	66,311	78,509	77,344	84,677	85,841	76,120	79,399
United Kingdom	271,313	304,695	364,236	444,290	479,022	522,383	620,083	565,257	497,232	484,511	512,472	517,327	536,626	591,591	573,323	541,581
Other Europe																
Norway	15,785	18,801	23,810	28,074	31,456	33,152	42,059	47,068	45,074	48,906	55,345	58,419	60,909	58,779	48,686	47,518
Russia	26,397	30,429	39,830	55,895	75,751	100,477	141,563	178,336	145,459	163,331	184,618	206,443	227,222	215,206	147,907	146,827
Switzerland	61,994	65,151	77,317	86,058	90,373	96,796	111,294	121,085	119,746	125,231	149,702	145,881	152,492	153,229	146,522	145,137
Turkey	25,958	21,966	25,435	32,507	38,748	42,947	57,361	67,114	64,632	69,984	67,604	72,166	76,434	72,826	70,414	72,909
Ukraine	3,023	3,555	4,578	7,673	8,536	10,810	16,794	23,318	14,361	15,712	16,424	18,898	20,938	14,733	8,614	8,937
Middle East																
Bahrain	2,210	2,259	2,777	3,494	4,154	4,559	5,492	5,858	5,872	6,312	6,339	6,697	7,005	7,371	7,232	7,777
Iran	7,539	10,080	13,188	15,944	18,174	22,761	30,671	37,824	39,303	45,930	57,789	43,108	31,923	37,154	35,244	38,397
Israel	26,726	24,910	25,591	28,751	32,023	33,957	40,120	50,271	50,130	54,559	60,907	60,778	67,944	70,911	69,141	74,315
Jordan	1,371	1,503	1,592	1,809	2,233	2,535	2,884	3,691	3,877	4,463	4,878	5,372	5,899	6,233	6,527	6,786
Kuwait	3,477	4,151	5,793	7,287	11,078	14,422	20,330	20,757	16,237	18,103	15,141	15,514	15,766	16,819	11,914	12,013
Oman	2,040	2,151	2,176	2,333	2,619	3,162	3,779	4,481	4,815	5,433	6,090	7,118	7,894	9,054	9,552	9,256
Qatar	1,211	1,414	1,616	2,223	3,790	5,701	7,660	8,657	9,929	11,203	13,174	14,267	15,379	17,311	20,132	21,142

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Saudi Arabia	18,292	19,127	20,115	23,225	26,356	30,168	34,585	39,836	45,384	48,592	52,059	59,506	66,531	71,740	65,915	61,336
United Arab Emirates	13,885	15,749	17,775	21,373	26,488	31,254	41,162	46,133	44,715	45,300	48,785	53,159	58,745	60,686	57,711	59,395
Africa																
Cameroon	660	746	758	858	907	903	1,006	1,181	1,195	1,228	1,403	1,390	1,576	1,733	1,535	1,687
Egypt	15,581	12,967	10,901	12,784	13,665	14,706	16,851	20,667	23,063	25,667	29,867	31,552	30,606	33,625	35,718	32,001
Ghana	604	704	872	1,013	1,233	1,471	1,819	2,107	1,989	2,749	3,099	3,683	4,584	4,609	5,162	5,755
Kenya	1,396	1,377	1,696	1,577	1,839	2,344	2,897	3,328	3,419	3,631	3,584	4,370	5,048	5,576	5,565	6,261
Morocco	4,751	5,139	6,041	7,022	7,874	8,766	10,657	11,743	12,327	12,315	13,319	13,205	13,718	14,151	12,823	12,831
Nigeria	10,908	12,140	13,612	18,465	23,890	33,419	41,307	53,354	55,915	63,738	66,218	76,765	88,306	100,890	93,357	78,968
Senegal	411	466	626	792	901	1,032	1,258	1,513	1,423	1,429	1,579	1,541	1,677	1,754	1,565	1,864
South Africa	16,945	15,890	25,131	33,156	37,678	40,262	45,963	42,100	41,694	53,700	60,037	56,899	51,630	50,670	45,163	42,919
Tunisia	2,936	3,187	3,797	4,298	4,515	4,927	5,580	6,414	6,330	6,650	6,911	6,760	6,836	7,114	6,330	6,241
Asia																
Bangladesh	3,300	3,467	3,773	4,032	4,191	6,114	6,926	7,823	8,838	10,036	10,696	11,737	14,196	16,359	18,673	21,202
China	167,829	180,123	203,280	224,947	261,366	332,981	464,210	583,173	668,317	786,622	977,192	1,154,128	1,373,911	1,560,919	1,806,011	1,934,749
India	52,109	55,694	66,023	77,697	89,531	101,776	130,122	148,026	154,966	192,932	217,684	220,407	240,528	261,406	264,736	294,010
Indonesia	12,865	17,338	21,242	23,728	26,276	32,660	38,274	43,673	46,915	62,793	72,776	77,632	78,451	76,038	75,769	84,928
Japan	700,671	687,196	747,991	795,629	789,941	761,102	771,649	827,214	873,148	922,903	993,828	989,156	800,278	736,199	674,732	751,222
Malaysia	13,890	15,583	16,704	17,848	19,207	22,169	25,559	28,830	29,343	36,172	40,421	43,787	45,710	47,122	41,136	41,923

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Pakistan	4,511	5,427	6,076	6,991	8,949	13,400	15,224	15,664	16,154	16,963	19,520	20,737	20,026	23,161	24,482	26,903
Philippines	8,676	9,438	9,981	10,977	12,877	15,715	19,500	22,485	22,030	26,082	29,520	33,727	37,543	39,231	41,135	42,858
Singapore	14,826	15,008	15,835	17,636	19,514	23,364	29,556	32,626	33,670	39,303	46,038	49,760	54,165	57,453	55,904	55,557
South Korea	62,933	78,741	86,802	92,189	110,423	124,743	138,664	123,887	109,325	129,351	142,909	148,560	154,490	168,734	166,445	169,833
Sri Lanka	883	1,280	1,419	1,492	1,747	2,264	2,694	3,258	3,502	4,126	3,898	4,301	4,639	5,041	5,216	5,450
Taiwan	43,257	42,865	43,029	46,444	50,047	50,483	52,399	53,875	47,899	53,267	58,870	59,676	61,227	63,373	62,011	63,264
Thailand	11,448	13,644	15,669	17,767	19,946	22,967	27,141	29,547	29,457	33,889	38,081	42,143	47,463	47,608	46,512	49,313
Vietnam	1,502	1,619	1,789	2,036	2,249	2,571	2,997	3,802	4,112	9,211	10,437	11,756	13,270	14,047	14,745	15,874
Australia and Oceania																
Australia	66,515	73,341	94,745	116,508	131,201	145,593	178,493	192,323	187,679	234,629	277,292	291,520	278,802	264,831	217,427	226,015
New Zealand	8,419	10,093	13,728	16,688	18,675	17,809	21,623	21,525	20,262	23,305	25,906	27,445	39,956	43,429	38,274	40,482

EU = European Union; KI = knowledge intensive.

### Note(s)

Value added is the amount contributed by a country, firm, or other entity to the value of a good or service and excludes purchases of domestic and imported materials and inputs. KI services include business, financial, information, education, and health formerly classified by the Organisation for Economic Co-operation and Development. Commercial KI services include business, financial, and information. Data are not available for EU members Cyprus, Estonia, Latvia, Lithuania, Luxembourg, Malta, and Slovenia. China includes Hong Kong. Detail may not add to total because of rounding or minor discrepancies. See Appendix Table 6-1 for a full list of countries and economies in each region.

### Source(s)

IHS Global Insight, World Industry Service database, accessed 17 July 2017.

*Science and Engineering Indicators 2018*



## CHAPTER 6 | Industry, Technology, and the Global Marketplace

APPENDIX TABLE 6-5

## Value added of education services, by region, country, or economy: 2001–16

(Millions of current dollars)

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
World	1,420,668	1,504,185	1,688,489	1,856,805	1,975,357	2,101,272	2,336,617	2,556,804	2,576,609	2,703,020	2,964,154	3,034,924	3,117,951	3,224,911	3,141,410	3,200,073
North America																
Canada	34,108	35,524	41,891	47,600	53,735	62,987	70,604	74,947	73,787	84,307	91,653	93,765	94,004	91,242	82,899	82,715
Mexico	25,371	28,317	29,133	29,494	33,638	36,744	39,612	42,423	36,928	41,883	45,653	47,398	51,901	53,218	47,848	44,843
United States	511,500	545,000	581,000	609,800	638,000	675,400	717,600	757,600	783,500	797,200	826,367	861,995	874,132	919,057	952,523	976,401
Central and South America																
Argentina	16,215	5,102	5,774	6,415	8,589	10,730	13,826	18,815	19,740	23,175	30,429	34,574	36,508	31,353	34,948	31,474
Bolivia	124	124	125	132	133	149	165	192	216	235	254	281	308	329	373	441
Brazil	24,953	23,424	24,736	27,660	34,762	45,855	58,524	72,054	73,902	93,170	117,580	109,956	119,800	127,761	104,648	108,066
Chile	5,954	5,298	5,571	6,683	7,791	8,884	10,030	11,674	11,878	14,465	16,520	17,564	19,038	17,888	17,398	18,383
Colombia	5,165	5,091	4,825	5,815	7,227	7,585	9,445	11,158	11,072	13,628	15,058	17,209	18,477	19,070	16,863	16,435
Costa Rica	1,027	1,097	1,150	1,194	1,250	1,343	1,545	1,826	2,127	2,732	3,205	3,536	3,918	3,877	4,191	4,302
Ecuador	1,025	996	1,390	1,761	2,050	2,373	2,629	3,162	3,464	3,781	3,814	4,404	4,670	4,998	5,508	5,389
Honduras	423	481	522	552	626	710	863	1,001	1,168	1,218	1,252	1,312	1,348	1,412	1,429	1,484
Panama	512	536	568	588	604	635	772	839	919	995	1,068	1,206	1,422	1,580	1,686	1,933
Peru	2,808	3,066	3,337	3,678	3,994	4,361	4,950	5,612	5,685	6,348	7,042	8,206	8,715	9,147	9,052	9,395

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Uruguay	813	513	415	460	591	689	837	1,169	1,327	1,634	1,984	2,171	2,477	2,493	2,340	2,254
Venezuela	9,235	6,569	5,611	6,092	7,128	8,865	11,639	14,366	18,029	10,572	14,162	18,510	18,066	13,943	22,750	4,536
Europe																
EU	398,314	445,010	543,219	621,701	652,820	681,134	779,895	849,046	808,942	795,523	844,170	804,552	839,234	864,608	767,572	765,699
Austria	9,223	9,960	12,353	13,748	14,367	15,227	17,375	19,606	19,600	19,222	20,542	19,551	20,769	21,480	18,823	19,383
Belgium	13,527	14,919	18,534	20,897	21,912	23,049	26,335	30,116	29,517	29,235	32,195	31,296	33,331	34,601	29,945	30,050
Bulgaria	660	784	910	1,072	1,166	1,198	1,502	1,691	1,700	1,577	1,649	1,578	1,565	2,096	1,791	1,779
Czech Republic	2,237	2,853	3,658	4,236	4,888	5,486	6,536	8,085	7,476	7,478	8,294	7,684	7,818	7,730	6,926	7,058
Denmark	7,691	8,487	10,497	12,044	12,302	12,866	14,127	16,185	16,243	17,280	18,405	17,797	18,841	19,626	17,182	17,141
Finland	5,054	5,612	7,020	8,077	8,431	8,714	9,960	11,291	11,064	10,952	11,983	11,419	12,101	12,331	10,710	10,593
France	67,976	74,629	92,218	102,014	105,587	108,896	124,130	138,441	134,197	131,626	141,115	133,243	141,963	145,675	126,139	127,830
Germany	76,569	83,843	100,261	114,032	115,782	114,981	129,326	141,360	138,521	134,380	144,591	139,020	147,396	153,180	135,232	140,469
Greece	5,522	7,230	9,199	11,826	12,338	12,665	14,800	17,520	17,179	15,438	15,906	13,578	12,885	13,052	11,311	11,369
Hungary	2,162	2,911	4,074	4,652	5,102	5,052	5,755	6,506	5,344	5,172	5,548	5,160	5,666	5,734	5,021	5,075
Ireland	3,964	4,875	6,661	8,003	8,801	9,866	11,676	13,581	13,414	12,239	12,814	11,896	12,289	12,597	11,597	12,084
Italy	48,086	53,344	66,700	72,032	75,787	78,829	89,196	93,458	90,995	86,074	87,760	81,780	85,697	87,802	76,465	76,821
Netherlands	16,003	18,207	23,073	26,177	26,994	27,879	32,121	36,367	36,695	35,826	37,761	35,885	37,800	38,498	33,260	33,566
Poland	9,372	10,021	10,553	11,807	14,552	15,811	19,092	23,673	19,988	21,503	23,298	21,759	22,917	24,151	21,546	21,283
Portugal	7,236	8,288	10,266	11,853	12,508	12,749	13,749	15,332	15,047	14,678	14,160	12,807	13,389	13,309	11,766	11,959

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Romania	1,207	1,348	1,851	2,572	3,367	3,927	4,849	6,912	5,644	5,763	6,152	6,975	7,629	7,824	6,117	6,301
Slovakia	700	843	1,165	1,355	1,526	1,645	2,066	2,801	2,884	2,816	3,098	3,038	3,312	3,153	2,690	2,727
Spain	29,248	32,884	42,236	49,888	53,889	58,074	68,553	78,876	78,696	75,305	78,653	71,184	73,639	72,446	63,692	65,746
Sweden	10,619	12,040	15,393	17,477	17,812	18,955	21,704	23,256	20,458	22,452	25,983	25,518	27,011	26,688	22,857	23,440
United Kingdom	81,260	91,930	106,597	127,938	135,710	145,266	167,042	163,990	144,278	146,508	154,262	153,384	153,216	162,633	154,502	141,025
Other Europe																
Norway	6,848	8,090	9,802	10,690	11,773	12,360	14,369	16,224	15,599	17,240	19,335	20,001	20,516	19,890	16,968	16,733
Russia	8,445	8,931	10,359	13,887	17,437	22,773	30,095	39,056	35,734	40,370	47,206	49,878	55,700	50,799	36,734	36,147
Switzerland	1,743	1,907	2,108	2,159	2,156	2,166	2,386	2,752	2,836	2,846	3,615	3,436	3,599	3,787	3,834	3,856
Turkey	5,405	6,949	9,373	11,730	14,558	16,391	20,720	23,161	21,446	25,069	25,639	27,228	28,177	28,037	26,880	27,547
Ukraine	1,678	2,035	2,583	3,054	4,072	5,192	6,522	8,258	6,325	6,737	7,452	8,981	9,757	6,392	3,808	3,638
Middle East																
Bahrain	328	387	459	513	557	636	715	834	970	1,027	1,146	1,361	1,528	1,536	1,507	1,528
Iran	1,639	2,377	2,355	3,248	3,820	4,639	4,876	6,025	6,676	7,751	9,461	6,980	5,174	6,009	5,714	6,191
Israel	8,395	7,541	7,736	7,423	7,520	7,923	9,069	11,155	10,720	12,256	13,795	13,984	15,915	16,767	16,412	17,274
Jordan	193	229	231	263	296	332	370	405	430	492	513	574	634	674	706	732
Kuwait	1,927	2,132	2,255	2,443	2,647	3,071	3,591	4,460	4,581	4,635	5,661	6,688	6,961	7,497	5,324	5,216
Oman	575	856	1,074	1,416	1,504	1,662	1,855	2,166	2,356	2,511	2,696	3,240	3,499	3,949	4,191	4,013
Qatar	28	30	30	325	396	613	850	1,128	1,409	1,586	1,866	2,195	2,590	2,837	2,933	3,019

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Saudi Arabia	1,758	1,838	1,914	2,032	2,124	2,232	2,362	2,516	2,731	2,899	3,249	3,638	3,862	4,188	3,635	3,364
United Arab Emirates	657	758	857	978	1,065	1,204	1,461	1,828	1,921	2,067	2,617	2,883	3,167	3,267	3,101	3,236
Africa																
Cameroon	224	270	379	475	498	565	742	804	860	933	1,033	1,006	1,087	1,211	1,074	1,175
Egypt	7,669	7,397	6,221	5,666	7,287	8,318	5,252	5,762	6,647	7,590	7,775	9,550	9,372	10,361	11,033	9,975
Ghana	294	342	424	492	599	715	915	1,070	1,069	1,312	1,527	1,687	1,639	1,340	1,418	1,650
Kenya	849	1,004	1,238	1,301	1,422	1,613	1,908	2,315	2,249	2,148	2,183	2,634	2,842	3,106	3,099	3,439
Morocco	1,028	1,067	1,368	1,544	1,701	1,778	2,216	2,440	2,417	2,471	2,737	2,773	3,037	3,109	2,821	2,796
Nigeria	903	1,151	1,351	1,768	2,266	3,157	3,702	4,525	4,317	5,500	7,316	8,059	9,983	11,531	10,991	9,366
Senegal	158	177	209	270	291	322	414	465	454	472	540	544	561	584	522	612
South Africa	1,150	1,118	1,817	2,406	2,757	2,932	3,162	2,882	3,227	3,748	4,176	6,475	5,924	5,599	5,004	4,754
Tunisia	10	11	13	13	13	13	15	16	15	15	17	18	17	18	16	16
Asia																
Bangladesh	1,049	1,097	1,215	1,323	1,366	1,445	1,721	2,089	2,354	2,621	2,886	3,061	3,640	4,222	4,827	5,698
China	43,337	49,826	56,603	66,012	77,436	87,609	108,662	135,839	161,763	186,042	231,095	265,827	309,585	355,498	399,682	424,156
India	17,569	19,671	23,670	28,887	33,511	36,417	43,761	45,487	43,415	50,311	57,413	57,849	59,629	68,773	72,788	80,128
Indonesia	3,635	5,010	6,703	7,807	8,907	11,290	13,436	15,040	16,627	22,173	26,520	28,813	29,450	28,819	29,037	31,156
Japan	195,561	187,852	195,979	204,724	195,564	184,064	180,085	201,065	215,684	226,182	254,503	259,866	210,898	191,673	180,988	202,993
Malaysia	853	860	868	864	1,129	1,204	1,372	1,495	1,515	1,834	2,110	2,281	2,419	2,526	2,447	2,488

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Pakistan	1,155	1,339	1,508	1,663	1,921	2,163	2,304	2,380	2,560	2,647	3,448	3,441	3,702	5,005	5,508	5,965
Philippines	1,913	2,058	2,137	2,281	2,409	2,707	3,291	3,540	6,246	6,898	7,741	8,455	9,191	9,405	9,912	10,375
Singapore	2,079	2,219	2,326	2,527	2,581	2,804	2,990	3,369	3,411	4,407	5,399	5,750	6,211	6,371	6,083	5,988
South Korea	24,231	27,917	32,901	37,790	45,407	53,453	59,784	55,297	49,688	56,128	62,200	63,364	66,928	72,041	72,651	71,461
Sri Lanka	434	552	368	319	366	160	142	231	806	1,225	1,340	1,345	1,467	1,625	1,851	1,927
Taiwan	14,067	14,725	15,963	16,494	17,746	18,456	19,102	20,008	19,551	20,678	22,639	23,122	23,055	22,991	21,951	21,736
Thailand	4,717	4,998	5,487	6,505	7,191	8,423	10,128	11,170	11,594	13,296	15,031	16,334	17,249	17,237	16,852	16,742
Vietnam	1,057	1,165	1,303	1,489	1,698	1,921	2,163	2,347	2,507	2,699	3,257	4,054	5,044	5,733	6,307	6,704
Australia and Oceania																
Australia	17,371	19,586	24,531	30,052	33,569	35,214	41,245	45,174	45,422	56,395	68,938	72,630	71,246	69,569	62,649	64,239
New Zealand	2,189	2,565	3,505	4,348	4,855	4,889	5,930	6,143	5,795	6,945	7,868	8,283	8,679	8,959	8,122	8,288

EU = European Union.

### Note(s)

Value added is the amount contributed by a country, firm, or other entity to the value of a good or service and excludes purchases of domestic and imported materials and inputs. Data are not available for EU members Cyprus, Estonia, Latvia, Lithuania, Luxembourg, Malta, and Slovenia. China includes Hong Kong. Detail may not add to total because of rounding or minor discrepancies. See Appendix Table 6-1 for a full list of countries and economies in each region.

### Source(s)

IHS Global Insight, World Industry Service database, accessed 17 July 2017.

*Science and Engineering Indicators 2018*

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

APPENDIX TABLE 6-6

### Value added of health care, by region, country, or economy: 2001–16

(Millions of current dollars)

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
World	1,663,565	1,786,498	2,034,846	2,273,793	2,409,805	2,570,198	2,829,828	3,122,828	3,175,613	3,330,685	3,620,337	3,674,344	3,737,121	3,820,983	3,699,475	3,834,707
North America																
Canada	44,435	46,206	55,283	62,818	70,375	79,793	89,619	95,958	95,100	108,971	119,376	122,245	123,152	120,491	109,093	110,411
Mexico	14,728	16,161	15,831	16,148	17,491	18,949	20,478	22,472	19,702	22,682	25,009	25,402	28,537	28,750	26,022	24,356
United States	641,971	692,744	738,026	788,841	828,880	883,002	925,919	996,023	1,051,042	1,079,189	1,111,578	1,153,783	1,186,799	1,223,155	1,298,901	1,368,697
Central and South America																
Argentina	12,599	3,767	4,212	4,501	5,627	6,899	8,974	12,660	14,600	18,005	24,332	29,571	31,673	27,670	30,843	27,862
Bolivia	170	169	171	180	182	204	225	263	295	322	347	385	422	451	511	605
Brazil	19,316	18,475	19,355	22,816	28,420	37,350	48,229	57,706	59,374	73,606	86,217	87,197	93,227	98,856	80,386	83,190
Chile	6,154	5,386	4,005	4,932	5,729	6,714	7,650	8,186	8,491	10,560	12,609	14,169	15,815	14,859	14,350	15,196
Colombia	2,051	2,005	1,951	2,402	3,151	3,501	4,354	4,925	4,914	6,449	7,194	8,298	8,900	9,105	7,994	7,807
Costa Rica	770	833	875	926	987	1,125	1,321	1,616	1,844	2,405	2,743	2,983	3,358	3,294	3,538	3,640
Ecuador	476	570	797	920	1,050	1,152	1,303	1,565	1,721	1,969	2,182	2,538	2,885	3,037	3,327	3,263
Honduras	192	207	217	230	257	302	358	437	520	583	607	650	684	712	717	738
Panama	416	461	492	511	539	548	711	730	805	896	948	999	1,222	1,358	1,449	1,555
Peru	1,295	1,447	1,601	1,747	1,909	2,100	2,312	2,601	2,841	3,288	3,710	4,405	4,892	5,512	5,214	5,417

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Uruguay	1,232	755	573	611	799	914	1,059	1,491	1,690	2,170	2,631	2,903	3,341	3,387	3,178	3,078
Venezuela	3,922	2,765	2,396	2,589	3,001	4,056	5,873	8,464	11,428	7,498	10,315	12,958	12,161	9,386	15,314	2,914
Europe																
EU	491,557	556,754	692,448	810,159	852,175	911,299	1,036,042	1,135,700	1,097,170	1,087,927	1,160,948	1,097,164	1,135,536	1,173,329	1,031,357	1,034,860
Austria	9,831	10,774	13,725	15,722	16,418	17,541	20,000	22,496	21,912	21,280	23,498	22,088	23,200	23,976	20,842	21,550
Belgium	13,649	15,131	18,983	21,973	22,984	24,211	27,926	32,071	32,206	31,725	35,100	33,706	35,496	36,819	31,605	31,785
Bulgaria	377	546	534	673	918	837	1,028	1,213	1,192	1,341	1,594	1,531	1,839	1,790	1,517	1,510
Czech Republic	2,173	2,877	3,535	4,101	4,796	5,264	6,074	7,936	7,624	7,637	8,486	7,764	7,808	7,714	6,856	7,002
Denmark	14,417	15,863	19,872	22,792	23,344	24,704	27,972	31,658	32,599	31,963	32,955	31,481	32,952	34,298	29,786	29,779
Finland	8,480	9,436	11,899	13,790	14,680	15,491	17,893	20,666	20,573	20,208	22,358	21,043	22,049	22,450	19,342	19,170
France	88,969	100,930	127,877	149,851	157,373	168,740	193,127	215,458	212,029	209,053	226,433	211,185	222,483	228,122	195,935	198,992
Germany	108,351	121,625	148,974	167,738	171,336	178,838	197,076	220,521	220,456	217,428	229,616	218,056	228,598	237,383	207,904	217,265
Greece	6,541	7,209	9,018	10,865	12,305	14,075	16,344	18,793	17,416	15,338	14,642	10,067	9,848	9,109	7,828	7,885
Hungary	1,881	2,517	3,532	4,036	4,374	4,255	4,907	5,457	4,533	4,328	4,601	4,226	4,591	4,642	4,032	4,085
Ireland	5,417	6,435	8,925	10,987	12,040	13,522	16,189	18,995	17,899	15,728	16,655	15,536	16,156	16,077	14,800	15,499
Italy	50,605	55,350	68,372	81,230	86,249	91,502	99,113	113,716	109,849	108,206	113,885	104,796	108,572	111,151	96,052	96,708
Netherlands	26,649	32,122	41,488	47,359	48,949	51,409	59,071	67,472	69,020	68,376	74,085	69,531	72,414	73,693	63,145	63,864
Poland	6,116	6,821	8,218	9,203	10,413	12,002	14,876	18,994	15,688	17,704	19,320	18,142	19,677	20,720	18,339	18,155
Portugal	5,794	6,560	8,255	9,849	10,543	10,672	12,434	13,543	13,294	12,955	13,214	11,799	12,194	12,112	10,620	10,817

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Romania	814	1,173	1,503	1,894	2,662	3,016	4,235	5,572	4,631	4,980	4,999	4,332	4,481	5,163	3,999	4,129
Slovakia	680	800	1,035	1,202	1,285	1,440	2,157	2,527	2,672	2,670	2,761	2,768	3,056	2,909	2,482	2,539
Spain	27,834	32,060	42,527	50,739	55,141	60,175	72,135	86,045	86,148	82,969	86,769	77,231	79,801	78,445	68,409	70,769
Sweden	20,911	23,709	30,313	34,416	35,075	37,326	42,739	45,796	40,287	44,213	51,166	49,648	51,960	51,296	43,572	44,779
United Kingdom	92,069	104,815	123,864	151,738	161,291	176,280	200,750	186,773	167,142	169,822	178,810	182,232	178,361	195,460	184,291	168,579
Other Europe																
Norway	12,560	15,399	18,590	20,809	23,314	25,129	30,331	34,859	33,335	36,571	42,516	43,476	44,086	42,705	36,127	35,703
Russia	6,718	10,254	12,246	16,401	19,963	28,148	37,156	48,197	42,858	48,976	59,816	62,310	72,240	67,506	48,545	46,622
Switzerland	17,134	19,516	23,502	26,645	26,927	27,452	29,331	34,856	36,254	38,741	47,294	47,060	49,416	51,587	50,931	51,328
Turkey	2,828	3,722	5,120	6,308	8,469	9,307	11,918	13,321	12,335	14,419	14,747	15,660	16,206	16,126	14,990	15,109
Ukraine	1,129	1,386	1,703	2,046	2,709	3,484	4,435	5,502	4,397	4,858	5,253	6,161	6,036	3,886	2,543	2,452
Middle East																
Bahrain	202	217	254	280	337	395	452	503	565	605	668	815	847	1,028	1,009	1,041
Iran	2,147	2,489	3,170	3,841	4,927	5,823	6,706	7,821	8,785	9,971	11,864	8,753	6,488	7,535	7,166	7,699
Israel	7,779	7,100	7,544	7,744	7,852	8,490	9,241	11,394	11,415	12,684	14,765	14,631	16,599	17,424	17,055	17,976
Jordan	113	120	130	147	157	199	239	261	271	298	310	347	383	407	427	443
Kuwait	737	800	876	937	1,082	1,199	1,445	1,800	1,956	2,662	3,139	3,512	3,666	3,948	2,804	2,772
Oman	298	406	479	556	578	618	699	819	922	1,001	1,098	1,341	1,427	1,605	1,703	1,622
Qatar	8	10	9	359	411	702	823	1,073	1,341	1,450	1,706	2,069	2,382	2,696	2,905	3,028



## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Saudi Arabia	2,254	2,358	2,454	2,606	2,724	2,862	3,029	3,227	3,491	3,820	4,275	4,757	5,061	5,493	4,789	4,441
United Arab Emirates	900	1,038	1,175	1,341	1,459	1,650	2,002	2,505	2,632	2,833	3,598	3,964	4,333	4,470	4,243	4,398
Africa																
Cameroon	56	69	93	110	156	156	178	200	216	257	284	276	311	350	311	339
Egypt	309	312	253	230	296	338	214	234	270	309	316	388	381	421	449	400
Ghana	112	130	162	188	229	273	329	360	364	471	482	501	482	376	404	508
Kenya	294	330	380	397	463	536	656	710	741	813	744	810	847	1,019	1,068	1,182
Morocco	1,409	1,462	1,874	2,116	2,331	2,437	3,037	3,344	3,312	3,386	3,751	3,800	4,162	4,260	3,866	3,839
Nigeria	427	515	570	738	933	1,284	1,498	1,810	1,730	2,202	2,550	2,850	3,341	3,930	3,546	2,934
Senegal	76	79	101	88	92	109	134	166	161	158	178	176	182	190	170	198
South Africa	1,575	1,532	2,490	3,296	3,778	4,018	4,332	3,949	4,422	5,135	5,722	8,873	8,118	7,672	6,856	6,528
Tunisia	14	14	17	18	18	18	20	22	21	21	24	24	24	25	22	22
Asia																
Bangladesh	1,025	1,050	1,135	1,209	1,260	1,347	1,518	1,773	1,936	2,200	2,392	2,461	3,056	3,469	3,866	4,409
China	29,602	33,010	36,252	41,119	46,243	51,649	63,071	77,509	85,804	98,161	126,553	155,246	192,360	220,176	245,735	261,078
India	6,063	6,526	7,333	9,050	10,435	11,720	14,281	15,676	16,844	20,944	23,470	23,932	24,120	26,714	28,274	31,783
Indonesia	1,200	1,653	2,212	2,576	2,939	3,725	4,433	4,963	5,355	7,309	8,706	9,190	9,267	9,196	9,220	10,025
Japan	270,668	266,127	294,860	318,876	322,337	311,629	317,158	365,505	392,080	422,181	475,952	486,365	403,957	380,398	360,269	406,760
Malaysia	707	683	692	678	929	1,014	1,163	1,309	1,338	1,634	1,865	2,007	2,133	2,228	2,144	2,185

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Pakistan	693	803	905	998	1,153	1,298	1,658	1,728	1,781	1,937	2,290	2,456	2,601	3,070	3,447	3,742
Philippines	1,112	1,208	1,278	1,352	1,492	1,698	2,077	2,316	2,097	2,437	2,804	3,257	3,541	3,623	3,819	4,005
Singapore	2,666	2,845	2,983	3,240	3,310	3,596	3,835	4,320	4,370	5,838	7,117	7,569	8,126	8,349	7,988	8,007
South Korea	15,392	16,720	19,456	22,368	27,886	33,115	38,150	34,891	33,747	40,853	46,697	49,749	54,156	61,030	64,501	68,908
Sri Lanka	428	544	363	315	361	158	140	227	795	1,208	1,532	1,500	1,540	1,611	1,846	1,818
Taiwan	8,344	8,644	8,859	9,469	10,321	10,908	11,041	11,739	11,621	12,412	13,942	14,533	15,053	15,522	15,478	15,833
Thailand	1,913	2,227	2,386	2,855	3,116	3,586	4,165	4,498	4,751	5,501	6,066	6,381	6,671	6,666	6,517	6,711
Vietnam	495	543	607	687	773	870	991	1,162	1,247	1,259	1,307	1,616	2,823	3,155	3,331	3,614
Australia and Oceania																
Australia	20,299	22,904	29,927	36,223	41,335	45,259	55,918	59,542	61,007	79,754	93,970	99,287	96,905	95,898	88,283	90,348
New Zealand	2,594	3,042	4,173	5,246	6,136	6,090	7,596	7,939	7,508	8,894	9,826	10,593	11,191	11,866	10,638	11,305

EU = European Union.

### Note(s)

Value added is the amount contributed by a country, firm, or other entity to the value of a good or service and excludes purchases of domestic and imported materials and inputs. Health care includes social services. Data are not available for EU members Cyprus, Estonia, Latvia, Lithuania, Luxembourg, Malta, and Slovenia. China includes Hong Kong. Detail may not add to total because of rounding or minor discrepancies. See Appendix Table 6-1 for a full list of countries and economies in each region.

### Source(s)

IHS Global Insight, World Industry Service database, accessed 17 July 2017.

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

APPENDIX TABLE 6-7

### Value added of MHT manufacturing industries, by region, country, or economy: 2001–16

(Millions of current dollars)

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
World	1,464,201	1,508,828	1,696,166	1,900,630	2,012,673	2,196,550	2,499,071	2,713,370	2,370,692	2,857,262	3,131,804	3,334,653	3,418,794	3,533,982	3,325,441	3,326,054
North America																
Canada	34,205	35,729	37,755	39,594	41,951	43,224	45,257	40,059	32,771	41,074	48,462	50,481	49,440	50,064	43,932	41,739
Mexico	32,623	29,741	31,825	35,300	38,131	45,704	47,899	49,730	36,644	49,937	56,437	62,897	67,121	67,954	66,465	60,336
United States	418,294	425,757	435,049	445,925	455,338	487,335	497,881	474,569	421,681	488,034	527,639	560,933	585,932	607,158	619,614	619,053
Central and South America																
Argentina	6,732	3,185	4,269	5,494	6,948	8,612	11,032	14,495	13,706	16,065	19,589	20,558	20,565	16,869	15,340	12,605
Bolivia	67	63	64	67	71	75	80	116	134	138	150	159	174	185	195	223
Brazil	30,242	27,773	31,828	39,970	48,393	57,958	77,545	99,478	83,384	116,293	134,767	116,252	115,525	104,144	63,639	59,123
Chile	369	345	396	486	704	598	641	596	840	1,084	1,103	1,136	1,354	1,293	1,413	1,478
Colombia	2,290	2,391	2,385	2,818	3,454	3,978	4,979	5,534	5,104	6,196	6,729	7,203	7,099	6,951	5,560	5,132
Costa Rica	259	254	261	276	308	348	421	470	410	530	597	639	675	666	647	648
Ecuador	1,168	1,265	1,327	1,393	1,416	1,540	1,688	2,131	2,491	2,522	2,661	2,888	2,943	3,466	3,440	3,235
Honduras	288	292	298	289	332	361	390	431	427	433	509	562	556	574	570	568
Panama	25	23	23	24	25	27	36	41	46	47	48	65	67	70	69	69
Peru	2,631	2,395	2,931	3,177	3,597	4,217	4,506	5,029	4,452	5,526	6,289	7,194	6,880	6,359	5,526	5,412

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Uruguay	275	168	159	170	181	201	225	346	257	423	504	485	496	524	494	453
Venezuela	4,158	2,853	2,628	3,500	4,304	5,097	6,291	8,687	10,474	5,963	7,285	8,607	8,127	6,552	10,690	1,715
Europe																
EU	414,590	437,789	522,064	596,304	606,409	649,267	754,808	786,108	598,870	682,604	762,344	706,524	735,738	768,298	674,889	668,328
Austria	9,442	10,108	12,378	14,186	15,061	16,912	21,291	23,500	19,225	20,450	23,930	23,147	23,969	24,303	22,223	22,411
Belgium	12,319	13,041	15,283	16,903	17,765	18,342	19,889	20,934	17,007	17,567	19,413	17,940	18,502	18,239	16,625	15,948
Bulgaria	301	337	441	588	694	766	1,056	932	793	925	1,168	1,096	1,121	1,218	1,028	1,028
Czech Republic	4,540	5,165	6,150	8,178	9,771	11,771	15,151	17,741	14,358	16,060	18,680	17,594	17,260	18,872	17,637	18,078
Denmark	5,150	5,766	6,294	7,167	7,128	8,169	9,821	11,342	8,861	8,685	8,626	8,552	9,512	9,635	9,722	9,978
Finland	5,145	4,889	5,838	6,952	7,492	8,342	10,348	11,636	9,045	9,433	11,494	9,787	10,322	10,436	9,218	9,276
France	42,319	42,971	49,588	56,465	55,252	53,320	61,696	64,960	53,844	54,493	56,229	50,658	52,483	52,068	44,743	45,090
Germany	161,789	171,699	210,259	239,650	240,558	265,653	309,080	322,455	245,947	297,092	339,409	320,402	334,414	353,512	302,031	301,572
Greece	1,591	1,543	1,948	2,294	2,253	2,418	2,864	3,345	2,699	2,518	2,259	1,819	1,755	1,680	1,403	1,453
Hungary	2,805	3,469	4,614	5,836	6,763	7,297	9,372	10,003	7,471	9,092	9,900	9,041	10,250	11,397	11,002	10,428
Ireland	6,989	9,465	9,640	9,333	8,565	8,426	10,681	10,840	8,727	9,921	10,121	9,882	9,713	14,029	16,035	14,417
Italy	48,370	50,815	61,125	70,843	71,502	77,210	90,350	94,539	76,941	78,786	83,387	73,795	75,165	74,486	65,220	65,862
Netherlands	13,247	14,299	17,860	21,460	21,896	23,869	27,990	29,461	20,441	25,861	30,818	27,866	27,186	27,883	25,460	25,741
Poland	7,697	7,695	9,346	12,163	14,351	13,539	17,355	21,111	16,218	17,242	20,035	17,236	18,633	18,903	15,880	15,697
Portugal	3,686	3,722	4,274	4,612	4,257	4,358	5,073	5,433	4,402	4,718	4,864	4,129	4,390	4,387	3,568	3,533

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Romania	1,111	1,136	1,365	1,735	2,199	2,849	3,959	4,932	3,872	4,408	5,292	4,892	5,794	6,295	5,238	5,577
Slovakia	1,251	1,488	1,858	1,890	1,632	2,109	3,305	3,473	2,981	4,221	4,921	4,713	5,424	5,616	4,697	4,843
Spain	23,818	25,237	30,708	35,740	36,785	39,486	44,591	45,506	34,166	35,932	37,643	32,180	33,122	33,643	26,563	26,902
Sweden	13,292	14,124	17,151	18,871	19,212	20,639	24,369	21,752	13,270	20,075	24,527	21,830	23,038	21,929	20,471	20,515
United Kingdom	49,726	50,820	55,944	61,439	63,274	63,794	66,568	62,212	38,603	45,125	49,627	49,965	53,686	59,764	56,123	49,977
Other Europe																
Norway	2,643	2,917	3,500	3,813	4,443	5,130	6,593	7,748	6,790	7,076	8,439	8,594	9,272	9,190	7,634	6,929
Russia	13,125	12,653	13,598	20,447	26,834	33,329	44,815	60,720	32,201	39,186	52,031	50,944	51,335	45,491	27,548	28,290
Switzerland	12,006	12,840	14,341	15,751	16,171	17,350	19,526	22,644	20,672	22,461	26,388	22,617	23,468	23,790	22,235	21,455
Turkey	4,979	6,191	8,261	10,335	12,504	14,010	16,738	19,893	13,304	15,745	18,777	17,813	18,764	18,110	16,526	16,006
Ukraine	709	841	1,153	1,559	1,999	2,469	3,259	4,216	2,995	4,313	5,767	5,997	5,896	4,021	1,188	1,124
Middle East																
Bahrain	145	152	164	178	239	322	415	526	418	482	557	588	623	642	537	534
Iran	4,365	5,188	6,267	7,385	8,338	11,329	13,725	14,972	18,880	19,644	30,026	22,519	16,990	18,598	17,688	19,196
Israel	1,854	1,728	1,756	1,833	1,942	2,570	3,062	4,130	3,935	3,995	4,387	3,750	4,023	4,111	3,866	3,903
Jordan	343	422	401	475	496	619	755	916	929	812	755	777	879	712	664	632
Kuwait	543	705	796	1,043	1,212	1,038	1,403	1,796	1,714	2,028	2,189	2,538	2,421	2,300	1,741	1,648
Oman	292	301	331	368	457	449	612	792	1,538	1,458	3,108	4,269	4,377	4,095	3,323	2,797
Qatar	143	149	239	669	691	784	1,896	3,405	6,242	3,310	4,693	5,812	5,984	6,294	5,809	5,662

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Saudi Arabia	5,293	5,565	6,715	7,338	8,649	9,837	14,525	15,253	16,235	20,473	22,822	24,431	24,492	27,158	21,580	19,300
United Arab Emirates	315	329	349	390	439	492	534	622	535	576	670	735	767	781	692	695
Africa																
Cameroon	16	34	34	46	49	51	57	98	98	99	112	111	124	135	120	127
Egypt	1,378	1,278	1,049	1,373	1,596	1,757	2,182	2,761	3,038	3,419	3,605	4,029	3,673	4,551	5,427	4,526
Ghana	225	261	318	356	423	503	538	544	445	520	643	586	612	534	424	453
Kenya	181	181	215	249	242	337	471	513	506	492	516	578	604	642	649	677
Morocco	1,483	1,641	1,830	1,943	2,312	2,370	2,889	3,356	3,104	3,667	4,480	4,210	5,008	5,535	4,745	4,638
Nigeria	1,186	1,613	1,778	2,146	2,840	3,822	4,479	5,602	5,255	6,611	8,307	10,403	13,627	16,507	14,091	10,238
Senegal	74	92	111	119	116	98	91	114	109	114	155	127	107	108	108	107
South Africa	6,083	5,901	8,725	10,930	11,945	10,319	10,538	10,001	9,266	10,962	10,825	11,437	10,531	10,072	9,448	8,470
Tunisia	627	565	693	824	939	1,145	1,576	1,988	1,780	2,174	2,171	2,137	2,133	2,214	1,879	1,749
Asia																
Bangladesh	635	627	586	579	577	617	681	775	1,021	1,073	1,052	1,043	1,221	1,539	1,935	2,145
China	116,539	131,285	157,270	177,783	209,844	256,589	340,782	451,382	492,848	621,086	760,804	833,613	926,770	1,001,694	1,023,750	1,048,523
India	13,245	14,052	16,898	21,173	25,340	28,755	35,916	37,394	41,025	49,891	60,793	53,998	53,886	53,973	56,846	58,555
Indonesia	10,168	10,196	12,792	14,283	13,619	14,345	18,059	23,434	22,851	29,369	35,903	39,237	43,691	43,991	42,091	45,477
Japan	240,367	234,670	263,671	304,459	313,891	321,011	333,756	370,332	306,619	382,124	273,560	443,274	361,957	353,073	296,672	318,103
Malaysia	4,698	5,508	6,060	7,407	6,918	8,704	8,541	9,811	8,150	10,674	11,592	12,558	11,967	12,251	11,759	11,325

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Pakistan	1,303	1,426	1,929	2,834	3,479	3,497	3,762	4,082	3,371	4,122	5,214	5,336	5,082	5,597	5,962	6,048
Philippines	1,669	1,774	1,786	1,955	1,958	2,014	2,366	2,803	2,886	3,308	3,425	3,452	4,000	4,326	4,965	4,887
Singapore	2,963	3,334	3,643	5,075	5,264	5,539	7,075	5,754	6,487	8,523	10,193	8,574	10,782	11,398	8,972	8,649
South Korea	33,950	38,364	43,468	51,009	60,529	68,239	77,867	69,552	63,455	85,500	101,332	102,503	110,718	121,635	116,838	109,490
Sri Lanka	293	344	393	433	558	3,074	1,649	981	1,000	1,042	1,219	1,186	1,339	1,589	1,650	1,623
Taiwan	16,407	17,675	18,650	21,676	23,473	20,948	23,053	20,291	20,292	28,082	29,119	27,720	28,394	29,861	31,893	29,853
Thailand	6,796	7,517	9,207	11,121	12,800	15,509	18,483	21,235	17,735	19,512	19,725	20,289	20,618	17,509	17,502	17,706
Vietnam	951	1,146	1,363	1,713	2,288	3,067	3,866	5,413	5,055	5,351	5,661	6,364	6,689	7,282	7,942	8,572
Australia and Oceania																
Australia	6,851	8,062	10,947	12,829	13,454	13,851	16,328	17,596	14,550	18,885	23,237	21,435	20,783	18,962	14,093	13,630
New Zealand	1,143	1,279	1,621	1,942	2,242	2,115	2,527	2,105	1,665	2,236	2,438	2,486	2,497	2,582	2,169	2,192

EU = European Union; MHT = medium high technology.

### Note(s)

Value added is the amount contributed by a country, firm, or other entity to the value of a good or service and excludes purchases of domestic and imported materials and inputs. MHT manufacturing industries include motor vehicles, electrical machinery, and apparatus; chemicals excluding pharmaceuticals; railroad and other transportation equipment; and machinery and equipment. Data are not available for EU members Cyprus, Estonia, Latvia, Lithuania, Luxembourg, Malta, and Slovenia. China includes Hong Kong. Detail may not add to total because of rounding or minor discrepancies. See Appendix Table 6-1 for a full list of countries and economies in each region.

### Source(s)

IHS Global Insight, World Industry Service database, accessed 17 July 2017.

*Science and Engineering Indicators 2018*

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

APPENDIX TABLE 6-8

### Value added of HT manufacturing industries, by region, country, or economy: 2001–16

(Millions of current dollars)

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
World	778,676	783,560	876,242	956,826	1,013,734	1,110,280	1,208,038	1,276,479	1,210,161	1,360,866	1,386,931	1,469,681	1,529,502	1,602,044	1,595,875	1,618,453
North America																
Canada	13,967	13,041	15,046	15,864	16,560	17,999	17,820	18,229	16,761	18,734	18,643	18,863	17,941	18,457	16,629	16,333
Mexico	18,568	18,128	14,401	13,956	15,206	16,740	17,700	17,227	14,245	15,212	15,610	16,511	17,037	17,047	17,257	15,844
United States	288,458	290,530	311,140	321,276	337,956	366,070	387,767	391,138	410,895	426,544	427,152	433,940	446,037	466,321	505,155	495,473
Central and South America																
Argentina	1,014	275	397	525	674	801	994	1,272	1,301	1,603	1,978	2,195	2,186	1,972	1,804	1,605
Bolivia	45	45	50	49	57	53	52	80	99	94	100	106	116	124	130	160
Brazil	10,604	8,265	7,480	9,751	11,672	14,792	17,284	19,958	15,837	19,825	21,452	21,055	21,553	21,139	13,843	13,364
Chile	154	137	129	168	209	213	244	223	291	368	388	411	460	469	514	474
Colombia	619	632	594	815	838	936	1,126	1,340	1,329	1,571	1,634	1,798	1,834	1,773	1,379	1,374
Costa Rica	70	72	75	83	88	100	121	135	118	152	171	183	193	191	186	193
Ecuador	435	471	494	519	511	536	554	657	759	824	889	1,031	1,133	1,383	1,369	1,308
Honduras	81	82	83	82	92	96	103	114	117	112	133	145	141	147	146	148
Panama	8	8	8	8	8	9	12	14	15	16	16	25	24	25	24	26
Peru	656	723	684	848	992	1,143	1,331	1,601	1,351	1,704	1,704	2,220	2,372	2,240	1,959	1,910



## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Uruguay	72	39	46	61	76	82	95	154	153	172	195	213	234	257	270	304
Venezuela	439	301	278	370	456	540	667	1,024	1,194	717	885	1,054	996	803	1,310	263
Europe																
EU	140,891	147,954	177,026	200,601	210,659	223,292	251,601	266,067	230,294	238,622	254,819	238,567	258,860	274,269	258,813	263,648
Austria	2,975	3,318	3,970	4,400	5,345	5,747	5,989	5,976	5,607	5,994	6,352	6,179	6,685	7,241	6,809	7,305
Belgium	3,628	3,890	4,537	4,907	5,123	5,464	5,862	6,740	6,328	7,496	7,778	7,237	8,697	9,761	8,678	9,891
Bulgaria	89	100	138	135	159	169	227	172	168	171	210	241	203	217	188	191
Czech Republic	787	935	1,134	1,320	1,614	1,784	2,134	2,401	1,889	2,090	2,292	1,800	1,988	2,216	2,014	2,091
Denmark	3,234	3,173	4,145	4,465	5,041	5,076	5,549	5,199	5,323	6,520	6,585	7,104	7,749	8,057	7,147	7,625
Finland	4,867	5,964	7,078	7,482	7,849	8,593	10,880	10,307	5,451	5,439	4,325	3,667	3,859	3,869	3,342	3,365
France	21,711	22,374	26,355	26,942	28,560	29,839	31,800	31,781	27,236	24,543	21,633	20,946	23,799	23,206	22,156	21,771
Germany	31,725	33,517	42,924	51,290	55,156	57,465	70,387	73,849	58,165	62,869	72,147	68,252	74,542	80,812	72,065	73,555
Greece	753	694	816	939	811	882	1,006	1,154	1,175	1,079	909	791	1,049	1,140	1,356	1,399
Hungary	1,339	1,539	2,413	3,160	3,571	3,573	3,354	3,761	3,148	3,621	3,595	2,919	2,813	2,885	2,734	2,796
Ireland	7,905	8,794	11,750	12,684	13,551	14,561	17,168	19,758	21,849	20,033	23,027	20,345	20,166	22,903	29,152	32,530
Italy	14,610	15,726	18,063	20,432	20,303	21,242	23,061	25,248	22,177	21,497	23,104	20,385	21,937	22,911	20,268	20,851
Netherlands	3,677	3,420	3,753	3,901	4,027	3,708	4,162	4,787	4,574	4,562	5,015	4,832	4,909	5,265	5,028	5,009
Poland	1,556	1,652	1,849	2,289	2,716	2,562	3,284	3,845	3,195	3,467	3,703	3,110	3,893	3,999	3,319	3,309
Portugal	616	673	785	900	959	981	1,141	1,151	844	766	726	732	981	931	758	776

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Romania	267	249	322	395	411	552	825	937	651	786	727	722	789	826	684	649
Slovakia	85	110	161	218	266	278	400	488	348	523	460	470	394	402	338	344
Spain	5,359	5,339	6,563	7,259	7,167	7,978	9,252	10,717	8,980	9,358	9,348	8,931	9,957	10,098	7,846	8,107
Sweden	4,409	5,923	8,197	11,244	11,453	12,202	12,363	12,184	12,264	14,024	15,894	15,117	15,851	15,249	13,552	13,424
United Kingdom	31,298	30,565	32,072	36,240	36,575	40,637	42,756	45,612	40,922	43,784	46,990	44,787	48,598	52,280	51,380	48,662
Other Europe																
Norway	1,114	1,214	1,592	1,617	1,774	2,039	2,330	2,662	1,890	1,999	2,154	2,261	2,159	2,121	2,020	2,366
Russia	2,924	3,881	4,940	6,947	8,447	10,301	13,932	16,220	11,795	14,352	17,814	18,435	20,710	19,501	11,277	11,658
Switzerland	15,720	18,623	22,603	26,432	28,549	31,392	35,730	42,326	39,273	42,579	52,095	51,115	53,013	53,573	49,370	48,972
Turkey	1,932	1,084	1,383	1,636	2,450	2,506	3,118	3,963	3,704	4,007	4,054	3,503	3,443	3,964	4,161	4,480
Ukraine	360	427	549	638	796	981	1,228	1,441	973	1,426	1,732	1,828	2,466	1,640	462	480
Middle East																
Bahrain	16	16	18	19	26	35	44	56	45	52	60	63	67	69	58	55
Iran	302	441	588	734	713	800	1,032	1,241	1,797	1,923	2,939	2,204	1,663	1,821	1,731	1,929
Israel	7,816	7,073	7,200	7,922	8,143	8,488	9,606	10,121	10,253	11,254	11,379	13,153	13,417	13,729	12,321	11,837
Jordan	155	191	197	219	255	305	377	552	552	529	540	607	645	649	614	643
Kuwait	77	128	160	216	243	186	260	355	349	427	538	586	571	549	408	397
Oman	16	16	18	20	24	26	66	54	68	87	159	101	104	97	79	76
Qatar	193	244	291	378	595	712	598	642	221	1,173	1,641	2,020	2,077	2,182	2,015	2,031

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Saudi Arabia	1,224	1,288	1,558	1,705	2,014	2,295	3,031	3,158	3,356	4,231	4,714	5,040	5,047	5,585	4,456	4,015
United Arab Emirates	197	205	218	244	275	307	334	389	334	360	420	460	480	489	433	434
Africa																
Cameroon	2	4	5	6	7	7	8	13	13	13	15	15	17	18	16	18
Egypt	414	384	315	413	480	528	655	828	911	1,086	1,059	1,019	968	1,296	1,799	1,407
Ghana	50	58	71	80	95	112	120	122	99	116	144	131	137	119	95	103
Kenya	61	63	79	92	96	82	96	104	105	99	112	126	132	140	141	154
Morocco	443	504	593	665	864	913	951	957	990	1,089	1,259	1,221	1,376	1,504	1,330	1,277
Nigeria	309	416	450	526	664	852	975	1,168	1,123	1,349	1,622	1,896	2,387	2,769	2,428	1,956
Senegal	10	9	10	14	14	16	17	18	21	23	25	27	19	21	28	32
South Africa	536	537	753	963	1,005	1,008	1,086	1,072	1,148	1,322	1,348	1,375	1,325	1,278	1,310	1,286
Tunisia	70	66	82	89	104	110	132	176	174	222	203	203	212	215	181	171
Asia																
Bangladesh	438	513	568	614	686	709	745	845	1,074	1,150	1,168	1,189	1,360	1,814	2,845	3,385
China	49,676	55,747	69,183	79,611	90,395	109,940	129,711	158,203	158,850	193,680	225,865	262,113	299,892	335,626	362,846	380,449
India	4,364	4,828	5,543	6,578	7,812	8,629	11,124	11,738	11,456	12,535	16,906	14,529	14,458	13,405	13,448	14,459
Indonesia	1,597	2,779	3,240	2,836	3,030	3,584	5,122	6,289	6,006	6,692	5,858	3,802	4,319	4,333	4,284	4,586
Japan	144,000	121,552	133,128	138,593	135,976	139,610	136,107	148,449	129,319	162,346	102,703	147,536	114,743	103,693	86,007	101,664
Malaysia	6,744	6,473	7,718	9,025	8,391	9,173	10,725	10,198	7,058	9,148	10,972	12,750	14,909	15,703	13,683	13,694

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Pakistan	451	495	666	945	1,127	868	1,008	1,160	936	1,153	1,534	1,603	1,628	1,790	1,817	2,018
Philippines	2,153	2,392	2,091	2,447	2,673	3,195	4,424	3,221	3,787	3,799	4,088	4,530	5,423	6,211	6,783	6,896
Singapore	9,917	11,248	11,993	14,850	16,623	20,255	21,318	18,139	17,598	23,337	25,327	27,910	24,774	24,578	19,771	21,407
South Korea	23,261	26,898	30,299	38,921	43,436	48,977	52,314	45,436	41,098	57,219	60,252	62,224	75,112	74,710	71,529	68,755
Sri Lanka	72	83	95	105	135	727	393	236	241	252	318	323	398	434	433	435
Taiwan	21,246	26,551	32,208	37,008	40,074	46,418	48,778	51,670	45,627	56,074	61,041	63,501	68,279	78,544	75,996	72,894
Thailand	1,905	3,113	3,758	3,860	4,037	4,753	5,895	6,525	6,335	8,447	7,224	6,385	6,498	6,941	5,737	5,670
Vietnam	369	392	413	511	551	727	922	1,046	1,466	2,015	3,296	5,154	6,075	6,846	7,189	7,861
Australia and Oceania																
Australia	2,255	2,691	3,435	4,020	4,690	4,929	5,742	6,007	4,995	6,516	8,026	9,860	7,508	6,881	5,493	5,578
New Zealand	206	233	298	352	408	382	517	449	367	513	559	567	573	589	491	501

EU = European Union; HT = high technology.

### Note(s)

Value added is the amount contributed by a country, firm, or other entity to the value of a good or service and excludes purchases of domestic and imported materials and inputs. HT manufacturing industries include aerospace, communications and semiconductors, computers and office machinery, pharmaceuticals, and scientific instruments and measuring equipment formerly classified by the Organisation for Economic Co-operation and Development. Data are not available for EU members Cyprus, Estonia, Latvia, Lithuania, Luxembourg, Malta, and Slovenia. China includes Hong Kong. Detail may not add to total because of rounding or minor discrepancies. See Appendix Table 6-1 for a full list of countries/economies in each region.

### Source(s)

IHS Global Insight, World Industry Service database, accessed 17 July 2017.

*Science and Engineering Indicators 2018*

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

APPENDIX TABLE 6-9

### Value added of financial services, by region, country, or economy: 2001–16

(Millions of current dollars)

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
World	1,876,912	1,960,991	2,207,108	2,426,265	2,676,797	2,892,075	3,254,173	3,233,664	3,309,705	3,571,858	3,871,857	4,051,198	4,190,709	4,425,344	4,419,251	4,556,127
North America																
Canada	43,615	43,915	51,932	61,279	69,161	80,817	90,807	93,550	82,216	97,121	107,171	104,976	107,607	106,902	99,787	103,037
Mexico	10,776	19,077	17,266	19,004	25,531	27,669	32,599	35,091	30,297	34,819	36,387	35,917	41,922	42,797	38,914	37,240
United States	817,492	835,186	866,781	890,279	991,844	1,048,838	1,040,521	907,226	969,254	1,005,832	1,038,026	1,142,684	1,136,414	1,251,154	1,293,093	1,355,546
Central and South America																
Argentina	16,486	6,425	5,631	4,510	5,366	6,726	8,714	11,547	11,024	12,703	14,698	17,867	17,101	13,823	15,408	13,633
Bolivia	387	357	304	277	312	359	435	579	630	743	819	1,095	1,295	1,506	1,706	2,183
Brazil	34,037	34,447	35,620	36,998	53,976	67,923	87,512	93,432	93,896	127,586	143,131	133,295	126,395	135,424	109,069	110,871
Chile	4,918	4,236	3,972	4,899	5,858	6,506	8,335	9,318	9,092	10,532	12,558	13,807	14,339	13,220	13,204	13,647
Colombia	3,945	3,920	3,733	4,665	5,778	6,279	8,557	11,095	10,973	12,799	14,531	16,274	16,459	16,418	14,675	14,385
Costa Rica	627	657	715	734	852	978	1,135	1,356	1,485	1,664	1,901	2,205	2,366	2,417	2,782	3,206
Ecuador	500	612	665	786	1,058	1,298	1,303	1,441	1,714	1,948	2,300	2,761	2,509	2,740	2,743	2,727
Honduras	373	383	400	462	511	623	735	889	911	960	1,071	1,143	1,207	1,296	1,347	1,377
Panama	1,156	1,184	1,155	1,193	1,344	1,423	1,616	1,866	2,235	2,272	2,479	2,865	3,013	3,348	3,574	3,962
Peru	1,460	1,740	1,918	2,044	2,435	2,754	3,286	4,033	4,888	5,963	7,003	8,173	8,984	9,820	9,840	10,402

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Uruguay	1,419	1,030	776	729	933	1,015	1,135	1,320	1,361	1,733	2,063	2,282	2,520	2,545	2,388	2,356
Venezuela	3,059	2,601	2,239	2,309	2,346	3,765	6,592	8,121	8,987	5,263	8,311	12,296	12,820	9,894	16,144	3,102
Europe																
EU	363,943	405,904	521,934	630,851	673,787	711,753	836,691	834,158	834,371	812,566	849,298	807,442	842,364	868,883	765,150	761,155
Austria	9,432	10,239	11,940	13,720	14,444	16,029	18,704	20,367	16,768	17,405	19,293	18,271	18,760	18,805	16,291	16,738
Belgium	11,976	13,931	16,356	19,698	20,058	20,757	22,935	23,985	25,938	27,796	28,920	28,938	30,222	31,040	26,620	26,629
Bulgaria	365	463	766	992	1,493	1,546	2,757	2,904	2,721	3,458	4,125	3,531	3,383	3,556	3,220	3,278
Czech Republic	1,856	2,008	2,897	3,372	3,403	4,042	5,584	8,158	7,883	8,546	9,474	8,798	9,651	9,310	7,527	7,704
Denmark	6,561	7,437	9,823	11,214	11,838	12,529	15,083	17,900	17,647	16,933	18,946	17,591	18,229	18,350	15,363	15,023
Finland	3,980	4,287	3,483	4,311	4,213	5,269	6,961	6,698	6,060	5,836	6,301	5,907	5,694	6,468	5,517	5,629
France	46,807	53,630	69,032	77,904	80,349	85,213	95,221	92,074	105,274	110,890	115,826	110,263	115,504	118,669	102,368	104,035
Germany	71,763	81,432	106,537	129,048	122,319	122,144	123,851	122,407	129,433	134,300	141,199	136,201	156,581	153,711	132,174	137,591
Greece	4,760	5,547	7,528	10,340	10,555	11,384	12,624	13,752	13,583	12,744	12,030	10,789	10,232	9,469	7,557	7,666
Hungary	1,598	2,217	2,937	3,721	4,459	4,696	5,130	5,449	5,172	5,155	5,131	4,534	4,422	4,306	3,743	3,717
Ireland	7,276	8,346	13,442	16,031	17,338	19,902	23,812	24,020	22,286	21,973	21,083	19,271	17,615	20,240	18,632	19,468
Italy	49,432	51,207	66,685	74,462	78,785	81,481	101,571	110,634	100,010	98,285	105,614	101,772	103,314	104,669	92,217	91,256
Netherlands	21,789	25,346	34,871	40,020	43,615	40,667	41,079	43,990	52,838	57,506	59,141	54,570	55,706	54,972	46,330	46,078
Poland	7,002	6,580	7,186	8,403	10,520	11,346	16,417	19,427	15,276	17,472	20,376	17,851	19,877	21,516	16,919	17,678
Portugal	6,826	7,337	9,301	10,963	11,230	13,427	16,029	18,499	15,275	13,805	15,027	11,908	10,961	10,527	9,385	9,566

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Romania	1,422	1,189	1,138	1,719	2,027	2,236	3,284	4,458	3,558	3,974	5,280	5,163	7,550	6,779	6,127	6,243
Slovakia	416	836	1,146	1,470	1,832	1,951	2,394	2,838	3,126	3,264	3,735	3,480	3,562	3,808	3,172	3,294
Spain	27,667	31,125	38,720	45,363	48,361	54,128	70,730	80,676	79,511	58,186	56,668	52,002	46,749	52,172	42,147	42,507
Sweden	8,597	8,722	11,243	14,437	15,302	14,264	15,826	16,641	15,844	16,303	18,210	17,703	19,826	19,835	17,765	18,354
United Kingdom	74,418	84,024	106,903	143,661	171,648	188,742	236,698	199,281	196,168	178,734	182,918	178,901	184,526	200,682	192,076	178,701
Other Europe																
Norway	4,531	5,212	7,877	9,895	10,614	10,220	13,297	14,791	15,456	17,255	18,974	20,002	21,066	20,866	17,943	17,754
Russia	6,779	8,942	12,642	16,455	24,789	35,933	49,012	61,878	53,785	58,401	66,537	77,135	89,393	89,883	62,788	62,435
Switzerland	30,490	31,224	39,866	43,597	46,660	51,408	61,305	61,497	57,801	58,397	69,431	66,786	69,562	67,016	62,249	61,622
Turkey	16,904	10,251	10,358	13,059	13,615	15,304	21,024	25,383	27,541	26,950	24,225	25,904	27,559	24,210	23,534	24,642
Ukraine	1,035	1,221	1,827	4,104	3,989	5,109	8,470	12,914	6,576	7,720	7,306	7,640	8,286	5,932	2,804	2,874
Middle East																
Bahrain	1,507	1,501	1,971	2,590	3,128	3,378	4,140	4,329	4,281	4,511	4,556	4,777	5,002	5,207	5,109	5,594
Iran	1,286	2,138	3,416	4,385	4,375	5,277	7,389	9,152	8,132	11,839	16,492	12,167	9,019	10,475	9,962	10,910
Israel	5,553	5,279	6,077	7,421	8,256	8,586	10,049	12,132	11,843	12,758	12,938	12,085	15,037	13,481	13,195	14,197
Jordan	307	422	456	549	962	1,131	1,379	2,019	2,034	2,398	2,710	3,045	3,402	3,618	3,791	3,943
Kuwait	2,260	2,840	4,151	5,290	8,805	11,279	16,531	16,395	12,057	14,303	10,717	10,854	11,083	11,936	8,392	8,508
Oman	817	956	965	1,038	1,190	1,538	1,819	2,150	2,310	2,658	3,074	3,574	3,931	4,448	4,695	4,566
Qatar	962	1,147	1,350	1,715	3,136	4,218	5,432	5,747	6,636	7,937	9,339	10,059	10,643	12,101	13,494	14,205

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Saudi Arabia	9,317	9,889	10,630	12,658	14,935	17,651	20,187	22,409	24,663	25,154	26,224	28,812	31,025	33,163	30,223	28,235
United Arab Emirates	5,442	6,002	6,788	8,112	11,490	13,912	18,481	20,234	19,958	20,154	21,474	23,786	26,679	27,523	26,123	27,066
Africa																
Cameroon	113	132	172	198	193	149	159	210	196	204	261	256	307	357	316	349
Egypt	10,785	8,418	6,914	8,647	7,981	8,636	9,565	11,627	12,952	14,709	13,788	14,475	14,205	15,703	16,723	15,005
Ghana	212	247	306	355	433	516	790	1,029	1,098	1,565	1,632	1,878	2,970	3,146	3,709	4,143
Kenya	761	676	920	796	925	1,234	1,504	1,867	1,900	2,183	2,332	2,892	3,532	4,061	4,244	4,777
Morocco	1,842	1,915	2,288	2,600	2,949	3,340	3,926	4,483	4,539	4,660	5,079	5,032	5,114	5,205	4,724	4,635
Nigeria	5,838	5,440	5,360	6,417	7,630	10,007	11,040	12,620	10,372	12,700	9,839	13,051	15,402	17,838	16,933	13,869
Senegal	29	34	60	87	91	88	98	120	101	123	140	149	154	161	144	172
South Africa	9,019	8,624	13,243	18,041	20,593	23,124	28,166	26,036	24,138	30,810	34,903	32,462	29,482	29,108	26,013	24,809
Tunisia	830	932	1,118	1,231	1,268	1,415	1,594	1,836	1,541	1,593	1,665	1,674	1,709	1,796	1,604	1,590
Asia																
Bangladesh	701	727	811	873	922	2,062	2,362	2,726	2,897	3,367	3,716	4,438	5,408	6,257	7,153	8,110
China	74,692	78,871	96,103	101,187	115,558	156,488	240,844	299,087	352,105	415,881	513,848	598,936	714,519	804,550	952,921	988,149
India	25,393	28,427	33,274	36,187	40,308	46,543	59,323	67,205	67,441	89,322	102,916	100,469	102,781	106,559	107,787	120,273
Indonesia	8,492	10,357	12,290	12,677	13,426	16,035	18,071	20,178	20,398	26,372	30,834	34,159	35,406	34,411	34,719	39,277
Japan	232,658	237,935	265,660	280,820	279,341	259,800	261,630	242,668	253,731	270,746	281,040	273,967	220,043	199,240	189,934	210,904
Malaysia	8,486	9,595	10,114	10,758	10,729	12,083	14,160	16,120	15,792	19,117	21,029	22,677	22,975	23,032	20,919	20,951



## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Pakistan	1,731	2,141	2,302	2,719	3,702	4,694	5,643	5,696	5,890	5,572	6,214	6,108	5,141	5,942	6,096	6,695
Philippines	4,091	4,366	4,566	5,008	6,063	7,734	9,744	11,279	11,421	13,798	15,794	18,083	20,853	22,277	23,372	24,401
Singapore	8,911	9,097	9,437	10,691	11,878	14,679	19,324	20,640	21,129	24,315	27,772	29,929	32,734	35,219	34,745	34,506
South Korea	28,829	38,364	41,856	43,541	52,137	57,850	65,766	59,101	50,931	62,148	71,079	74,063	77,434	86,326	93,396	97,873
Sri Lanka	566	838	953	1,023	1,198	1,606	1,908	2,353	2,524	3,032	2,564	2,835	3,026	3,383	3,507	3,683
Taiwan	24,436	24,202	23,638	25,919	28,218	27,718	28,725	28,944	24,124	27,544	31,051	31,500	32,665	34,664	34,258	35,095
Thailand	5,199	6,439	7,645	9,133	10,372	11,843	14,284	15,719	16,158	18,326	21,148	23,548	27,509	27,490	26,875	28,788
Vietnam	478	518	573	650	737	854	1,000	1,295	1,437	6,345	7,373	8,348	9,464	9,952	10,618	11,488
Australia and Oceania																
Australia	28,959	31,028	39,862	49,647	57,530	64,676	79,931	88,180	83,414	105,091	121,365	129,263	128,550	125,687	114,409	120,598
New Zealand	2,483	2,970	4,227	5,168	5,580	5,231	6,130	6,594	7,068	7,397	8,731	9,296	10,322	10,936	10,004	10,608

EU = European Union.

### Note(s)

Value added is the amount contributed by a country, firm, or other entity to the value of a good or service and excludes purchases of domestic and imported materials and inputs. Data are not available for EU members Cyprus, Estonia, Latvia, Lithuania, Luxembourg, Malta, and Slovenia. China includes Hong Kong. Detail may not add to total because of rounding or minor discrepancies. See Appendix Table 6-1 for a full list of countries and economies in each region.

### Source(s)

IHS Global Insight, World Industry Service database, accessed 17 July 2017.

*Science and Engineering Indicators 2018*

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

### APPENDIX TABLE 6-10

#### Value added of business services, by region, country, or economy: 2001–16

(Millions of current dollars)

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
World	1,812,541	1,878,176	2,082,458	2,294,181	2,462,751	2,695,390	3,032,889	3,360,664	3,177,453	3,326,363	3,665,854	3,768,550	3,861,866	3,997,691	3,836,465	3,953,984
North America																
Canada	32,517	33,893	40,136	45,962	52,823	60,598	66,643	71,855	65,469	75,930	84,383	87,924	87,602	82,237	69,973	67,941
Mexico	17,451	18,980	19,521	20,709	23,486	25,476	27,585	29,311	23,645	26,187	28,911	28,955	31,746	31,693	28,801	26,946
United States	714,888	742,455	762,909	805,432	857,593	933,555	976,651	1,054,747	992,638	999,655	1,041,303	1,094,521	1,117,217	1,172,597	1,265,695	1,316,111
Central and South America																
Argentina	19,605	5,969	6,655	8,301	9,995	12,089	15,486	19,165	18,714	21,770	25,651	27,356	28,652	24,483	27,219	23,987
Bolivia	257	229	223	224	221	238	267	311	354	386	420	483	533	563	626	738
Brazil	23,007	21,662	21,882	26,278	36,274	47,528	57,854	71,821	79,853	102,275	125,237	123,052	125,060	123,613	77,710	77,706
Chile	3,500	3,014	2,932	3,966	5,203	6,399	7,694	8,914	9,092	11,392	14,183	16,107	17,529	16,400	15,114	15,596
Colombia	4,732	4,802	4,571	5,630	7,124	7,824	10,115	11,728	11,597	14,272	15,639	17,469	17,885	17,845	12,623	12,310
Costa Rica	633	678	710	803	908	1,085	1,358	1,640	1,775	2,182	2,562	2,996	3,334	3,355	3,655	3,942
Ecuador	1,116	1,442	1,617	1,718	1,873	2,084	2,438	2,743	2,811	3,256	3,827	4,339	4,995	5,526	5,109	4,749
Honduras	115	126	139	155	161	156	166	180	225	260	227	228	240	232	213	223
Panama	793	855	913	961	1,039	1,155	1,195	1,341	1,511	1,701	1,907	2,081	2,377	2,646	2,814	3,082
Peru	1,498	1,765	1,723	1,854	2,003	2,279	2,696	3,360	3,477	4,243	4,918	5,731	6,083	6,407	6,185	6,395

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Uruguay	1,466	908	690	717	912	1,031	1,237	1,622	1,849	2,469	2,973	3,381	3,866	3,890	3,664	3,632
Venezuela	3,812	2,737	2,126	2,313	2,518	2,979	3,595	4,429	5,710	3,586	4,507	5,806	5,611	4,268	6,930	1,333
Europe																
EU	538,748	589,331	721,818	815,870	855,595	926,198	1,085,341	1,181,527	1,035,534	1,007,206	1,088,389	1,046,095	1,085,796	1,133,331	1,010,324	1,026,323
Austria	8,898	10,195	12,773	14,600	15,839	17,170	20,046	23,481	21,830	21,197	22,864	21,775	23,500	24,306	20,720	21,368
Belgium	18,487	19,732	24,586	28,217	30,086	32,567	38,137	43,124	39,807	38,957	42,587	39,355	42,777	44,820	39,078	40,662
Bulgaria	250	278	316	394	484	595	925	1,347	1,607	1,713	1,823	1,898	1,858	1,836	1,551	1,569
Czech Republic	2,574	3,690	4,386	5,101	6,169	6,792	8,422	11,204	9,607	9,812	10,793	9,683	9,172	8,773	7,746	7,624
Denmark	7,022	7,324	8,842	10,644	11,464	12,147	13,665	16,549	15,464	15,400	16,878	16,040	17,443	18,337	16,517	16,772
Finland	4,303	4,555	5,750	6,816	7,271	7,826	9,789	11,303	10,346	10,121	11,304	10,837	11,318	11,429	9,720	10,013
France	85,137	93,482	116,447	134,093	142,491	155,619	181,893	204,301	185,199	179,002	197,642	199,073	192,684	193,608	169,962	175,949
Germany	149,674	160,188	193,714	207,694	211,890	222,308	261,212	286,174	239,049	227,334	245,389	229,835	242,711	253,619	217,739	225,438
Greece	3,971	5,139	6,986	8,780	8,827	10,988	13,257	13,539	13,009	10,635	10,052	8,502	8,143	7,574	6,618	6,725
Hungary	2,204	2,968	3,660	4,447	4,857	5,288	6,037	7,263	6,148	6,078	6,487	5,861	6,288	6,620	5,817	6,149
Ireland	4,044	4,513	6,048	8,109	10,610	11,730	14,219	14,586	12,316	12,738	14,420	13,706	15,652	15,900	14,600	15,266
Italy	67,073	72,608	94,158	105,262	107,768	107,751	121,346	134,358	124,366	118,296	128,268	114,982	119,369	121,468	103,474	105,559
Netherlands	26,907	28,142	33,850	38,454	40,418	43,654	51,327	57,868	52,695	48,093	49,587	46,528	48,046	50,319	44,938	46,865
Poland	9,506	9,297	10,124	11,318	14,183	16,055	20,333	26,420	22,111	22,825	24,069	23,220	25,094	26,994	23,313	23,508
Portugal	4,280	4,631	5,814	6,688	7,138	7,343	9,023	10,458	9,778	9,245	9,148	7,737	8,155	8,390	7,245	7,436

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Romania	894	1,327	1,772	2,096	2,861	4,293	6,251	7,322	6,182	7,252	9,606	8,236	11,482	12,718	11,974	13,003
Slovakia	763	976	1,235	1,574	1,880	2,283	3,277	4,413	4,380	4,356	4,595	4,372	4,805	4,728	3,966	4,047
Spain	24,482	27,536	36,041	41,865	45,996	52,681	63,351	73,266	69,340	62,851	64,713	59,190	59,001	59,661	52,942	57,021
Sweden	12,221	13,267	16,455	19,262	20,020	23,240	28,258	29,642	24,323	28,594	34,837	34,301	37,828	38,296	33,680	35,297
United Kingdom	106,057	119,483	138,861	160,459	165,344	185,869	214,574	204,908	167,977	172,707	183,326	190,966	200,470	223,934	218,724	206,050
Other Europe																
Norway	5,618	6,594	7,642	8,630	10,101	11,811	15,692	18,410	16,598	17,948	20,900	22,570	23,458	22,449	17,929	17,227
Russia	12,651	12,560	15,684	21,221	28,195	36,007	52,978	67,260	52,055	62,629	69,560	75,734	85,435	78,002	52,878	52,537
Switzerland	19,786	20,872	22,813	26,059	26,969	28,518	32,148	38,895	41,037	44,113	53,384	53,222	56,257	58,751	57,097	56,275
Turkey	4,611	6,327	8,283	10,866	13,715	15,771	21,106	24,753	22,499	26,945	28,122	30,305	32,541	33,537	33,118	34,063
Ukraine	771	913	1,019	1,414	1,914	2,449	3,985	5,078	3,953	3,832	4,300	5,829	6,600	4,371	2,709	2,838
Middle East																
Bahrain	305	324	350	397	459	517	595	640	652	714	672	705	727	786	773	789
Iran	4,604	5,848	7,158	8,522	10,008	12,730	16,940	20,772	22,754	24,771	30,591	22,717	16,844	19,564	18,506	20,007
Israel	11,531	10,554	11,302	12,416	12,542	14,512	16,521	19,611	20,916	23,567	28,719	27,383	30,684	32,682	31,742	34,040
Jordan	503	515	543	580	581	611	645	656	738	814	896	971	1,039	1,106	1,153	1,201
Kuwait	359	442	497	532	590	615	672	713	655	742	1,302	1,324	1,371	1,546	1,129	1,131
Oman	411	437	427	441	459	521	629	714	768	818	886	1,036	1,152	1,377	1,459	1,382
Qatar	104	107	109	228	275	797	1,249	1,501	1,627	1,546	1,811	2,110	2,501	2,704	3,963	4,130

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Saudi Arabia	4,491	4,598	4,700	5,076	5,349	5,728	6,246	7,141	8,515	9,665	10,690	13,959	16,995	18,605	16,804	15,469
United Arab Emirates	4,127	4,754	5,471	6,554	7,428	8,505	11,604	12,957	11,766	12,070	12,891	14,118	15,582	16,266	15,352	15,645
Africa																
Cameroon	244	268	337	384	415	448	489	554	580	587	660	662	729	775	681	741
Egypt	1,226	1,138	911	851	1,194	1,479	1,424	1,641	1,936	2,193	5,997	6,282	6,051	6,587	6,972	6,180
Ghana	176	205	254	295	359	428	482	490	425	603	811	940	820	620	598	655
Kenya	267	274	312	313	358	431	533	570	588	606	580	691	745	781	740	823
Morocco	1,334	1,506	1,907	2,230	2,493	2,792	3,417	3,720	3,994	3,940	4,373	4,318	4,568	4,690	4,233	4,248
Nigeria	2,744	3,435	3,881	4,698	5,774	7,779	8,800	10,284	9,267	11,417	14,360	16,965	19,061	21,776	20,432	17,014
Senegal	188	214	265	306	323	355	437	520	508	511	575	544	595	619	548	644
South Africa	3,592	3,413	5,453	6,930	8,009	8,248	8,963	8,465	9,961	13,220	14,592	13,167	11,843	11,751	10,437	9,892
Tunisia	897	1,008	1,209	1,332	1,372	1,530	1,724	1,898	1,980	2,012	2,204	2,092	2,198	2,308	2,047	2,012
Asia																
Bangladesh	1,631	1,684	1,787	1,876	1,869	2,229	2,429	2,650	3,045	3,318	3,427	3,559	4,284	4,991	5,737	6,396
China	49,286	51,512	51,001	56,651	68,097	84,983	111,470	142,821	164,733	199,925	259,112	314,115	378,285	434,575	477,564	502,809
India	6,902	7,346	8,651	11,361	13,648	15,967	20,929	24,663	27,153	34,781	40,418	42,776	49,610	59,015	58,794	63,944
Indonesia	1,637	2,214	2,778	3,063	3,433	4,449	5,065	5,692	6,115	8,255	9,833	10,292	10,425	10,503	10,652	11,784
Japan	250,887	234,908	249,989	267,240	272,265	271,175	279,193	320,358	339,535	356,208	388,633	389,422	310,105	285,008	254,576	283,783
Malaysia	1,399	1,510	1,628	1,745	2,390	2,667	3,212	3,687	3,867	4,787	5,447	6,003	6,519	6,871	5,706	5,803

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Pakistan	1,334	1,666	1,894	2,179	2,856	5,635	6,270	6,397	6,880	7,877	9,435	10,448	11,006	12,992	14,142	15,535
Philippines	2,224	2,346	2,481	2,711	3,106	3,772	4,685	5,592	5,632	6,646	7,651	8,771	9,475	9,575	10,002	10,412
Singapore	2,193	2,305	2,432	2,578	2,876	3,424	4,231	5,219	5,354	6,867	8,492	9,116	9,874	10,123	9,513	9,536
South Korea	12,172	14,499	16,934	19,119	22,884	27,125	30,715	28,792	26,110	30,509	30,271	31,951	35,293	37,921	34,003	33,335
Sri Lanka	248	368	380	375	436	521	616	686	742	814	992	1,109	1,163	1,184	1,140	1,170
Taiwan	6,905	7,003	7,383	7,970	8,728	9,642	10,073	10,514	10,045	11,017	12,148	12,573	12,861	12,986	12,505	12,542
Thailand	3,270	3,796	4,330	4,913	5,370	6,281	7,137	7,687	7,228	8,617	9,591	10,665	11,407	11,420	11,157	11,574
Vietnam	636	694	758	852	882	979	1,142	1,428	1,541	1,651	1,899	2,185	2,488	2,662	2,771	2,940
Australia and Oceania																
Australia	23,304	26,572	34,776	42,752	48,448	54,471	67,170	71,629	71,961	91,360	112,266	118,204	108,834	100,658	67,343	68,089
New Zealand	3,836	4,602	6,166	7,627	8,854	8,813	10,951	10,911	9,490	11,698	12,328	13,191	23,916	26,468	22,908	24,375

EU = European Union.

### Note(s)

Value added is the amount contributed by a country, firm, or other entity to the value of a good or service and excludes purchases of domestic and imported materials and inputs. Data are not available for EU members Cyprus, Estonia, Latvia, Lithuania, Luxembourg, Malta, and Slovenia. China includes Hong Kong. Detail may not add to total because of rounding or minor discrepancies. See Appendix Table 6-1 for a full list of countries and economies in each region.

### Source(s)

IHS Global Insight, World Industry Service database, accessed 17 July 2017.

*Science and Engineering Indicators 2018*

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

### APPENDIX TABLE 6-11

#### Value added of information services, by region, country, or economy: 2001–16

(Millions of current dollars)

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
World	1,455,035	1,544,837	1,697,458	1,911,400	2,024,934	2,127,731	2,398,518	2,617,303	2,533,842	2,640,253	2,826,795	2,874,373	2,963,115	3,030,737	2,958,375	3,093,875
North America																
Canada	28,858	29,892	35,237	40,637	46,224	52,321	57,873	59,959	57,034	65,372	71,500	73,341	72,724	70,529	62,061	63,099
Mexico	15,526	15,789	15,091	17,366	20,917	24,034	28,406	29,361	25,359	28,167	28,110	26,674	28,043	27,487	22,843	23,047
United States	560,749	598,404	613,189	664,625	705,021	717,709	781,348	820,130	782,621	803,107	816,758	835,973	891,692	905,472	952,592	980,170
Central and South America																
Argentina	13,884	4,032	4,875	6,157	7,728	9,807	12,011	14,790	14,774	17,558	19,751	21,337	21,691	18,554	20,789	18,870
Bolivia	235	211	204	223	228	243	253	292	326	340	365	393	428	463	526	621
Brazil	22,026	18,643	19,958	25,771	34,669	41,254	53,045	63,173	61,497	71,896	81,904	76,016	73,039	71,651	56,447	57,177
Chile	1,840	1,651	1,706	2,070	2,445	2,917	3,317	3,554	3,539	4,323	4,924	5,007	5,202	4,665	4,336	4,481
Colombia	2,376	2,441	2,316	2,854	3,641	4,186	5,495	6,276	5,824	7,005	7,827	8,387	8,822	8,801	6,219	6,070
Costa Rica	351	400	445	503	562	687	800	927	949	1,256	1,491	1,853	2,003	1,877	2,099	2,280
Ecuador	593	696	829	941	1,151	1,152	1,241	1,425	1,554	1,682	1,812	1,914	2,012	2,174	2,046	2,026
Honduras	285	273	298	315	359	374	424	472	546	562	556	594	607	635	683	701
Panama	591	605	600	570	682	748	842	938	1,052	1,122	1,239	1,340	1,486	1,703	1,812	1,983
Peru	1,583	1,593	1,706	1,883	2,019	2,415	2,723	3,211	3,120	3,575	3,856	4,283	4,475	4,474	4,278	4,398

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Uruguay	976	624	517	561	722	817	949	1,227	1,273	1,646	1,901	2,047	2,305	2,298	2,179	2,254
Venezuela	4,429	3,367	2,894	3,278	4,034	5,803	7,987	10,540	13,235	8,483	10,518	13,045	12,167	9,833	16,347	3,086
Europe																
EU	384,120	430,143	510,443	592,956	604,840	635,092	730,448	781,078	718,202	695,359	735,267	700,346	729,433	754,756	666,415	680,029
Austria	6,427	7,297	8,763	9,421	9,837	10,141	11,179	12,214	11,331	11,008	11,510	10,581	11,248	11,570	9,835	10,097
Belgium	8,692	9,385	11,415	13,439	13,958	14,676	16,944	18,842	18,153	17,696	18,924	17,918	17,948	17,981	15,625	16,201
Bulgaria	473	622	787	1,016	960	1,092	1,395	2,659	2,416	2,379	2,680	2,383	2,700	2,738	2,253	2,378
Czech Republic	2,546	3,301	4,094	4,656	5,635	6,676	8,341	10,379	9,247	9,162	9,910	8,693	8,940	9,312	8,569	8,841
Denmark	5,815	6,387	8,217	9,092	9,136	9,830	11,074	12,652	12,381	12,078	12,838	11,921	12,646	12,936	11,871	13,064
Finland	5,871	6,537	7,689	9,277	8,448	8,576	10,234	11,465	10,689	10,328	11,279	11,225	12,073	12,754	11,339	11,838
France	60,769	68,292	83,477	96,493	97,509	102,736	115,956	127,012	117,605	114,615	119,728	112,008	113,832	109,967	94,420	96,494
Germany	74,797	80,433	87,007	101,053	99,066	104,743	118,883	127,705	129,697	119,229	123,693	120,418	129,999	137,375	117,323	122,131
Greece	4,878	5,678	6,807	8,243	8,636	9,779	11,331	11,797	11,907	10,175	8,836	7,090	6,814	6,661	5,439	5,404
Hungary	2,092	2,724	3,582	4,285	4,729	4,877	5,980	6,821	6,210	6,152	6,537	5,906	6,252	6,390	5,489	5,681
Ireland	7,000	7,324	9,511	11,776	12,719	12,899	15,549	18,601	17,671	18,868	21,973	22,711	25,928	26,711	23,158	26,180
Italy	46,505	54,225	64,883	73,077	74,607	75,484	85,385	91,839	86,562	83,052	84,063	75,087	76,144	76,498	62,083	62,578
Netherlands	17,497	19,884	25,218	27,983	29,047	30,714	35,859	38,601	34,772	33,549	35,249	32,996	34,811	35,778	31,338	31,767
Poland	6,656	7,774	8,521	10,580	11,771	12,624	15,242	19,539	15,904	16,470	17,507	16,881	18,118	18,889	15,680	15,878
Portugal	3,958	4,492	5,525	6,413	6,638	7,009	7,936	8,747	8,317	7,601	7,958	6,958	6,927	6,786	5,355	5,470



## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Romania	1,880	2,059	2,543	3,210	3,937	5,019	8,588	10,494	7,675	7,358	7,750	6,849	9,462	10,158	9,997	10,982
Slovakia	758	856	1,172	1,495	1,698	2,017	2,846	3,533	3,820	3,639	3,938	4,007	3,792	3,982	3,541	3,641
Spain	25,613	29,917	38,188	44,208	47,143	50,215	58,281	64,498	62,030	57,516	59,205	53,912	53,146	53,584	45,903	48,827
Sweden	11,056	11,767	14,570	17,071	17,335	18,212	20,632	22,610	18,727	21,414	25,462	25,340	27,023	27,710	24,674	25,749
United Kingdom	90,838	101,188	118,472	140,170	142,030	147,772	168,811	161,069	133,087	133,070	146,228	147,460	151,630	166,975	162,523	156,830
Other Europe																
Norway	5,637	6,995	8,291	9,549	10,741	11,120	13,070	13,868	13,020	13,703	15,470	15,848	16,385	15,464	12,815	12,537
Russia	6,966	8,928	11,504	18,219	22,767	28,537	39,573	49,198	39,619	42,302	48,522	53,574	52,394	47,321	32,241	31,855
Switzerland	11,718	13,054	14,638	16,401	16,743	16,869	17,842	20,693	20,908	22,721	26,886	25,873	26,673	27,462	27,176	27,239
Turkey	4,443	5,389	6,795	8,582	11,418	11,872	15,231	16,978	14,592	16,089	15,257	15,957	16,334	15,080	13,762	14,205
Ukraine	1,217	1,421	1,732	2,154	2,633	3,253	4,340	5,326	3,832	4,160	4,818	5,428	6,052	4,430	3,101	3,224
Middle East																
Bahrain	399	434	456	507	567	663	757	889	940	1,087	1,111	1,215	1,276	1,378	1,351	1,394
Iran	1,649	2,094	2,614	3,037	3,791	4,754	6,341	7,899	8,416	9,320	10,706	8,224	6,060	7,115	6,777	7,480
Israel	9,642	9,077	8,212	8,915	11,225	10,858	13,550	18,527	17,372	18,233	19,250	21,310	22,223	24,749	24,204	26,079
Jordan	560	566	593	680	690	793	860	1,016	1,105	1,250	1,273	1,356	1,458	1,509	1,584	1,642
Kuwait	859	869	1,146	1,465	1,683	2,527	3,127	3,649	3,525	3,058	3,123	3,336	3,312	3,337	2,393	2,374
Oman	813	757	784	854	970	1,103	1,332	1,617	1,737	1,957	2,131	2,508	2,812	3,228	3,398	3,307
Qatar	145	160	157	280	378	686	978	1,409	1,665	1,721	2,025	2,098	2,235	2,507	2,675	2,807

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Saudi Arabia	4,485	4,641	4,785	5,491	6,072	6,789	8,152	10,286	12,207	13,772	15,145	16,735	18,511	19,972	18,889	17,633
United Arab Emirates	4,316	4,993	5,515	6,707	7,571	8,837	11,078	12,942	12,991	13,075	14,420	15,255	16,484	16,896	16,235	16,684
Africa																
Cameroon	304	346	249	277	298	305	358	417	419	437	482	472	540	601	537	597
Egypt	3,570	3,411	3,076	3,285	4,490	4,592	5,862	7,399	8,175	8,764	10,083	10,795	10,350	11,336	12,023	10,816
Ghana	217	252	312	363	442	527	547	588	466	581	655	865	793	843	856	957
Kenya	368	427	463	468	556	680	860	891	931	842	673	787	771	734	581	661
Morocco	1,575	1,718	1,846	2,192	2,432	2,633	3,314	3,541	3,794	3,715	3,866	3,855	4,036	4,255	3,867	3,948
Nigeria	2,326	3,266	4,371	7,350	10,486	15,634	21,466	30,450	36,276	39,622	42,020	46,748	53,844	61,276	55,992	48,085
Senegal	194	218	301	399	487	590	724	873	813	795	864	847	928	974	873	1,048
South Africa	4,334	3,854	6,434	8,185	9,076	8,890	8,834	7,599	7,595	9,671	10,542	11,270	10,305	9,811	8,713	8,218
Tunisia	1,209	1,247	1,469	1,735	1,875	1,982	2,261	2,681	2,808	3,046	3,042	2,994	2,929	3,010	2,679	2,640
Asia																
Bangladesh	968	1,056	1,175	1,283	1,399	1,823	2,136	2,447	2,896	3,351	3,553	3,740	4,503	5,112	5,783	6,696
China	43,851	49,740	56,176	67,110	77,711	91,510	111,896	141,264	151,480	170,816	204,232	241,077	281,107	321,794	375,526	443,791
India	19,814	19,921	24,098	30,150	35,574	39,265	49,870	56,158	60,373	68,829	74,350	77,162	88,137	95,832	98,154	109,793
Indonesia	2,736	4,767	6,174	7,988	9,417	12,176	15,138	17,803	20,402	28,167	32,109	33,181	32,620	31,124	30,397	33,867
Japan	217,126	214,354	232,342	247,569	238,335	230,127	230,826	264,188	279,882	295,948	324,155	325,768	270,130	251,951	230,222	256,534
Malaysia	4,005	4,478	4,962	5,344	6,088	7,419	8,187	9,023	9,685	12,267	13,945	15,107	16,217	17,220	14,510	15,169

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Pakistan	1,447	1,621	1,881	2,093	2,391	3,071	3,311	3,571	3,384	3,513	3,871	4,181	3,879	4,227	4,244	4,673
Philippines	2,361	2,726	2,934	3,257	3,708	4,210	5,072	5,614	4,977	5,639	6,076	6,872	7,215	7,378	7,760	8,044
Singapore	3,721	3,606	3,965	4,368	4,760	5,260	6,001	6,766	7,187	8,121	9,775	10,715	11,557	12,111	11,646	11,515
South Korea	21,932	25,878	28,011	29,529	35,402	39,768	42,182	35,994	32,284	36,694	41,559	42,546	41,764	44,487	39,046	38,624
Sri Lanka	69	74	86	94	114	137	170	219	235	280	342	357	450	474	570	597
Taiwan	11,917	11,659	12,008	12,555	13,101	13,123	13,600	14,416	13,730	14,706	15,670	15,602	15,701	15,724	15,248	15,626
Thailand	2,980	3,409	3,695	3,721	4,204	4,842	5,721	6,141	6,071	6,945	7,342	7,930	8,548	8,699	8,480	8,952
Vietnam	389	408	458	534	630	739	855	1,079	1,134	1,215	1,165	1,223	1,318	1,433	1,356	1,447
Australia and Oceania																
Australia	14,253	15,741	20,107	24,109	25,224	26,446	31,392	32,513	32,304	38,178	43,660	44,053	41,418	38,486	35,675	37,329
New Zealand	2,100	2,521	3,334	3,893	4,241	3,766	4,543	4,019	3,705	4,210	4,847	4,958	5,718	6,025	5,362	5,500

EU = European Union.

### Note(s)

Value added is the amount contributed by a country, firm, or other entity to the value of a good or service and excludes purchases of domestic and imported materials and inputs. Data are not available for EU members Cyprus, Estonia, Latvia, Lithuania, Luxembourg, Malta, and Slovenia. China includes Hong Kong. Detail may not add to total because of rounding or minor discrepancies. See Appendix Table 6-1 for a full list of countries and economies in each region.

### Source(s)

IHS Global Insight, World Industry Service database, accessed 17 July 2017.

*Science and Engineering Indicators 2018*

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

### APPENDIX TABLE 6-12

#### Value added of computer programming and related services, by region, country, or economy: 2001–2016

(Millions of current dollars)

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
World	504,255	542,661	597,652	672,881	715,651	769,005	860,541	942,926	913,419	958,799	1,033,023	1,049,867	1,070,963	1,115,735	1,114,294	1,143,400
North America																
Canada	10,439	10,916	13,021	14,948	17,242	20,058	21,985	22,936	22,527	25,779	29,645	31,333	31,928	32,014	30,586	29,679
Mexico	905	893	862	995	1,149	1,202	1,318	1,428	1,199	1,360	1,436	1,461	1,514	1,635	1,542	1,499
United States	203,206	224,273	234,416	260,388	276,765	298,295	317,890	337,408	334,236	353,010	380,897	403,544	427,908	461,958	495,898	516,970
Central and South America																
Argentina	4,090	1,245	1,388	1,732	2,085	2,522	3,230	4,040	3,910	4,559	5,363	5,659	5,909	5,034	5,919	4,648
Bolivia	54	48	46	47	46	50	56	65	73	78	86	98	108	114	134	147
Brazil	4,165	3,634	4,015	4,999	7,049	8,035	10,838	11,181	12,035	14,609	17,950	17,904	19,152	19,601	15,129	12,672
Chile	916	794	891	1,133	1,425	1,692	1,949	2,448	2,472	3,139	3,906	4,391	4,858	4,579	4,545	4,785
Colombia	852	1,259	1,180	1,421	1,781	1,936	2,431	2,816	2,834	3,545	3,949	4,392	4,533	4,541	3,813	3,730
Costa Rica	103	107	109	115	120	141	169	199	220	292	356	413	465	483	535	595
Ecuador	117	154	173	184	200	222	259	295	310	371	428	485	564	589	622	648
Honduras	28	32	35	38	41	46	54	59	65	72	77	82	86	90	92	97
Jamaica	63	68	63	69	78	83	92	104	97	118	127	130	122	116	122	126
Panama	166	178	190	201	217	241	249	281	313	356	402	449	527	591	662	719

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Peru	473	488	511	552	606	667	766	887	967	1,138	1,278	1,481	1,633	1,718	1,775	1,832
Uruguay	306	189	144	150	190	215	258	353	404	554	665	764	885	914	916	928
Venezuela	743	534	415	451	491	581	701	936	1,213	811	1,029	1,336	1,301	1,029	1,626	303
Europe																
EU	147,110	162,743	193,454	227,062	238,071	257,743	303,811	335,225	303,924	296,092	309,567	291,689	299,142	310,991	291,790	290,709
Austria	2,183	2,767	3,122	3,581	3,872	4,154	4,627	5,104	4,830	4,688	5,190	4,704	4,797	4,695	3,911	3,950
Belgium	3,323	3,470	4,157	4,658	4,915	5,334	6,598	7,744	7,312	7,128	7,890	7,443	7,763	7,880	7,106	7,272
Bulgaria	55	64	83	107	124	143	190	227	237	208	237	212	224	224	202	217
Czech Republic	746	1,106	1,143	1,239	1,686	2,153	2,750	3,859	3,556	3,500	3,922	3,360	3,197	3,095	3,033	3,175
Denmark	2,315	2,630	3,193	3,688	3,473	4,129	5,009	6,451	6,351	6,322	6,891	6,673	6,906	7,455	7,055	7,078
Finland	2,102	2,162	2,620	3,336	3,594	3,899	4,738	5,440	5,057	5,115	5,649	5,649	6,090	6,446	5,914	6,167
France	31,323	33,458	40,068	45,989	46,779	51,604	59,718	68,703	65,601	59,437	60,661	56,892	58,892	59,370	55,728	56,845
Germany	28,659	29,379	32,920	37,708	39,174	40,761	49,094	56,945	54,023	53,061	53,118	51,010	53,843	56,376	51,583	53,258
Greece	198	589	751	1,084	1,176	1,181	1,295	1,536	1,713	1,623	1,296	998	876	773	682	677
Hungary	619	810	951	1,165	1,333	1,550	1,955	2,361	2,156	2,194	2,324	2,167	2,265	2,331	2,066	2,052
Ireland	2,894	3,084	3,379	3,770	6,870	8,085	9,135	10,047	8,076	8,010	8,676	7,625	7,255	7,466	7,140	7,307
Italy	16,292	20,083	24,074	25,668	26,164	26,791	31,303	34,250	32,279	30,931	30,520	27,298	27,186	26,250	22,998	23,186
Netherlands	7,351	7,323	8,781	10,013	10,972	12,310	15,270	17,407	15,919	14,683	15,633	14,087	14,318	14,243	12,807	13,089
Poland	1,507	1,754	2,062	2,570	2,691	3,029	3,742	4,686	4,578	5,051	4,881	4,859	5,120	5,236	4,728	4,836

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Portugal	792	955	1,189	1,391	1,504	1,661	1,899	2,136	2,186	2,142	1,894	1,642	1,670	1,658	1,490	1,508
Romania	181	232	319	382	602	925	1,665	2,078	1,702	1,725	1,918	2,179	2,428	2,639	2,654	2,807
Slovakia	196	192	256	392	490	654	1,101	1,339	1,306	1,288	1,354	1,242	1,403	1,338	1,183	1,206
Spain	7,199	8,687	11,058	12,680	13,359	14,578	17,238	19,912	18,735	17,325	15,188	12,544	12,105	11,177	10,104	10,618
Sweden	6,078	6,129	7,496	9,473	9,916	10,170	11,825	13,400	11,002	12,436	14,277	13,954	14,596	14,314	13,451	13,953
United Kingdom	33,099	37,868	45,833	58,167	59,376	64,635	74,658	71,600	57,305	59,225	68,048	67,151	68,209	78,026	77,954	71,507
Other Europe																
Norway	2,185	2,533	2,846	3,658	4,392	4,419	5,806	6,422	5,876	6,253	7,144	7,241	7,438	7,530	6,154	6,038
Russia	1,419	1,409	1,760	1,718	2,619	3,728	5,800	8,653	7,081	8,517	9,996	13,046	12,397	11,116	7,818	7,226
Switzerland	5,566	6,289	6,704	7,683	7,930	8,193	8,691	10,286	10,751	11,796	14,067	13,995	14,573	15,364	15,158	15,067
Turkey	1,824	2,131	2,748	3,635	4,674	5,744	7,466	8,884	8,725	9,587	9,257	9,556	9,848	9,459	8,763	8,956
Ukraine	198	233	262	365	490	625	1,012	1,303	987	1,065	1,270	1,572	1,615	1,062	798	777
Middle East																
Bahrain	64	68	73	83	96	108	124	139	139	151	143	149	154	165	171	177
Iran	898	1,140	1,396	1,662	1,951	2,482	3,303	4,090	4,297	4,638	5,702	4,199	3,144	3,645	3,614	3,852
Israel	1,904	1,784	1,866	1,995	2,129	2,357	2,707	3,300	3,479	3,871	4,198	4,061	4,652	4,837	4,971	5,265
Jordan	105	107	113	121	121	127	135	144	156	174	188	202	216	230	246	271
Kuwait	32	39	44	47	52	54	59	63	58	66	115	117	121	131	108	107
Qatar	65	68	71	136	168	386	578	721	723	740	792	867	924	1,079	1,174	1,255

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Saudi Arabia	937	959	980	1,059	1,116	1,195	1,303	1,540	1,826	2,093	2,325	3,059	3,771	4,175	3,928	3,967
United Arab Emirates	861	992	1,141	1,367	1,549	1,774	2,420	2,773	2,502	2,582	2,770	3,048	3,161	3,488	3,468	3,421
Africa																
Cameroon	47	52	66	75	81	87	95	110	112	112	125	126	141	151	140	156
Egypt	256	237	190	178	249	308	297	361	424	480	1,346	1,423	1,398	1,457	1,666	1,707
Kenya	81	84	95	97	110	130	147	173	170	172	165	198	204	226	242	269
Morocco	278	314	398	465	520	582	713	784	834	828	916	904	966	1,003	959	994
Nigeria	1,080	1,337	1,379	1,325	1,662	1,745	1,867	2,379	2,051	2,594	2,988	3,773	4,321	4,841	4,447	4,817
Senegal	39	45	55	64	67	74	91	110	105	105	118	112	123	129	132	144
South Africa	204	192	323	430	487	514	585	555	644	908	992	895	808	795	741	666
Tunisia	187	210	252	278	286	319	360	400	417	435	474	451	486	512	462	473
Zimbabwe	16	10	54	15	5	2	3	3	5	6	7	9	10	11	13	15
Asia																
Bangladesh	320	331	353	371	370	440	480	533	620	694	727	766	943	1,107	1,294	1,426
China	2,985	3,170	3,405	3,886	4,441	5,122	6,211	7,289	7,752	8,499	10,341	11,936	14,155	16,756	19,530	21,533
India	2,971	3,170	3,722	4,873	5,813	6,762	8,812	10,453	11,509	14,613	17,238	18,028	19,126	20,697	21,302	23,862
Indonesia	446	616	790	886	1,005	1,271	1,441	1,692	1,952	2,681	3,227	3,292	3,339	3,337	3,521	3,978
Japan	87,898	87,535	92,445	95,322	94,932	91,329	93,306	107,141	113,302	121,217	123,723	121,246	98,055	88,765	83,101	91,566
Malaysia	338	358	377	396	534	600	723	829	878	1,055	1,181	1,273	1,376	1,455	1,395	1,482

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Pakistan	163	203	230	262	339	670	738	724	692	741	821	843	875	1,001	1,160	1,273
Philippines	524	560	594	656	761	936	1,173	1,436	1,500	1,732	1,995	2,313	2,598	2,701	3,004	3,295
Singapore	641	676	706	764	871	1,052	1,379	1,737	1,781	2,221	2,694	2,936	3,217	3,342	3,221	3,122
South Korea	6,069	7,235	7,842	8,692	10,697	12,702	13,964	12,019	10,504	12,989	14,139	14,833	15,425	16,069	14,783	15,352
Sri Lanka	38	55	55	56	65	74	85	100	112	124	143	138	165	215	271	291
Taiwan	2,364	2,371	2,486	2,670	2,871	3,190	3,617	3,954	3,740	3,998	4,154	4,305	4,497	4,561	4,657	4,831
Thailand	682	792	903	1,025	1,120	1,310	1,489	1,625	1,502	1,778	1,975	2,188	2,313	2,364	2,455	2,528
Vietnam	117	128	141	159	165	179	210	262	299	526	589	621	723	777	853	924
Australia and Oceania																
Australia	6,086	6,921	8,858	10,674	11,909	13,278	15,657	17,559	17,334	20,628	25,008	27,688	28,262	29,805	27,919	27,439
New Zealand	631	751	1,016	1,251	1,447	1,405	1,637	1,718	1,783	2,247	2,807	2,847	4,789	5,384	4,941	4,773

EU = European Union.

### Note(s)

Value added is the amount contributed by a country, firm, or other entity to the value of a good or service and excludes purchases of domestic and imported materials and inputs. Data are not available for EU members Cyprus, Estonia, Latvia, Lithuania, Luxembourg, Malta, and Slovenia. China includes Hong Kong. Detail may not add to total because of rounding or minor discrepancies. See Appendix Table 6-1 for a full list of countries/economies in each region.

### Source(s)

IHS Global Insight, World Industry Service database, accessed 15 November 2016.

*Science and Engineering Indicators 2018*



## CHAPTER 6 | Industry, Technology, and the Global Marketplace

APPENDIX TABLE 6-13

## Value added of all manufacturing industries, by region, country, or economy: 2001–16

(Millions of current dollars)

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
World	5,251,818	5,363,747	5,993,882	6,751,532	7,244,049	7,851,140	8,838,779	9,584,206	8,751,713	10,023,016	11,255,875	11,423,418	11,674,103	11,926,212	11,432,231	11,429,595
North America																
Canada	120,132	121,009	134,097	150,255	160,537	170,920	179,445	169,505	142,697	167,012	184,230	189,309	183,268	185,346	160,241	155,021
Mexico	131,671	133,074	124,058	135,204	144,221	169,320	175,694	183,474	143,752	175,233	193,758	206,683	213,971	218,529	205,101	185,190
United States	1,503,417	1,499,771	1,558,395	1,648,102	1,732,408	1,833,865	1,885,205	1,844,693	1,755,476	1,859,246	1,938,513	2,016,100	2,068,215	2,133,761	2,206,680	2,229,571
Central and South America																
Argentina	25,382	12,519	16,699	21,151	26,120	31,249	38,584	50,489	43,569	53,503	65,415	69,083	68,752	59,919	66,865	55,442
Bolivia	903	861	867	924	942	1,096	1,265	1,573	1,712	1,881	2,081	2,329	2,567	2,711	3,071	3,600
Brazil	117,390	109,128	125,561	155,325	195,784	238,775	292,905	371,022	317,837	430,950	498,991	452,566	449,364	428,005	284,605	270,483
Chile	14,352	12,514	12,627	15,512	17,344	19,690	20,747	20,108	19,463	23,528	27,494	28,654	29,834	29,138	27,657	27,084
Colombia	13,884	13,747	13,475	16,875	20,718	23,169	29,984	33,890	30,519	36,868	42,198	46,025	45,818	44,001	33,241	31,542
Costa Rica	2,784	2,884	2,954	3,143	3,381	3,744	4,337	4,662	4,351	5,390	5,972	6,138	6,116	6,168	6,258	6,316
Ecuador	4,634	5,016	5,261	5,525	5,864	6,387	7,004	8,465	8,677	9,322	10,339	11,390	12,393	13,956	14,375	13,979
Honduras	1,503	1,564	1,628	1,699	1,862	2,071	2,219	2,472	2,426	2,619	3,045	3,277	3,199	3,323	3,504	3,459
Panama	858	895	891	786	807	856	1,149	1,305	1,463	1,481	1,538	1,699	1,855	1,972	2,105	2,107
Peru	8,110	8,493	9,046	10,934	12,593	14,604	16,882	19,656	18,482	22,950	25,923	29,222	29,836	28,135	24,942	23,980

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Uruguay	2,214	1,910	1,434	1,720	2,041	2,548	2,959	3,788	3,423	4,015	4,349	5,109	5,452	5,707	5,355	5,033
Venezuela	24,721	16,991	15,700	20,959	25,827	30,599	37,793	54,009	54,882	35,705	45,460	54,247	51,193	41,140	67,105	12,007
Europe																
EU	1,382,071	1,461,512	1,732,316	1,971,577	2,029,149	2,151,904	2,476,848	2,592,593	2,125,827	2,199,975	2,419,248	2,232,819	2,327,099	2,414,712	2,179,903	2,151,578
Austria	34,709	36,449	43,856	50,058	52,791	57,297	67,686	71,399	61,712	63,015	70,807	67,516	70,240	71,703	63,927	64,345
Belgium	37,427	39,967	47,137	54,535	55,877	57,671	64,943	67,782	56,793	57,940	63,408	59,135	61,714	62,311	56,499	55,885
Bulgaria	1,824	2,190	2,885	3,282	4,018	4,568	6,196	6,687	6,616	5,793	7,932	7,366	7,020	7,490	6,369	6,356
Czech Republic	15,183	17,604	20,788	25,983	29,923	34,377	41,798	49,574	40,110	41,172	46,601	42,095	41,964	45,013	41,351	41,837
Denmark	20,865	22,478	26,157	28,876	29,494	31,438	35,606	37,749	31,431	30,719	31,138	30,330	33,022	34,018	31,969	32,504
Finland	27,475	28,712	33,469	37,501	38,187	41,773	50,178	51,163	35,003	35,938	39,196	32,748	34,622	35,051	30,499	30,028
France	176,558	183,162	216,315	240,209	241,793	241,347	275,182	286,529	250,353	237,611	251,264	230,136	242,219	239,163	207,221	205,222
Germany	373,680	389,158	472,233	540,214	549,056	595,954	687,650	720,190	572,554	637,982	729,296	685,377	720,343	764,844	668,296	668,217
Greece	13,539	15,145	18,490	21,044	21,262	23,118	26,956	30,116	25,217	21,661	22,491	19,757	20,421	19,476	15,724	15,720
Hungary	10,093	12,265	15,434	19,279	21,141	22,170	25,763	28,361	21,550	24,218	26,293	23,375	25,017	26,786	24,887	24,495
Ireland	27,578	34,253	38,382	40,979	41,445	43,072	48,443	48,089	48,005	44,546	52,980	44,312	44,353	44,840	88,369	88,687
Italy	197,776	210,623	250,149	283,043	285,662	300,876	349,209	365,690	301,109	297,364	313,527	275,767	283,388	287,592	241,320	240,921
Netherlands	49,430	52,293	63,784	73,094	76,316	78,715	92,271	99,079	83,414	86,195	96,810	88,329	88,170	89,905	80,446	79,715
Poland	27,829	28,547	33,861	42,784	49,083	57,011	70,255	85,921	71,080	74,557	84,078	81,734	83,355	90,035	81,301	80,260
Portugal	17,837	19,060	22,223	24,683	24,763	25,746	29,407	31,268	27,139	27,575	27,752	24,627	26,129	26,716	23,338	22,874

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Romania	8,895	10,047	12,167	15,926	20,940	25,749	33,491	39,960	32,512	35,815	39,795	34,054	38,873	39,134	32,866	33,057
Slovakia	4,802	5,018	6,995	9,072	10,224	12,089	16,146	19,506	14,300	16,911	18,735	17,795	18,125	19,032	16,306	16,742
Spain	99,206	108,477	135,208	154,790	163,119	175,166	199,338	217,682	184,140	174,064	184,159	160,649	163,557	166,593	145,020	145,439
Sweden	40,014	43,594	53,557	61,388	62,637	67,013	77,319	73,026	54,606	68,564	79,361	72,289	75,713	73,291	66,555	66,594
United Kingdom	197,348	202,472	219,226	244,839	251,419	256,753	279,011	262,823	208,183	218,335	233,624	235,429	248,852	271,720	257,640	232,678
Other Europe																
Norway	14,882	16,650	19,390	21,691	24,319	27,736	31,990	34,487	27,189	28,969	33,476	33,935	34,335	33,151	27,805	25,803
Russia	46,750	52,092	61,226	88,777	118,037	149,093	193,236	243,992	155,410	193,116	250,784	251,021	267,290	245,090	154,953	158,079
Switzerland	51,157	56,668	65,616	73,583	76,792	82,311	92,343	108,346	99,258	107,432	130,935	122,216	125,151	126,502	116,615	113,810
Turkey	37,056	41,024	53,289	67,564	82,681	90,538	107,975	117,183	92,673	113,621	124,878	122,256	126,131	126,329	111,862	107,124
Ukraine	6,421	7,441	9,125	11,771	16,517	20,977	27,374	29,884	17,402	17,982	19,413	21,763	20,650	16,305	10,931	10,789
Middle East																
Bahrain	944	985	1,080	1,174	1,573	2,121	2,731	3,462	2,752	3,182	3,688	3,889	4,120	4,237	4,158	4,047
Iran	10,762	13,746	17,302	20,997	23,154	29,293	36,361	40,223	44,669	48,135	73,583	55,169	39,157	45,474	43,254	45,497
Israel	16,922	14,883	15,602	16,633	18,125	20,108	24,201	27,845	25,041	28,188	31,148	31,749	32,000	32,220	30,866	30,995
Jordan	1,426	1,537	1,699	2,153	2,401	2,644	3,146	4,060	3,905	4,828	5,253	5,437	6,105	6,300	6,601	6,460
Kuwait	2,174	2,930	3,713	4,851	5,789	5,480	6,261	6,424	5,349	6,667	8,115	9,595	9,627	8,590	6,100	5,649
Oman	1,709	1,739	1,919	2,135	2,679	4,193	4,526	6,386	5,602	6,203	7,750	8,213	8,529	7,832	6,780	6,101
Qatar	1,074	1,395	1,800	3,638	4,394	5,664	7,365	12,322	9,223	11,218	15,876	19,662	20,280	20,916	15,950	15,577

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Saudi Arabia	14,174	14,915	18,645	20,384	24,173	27,353	35,245	36,777	38,794	49,498	54,433	58,227	57,551	63,869	64,524	59,017
United Arab Emirates	2,745	2,863	3,043	3,396	3,823	4,280	4,645	5,414	4,652	5,014	5,853	6,411	6,682	6,797	6,451	6,382
Africa																
Cameroon	524	500	554	746	789	823	926	1,594	1,598	1,614	1,817	1,809	2,021	2,190	1,943	2,047
Egypt	7,011	6,505	6,967	7,428	9,419	10,580	12,485	15,727	18,238	21,123	22,906	25,002	23,901	26,468	24,816	19,801
Ghana	883	1,027	1,264	1,432	1,713	1,990	2,128	2,152	1,759	2,056	2,544	2,319	2,423	1,844	1,677	1,819
Kenya	1,799	1,831	2,050	2,280	2,797	3,277	4,088	4,342	4,428	4,502	4,930	5,553	5,787	6,135	6,560	6,935
Morocco	4,876	5,334	5,886	6,382	7,600	7,762	8,947	9,933	9,606	11,189	13,644	12,844	14,480	15,770	14,311	13,861
Nigeria	4,009	4,038	5,575	8,347	11,131	14,006	15,406	19,476	13,373	23,810	29,820	35,954	46,591	55,504	46,605	36,504
Senegal	236	320	384	505	487	506	623	686	690	689	792	734	719	710	637	687
South Africa	20,318	19,727	29,006	37,451	40,364	40,159	42,708	40,884	38,808	45,503	45,375	46,077	42,905	40,870	36,858	33,471
Tunisia	3,910	3,845	4,396	4,900	5,031	5,531	6,837	8,357	7,422	8,322	8,577	8,320	8,604	8,773	7,832	7,250
Asia																
Bangladesh	6,851	7,222	7,878	8,658	9,140	10,711	12,720	14,777	16,831	18,460	19,764	20,523	25,242	28,760	32,646	36,383
China	356,667	389,988	466,262	561,413	676,368	839,508	1,085,145	1,424,781	1,554,264	1,928,849	2,392,933	2,654,067	2,901,826	3,042,168	3,169,807	3,264,639
India	76,786	79,912	93,835	113,336	135,153	159,588	201,547	214,114	216,750	267,722	302,172	294,514	292,657	302,386	309,401	311,594
Indonesia	44,230	53,316	62,936	68,395	74,341	95,257	110,926	134,655	134,945	166,412	194,203	196,954	192,027	186,991	179,701	191,386
Japan	818,633	765,122	833,084	910,410	904,555	862,153	879,503	954,591	890,789	1,074,659	1,093,635	1,101,980	904,665	851,670	768,037	828,114
Malaysia	27,219	29,494	32,982	37,897	39,543	44,848	50,560	56,689	48,138	59,760	69,492	72,749	73,859	77,422	67,539	65,173

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Pakistan	7,632	8,365	9,762	12,039	14,843	17,675	20,185	22,340	20,548	22,817	29,283	30,083	29,828	32,969	31,031	31,795
Philippines	18,811	20,089	20,677	21,882	24,792	28,868	33,971	39,728	35,789	42,802	47,276	51,406	55,491	58,653	58,652	59,690
Singapore	20,743	22,536	23,711	30,486	33,692	38,295	41,617	38,293	37,665	47,471	52,124	54,183	52,117	54,155	54,209	53,398
South Korea	119,251	133,637	147,635	179,711	208,615	231,402	256,776	232,485	208,765	276,175	311,916	316,839	347,405	371,549	349,040	327,802
Sri Lanka	2,609	2,698	3,432	3,864	4,640	5,770	6,645	8,598	8,943	10,242	12,030	13,312	13,350	14,102	14,924	14,392
Taiwan	72,344	80,139	87,366	98,249	104,802	107,714	114,607	113,115	103,523	129,252	139,207	139,153	146,452	159,148	156,859	149,382
Thailand	18,462	33,170	38,483	42,983	47,279	48,161	57,107	64,386	58,678	73,335	75,840	83,503	86,371	81,196	76,087	75,380
Vietnam	6,426	7,173	8,040	9,181	10,848	12,863	15,003	18,418	19,402	20,708	24,455	27,098	29,953	32,505	26,492	28,451
Australia and Oceania																
Australia	41,149	47,281	60,908	70,202	75,388	76,256	90,988	89,053	81,214	95,921	108,991	105,076	98,278	92,499	79,853	79,105
New Zealand	8,219	9,723	12,350	14,912	16,664	14,846	16,910	16,522	13,076	15,893	18,412	19,172	20,612	21,639	18,855	18,814

EU = European Union.

### Note(s)

Value added is the amount contributed by a country, firm, or other entity to the value of a good or service and excludes purchases of domestic and imported materials and inputs. Data are not available for EU members Cyprus, Estonia, Latvia, Lithuania, Luxembourg, Malta, and Slovenia. China includes Hong Kong. Detail may not add to total because of rounding or minor discrepancies. See Appendix Table 6-1 for a full list of countries and economies in each region.

### Source(s)

IHS Global Insight, World Industry Service database, accessed 17 July 2017.

*Science and Engineering Indicators 2018*

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

APPENDIX TABLE 6-14

## Value added of semiconductor industry, by region, country, or economy: 2001–16

(Millions of current dollars)

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
World	177,305	188,975	222,029	249,065	260,912	283,339	299,319	303,543	263,684	348,325	340,584	359,548	375,892	396,140	385,046	383,252
North America																
Canada	1,091	833	1,248	1,360	1,279	1,404	1,164	1,099	971	1,176	1,212	1,112	1,027	1,084	783	755
Mexico	2,072	1,746	1,496	1,606	1,673	1,901	1,953	1,817	1,685	1,859	1,965	2,098	2,060	2,247	2,593	2,246
United States	50,507	53,995	63,003	65,309	69,868	68,607	70,786	73,703	68,429	86,402	91,316	86,347	84,844	86,914	89,141	82,915
Central and South America																
Argentina	11	3	5	9	12	13	15	18	16	23	32	34	33	30	27	22
Bolivia	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2
Brazil	528	495	380	523	506	936	794	854	446	669	841	761	700	627	356	303
Chile	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Colombia	1	1	1	1	2	2	10	4	7	10	5	6	7	8	6	5
Costa Rica	11	10	11	13	14	16	19	21	19	24	27	29	31	30	29	28
Ecuador	8	8	9	9	9	9	9	11	13	13	14	16	17	21	21	19
Honduras	2	2	2	2	2	3	3	3	3	3	3	4	3	4	4	4
Panama	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Peru	7	16	22	29	33	38	44	54	42	56	53	74	82	77	68	64

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Uruguay	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Venezuela	116	80	74	98	121	143	177	271	316	190	234	279	264	213	347	68
Europe																
EU	18,519	19,255	21,993	27,543	26,903	28,264	32,322	31,197	23,394	25,128	24,752	20,816	21,511	22,212	18,757	18,328
Austria	977	943	1,054	1,236	1,360	1,523	968	981	796	979	971	892	955	961	846	904
Belgium	601	601	701	700	703	737	761	728	573	416	433	391	373	362	306	297
Bulgaria	15	12	29	21	29	33	48	56	24	35	46	49	31	33	27	27
Czech Republic	146	191	216	268	323	374	439	469	265	293	302	211	239	280	240	237
Denmark	288	381	358	339	335	358	500	410	345	374	374	365	331	337	316	308
Finland	2,337	2,951	3,492	3,661	3,774	4,131	5,338	4,943	2,180	2,144	1,531	1,268	1,305	1,295	1,123	1,087
France	2,839	2,928	2,983	3,362	3,098	2,947	3,145	3,071	2,801	2,448	2,531	1,767	2,063	1,993	1,443	1,386
Germany	3,902	4,307	5,658	7,170	6,670	7,121	9,229	8,458	6,448	7,267	8,450	7,013	7,304	8,011	6,410	6,353
Greece	45	47	51	43	34	35	40	49	35	38	34	42	31	19	17	16
Hungary	297	365	606	838	976	978	867	980	790	907	829	577	539	534	499	513
Ireland	640	478	589	791	743	1,099	1,016	890	600	416	302	338	224	226	377	449
Italy	2,127	2,150	2,925	3,357	3,375	3,315	3,743	3,817	3,433	3,782	2,706	1,768	2,008	2,220	1,810	1,863
Netherlands	529	320	323	359	405	304	363	337	300	350	398	378	371	378	354	352
Poland	161	167	188	243	317	299	384	425	355	367	453	479	469	488	383	365
Portugal	132	150	185	215	259	265	308	304	67	70	55	71	73	61	36	34

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Romania	60	58	68	92	68	92	143	174	122	144	164	211	196	207	174	155
Slovakia	28	35	57	78	98	125	182	221	134	211	130	123	127	140	117	116
Spain	476	534	593	634	497	547	691	612	487	512	457	378	375	397	380	395
Sweden	200	466	571	1,962	1,817	1,987	2,042	1,984	1,731	2,251	2,405	2,211	2,136	1,935	1,853	1,773
United Kingdom	2,719	2,171	1,346	2,173	2,022	1,993	2,116	2,287	1,908	2,126	2,182	2,284	2,364	2,336	2,045	1,700
Other Europe																
Norway	216	191	253	239	265	258	347	353	281	286	304	295	301	294	265	224
Russia	74	135	201	371	495	652	991	1,180	872	1,013	1,385	1,320	1,654	1,753	1,284	1,244
Switzerland	902	977	1,139	1,271	1,298	1,354	1,498	1,732	1,482	1,448	1,660	1,529	1,583	1,543	1,372	1,198
Turkey	48	11	42	64	117	60	41	50	22	67	90	102	104	107	95	88
Ukraine	17	20	18	26	26	31	40	48	22	27	30	27	25	13	2	3
Middle East																
Bahrain	10	10	11	12	16	22	28	36	29	33	38	40	43	44	37	35
Iran	4	8	16	13	11	12	12	14	17	16	24	18	13	15	14	15
Israel	2,149	1,580	1,614	1,610	1,781	1,809	2,007	1,787	2,318	2,251	2,086	4,054	3,727	3,683	2,546	2,142
Jordan	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Kuwait	1	1	1	2	2	1	1	2	2	2	3	4	5	4	2	2
Oman	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1
Qatar	0	0	0	0	0	1	2	1	1	6	8	10	10	10	10	9



## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Saudi Arabia	10	11	15	17	22	26	31	33	35	48	57	62	63	72	53	45
United Arab Emirates	5	5	5	6	6	7	8	9	8	8	10	11	11	11	10	10
Africa																
Cameroon	0	0	1	0	0	1	1	1	1	1	1	1	1	1	1	1
Egypt	1	1	1	1	1	2	2	3	3	4	4	5	6	7	9	8
Ghana	2	2	2	2	3	3	4	4	3	3	4	4	4	4	3	3
Kenya	9	9	10	12	14	8	19	21	22	24	29	29	30	31	32	32
Morocco	138	157	189	225	295	313	287	266	289	323	413	305	384	375	335	305
Nigeria	3	5	6	8	12	19	24	34	30	42	59	73	101	124	107	80
Senegal	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1
South Africa	16	15	24	30	30	27	27	24	23	25	24	28	27	30	25	21
Tunisia	29	23	31	33	41	50	65	93	89	123	107	104	106	103	87	78
Asia																
Bangladesh	21	20	20	19	19	18	17	19	23	26	25	26	28	33	46	51
China	14,758	16,891	20,600	24,801	27,534	35,003	40,773	49,977	47,141	67,257	77,277	85,731	98,582	111,492	118,959	120,030
India	304	342	406	361	530	614	789	799	1,066	951	1,008	731	540	265	208	201
Indonesia	396	866	990	1,002	782	1,181	1,827	2,065	1,956	1,768	1,748	1,739	2,633	2,632	2,544	2,632
Japan	53,260	52,702	61,436	62,498	62,181	65,362	62,225	57,060	43,334	63,692	38,157	51,439	37,944	33,375	25,934	32,115
Malaysia	3,874	3,207	3,767	4,546	4,269	4,381	5,345	5,121	3,942	5,589	6,685	7,781	9,648	10,246	8,790	8,851

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Pakistan	5	6	8	11	13	2	2	3	2	3	3	3	3	4	4	4
Philippines	629	770	651	774	802	969	1,376	751	841	915	898	950	1,027	1,090	1,122	1,023
Singapore	2,355	2,832	3,665	4,677	5,532	7,095	7,577	6,625	5,750	9,446	8,125	8,158	8,853	8,664	6,595	7,441
South Korea	9,281	11,142	13,053	18,817	20,472	23,007	24,334	21,340	19,064	28,577	31,461	32,346	40,707	39,729	39,500	38,955
Sri Lanka	5	6	7	7	10	62	31	17	17	18	21	21	24	29	30	29
Taiwan	13,961	17,448	21,880	27,195	29,777	34,865	36,341	38,467	33,343	40,358	40,864	44,080	49,874	59,304	56,793	55,646
Thailand	1,699	2,817	3,348	3,425	3,570	4,181	5,159	5,746	5,492	7,363	6,173	5,308	5,525	5,839	4,644	4,572
Vietnam	54	65	67	77	92	124	190	202	252	322	468	640	805	886	766	743
Australia and Oceania																
Australia	153	209	248	337	385	404	479	497	478	610	740	866	786	721	574	551
New Zealand	43	45	61	73	85	79	120	110	93	125	132	129	130	135	112	108

EU = European Union.

### Note(s)

Value added is the amount contributed by a country, firm, or other entity to the value of a good or service and excludes purchases of domestic and imported materials and inputs. Data are not available for EU members Cyprus, Estonia, Latvia, Lithuania, Luxembourg, Malta, and Slovenia. China includes Hong Kong. Detail may not add to total because of rounding or minor discrepancies. See Appendix Table 6-1 for a full list of countries and economies in each region.

### Source(s)

IHS Global Insight, World Industry Service database, accessed 17 July 2017.

*Science and Engineering Indicators 2018*

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

APPENDIX TABLE 6-15

### Value added of computers and office machinery, by region, country, or economy: 2001–16

(Millions of current dollars)

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
World	106,840	92,898	96,516	95,191	98,435	100,964	104,829	108,734	94,512	94,194	89,702	101,775	103,721	99,569	91,697	87,919
North America																
Canada	885	912	1,090	1,151	1,101	991	810	703	608	706	690	587	507	429	493	435
Mexico	6,161	5,149	3,141	2,436	2,750	3,136	3,048	2,080	1,374	1,431	1,449	1,512	1,553	2,129	2,079	1,805
United States	34,091	33,288	35,879	33,885	36,725	39,846	38,510	41,527	38,708	31,202	24,658	28,012	31,235	30,900	30,106	28,753
Central and South America																
Argentina	21	2	3	3	4	4	5	5	5	6	7	7	6	5	4	3
Bolivia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Brazil	1,663	826	811	771	1,021	1,405	1,912	2,822	2,152	2,553	2,489	2,591	2,238	2,077	744	577
Chile	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Colombia	2	2	2	3	4	4	5	6	6	7	8	9	9	9	7	6
Costa Rica	0	0	0	0	0	0	0	1	0	1	1	1	1	1	1	1
Ecuador	88	95	99	104	100	104	107	126	147	151	160	180	195	242	239	219
Honduras	15	16	16	17	18	20	22	23	25	24	28	30	28	30	30	29
Panama	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Peru	66	158	223	287	334	383	442	536	423	558	533	740	818	771	679	629

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Uruguay	0	0	0	0	3	3	3	5	5	6	7	8	8	11	9	8
Venezuela	1	0	0	0	1	1	1	1	1	1	1	1	1	1	2	0
Europe																
EU	10,424	9,672	10,905	13,567	14,019	13,353	14,600	13,364	9,110	9,448	9,230	8,929	8,478	8,900	7,208	6,463
Austria	53	65	71	56	92	93	87	74	71	86	83	76	81	82	72	76
Belgium	60	60	73	87	84	88	133	168	180	199	207	187	178	173	146	144
Bulgaria	14	11	7	5	4	4	6	7	3	4	4	6	5	5	4	4
Czech Republic	84	41	96	71	99	106	128	170	207	223	241	168	190	223	191	188
Denmark	89	93	111	102	109	109	104	82	102	110	110	108	97	99	93	92
Finland	20	13	19	24	24	33	38	36	27	27	19	16	16	16	14	14
France	630	687	946	778	583	468	564	539	458	382	400	326	264	176	117	100
Germany	2,372	2,613	3,328	4,179	3,848	3,723	4,799	4,393	1,982	2,352	2,688	2,561	2,287	2,370	1,222	1,058
Greece	283	180	174	192	107	69	39	21	15	16	14	16	16	16	15	14
Hungary	145	111	279	443	511	337	242	274	194	223	204	142	133	131	123	124
Ireland	1,209	833	1,318	1,683	1,603	1,536	1,429	1,252	844	360	300	380	329	332	555	632
Italy	774	470	518	740	699	761	824	828	509	558	163	105	56	61	50	46
Netherlands	303	219	198	234	236	232	226	211	175	204	232	205	205	210	162	161
Poland	171	189	213	244	204	192	246	273	228	215	245	194	172	179	140	136
Portugal	22	25	30	32	32	33	38	38	62	51	47	34	50	43	21	20

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Romania	31	20	31	39	27	41	49	41	17	17	15	11	8	6	5	4
Slovakia	10	14	18	30	32	19	28	34	21	33	22	43	37	41	35	34
Spain	383	261	214	175	169	186	235	209	166	175	139	127	102	97	76	68
Sweden	128	165	216	314	243	226	238	223	189	247	264	242	234	212	203	192
United Kingdom	3,643	3,602	3,045	4,140	5,316	5,097	5,147	4,493	3,659	3,968	3,835	3,983	4,017	4,427	3,964	3,355
Other Europe																
Norway	29	11	30	20	24	13	17	17	14	14	15	14	14	14	12	11
Russia	118	88	57	93	150	230	387	373	399	498	608	830	745	569	266	241
Switzerland	440	288	268	301	323	335	390	522	468	493	585	545	541	537	478	407
Turkey	121	117	147	151	156	117	94	90	43	114	147	231	257	265	236	218
Ukraine	28	34	43	39	47	58	73	77	38	63	64	60	108	59	9	11
Middle East																
Bahrain	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Iran	18	23	18	36	42	34	40	70	218	163	249	187	141	154	147	154
Israel	229	170	181	169	152	180	216	243	248	230	216	136	132	136	126	125
Jordan	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Kuwait	7	11	14	20	20	11	17	19	22	29	35	48	53	47	29	27
Oman	1	1	1	2	2	2	3	3	4	10	19	9	9	8	7	6
Qatar	3	4	5	1	7	9	25	22	17	86	122	151	156	164	151	145

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Saudi Arabia	85	92	119	137	176	215	261	271	300	412	484	530	536	614	455	395
United Arab Emirates	47	49	52	58	65	73	79	92	79	85	99	109	114	116	102	99
Africa																
Cameroon	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Egypt	6	6	5	6	7	8	10	13	14	18	21	23	18	19	20	20
Ghana	7	8	10	11	13	15	16	16	13	16	19	18	18	16	13	14
Kenya	4	7	8	9	10	25	14	13	12	8	8	10	11	12	12	13
Morocco	54	61	74	88	115	122	112	104	113	126	139	127	198	252	226	211
Nigeria	64	85	90	101	120	142	155	168	171	183	188	203	222	229	210	157
Senegal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
South Africa	5	4	7	8	9	9	9	9	10	12	10	11	11	10	9	8
Tunisia	0	0	0	0	0	0	2	3	3	4	3	3	3	3	3	3
Asia																
Bangladesh	10	11	11	11	11	11	9	9	9	10	9	9	8	8	10	10
China	5,413	6,222	9,800	11,965	13,544	15,211	19,752	21,377	18,504	18,294	25,149	29,753	32,241	30,426	32,168	32,239
India	558	581	683	718	495	474	527	440	527	658	530	498	384	260	212	187
Indonesia	1	1	7	6	61	98	117	134	133	158	92	89	167	167	158	161
Japan	31,307	19,077	16,531	15,085	13,295	10,704	9,239	10,675	10,537	13,625	8,163	11,004	8,207	5,864	2,984	3,223
Malaysia	2,075	2,072	2,563	2,837	2,490	2,865	3,304	2,997	1,616	1,728	2,203	2,678	2,820	2,703	2,263	2,183

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Pakistan	7	7	10	14	16	17	19	22	18	21	27	28	27	30	30	31
Philippines	528	384	488	535	657	709	1,012	549	427	362	335	448	449	501	386	409
Singapore	3,993	3,969	3,416	3,540	3,207	2,717	2,274	2,919	2,737	4,267	3,614	3,952	4,346	3,839	3,001	2,658
South Korea	3,269	3,171	3,083	1,156	1,448	1,644	1,714	1,182	1,107	1,449	1,568	1,341	1,386	1,622	1,182	1,035
Sri Lanka	11	13	15	16	21	138	70	38	38	39	47	47	54	64	67	65
Taiwan	4,787	5,943	6,276	5,495	5,258	5,067	4,826	4,450	3,601	4,143	4,795	4,567	4,240	4,372	4,384	3,800
Thailand	31	38	58	70	102	119	166	194	222	254	207	201	179	183	123	105
Vietnam	60	55	76	84	105	141	170	184	90	280	373	429	576	549	414	421
Australia and Oceania																
Australia	95	158	177	154	168	167	196	202	164	209	254	840	230	211	168	163
New Zealand	18	19	25	31	36	34	48	40	30	39	41	40	41	42	35	35

EU = European Union.

### Note(s)

Value added is the amount contributed by a country, firm, or other entity to the value of a good or service and excludes purchases of domestic and imported materials and inputs. Data are not available for EU members Cyprus, Estonia, Latvia, Lithuania, Luxembourg, Malta, and Slovenia. China includes Hong Kong. Detail may not add to total because of rounding or minor discrepancies. See Appendix Table 6-1 for a full list of countries and economies in each region.

### Source(s)

IHS Global Insight, World Industry Service database, accessed 17 July 2017.

*Science and Engineering Indicators 2018*

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

APPENDIX TABLE 6-16

## Value added of communications, by region, country, or economy: 2001–16

(Millions of current dollars)

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
World	97,869	83,575	89,057	100,446	102,760	117,573	118,782	119,228	111,156	125,983	126,409	130,268	140,328	145,667	141,949	141,544
North America																
Canada	3,263	2,451	2,310	2,469	2,853	2,725	2,507	2,536	2,586	2,926	2,751	2,367	1,778	1,609	1,383	1,390
Mexico	1,769	1,400	1,211	967	1,060	1,163	1,245	1,494	1,279	1,329	1,305	1,258	1,374	1,325	1,579	1,427
United States	42,250	32,204	34,140	34,157	33,901	40,644	37,363	33,542	32,449	33,013	32,829	31,403	33,227	32,022	32,290	33,155
Central and South America																
Argentina	89	26	44	73	97	114	131	155	139	195	274	284	281	252	230	194
Bolivia	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1
Brazil	2,885	1,798	1,217	2,153	2,219	2,685	2,899	3,147	1,771	2,354	2,293	3,334	4,392	4,103	2,163	1,998
Chile	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1
Colombia	8	9	8	13	13	16	17	9	4	5	5	5	6	7	5	5
Costa Rica	3	3	3	3	4	4	5	6	5	7	8	8	9	9	8	8
Ecuador	78	84	88	93	89	93	95	112	131	134	142	160	173	216	214	208
Honduras	18	19	20	21	23	25	27	29	30	29	34	38	35	37	37	37
Panama	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Peru	53	127	179	230	268	307	355	430	339	448	428	593	656	618	544	526



## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Uruguay	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Venezuela	5	4	3	5	6	7	8	13	15	9	11	13	12	10	16	3
Europe																
EU	9,255	9,289	10,644	13,241	12,786	13,287	15,674	13,688	9,913	10,027	9,608	8,141	8,126	8,374	7,517	7,192
Austria	569	553	612	690	754	843	390	368	274	207	205	189	202	203	179	189
Belgium	252	257	297	285	283	296	300	235	201	410	427	386	368	357	301	307
Bulgaria	4	9	11	7	12	14	20	23	13	13	16	23	16	17	14	14
Czech Republic	60	97	103	116	147	175	193	209	108	120	123	86	98	114	98	99
Denmark	89	104	110	89	100	79	106	97	104	113	113	110	100	102	96	97
Finland	1,458	1,928	2,277	2,354	2,348	2,562	3,363	2,897	1,111	1,093	780	646	665	660	572	576
France	1,069	1,195	1,106	1,224	1,081	1,020	1,041	1,012	916	430	428	327	287	297	282	256
Germany	1,219	1,443	2,074	2,749	2,456	2,462	3,984	2,773	2,114	2,461	2,600	2,063	2,013	2,114	1,870	1,818
Greece	79	63	92	103	61	44	37	44	31	34	30	39	31	33	38	14
Hungary	169	188	316	446	522	549	425	502	402	461	422	293	274	272	254	272
Ireland	346	261	255	331	424	703	618	541	365	253	184	206	136	137	229	256
Italy	1,091	1,042	1,490	1,603	1,575	1,436	1,590	1,638	1,453	1,275	1,029	903	895	935	788	701
Netherlands	342	195	198	220	250	177	204	179	161	188	214	203	200	203	190	197
Poland	173	147	143	222	278	262	336	372	311	305	360	225	438	455	357	355
Portugal	69	55	57	61	61	62	72	72	60	71	68	61	74	62	36	35

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Romania	39	33	40	46	54	67	144	144	65	59	27	23	31	33	28	26
Slovakia	4	5	9	12	14	23	34	41	25	39	36	31	31	34	29	30
Spain	816	536	547	589	472	520	657	582	463	487	395	312	321	408	325	198
Sweden	111	260	237	1,168	1,086	1,185	1,183	1,159	1,072	1,427	1,525	1,402	1,354	1,227	1,175	1,174
United Kingdom	1,296	918	670	927	809	807	977	801	661	581	626	611	593	710	655	577
Other Europe																
Norway	114	92	121	104	119	113	157	160	127	130	138	134	136	133	120	114
Russia	62	113	168	310	413	544	827	984	727	845	1,155	1,101	1,380	1,518	1,137	1,144
Switzerland	449	528	632	787	865	923	993	1,253	1,303	1,512	2,125	2,039	2,032	2,046	1,921	1,756
Turkey	121	31	33	32	40	23	24	20	19	18	24	24	19	19	17	17
Ukraine	74	80	109	76	78	92	119	141	65	78	87	80	28	15	2	3
Middle East																
Bahrain	5	5	5	6	8	11	14	17	14	16	18	19	21	21	18	17
Iran	31	64	72	139	83	73	110	59	83	56	85	64	48	53	50	55
Israel	1,230	968	858	1,032	994	1,200	1,445	1,611	1,347	1,314	1,433	1,247	1,258	1,323	1,226	1,266
Jordan	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Kuwait	14	23	29	41	42	23	35	40	46	60	74	100	110	99	84	79
Oman	2	2	2	3	3	2	8	6	8	16	29	16	17	16	13	12
Qatar	2	4	5	1	5	7	18	16	12	62	88	109	112	118	109	108

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Saudi Arabia	289	299	344	363	400	425	439	441	454	505	515	527	518	535	492	430
United Arab Emirates	53	56	59	66	74	83	90	105	90	97	113	124	130	132	117	117
Africa																
Cameroon	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Egypt	5	5	4	5	6	7	8	11	12	15	18	20	24	28	39	34
Ghana	14	16	20	22	27	32	34	34	28	33	41	37	39	34	27	29
Kenya	4	4	5	6	7	4	9	10	10	9	10	11	12	12	12	13
Morocco	58	66	79	94	124	131	121	112	121	136	123	178	29	36	32	31
Nigeria	35	50	59	82	128	200	250	350	308	434	609	757	1,043	1,284	1,102	874
Senegal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
South Africa	39	36	57	70	72	64	64	56	55	59	57	66	65	70	58	52
Tunisia	7	5	6	6	8	9	9	14	13	18	16	15	16	15	13	12
Asia																
Bangladesh	53	54	54	53	54	54	52	57	69	77	76	78	85	100	139	159
China	9,189	10,502	12,211	15,503	16,008	20,292	19,377	23,890	26,511	31,363	31,885	34,519	42,406	51,265	54,698	57,161
India	483	541	559	698	1,072	1,241	1,596	1,616	944	390	514	642	474	232	182	184
Indonesia	1	7	20	37	26	45	70	79	75	67	69	59	80	80	79	86
Japan	17,158	11,610	11,156	10,268	9,453	8,696	8,675	11,135	9,565	11,474	6,874	9,267	6,970	4,890	3,188	3,314
Malaysia	183	604	776	951	919	1,129	1,125	972	551	614	691	768	816	1,013	828	830

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Pakistan	114	125	169	240	286	46	52	59	49	58	73	76	74	81	82	86
Philippines	684	881	541	657	575	714	1,444	1,051	1,374	1,312	1,588	1,809	2,338	2,769	3,118	3,251
Singapore	887	694	654	912	1,149	1,040	383	170	172	206	204	198	217	224	194	147
South Korea	5,637	6,839	8,004	11,780	12,668	14,084	14,651	12,462	11,245	14,201	13,267	12,981	14,519	12,720	10,205	7,897
Sri Lanka	15	17	20	22	29	187	95	51	52	53	64	64	73	87	85	85
Taiwan	880	1,408	1,852	1,974	2,918	4,184	5,175	6,017	6,010	8,396	11,648	11,093	10,299	10,621	10,649	9,493
Thailand	10	24	29	31	33	30	42	47	54	54	42	34	35	41	37	38
Vietnam	18	23	24	26	28	38	34	84	274	923	1,876	3,413	3,926	4,613	5,215	5,844
Australia and Oceania																
Australia	255	368	429	595	693	727	862	894	669	855	1,037	944	856	786	625	618
New Zealand	17	18	24	29	34	32	48	44	37	50	53	52	52	54	45	45

EU = European Union.

### Note(s)

Value added is the amount contributed by a country, firm, or other entity to the value of a good or service and excludes purchases of domestic and imported materials and inputs. Data are not available for EU members Cyprus, Estonia, Latvia, Lithuania, Luxembourg, Malta, and Slovenia. China includes Hong Kong. Detail may not add to total because of rounding or minor discrepancies. See Appendix Table 6-1 for a full list of countries and economies in each region.

### Source(s)

IHS Global Insight, World Industry Service database, accessed 17 July 2017.

*Science and Engineering Indicators 2018*

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

APPENDIX TABLE 6-17

### Value added of pharmaceuticals industry, by region, country, or economy: 2001–16

(Millions of current dollars)

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
World	186,303	206,456	235,067	253,096	265,877	298,474	329,389	364,074	387,625	400,832	413,806	437,079	452,700	483,810	501,462	535,417
North America																
Canada	2,716	3,357	4,084	4,120	4,223	4,968	4,450	4,176	4,116	4,540	4,284	4,694	3,801	4,084	4,409	4,858
Mexico	5,949	6,962	6,365	6,615	7,236	7,780	8,393	8,550	7,085	7,031	6,675	6,996	7,251	6,165	5,481	5,245
United States	60,841	68,297	70,237	72,266	68,083	78,980	81,021	80,902	103,049	97,619	94,009	90,967	94,415	104,118	124,961	127,253
Central and South America																
Argentina	754	188	264	329	417	506	623	830	893	1,078	1,327	1,534	1,523	1,355	1,240	1,130
Bolivia	41	41	46	45	54	49	47	75	93	88	95	99	109	117	123	152
Brazil	3,145	3,000	3,282	3,870	5,523	6,930	8,486	9,157	8,653	10,508	11,269	10,132	9,814	10,119	7,470	7,342
Chile	149	133	125	164	204	209	240	219	285	362	381	403	451	458	503	464
Colombia	574	583	547	757	771	863	1,027	1,256	1,226	1,453	1,505	1,664	1,685	1,640	1,273	1,274
Costa Rica	52	54	58	64	66	75	90	101	88	113	128	137	144	143	139	146
Ecuador	98	106	112	117	124	135	142	173	194	244	273	340	384	451	445	429
Honduras	35	33	34	30	36	36	39	44	44	41	50	56	57	58	58	61
Panama	8	8	7	8	8	9	12	13	15	15	16	25	23	24	24	26
Peru	117	146	118	119	144	172	209	248	264	277	319	343	305	309	238	266

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Uruguay	67	38	44	59	71	77	89	145	144	161	182	197	218	238	251	285
Venezuela	224	153	142	189	232	275	340	522	608	365	451	537	507	409	668	138
Europe																
EU	52,561	58,340	74,461	79,052	84,506	91,140	102,670	117,035	113,902	113,256	119,573	112,582	123,320	133,091	130,025	136,764
Austria	748	1,037	1,343	1,338	1,966	2,075	3,099	2,965	3,016	3,296	3,577	3,632	3,962	4,500	4,402	4,687
Belgium	1,980	2,294	2,724	2,920	3,078	3,368	3,523	4,398	4,428	5,422	5,608	5,271	6,791	7,898	7,066	8,253
Bulgaria	44	48	67	78	89	90	111	36	73	78	106	95	103	111	99	100
Czech Republic	232	288	358	407	548	606	663	761	691	775	818	724	782	826	804	869
Denmark	1,796	1,674	2,341	2,586	3,084	2,944	2,987	2,966	3,386	4,422	4,489	5,059	5,895	6,167	5,373	5,776
Finland	312	318	371	524	639	739	831	992	1,010	1,078	1,185	1,052	1,138	1,175	1,006	1,050
France	7,923	8,407	10,620	11,195	11,852	12,641	12,942	12,274	11,102	9,683	7,725	7,913	8,771	8,688	9,388	9,488
Germany	8,646	9,156	12,576	15,265	17,760	18,944	22,364	26,138	22,943	21,918	25,055	23,935	27,357	31,200	28,959	30,972
Greece	193	255	337	420	460	548	675	787	890	700	558	544	821	783	672	725
Hungary	546	647	906	1,065	1,166	1,287	1,360	1,431	1,308	1,517	1,660	1,565	1,534	1,616	1,546	1,564
Ireland	4,512	5,895	7,666	7,827	8,342	8,854	10,896	14,278	18,170	17,021	20,252	16,978	17,098	19,867	24,100	26,238
Italy	5,580	6,233	7,577	8,101	7,672	7,757	8,541	9,554	8,928	8,251	8,106	7,780	8,893	9,429	8,821	9,370
Netherlands	1,228	1,476	1,592	1,591	1,429	1,344	1,519	1,913	2,079	1,759	1,840	1,834	1,953	2,252	2,235	2,172
Poland	716	840	945	1,085	1,319	1,244	1,595	1,940	1,516	1,730	1,646	1,233	1,733	1,844	1,521	1,578
Portugal	360	406	466	543	559	571	665	657	591	502	476	492	539	558	541	568

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Romania	71	84	97	103	156	179	249	319	274	395	381	328	378	395	326	321
Slovakia	19	22	35	38	42	52	69	86	105	138	168	171	87	60	50	52
Spain	2,297	2,679	3,472	3,807	3,993	4,461	4,968	6,379	5,430	5,418	5,049	5,003	5,522	5,553	4,450	4,711
Sweden	3,217	4,047	4,965	5,085	5,450	5,878	5,686	5,806	6,757	7,135	8,344	8,227	9,119	9,080	7,674	7,721
United Kingdom	12,140	12,533	16,002	15,074	14,904	17,559	19,927	23,354	21,207	22,017	22,533	20,745	20,845	21,088	20,993	20,549
Other Europe																
Norway	325	407	463	545	578	775	789	1,055	604	727	790	920	779	771	826	1,264
Russia	708	839	972	1,223	1,485	1,810	2,343	2,695	2,124	2,434	2,634	3,101	3,938	3,555	2,482	2,770
Switzerland	7,532	9,431	11,761	14,134	14,983	16,477	18,721	21,600	21,367	23,011	25,971	25,278	26,393	26,677	24,592	26,279
Turkey	808	304	605	729	1,038	1,144	1,528	1,943	1,703	2,018	1,615	1,453	1,409	1,604	1,795	2,059
Ukraine	147	167	201	279	370	435	517	568	321	485	551	630	694	582	195	210
Middle East																
Bahrain	0	0	0	0	0	0	0	1	0	1	1	1	1	1	1	1
Iran	186	255	363	389	422	508	659	842	1,108	1,256	1,920	1,440	1,087	1,190	1,131	1,273
Israel	1,606	1,858	1,957	2,385	2,491	2,715	2,886	2,805	2,692	3,551	3,407	3,441	3,601	3,843	4,063	3,962
Jordan	143	176	183	207	246	296	369	539	537	515	524	579	618	632	607	636
Kuwait	20	32	41	55	61	45	60	72	71	89	112	136	141	129	96	98
Oman	6	7	7	8	10	13	37	34	26	20	36	41	43	40	32	32
Qatar	50	55	62	70	70	79	63	81	21	56	57	58	58	57	54	56

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Saudi Arabia	208	219	264	289	340	387	660	703	770	972	1,085	1,162	1,164	1,291	1,026	963
United Arab Emirates	12	12	13	15	16	18	20	23	20	21	25	27	29	29	26	27
Africa																
Cameroon	1	4	4	6	6	6	7	12	12	12	14	14	15	17	15	17
Egypt	384	356	292	383	445	490	608	769	846	1,012	969	922	893	1,212	1,700	1,318
Ghana	15	18	22	24	29	34	37	37	30	36	44	40	42	37	29	32
Kenya	27	28	37	42	42	27	25	29	28	28	30	34	35	37	38	43
Morocco	79	91	106	99	109	107	118	136	134	146	171	161	181	204	180	182
Nigeria	49	67	74	89	117	158	185	231	216	272	343	409	530	628	546	477
Senegal	10	8	10	14	14	16	17	17	20	20	22	24	16	18	25	29
South Africa	233	236	342	465	509	533	581	596	635	775	783	826	828	807	846	853
Tunisia	24	26	31	35	38	32	41	46	49	50	53	57	63	70	59	60
Asia																
Bangladesh	96	124	142	155	184	218	252	296	415	421	430	432	537	648	696	891
China	13,446	14,497	16,186	16,141	19,658	22,350	28,051	37,488	41,334	47,335	58,692	73,290	84,314	95,164	106,544	118,540
India	2,727	3,063	3,464	4,334	5,110	5,651	7,391	8,063	7,915	9,534	13,724	11,487	11,952	11,536	11,755	12,756
Indonesia	1,111	1,840	2,137	1,682	2,008	2,026	2,796	3,603	3,427	4,184	3,533	1,468	1,141	1,156	1,213	1,392
Japan	22,274	22,621	26,008	29,911	29,861	32,475	33,202	39,935	43,880	46,057	32,690	52,577	45,461	44,407	40,209	47,964
Malaysia	73	87	99	108	142	180	178	223	212	275	299	323	316	331	358	374



## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Pakistan	293	322	433	615	734	650	741	845	696	825	1,044	1,075	1,053	1,153	1,159	1,307
Philippines	133	151	185	210	236	331	285	236	386	471	435	392	472	544	717	709
Singapore	1,616	2,496	2,945	4,147	4,873	7,260	8,382	5,533	6,198	6,306	9,326	11,638	7,218	7,914	6,435	7,394
South Korea	2,965	3,478	3,710	4,194	5,298	6,034	6,633	6,058	5,604	6,548	6,913	7,188	8,211	9,486	9,866	10,545
Sri Lanka	21	22	25	27	34	68	60	56	58	65	94	99	142	127	127	130
Taiwan	529	577	670	708	791	898	936	970	1,049	1,201	1,303	1,344	1,392	1,305	1,276	1,351
Thailand	89	91	108	122	136	168	200	224	259	338	366	433	425	524	622	638
Vietnam	210	222	215	287	290	375	480	526	621	430	500	598	669	700	714	768
Australia and Oceania																
Australia	760	764	925	1,081	1,300	1,383	1,537	1,646	1,505	2,058	2,616	3,104	2,659	2,433	1,952	2,032
New Zealand	56	66	75	87	103	100	114	93	71	123	147	171	174	174	145	155

EU = European Union.

### Note(s)

Value added is the amount contributed by a country, firm, or other entity to the value of a good or service and excludes purchases of domestic and imported materials and inputs. Data are not available for EU members Cyprus, Estonia, Latvia, Lithuania, Luxembourg, Malta, and Slovenia. China includes Hong Kong. Detail may not add to total because of rounding or minor discrepancies. See Appendix Table 6-1 for a full list of countries and economies in each region.

### Source(s)

IHS Global Insight, World Industry Service database, accessed 17 July 2017.

*Science and Engineering Indicators 2018*

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

### APPENDIX TABLE 6-18

#### Value added of testing, measuring, and control instruments industry, by region, country, or economy: 2001–16

(Millions of current dollars)

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
World	111,495	117,401	136,269	156,503	167,042	180,859	206,526	226,806	204,080	232,942	248,009	270,190	273,006	281,581	282,386	280,073
North America																
Canada	1,440	1,434	1,682	1,928	2,007	2,183	2,488	2,431	2,338	2,794	2,905	2,550	2,469	2,507	2,168	2,118
Mexico	2,112	2,390	1,785	1,889	1,993	2,235	2,466	2,614	2,279	2,934	3,380	3,582	3,563	3,781	4,097	3,746
United States	41,183	47,603	53,845	60,511	63,303	68,112	75,649	81,164	86,653	94,812	97,133	110,128	111,122	115,289	124,782	123,265
Central and South America																
Argentina	131	52	77	106	137	156	211	253	238	291	328	329	333	323	295	250
Bolivia	2	2	2	2	2	2	3	3	3	4	3	4	4	4	4	5
Brazil	621	558	503	676	958	1,131	1,402	1,832	1,514	1,825	2,322	2,022	2,104	1,775	1,298	1,308
Chile	3	3	3	3	3	2	3	3	4	5	4	5	7	8	7	7
Colombia	27	29	29	38	44	46	58	56	67	72	88	89	97	80	62	59
Costa Rica	3	3	2	2	2	2	3	3	3	3	4	4	4	4	4	4
Ecuador	71	77	81	85	82	85	87	102	120	123	130	146	159	197	196	186
Honduras	8	9	9	9	10	11	11	12	13	12	14	15	14	15	15	15
Panama	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Peru	378	235	100	129	150	172	199	241	190	251	240	333	368	347	323	318

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Uruguay	4	2	1	2	2	2	3	4	3	5	6	7	7	8	10	10
Venezuela	93	64	59	79	97	115	142	217	253	152	188	224	211	170	278	54
Europe																
EU	29,208	30,533	36,388	43,307	45,087	47,711	55,865	56,656	43,127	47,786	54,691	52,529	54,726	56,366	53,197	52,833
Austria	612	691	880	1,062	1,155	1,186	1,412	1,547	1,420	1,394	1,481	1,360	1,455	1,466	1,290	1,427
Belgium	286	312	401	476	516	567	655	682	488	604	629	569	542	526	444	458
Bulgaria	12	20	24	23	25	29	42	49	54	41	39	68	49	52	44	45
Czech Republic	205	244	286	369	404	429	564	615	428	494	590	412	466	547	469	479
Denmark	962	910	1,216	1,338	1,401	1,575	1,840	1,627	1,375	1,488	1,488	1,454	1,317	1,343	1,260	1,342
Finland	659	658	820	813	956	1,019	1,175	1,303	1,021	1,004	717	594	611	606	526	536
France	5,105	5,188	5,967	7,023	6,625	6,809	7,583	7,249	5,039	4,397	4,557	4,532	4,886	4,590	4,702	4,059
Germany	10,917	11,183	14,229	16,529	17,392	18,845	22,681	23,337	16,502	19,986	22,994	21,986	23,578	24,728	22,632	22,070
Greece	123	113	120	133	104	131	132	142	102	109	97	87	93	111	106	104
Hungary	172	215	287	342	371	387	418	497	412	473	432	301	281	278	260	263
Ireland	1,009	1,160	1,735	1,826	2,214	2,131	2,909	2,548	1,719	1,849	1,894	2,344	2,282	2,304	3,847	4,909
Italy	3,227	3,912	3,819	4,467	4,804	5,329	6,147	6,195	5,333	5,511	8,762	7,663	7,795	7,819	6,810	6,869
Netherlands	1,096	1,018	1,164	1,234	1,405	1,342	1,558	1,740	1,511	1,763	2,003	1,902	1,870	1,901	1,784	1,831
Poland	212	214	244	288	341	321	412	456	381	362	416	366	373	388	305	313
Portugal	24	26	34	38	37	37	44	43	38	47	54	50	238	201	118	112

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Romania	57	46	73	101	84	141	195	201	98	99	51	47	62	47	40	38
Slovakia	23	33	42	60	80	58	86	104	63	99	103	98	107	120	103	108
Spain	842	699	887	1,022	1,034	1,139	1,438	1,274	1,014	1,066	1,085	1,089	975	1,050	771	792
Sweden	197	461	1,558	1,995	2,038	2,183	2,339	2,070	1,584	2,027	2,166	1,991	1,923	1,743	1,669	1,675
United Kingdom	3,468	3,431	2,603	4,169	4,099	4,052	4,236	4,976	4,544	4,972	5,132	5,619	5,823	6,546	6,020	5,402
Other Europe																
Norway	378	458	648	608	676	697	876	891	709	722	768	744	759	741	668	624
Russia	1,071	1,576	2,132	3,002	3,484	3,959	5,070	6,254	3,431	4,540	5,506	5,677	6,806	6,080	4,259	4,454
Switzerland	6,181	7,143	8,481	9,555	10,681	11,856	13,622	16,602	14,057	15,226	20,391	20,388	21,055	21,341	19,691	18,112
Turkey	151	122	155	193	246	233	286	298	214	497	605	564	581	598	532	575
Ukraine	54	69	92	85	95	120	162	205	95	163	192	181	176	95	15	19
Middle East																
Bahrain	1	1	1	1	1	1	1	2	1	2	2	2	2	2	2	2
Iran	64	69	97	127	121	132	157	190	285	327	500	375	283	310	294	326
Israel	2,096	2,054	2,132	2,185	2,179	2,330	2,734	3,258	3,243	3,518	3,803	3,856	4,222	4,231	3,849	3,787
Jordan	13	15	14	11	9	9	8	13	15	14	16	28	27	17	7	7
Kuwait	18	30	37	46	58	57	69	86	71	88	112	118	110	104	71	69
Oman	2	2	2	2	3	3	5	5	7	17	27	18	18	17	14	13
Qatar	82	116	145	15	199	263	327	415	62	159	225	278	287	302	278	285

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Saudi Arabia	164	176	225	257	325	392	509	538	571	776	905	988	998	1,139	851	771
United Arab Emirates	25	26	28	31	35	39	43	50	43	46	54	59	62	63	55	57
Africa																
Cameroon	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Egypt	18	16	13	18	20	22	27	33	36	38	46	49	27	30	31	26
Ghana	8	10	12	13	16	19	20	20	17	19	24	22	23	20	16	17
Kenya	12	11	13	16	18	10	24	26	27	26	30	37	39	41	42	46
Morocco	52	59	71	84	110	117	108	100	108	121	126	132	169	178	149	146
Nigeria	71	95	101	114	135	159	174	189	193	206	212	228	249	258	236	188
Senegal	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1
South Africa	159	155	204	248	242	225	243	229	238	253	280	261	230	207	213	201
Tunisia	3	2	3	3	4	4	12	18	17	23	20	20	20	19	16	16
Asia																
Bangladesh	1	1	1	2	2	2	2	2	3	3	3	3	3	4	5	6
China	4,518	4,730	7,076	7,819	9,486	12,027	14,333	16,948	16,548	20,082	24,159	29,783	32,821	36,867	39,405	40,611
India	272	267	382	397	543	575	736	734	976	959	1,086	1,018	951	946	920	956
Indonesia	21	6	11	17	37	137	211	259	258	306	138	198	197	197	192	206
Japan	16,530	12,452	13,867	16,229	17,096	17,228	18,689	24,379	17,187	21,683	12,990	17,512	10,884	9,059	7,239	8,172
Malaysia	519	473	478	546	479	385	547	541	477	544	558	572	572	569	558	593

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Pakistan	30	33	45	63	75	84	96	109	90	107	135	139	136	149	150	166
Philippines	140	159	177	215	337	404	253	549	683	680	770	858	1,069	1,236	1,356	1,419
Singapore	315	373	426	485	568	639	928	984	883	1,066	1,858	1,729	1,816	1,893	1,726	1,844
South Korea	1,655	1,893	2,088	2,563	3,169	3,676	4,261	3,640	3,339	5,615	6,182	7,139	8,598	9,030	8,312	7,917
Sri Lanka	11	13	15	17	22	144	73	39	40	41	49	49	56	67	68	70
Taiwan	853	957	1,345	1,490	1,215	1,334	1,395	1,628	1,501	1,833	2,258	2,243	2,298	2,753	2,697	2,424
Thailand	71	135	205	199	182	238	308	294	292	414	409	380	308	333	289	295
Vietnam	26	27	31	37	36	48	46	49	228	58	77	67	93	89	67	70
Australia and Oceania																
Australia	609	663	924	1,013	1,227	1,286	1,526	1,583	1,283	1,639	1,988	2,439	1,804	1,655	1,317	1,342
New Zealand	18	19	26	32	37	34	56	53	47	64	68	66	67	69	58	59

EU = European Union.

### Note(s)

Value added is the amount contributed by a country, firm, or other entity to the value of a good or service and excludes purchases of domestic and imported materials and inputs. Data are not available for EU members Cyprus, Estonia, Latvia, Lithuania, Luxembourg, Malta, and Slovenia. China includes Hong Kong. Detail may not add to total because of rounding or minor discrepancies. See Appendix Table 6-1 for a full list of countries and economies in each region.

### Source(s)

IHS Global Insight, World Industry Service database, accessed 17 July 2017.

*Science and Engineering Indicators 2018*

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

### APPENDIX TABLE 6-19

#### Value added of aircraft and spacecraft, by region, country, or economy: 2001–16

(Millions of current dollars)

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
World	98,864	94,255	97,302	102,525	118,708	129,071	149,192	154,095	149,103	158,590	168,420	170,822	183,856	195,276	193,334	190,248
North America																
Canada	4,572	4,054	4,633	4,836	5,096	5,728	6,400	7,284	6,143	6,591	6,801	7,553	8,359	8,745	7,394	6,778
Mexico	505	480	405	442	494	525	594	673	543	629	836	1,065	1,236	1,400	1,427	1,374
United States	59,586	55,143	54,036	55,148	66,076	69,881	84,438	80,300	81,607	83,496	87,207	87,083	91,194	97,078	103,875	100,132
Central and South America																
Argentina	7	4	5	6	8	8	10	11	10	10	10	8	8	7	7	6
Bolivia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Brazil	1,762	1,587	1,288	1,757	1,445	1,705	1,790	2,146	1,300	1,916	2,239	2,215	2,305	2,439	1,812	1,837
Chile	3	1	1	1	1	1	1	1	1	1	1	1	2	2	1	1
Colombia	7	8	6	3	4	5	8	10	18	24	22	25	29	30	26	24
Costa Rica	2	2	1	2	2	2	3	3	3	4	4	4	5	5	4	5
Ecuador	92	100	105	110	106	110	113	133	155	159	169	190	206	256	253	247
Honduras	2	2	2	2	2	2	2	2	2	3	3	3	3	3	3	3
Panama	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Peru	36	41	41	53	62	71	82	94	93	114	131	137	142	118	108	107

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Uruguay	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Venezuela	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Europe																
EU	20,923	20,865	22,636	23,893	27,357	29,539	30,471	34,127	30,847	32,977	36,965	35,570	42,699	45,326	42,109	42,068
Austria	15	29	10	18	17	27	33	41	29	33	36	30	30	29	20	21
Belgium	448	368	341	438	459	407	490	530	458	445	473	432	445	444	416	432
Bulgaria	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Czech Republic	60	74	76	89	93	94	147	177	190	186	219	199	214	227	211	219
Denmark	10	10	9	12	13	12	12	17	11	13	11	8	8	9	10	10
Finland	82	96	98	107	108	110	135	137	101	93	92	91	123	117	102	102
France	4,146	3,969	4,732	3,359	5,321	5,954	6,526	7,637	6,920	7,203	5,993	6,080	7,528	7,462	6,224	6,482
Germany	4,669	4,817	5,058	5,398	7,031	6,370	7,329	8,751	8,175	8,886	10,360	10,694	12,003	12,389	10,973	11,285
Greece	30	36	43	47	45	54	83	110	102	183	176	63	57	177	508	525
Hungary	10	13	18	27	25	34	42	77	42	40	47	41	53	54	52	61
Ireland	188	167	187	226	225	239	300	248	150	134	96	100	98	38	44	45
Italy	1,812	1,919	1,733	2,164	2,179	2,644	2,216	3,215	2,522	2,119	2,339	2,167	2,290	2,447	1,990	2,001
Netherlands	180	192	279	264	302	309	292	407	348	298	329	311	309	322	303	295
Poland	123	97	116	208	257	242	311	378	404	488	584	613	708	645	612	561
Portugal	7	10	12	13	12	13	15	38	25	24	25	24	8	7	5	6



## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Romania	8	8	13	14	22	33	45	58	75	73	89	102	114	138	111	105
Slovakia	0	0	0	0	0	0	1	1	1	2	2	4	5	6	5	5
Spain	544	628	851	1,032	1,002	1,124	1,263	1,662	1,420	1,700	2,222	2,021	2,663	2,593	1,844	1,943
Sweden	556	524	652	719	819	742	876	942	930	938	1,192	1,044	1,083	1,051	977	890
United Kingdom	8,033	7,910	8,406	9,757	9,426	11,129	10,354	9,701	8,943	10,121	12,682	11,546	14,956	17,173	17,703	17,079
Other Europe																
Norway	52	56	77	101	113	183	143	184	155	120	140	154	170	168	129	128
Russia	891	1,131	1,410	1,949	2,420	3,104	4,314	4,734	4,241	5,024	6,526	6,405	6,188	6,026	1,849	1,806
Switzerland	216	256	322	384	399	447	506	617	596	890	1,362	1,337	1,409	1,428	1,314	1,221
Turkey	684	498	401	467	854	928	1,144	1,562	1,703	1,293	1,572	1,129	1,073	1,372	1,486	1,524
Ukraine	40	57	87	133	180	244	316	402	432	610	808	849	1,435	875	238	234
Middle East																
Bahrain	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1
Iran	0	22	23	30	34	42	54	67	85	105	161	121	91	100	95	108
Israel	506	443	458	541	547	254	318	416	406	390	434	419	477	513	511	555
Jordan	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Kuwait	19	31	37	53	59	50	78	136	138	159	202	179	151	167	126	120
Oman	4	4	4	5	6	6	11	7	22	23	46	16	17	16	13	12
Qatar	57	64	73	292	313	353	164	106	108	805	1,142	1,414	1,455	1,531	1,413	1,429

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Saudi Arabia	468	491	590	643	752	849	1,130	1,172	1,226	1,517	1,668	1,771	1,768	1,934	1,579	1,411
United Arab Emirates	55	58	61	69	77	87	94	110	94	101	118	130	135	138	122	125
Africa																
Cameroon	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Egypt	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ghana	4	5	6	6	8	9	10	10	8	9	12	11	11	10	8	8
Kenya	5	5	6	7	6	7	5	6	5	4	5	5	6	6	6	7
Morocco	62	71	73	75	111	123	206	241	226	237	288	318	415	459	408	402
Nigeria	87	114	120	132	152	174	187	197	205	212	212	226	242	247	227	181
Senegal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
South Africa	84	91	121	141	144	150	163	158	187	198	194	183	165	154	159	151
Tunisia	8	9	12	13	13	14	2	3	3	4	3	3	4	4	3	3
Asia																
Bangladesh	257	302	340	375	417	406	412	462	555	614	625	642	699	1,021	1,950	2,267
China	2,353	2,903	3,310	3,382	4,165	5,058	7,425	8,523	8,811	9,349	8,702	9,036	9,529	10,413	11,070	11,868
India	20	34	49	71	63	74	85	87	27	43	44	153	156	166	170	175
Indonesia	66	59	76	93	118	97	101	149	156	208	278	249	100	100	99	108
Japan	3,471	3,089	4,129	4,602	4,091	5,145	4,077	5,264	4,816	5,816	3,829	5,738	5,277	6,098	6,453	6,877
Malaysia	21	31	34	37	90	232	226	343	260	397	536	629	737	841	886	862

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Pakistan	2	1	2	2	2	70	98	122	81	140	252	282	334	373	392	424
Philippines	41	47	49	55	65	69	55	85	76	60	61	73	67	71	83	85
Singapore	752	884	886	1,089	1,294	1,505	1,774	1,907	1,857	2,047	2,199	2,235	2,325	2,044	1,821	1,923
South Korea	453	375	361	410	381	531	719	755	739	829	861	1,228	1,691	2,123	2,464	2,406
Sri Lanka	10	12	14	15	20	128	65	35	35	36	43	43	50	60	57	57
Taiwan	236	218	185	146	115	70	105	138	122	142	172	176	177	189	198	181
Thailand	7	8	10	12	14	17	20	20	16	24	27	28	26	22	21	22
Vietnam	0	0	0	0	1	1	1	2	1	1	2	7	5	8	13	14
Australia and Oceania																
Australia	383	530	733	840	918	962	1,142	1,185	897	1,145	1,390	1,668	1,172	1,076	856	872
New Zealand	54	66	86	101	114	102	132	108	90	112	119	109	111	115	96	98

EU = European Union.

### Note(s)

Value added is the amount contributed by a country, firm, or other entity to the value of a good or service and excludes purchases of domestic and imported materials and inputs. Data are not available for EU members Cyprus, Estonia, Latvia, Lithuania, Luxembourg, Malta, and Slovenia. China includes Hong Kong. Detail may not add to total because of rounding or minor discrepancies. See Appendix Table 6-1 for a full list of countries and economies in each region.

### Source(s)

IHS Global Insight, World Industry Service database, accessed 17 July 2017.

*Science and Engineering Indicators 2018*

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

APPENDIX TABLE 6-20

## Value added of motor vehicles, trailers, and parts, by region, country, or economy: 2001–16

(Millions of current dollars)

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
World	419,460	448,137	513,920	551,624	565,261	604,121	667,233	663,253	530,668	721,425	775,804	860,190	874,076	919,867	880,193	913,032
North America																
Canada	16,449	18,188	18,751	17,861	18,247	18,129	18,504	13,512	9,732	14,077	14,574	16,081	15,502	16,146	14,458	14,443
Mexico	14,807	11,106	15,071	15,918	17,269	20,577	21,734	21,716	14,810	22,277	26,575	30,114	33,230	36,981	37,448	34,262
United States	125,256	136,156	144,296	140,278	136,908	134,632	125,258	91,667	48,439	92,904	111,116	125,662	133,564	144,150	163,150	175,914
Central and South America																
Argentina	1,528	1,033	1,317	1,712	2,292	3,126	4,323	5,606	4,784	5,096	6,225	6,254	6,412	4,435	4,058	3,315
Bolivia	4	3	3	3	3	3	4	4	5	5	5	5	6	6	6	7
Brazil	8,764	8,707	10,542	13,324	17,315	21,537	28,956	39,148	33,935	47,067	54,604	43,664	43,533	35,406	20,757	18,350
Chile	74	63	62	79	87	88	91	72	88	102	121	123	139	88	159	233
Colombia	391	378	327	378	492	595	869	663	505	726	857	935	767	806	693	628
Costa Rica	12	13	11	13	15	17	20	23	20	26	29	31	33	32	32	32
Ecuador	234	254	266	279	332	394	504	728	872	877	887	881	742	773	697	585
Honduras	45	48	49	52	56	60	65	70	74	72	83	91	85	90	90	91
Panama	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
Peru	466	295	320	430	517	594	857	1,000	994	1,340	1,456	1,745	1,806	1,541	1,340	1,350

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Uruguay	108	46	39	32	27	24	27	47	29	88	120	70	53	51	34	28
Venezuela	1,820	1,247	1,152	1,536	1,891	2,241	2,767	3,421	4,282	2,227	2,673	3,167	2,991	2,412	3,935	374
Europe																
EU	108,911	116,184	143,680	162,682	160,519	172,936	200,420	188,871	132,422	173,662	194,699	178,087	190,690	205,413	185,621	189,588
Austria	2,139	2,347	2,896	3,450	3,962	4,188	4,782	4,796	3,558	3,741	4,497	4,264	4,743	4,846	4,305	4,525
Belgium	3,075	3,298	3,996	4,164	4,115	4,154	4,192	4,414	3,257	3,463	3,565	3,085	3,091	3,175	2,895	2,923
Bulgaria	26	32	36	49	64	72	104	34	71	107	168	162	111	148	135	144
Czech Republic	1,750	2,127	2,349	3,630	4,297	5,269	6,564	7,633	6,173	7,212	8,529	7,842	7,541	8,568	8,434	8,999
Denmark	312	330	368	402	477	499	533	555	326	362	365	328	335	321	312	378
Finland	344	382	415	450	521	546	690	722	446	467	588	428	536	652	565	564
France	11,629	13,009	14,673	16,690	14,868	12,672	14,015	13,746	9,919	12,179	10,090	8,391	8,423	8,661	8,203	8,606
Germany	49,602	53,258	68,176	75,218	74,818	85,222	100,351	91,718	63,827	94,213	107,697	101,956	108,242	117,648	101,049	102,731
Greece	328	246	343	406	222	186	232	229	176	137	103	75	63	65	43	44
Hungary	1,168	1,388	1,913	2,298	2,731	3,305	4,259	4,470	2,975	3,244	3,589	3,442	4,379	5,244	5,538	5,428
Ireland	102	100	130	134	147	156	191	169	222	129	226	115	112	124	146	159
Italy	8,001	7,901	9,224	10,718	10,380	11,662	13,873	13,417	10,412	10,648	10,263	8,131	8,276	8,689	9,595	9,801
Netherlands	1,710	1,737	2,112	2,469	2,375	2,473	2,892	3,370	1,399	2,006	2,866	2,373	2,253	2,422	2,685	2,918
Poland	2,361	2,356	3,117	3,986	4,548	4,290	5,499	6,690	5,263	5,842	7,050	6,197	7,007	7,163	6,198	6,363
Portugal	1,153	1,185	1,341	1,381	1,317	1,347	1,567	1,549	1,284	1,405	1,544	1,297	1,374	1,513	1,245	1,225

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Romania	185	213	298	426	651	820	1,144	1,463	1,237	1,492	1,217	1,726	2,142	2,266	2,052	2,269
Slovakia	742	913	1,099	912	674	890	1,651	1,430	1,550	2,118	2,481	2,524	2,914	3,041	2,478	2,584
Spain	7,819	8,472	10,606	12,098	11,755	12,634	14,082	13,149	9,827	10,741	11,767	9,814	11,085	11,819	10,091	10,462
Sweden	4,551	4,683	6,266	7,119	6,537	6,897	7,645	5,269	2,578	5,731	7,280	5,735	6,477	6,215	6,577	7,229
United Kingdom	11,913	12,204	14,321	16,684	16,063	15,654	16,154	14,047	7,920	8,425	10,814	10,204	11,585	12,832	13,077	12,234
Other Europe																
Norway	267	336	380	403	411	412	408	411	243	236	268	270	288	290	278	269
Russia	2,743	1,982	1,151	1,577	1,920	2,366	3,202	3,756	3,978	4,501	5,415	6,419	7,503	5,994	2,196	2,216
Switzerland	276	295	333	356	366	461	507	576	537	728	961	811	852	861	794	724
Turkey	1,648	2,349	3,133	3,861	5,038	5,200	6,369	7,728	4,240	5,375	6,524	5,809	6,107	5,922	6,034	5,965
Ukraine	26	41	69	94	117	141	209	296	164	293	361	383	509	239	100	93
Middle East																
Bahrain	32	33	36	39	52	70	90	115	91	105	122	129	136	140	117	116
Iran	1,801	1,807	2,898	2,911	3,713	5,188	5,087	5,931	7,560	7,735	11,823	8,867	6,690	7,323	6,964	7,631
Israel	214	224	216	215	224	242	286	318	324	328	299	278	278	261	228	230
Jordan	9	11	10	12	12	15	17	21	22	20	19	12	11	10	9	9
Kuwait	134	158	142	187	188	172	261	349	476	574	721	938	782	698	537	525
Oman	18	18	20	22	28	30	74	77	74	201	295	181	185	173	141	135
Qatar	5	5	5	109	116	142	237	306	26	681	966	1,197	1,232	1,296	1,196	1,218

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Saudi Arabia	1,471	1,547	1,867	2,040	2,405	2,735	3,133	3,132	3,146	3,971	4,432	4,744	4,753	5,272	4,188	3,845
United Arab Emirates	84	87	93	104	117	131	142	165	142	153	178	195	204	207	184	185
Africa																
Cameroon	1	1	1	1	1	1	2	3	3	3	3	3	3	4	3	3
Egypt	140	130	106	139	162	178	221	280	308	396	350	303	325	468	553	370
Ghana	44	51	62	70	83	98	105	106	87	101	125	114	120	104	83	89
Kenya	21	20	22	27	21	28	51	57	54	44	48	54	57	60	61	66
Morocco	250	261	253	258	311	402	493	563	535	624	729	697	969	993	892	888
Nigeria	342	465	513	618	816	1,096	1,283	1,602	1,504	1,889	2,340	3,278	4,372	5,533	4,543	2,687
Senegal	1	0	1	0	1	2	0	1	4	4	4	4	4	4	3	4
South Africa	1,599	1,451	2,100	2,693	3,086	3,368	3,317	2,818	2,248	3,111	3,281	3,390	3,057	3,013	3,019	2,756
Tunisia	114	116	148	169	172	233	279	341	386	383	426	401	413	448	377	359
Asia																
Bangladesh	76	74	56	75	88	84	85	98	120	134	135	136	133	183	206	232
China	22,155	27,593	34,495	32,223	33,943	41,976	56,275	70,412	87,698	120,073	136,634	157,802	180,588	210,215	214,568	232,565
India	1,736	1,990	2,981	3,941	4,285	5,137	6,495	6,400	8,909	10,657	13,384	13,249	11,495	10,918	11,947	12,579
Indonesia	4,378	5,247	6,604	7,836	6,327	4,735	6,765	9,050	8,665	11,852	11,828	13,449	12,481	12,476	11,847	12,788
Japan	78,721	82,501	90,536	102,335	105,348	109,284	116,214	132,709	106,462	134,980	102,457	174,159	140,580	135,320	113,445	125,553
Malaysia	1,326	1,690	1,624	1,624	1,224	1,238	1,244	1,579	1,422	2,024	2,288	2,551	2,507	2,632	2,781	2,593

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Pakistan	272	296	405	670	897	899	815	685	567	826	1,096	1,112	950	1,070	1,422	1,460
Philippines	383	424	428	471	547	558	766	965	848	1,310	1,186	1,044	952	1,005	1,165	1,184
Singapore	140	137	133	116	122	130	132	112	125	134	184	164	278	291	277	277
South Korea	10,741	11,855	13,463	16,289	19,588	22,684	26,141	21,481	18,950	26,695	31,321	31,447	34,607	38,936	38,816	35,843
Sri Lanka	77	90	105	115	151	984	497	269	273	279	334	334	382	458	463	474
Taiwan	2,741	3,439	3,517	3,589	4,128	3,261	3,057	2,796	2,706	3,336	3,867	3,802	3,939	4,363	4,539	4,227
Thailand	4,190	4,627	5,827	7,141	8,541	10,377	12,437	14,673	11,339	10,301	9,263	9,081	9,017	6,811	6,959	6,843
Vietnam	114	161	236	257	380	553	728	907	914	1,020	1,030	1,253	1,377	1,664	2,093	2,406
Australia and Oceania																
Australia	2,234	2,823	3,961	4,337	4,226	4,431	5,256	5,455	4,420	5,651	6,868	5,046	6,214	5,701	4,538	4,272
New Zealand	69	83	105	122	139	128	154	162	108	149	212	170	172	178	149	154

EU = European Union.

### Note(s)

Value added is the amount contributed by a country, firm, or other entity to the value of a good or service and excludes purchases of domestic and imported materials and inputs. Data are not available for EU members Cyprus, Estonia, Latvia, Lithuania, Luxembourg, Malta, and Slovenia. China includes Hong Kong. Detail may not add to total because of rounding or minor discrepancies. See Appendix Table 6-1 for a full list of countries and economies in each region.

### Source(s)

IHS Global Insight, World Industry Service database, accessed 17 July 2017.

*Science and Engineering Indicators 2018*



## CHAPTER 6 | Industry, Technology, and the Global Marketplace

APPENDIX TABLE 6-21

### Value added of chemicals excluding pharmaceuticals, by region, country, or economy: 2001–16

(Millions of current dollars)

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
World	395,521	412,721	454,591	517,308	538,185	575,252	661,453	713,262	677,009	803,008	899,501	918,467	949,068	960,428	889,893	857,856
North America																
Canada	5,936	6,401	7,115	7,895	8,016	7,967	8,456	8,507	8,130	10,630	13,437	13,322	13,671	13,339	11,948	11,470
Mexico	9,202	9,662	8,847	10,444	10,772	13,621	14,054	15,591	12,511	14,679	15,300	17,334	18,140	14,922	13,152	11,347
United States	126,204	130,267	130,389	140,466	139,478	156,074	166,374	170,054	182,135	198,447	206,867	216,734	225,460	228,519	222,534	216,791
Central and South America																
Argentina	4,546	1,705	2,431	3,106	3,847	4,552	5,505	7,378	7,528	9,247	11,221	12,200	12,043	10,508	9,616	7,886
Bolivia	56	53	55	58	62	66	69	102	120	122	134	141	155	165	175	200
Brazil	11,166	9,790	11,488	14,181	15,734	17,755	23,395	28,636	22,786	30,760	36,028	33,051	32,509	32,662	19,186	18,745
Chile	193	189	249	303	492	370	399	381	562	757	756	768	920	939	1,001	1,003
Colombia	1,417	1,524	1,595	1,804	2,141	2,364	2,741	3,348	3,259	3,804	4,031	4,376	4,407	4,274	3,318	3,068
Costa Rica	171	166	176	175	180	204	246	275	240	310	349	374	395	390	379	376
Ecuador	406	440	462	485	466	484	497	584	682	699	743	834	904	1,125	1,115	983
Honduras	119	113	115	100	122	120	130	150	149	139	170	188	191	197	195	188
Panama	21	19	19	20	21	23	31	35	39	39	41	56	57	60	59	59
Peru	625	703	717	923	1,075	1,231	1,422	1,620	1,610	1,966	2,248	2,342	2,357	2,218	2,054	1,981

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Uruguay	129	105	99	108	122	142	153	232	183	235	303	330	353	386	374	342
Venezuela	1,724	1,184	1,087	1,446	1,774	2,100	2,589	3,969	4,654	2,778	3,419	4,077	3,848	3,102	5,062	989
Europe																
EU	97,659	105,336	122,097	134,970	140,250	143,285	164,280	168,559	137,791	153,478	167,301	153,440	157,825	163,642	142,975	135,034
Austria	1,520	1,447	1,789	1,991	2,022	2,419	2,889	2,964	2,770	3,163	4,092	4,218	4,240	4,227	3,813	3,714
Belgium	5,433	5,835	6,771	7,680	8,309	8,298	9,137	9,135	7,895	8,282	9,267	8,682	9,349	9,324	8,732	8,038
Bulgaria	146	146	164	180	197	204	240	92	149	176	260	199	191	204	164	159
Czech Republic	706	712	882	1,067	1,247	1,212	1,474	1,730	1,149	1,506	1,660	1,524	1,458	1,589	1,270	1,094
Denmark	848	835	1,133	1,287	1,289	1,308	1,332	1,672	1,713	1,924	1,980	2,182	2,431	2,602	2,412	2,392
Finland	1,282	1,249	1,494	1,880	1,827	1,843	2,327	2,374	1,916	2,020	2,732	2,254	2,430	2,507	2,187	2,115
France	11,396	10,644	12,602	14,282	15,330	15,224	17,811	19,539	18,146	17,098	17,843	16,013	16,640	16,630	13,660	13,514
Germany	28,668	31,028	36,182	40,540	40,715	42,467	49,081	52,437	44,942	51,026	58,330	52,494	54,240	54,173	44,473	42,285
Greece	684	685	826	992	942	872	1,030	1,275	1,134	954	917	722	829	809	616	642
Hungary	470	523	593	725	745	856	1,105	1,108	617	647	753	653	669	695	616	578
Ireland	6,080	8,508	8,434	8,095	7,288	7,071	9,013	8,848	7,207	8,635	8,270	8,439	8,206	12,228	13,964	12,326
Italy	8,212	9,046	10,152	11,488	11,494	11,787	13,525	13,311	11,849	12,042	12,056	10,742	10,818	10,669	8,472	8,317
Netherlands	6,868	7,719	9,480	11,622	12,009	12,965	14,825	15,241	10,190	13,946	16,322	14,873	14,082	13,794	12,211	12,485
Poland	2,063	2,000	2,137	2,648	3,059	2,886	3,699	4,500	3,129	3,722	4,607	3,842	3,986	3,756	2,943	2,767
Portugal	566	616	750	887	882	902	1,050	1,038	877	972	1,020	741	774	764	602	573

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Romania	187	197	190	235	309	449	625	800	668	692	1,038	636	713	746	538	482
Slovakia	126	146	142	162	186	243	298	294	216	306	468	269	309	283	240	215
Spain	5,684	6,335	7,446	8,883	9,332	9,519	10,852	11,459	8,319	9,692	10,834	9,087	8,880	9,040	6,884	6,790
Sweden	2,026	2,083	2,113	2,483	2,757	2,779	3,368	3,046	2,932	3,112	3,173	3,136	3,438	3,433	2,892	2,690
United Kingdom	14,695	15,584	18,819	17,842	20,309	19,982	20,599	17,696	11,973	13,565	11,678	12,736	14,142	16,169	16,288	13,860
Other Europe																
Norway	886	844	1,226	1,315	1,629	1,647	2,229	2,201	1,719	1,972	2,500	2,047	2,029	1,889	1,438	1,297
Russia	1,931	2,955	4,081	6,360	9,056	10,426	12,751	23,052	10,677	13,115	19,203	17,345	16,356	15,573	11,425	11,868
Switzerland	1,969	2,356	2,638	2,914	3,069	3,356	3,743	4,250	4,302	4,544	4,619	3,457	3,668	3,780	3,787	3,772
Turkey	1,614	1,623	2,088	2,377	1,585	2,229	2,339	2,931	2,316	2,849	3,460	3,025	3,112	3,011	2,538	2,382
Ukraine	174	212	277	422	566	645	805	1,023	378	541	858	902	1,542	1,056	367	329
Middle East																
Bahrain	51	53	57	62	83	112	144	183	145	167	192	202	215	222	186	190
Iran	1,644	2,114	1,950	2,794	2,634	3,852	5,897	6,307	7,743	8,271	12,642	9,482	7,153	7,831	7,447	8,018
Israel	380	407	442	563	682	810	915	1,368	1,231	1,290	1,501	1,333	1,421	1,410	1,321	1,288
Jordan	270	332	306	349	354	441	522	636	650	612	587	598	658	525	503	472
Kuwait	168	279	353	471	527	387	519	623	608	770	966	1,175	1,217	1,109	824	755
Oman	224	231	254	282	350	316	382	513	1,287	1,002	2,334	3,583	3,673	3,437	2,789	2,293
Qatar	99	105	190	488	512	557	1,237	2,555	337	1,314	1,863	2,307	2,376	2,499	2,306	2,140

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Saudi Arabia	2,478	2,606	3,144	3,436	4,050	4,607	7,856	8,364	9,205	11,603	12,925	13,837	13,879	15,391	12,227	10,816
United Arab Emirates	74	77	82	91	103	115	125	146	125	135	156	171	179	183	162	162
Africa																
Cameroon	11	31	30	41	43	45	51	87	87	88	99	99	110	120	106	113
Egypt	755	701	575	753	875	963	1,196	1,514	1,665	1,992	2,472	2,943	2,621	3,252	3,667	3,111
Ghana	79	91	111	124	148	175	188	190	155	181	224	204	213	186	148	154
Kenya	120	119	145	163	160	188	235	272	270	282	279	313	327	347	351	356
Morocco	459	521	579	607	797	742	969	1,157	1,056	1,396	1,909	1,721	2,050	2,350	2,077	2,037
Nigeria	312	423	467	562	742	996	1,166	1,455	1,367	1,716	2,163	2,581	3,346	3,966	3,452	2,768
Senegal	69	87	105	110	107	89	83	104	95	99	139	111	93	91	98	96
South Africa	2,857	2,774	4,263	5,276	5,669	3,564	3,606	3,862	3,816	4,203	3,893	4,229	3,998	3,901	3,393	3,001
Tunisia	253	163	189	224	260	288	540	717	623	755	611	677	650	690	582	520
Asia																
Bangladesh	205	232	252	272	297	307	360	400	548	531	501	474	591	674	670	715
China	33,983	36,714	43,679	56,156	62,766	74,293	100,065	120,193	127,065	163,643	214,757	221,443	242,156	250,293	248,493	241,652
India	5,034	5,312	6,058	7,118	8,129	8,990	11,758	12,827	13,305	15,775	21,693	16,722	17,435	16,829	17,140	17,149
Indonesia	1,649	1,730	2,453	1,819	2,646	4,348	6,000	7,728	7,355	8,976	12,350	13,473	17,468	17,695	16,738	18,075
Japan	56,493	57,146	63,165	69,216	66,808	61,299	61,763	59,793	57,557	73,973	48,927	73,651	61,640	57,325	47,089	49,759
Malaysia	1,720	2,101	2,656	3,586	3,749	4,975	4,655	5,283	4,407	5,847	6,194	6,542	6,168	6,269	5,600	5,365

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Pakistan	847	929	1,252	1,777	2,122	1,881	2,138	2,480	2,038	2,412	3,039	3,124	3,080	3,379	3,390	3,383
Philippines	565	619	605	660	614	706	702	684	746	722	1,022	1,101	1,562	1,629	1,803	1,685
Singapore	1,296	1,615	1,896	2,911	2,586	2,483	3,381	1,513	2,423	3,491	4,005	2,657	4,195	4,462	3,796	3,557
South Korea	7,437	8,649	9,680	11,759	13,074	13,350	14,966	13,457	12,815	17,391	24,254	25,272	28,249	30,701	28,262	26,567
Sri Lanka	99	117	135	149	195	1,273	643	348	352	361	432	432	494	593	598	554
Taiwan	6,402	6,759	7,124	9,597	10,161	7,631	8,949	6,271	8,207	12,642	11,839	9,455	10,154	10,005	12,074	11,391
Thailand	535	889	1,050	1,111	1,195	1,328	1,585	1,974	2,108	2,824	3,479	3,498	3,606	3,524	3,137	2,999
Vietnam	354	415	459	560	699	826	1,157	1,891	1,534	1,466	1,673	1,821	1,856	1,970	2,099	2,116
Australia and Oceania																
Australia	2,133	2,367	3,200	3,813	3,964	4,047	4,783	4,982	3,838	5,276	6,746	6,152	5,535	5,059	4,042	3,867
New Zealand	314	361	434	532	627	609	711	505	472	692	646	741	753	755	630	621

EU = European Union.

### Note(s)

Value added is the amount contributed by a country, firm, or other entity to the value of a good or service and excludes purchases of domestic and imported materials and inputs. Data are not available for EU members Cyprus, Estonia, Latvia, Lithuania, Luxembourg, Malta, and Slovenia. China includes Hong Kong. Detail may not add to total because of rounding or minor discrepancies. See Appendix Table 6-1 for a full list of countries and economies in each region.

### Source(s)

IHS Global Insight, World Industry Service database, accessed 17 July 2017.

*Science and Engineering Indicators 2018*

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

APPENDIX TABLE 6-22

### Value added of machinery and equipment, by region, country, or economy: 2001–16

(Millions of current dollars)

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
World	408,875	404,934	454,430	526,119	577,860	637,273	738,666	836,516	699,199	807,960	897,632	964,974	979,385	1,009,634	939,663	931,046
North America																
Canada	7,723	7,572	8,302	9,889	11,145	12,191	13,034	12,723	10,155	11,439	14,507	15,253	14,716	14,684	12,307	10,955
Mexico	4,011	4,333	3,681	4,215	4,807	5,420	5,689	5,924	4,534	7,075	8,119	8,524	8,698	8,439	7,964	7,398
United States	113,586	106,824	105,539	112,643	123,327	131,105	139,214	139,061	124,045	131,318	147,005	153,679	157,811	163,551	164,086	157,805
Central and South America																
Argentina	367	246	278	347	413	470	586	726	723	880	1,090	1,068	1,057	959	781	661
Bolivia	5	4	3	3	3	4	5	6	6	7	8	9	9	10	10	11
Brazil	6,176	5,685	6,016	7,875	8,610	10,280	13,932	17,720	14,202	21,527	25,926	23,457	23,025	21,133	14,554	13,549
Chile	18	28	27	36	41	45	49	45	50	62	69	70	73	69	62	61
Colombia	189	185	186	249	310	366	496	544	472	577	601	624	631	572	497	462
Costa Rica	24	28	30	34	35	40	48	54	47	60	68	73	77	76	74	75
Ecuador	422	457	479	504	484	503	516	607	708	726	772	866	939	1,169	1,159	1,085
Honduras	32	31	32	30	38	55	60	64	49	73	82	92	100	98	98	100
Panama	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1
Peru	1,344	1,209	1,734	1,601	1,749	2,071	1,809	1,947	1,460	1,702	2,021	2,426	1,985	1,983	1,712	1,670

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Uruguay	6	5	5	6	6	8	9	12	12	52	28	32	31	30	21	19
Venezuela	390	267	247	329	405	480	592	848	958	502	536	612	578	466	761	156
Europe																
EU	134,619	139,425	164,159	193,448	201,169	218,162	259,957	284,427	209,859	229,631	262,048	248,921	258,088	268,197	232,738	231,321
Austria	3,599	3,903	4,745	5,613	5,977	6,654	8,033	9,058	7,315	7,342	8,868	8,806	9,206	9,303	9,054	8,781
Belgium	2,280	2,390	2,708	3,129	3,373	3,818	4,621	5,101	3,786	3,892	4,399	4,057	4,139	4,023	3,555	3,535
Bulgaria	82	99	147	227	261	294	427	503	296	372	439	421	463	491	387	384
Czech Republic	1,157	1,348	1,585	1,847	2,377	2,985	4,063	4,879	3,896	3,936	4,429	4,161	4,240	4,407	3,903	3,832
Denmark	3,204	3,831	3,951	4,438	4,385	5,299	6,672	7,449	5,670	5,170	5,104	4,969	5,747	5,680	5,836	5,991
Finland	2,593	2,419	2,913	3,435	3,702	4,386	5,447	6,097	4,887	5,043	6,101	5,382	5,541	5,482	4,935	5,078
France	11,302	11,167	13,282	15,074	15,141	15,792	18,203	19,490	15,148	15,134	16,774	15,809	16,360	16,548	14,345	14,478
Germany	54,704	56,743	68,797	80,720	82,847	90,341	109,001	121,442	88,285	97,762	111,755	108,894	113,843	120,356	104,191	104,286
Greece	363	401	502	557	710	846	965	1,075	797	672	586	553	478	473	365	386
Hungary	490	625	746	907	1,060	1,123	1,394	1,653	2,865	4,179	4,600	4,118	4,294	4,477	3,943	3,494
Ireland	701	743	937	931	935	992	1,221	1,600	1,139	993	1,312	1,063	1,116	1,399	1,677	1,662
Italy	22,892	23,521	29,152	33,868	34,811	38,013	44,729	48,195	38,313	39,441	43,502	40,418	40,962	41,263	35,284	36,220
Netherlands	3,419	3,679	4,863	5,853	6,054	6,845	8,198	8,595	7,093	8,435	10,133	9,216	9,467	10,243	9,221	8,913
Poland	1,709	1,783	2,188	2,964	3,746	3,534	4,530	5,511	4,287	4,041	4,210	3,566	3,721	3,985	3,227	3,179
Portugal	683	739	859	924	956	977	1,137	1,124	781	811	803	910	931	930	746	746

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Romania	439	429	467	562	597	729	1,016	1,300	857	790	1,519	968	1,185	1,255	871	867
Slovakia	214	241	350	483	434	590	826	1,076	705	1,045	1,134	1,129	1,277	1,325	1,160	1,193
Spain	5,935	5,737	6,844	8,019	8,441	8,875	10,185	10,860	8,196	7,865	8,136	7,354	7,467	7,006	5,262	5,333
Sweden	4,622	5,155	6,178	6,655	7,255	8,095	9,857	9,877	5,117	8,396	10,621	9,664	9,662	9,078	8,078	7,796
United Kingdom	14,233	14,472	12,944	17,243	18,109	17,975	19,431	19,542	10,428	14,311	17,622	17,461	17,990	20,474	16,699	15,165
Other Europe																
Norway	1,012	1,202	1,305	1,364	1,570	2,094	2,826	3,877	3,756	3,854	4,400	5,013	5,627	5,744	4,896	4,427
Russia	3,974	4,050	5,357	8,078	10,126	12,577	18,421	22,151	10,729	12,832	16,063	15,871	16,424	13,936	10,214	10,263
Switzerland	6,740	7,077	7,887	8,583	8,699	9,286	10,251	11,611	10,075	11,412	13,654	11,857	12,138	12,269	11,310	10,908
Turkey	678	940	1,391	2,096	2,947	3,174	3,828	4,339	2,715	3,438	4,424	4,539	4,842	4,750	4,080	3,927
Ukraine	158	175	238	359	483	573	744	994	1,096	1,545	1,904	2,073	1,921	1,351	327	315
Middle East																
Bahrain	13	14	15	16	22	29	38	48	38	44	51	54	57	58	49	48
Iran	284	463	531	620	738	851	1,173	1,158	1,235	1,392	2,127	1,595	1,204	1,318	1,253	1,363
Israel	976	845	804	785	767	853	1,035	1,386	1,375	1,379	1,495	1,093	1,155	1,208	1,107	1,090
Jordan	26	32	38	47	50	64	85	96	90	63	46	49	55	48	44	44
Kuwait	209	221	236	302	387	366	459	609	439	492	319	266	273	282	247	241
Oman	12	12	14	15	19	24	36	55	24	27	58	63	64	60	49	46
Qatar	11	8	8	57	47	65	288	366	5,587	871	1,235	1,530	1,575	1,657	1,529	1,535



## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Saudi Arabia	930	978	1,180	1,289	1,519	1,728	2,593	2,683	2,833	3,576	3,991	4,272	4,281	4,748	3,772	3,388
United Arab Emirates	103	108	114	128	144	161	175	204	175	189	220	241	251	256	227	227
Africa																
Cameroon	1	1	1	2	2	2	2	4	4	4	5	5	5	5	5	5
Egypt	88	81	67	88	102	112	139	176	194	215	261	280	264	322	481	419
Ghana	73	84	102	115	136	162	173	175	143	167	207	189	197	172	137	149
Kenya	6	9	11	13	15	63	55	49	45	40	40	45	47	50	50	54
Morocco	351	382	458	489	536	548	628	735	673	741	819	823	931	1,026	805	772
Nigeria	402	546	602	725	957	1,286	1,505	1,879	1,764	2,216	2,793	3,330	4,320	5,115	4,452	3,588
Senegal	1	1	1	1	1	1	1	1	2	1	1	1	1	2	1	1
South Africa	987	1,038	1,464	1,850	1,963	1,993	2,180	1,966	1,773	2,004	2,020	2,113	1,910	1,684	1,609	1,440
Tunisia	63	74	91	103	113	125	142	171	173	175	181	175	160	154	143	140
Asia																
Bangladesh	19	21	23	24	27	31	32	37	46	52	53	55	62	74	88	99
China	29,884	33,564	41,002	46,834	59,685	75,322	100,210	144,757	150,616	186,474	231,110	254,584	280,127	292,903	298,039	301,932
India	3,277	3,355	3,903	5,301	6,160	6,998	8,920	9,732	9,142	10,981	13,130	12,416	11,194	11,300	11,824	12,228
Indonesia	603	427	418	295	648	841	953	992	1,010	1,253	1,920	2,089	2,268	2,351	2,464	2,638
Japan	71,493	64,003	74,528	89,844	97,524	102,459	106,709	122,727	91,456	111,992	80,473	130,816	105,866	107,909	91,252	94,483
Malaysia	860	837	837	1,004	984	1,324	1,331	1,490	1,239	1,530	1,651	1,772	1,705	1,686	1,727	1,726

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Pakistan	45	50	67	95	113	186	213	242	200	237	300	309	302	331	333	341
Philippines	235	209	270	279	175	139	166	186	227	227	256	278	430	582	648	653
Singapore	1,210	1,247	1,283	1,661	2,114	2,424	2,954	3,426	3,326	4,186	5,214	4,947	5,455	5,782	4,140	4,069
South Korea	9,341	10,421	12,196	14,186	17,277	19,991	23,031	21,090	18,930	24,460	28,068	28,455	29,551	31,661	30,452	28,355
Sri Lanka	73	85	94	103	125	252	225	210	218	243	260	229	243	275	322	325
Taiwan	3,425	3,495	3,847	4,206	4,683	5,356	5,639	5,714	4,613	6,079	7,025	7,635	7,465	8,444	8,230	7,583
Thailand	513	471	558	686	718	834	1,069	1,241	1,185	1,926	2,003	2,324	2,434	2,399	2,319	2,635
Vietnam	108	115	144	175	181	256	328	356	469	413	484	562	608	644	639	675
Australia and Oceania																
Australia	1,329	1,516	2,026	2,372	2,731	2,743	3,180	3,945	3,582	4,674	5,443	6,241	5,082	4,512	2,622	2,612
New Zealand	448	478	603	722	825	778	930	931	720	921	1,049	1,079	1,071	1,129	957	974

EU = European Union.

### Note(s)

Value added is the amount contributed by a country, firm, or other entity to the value of a good or service and excludes purchases of domestic and imported materials and inputs. Data are not available for EU members Cyprus, Estonia, Latvia, Lithuania, Luxembourg, Malta, and Slovenia. China includes Hong Kong. Detail may not add to total because of rounding or minor discrepancies. See Appendix Table 6-1 for a full list of countries and economies in each region.

### Source(s)

IHS Global Insight, World Industry Service database, accessed 17 July 2017.

*Science and Engineering Indicators 2018*

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

APPENDIX TABLE 6-23

## Value added of electrical machinery, by region, country, or economy: 2001–16

(Millions of current dollars)

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
World	207,959	208,494	233,735	260,942	282,399	325,292	366,992	425,135	392,275	444,898	471,648	501,737	527,381	546,611	523,277	530,088
North America																
Canada	2,578	2,140	2,148	2,565	2,863	3,110	3,477	3,540	3,233	3,513	4,061	3,997	3,790	3,799	3,271	3,093
Mexico	4,285	4,290	3,858	4,237	4,735	5,588	5,860	5,904	4,467	5,560	5,729	5,949	6,042	6,416	6,391	5,910
United States	44,294	43,690	45,610	42,106	43,247	51,434	50,193	55,089	50,177	49,971	47,393	50,995	54,416	55,438	56,314	55,492
Central and South America																
Argentina	263	188	228	309	371	438	586	750	637	809	1,022	1,008	1,025	943	863	723
Bolivia	2	2	2	2	2	2	2	2	2	3	3	3	3	3	3	4
Brazil	3,509	3,023	3,118	3,528	5,193	6,123	8,137	10,304	9,691	12,898	14,232	13,167	13,673	12,109	7,035	6,558
Chile	79	60	52	65	78	90	97	93	133	154	147	165	209	185	181	172
Colombia	230	232	200	288	385	477	657	755	653	819	884	862	829	820	637	596
Costa Rica	51	47	45	54	77	88	106	118	103	133	150	161	170	167	163	164
Ecuador	86	94	98	103	112	137	147	184	197	187	225	268	317	347	417	532
Honduras	88	95	97	102	110	119	128	139	146	142	165	180	169	179	177	178
Panama	3	3	3	3	3	3	5	5	6	6	6	7	7	8	8	8
Peru	163	150	122	174	199	255	343	377	302	414	444	556	604	508	322	314

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Uruguay	31	11	14	21	23	23	29	49	33	46	51	50	58	56	65	63
Venezuela	219	150	138	185	227	269	333	435	563	445	644	735	695	560	914	192
Europe																
EU	67,009	69,537	83,156	95,469	94,331	103,625	116,361	128,255	105,324	112,336	124,072	112,989	115,848	117,133	101,210	100,088
Austria	1,905	1,997	2,362	2,590	2,574	2,858	4,628	5,472	4,724	5,240	5,424	4,966	4,881	5,066	4,451	4,764
Belgium	1,476	1,461	1,738	1,853	1,890	1,997	1,835	2,183	1,980	1,841	2,089	2,031	1,837	1,632	1,363	1,372
Bulgaria	42	53	82	117	150	169	246	289	250	250	278	292	338	356	324	324
Czech Republic	807	821	1,126	1,412	1,599	2,030	2,661	3,015	2,615	2,902	3,464	3,521	3,436	3,689	3,452	3,555
Denmark	712	682	751	918	839	934	1,177	1,490	1,045	1,103	1,068	996	919	946	1,068	1,120
Finland	872	775	929	1,099	1,321	1,468	1,771	2,314	1,705	1,821	1,988	1,641	1,703	1,690	1,438	1,427
France	7,555	7,523	8,437	9,661	9,002	8,633	10,192	10,750	9,291	8,625	10,355	9,303	9,810	8,998	7,460	7,397
Germany	27,567	29,276	35,211	41,273	39,944	45,290	47,685	53,696	46,317	51,265	58,602	54,178	55,028	57,914	49,289	49,166
Greece	187	178	239	294	343	472	574	701	532	627	550	430	339	287	246	243
Hungary	646	878	1,282	1,812	2,143	1,942	2,497	2,567	911	918	836	727	790	838	793	822
Ireland	88	99	122	152	174	185	227	200	145	151	305	255	269	273	245	266
Italy	8,170	9,005	10,947	12,808	13,175	13,990	16,027	17,092	14,359	14,855	15,762	13,060	13,797	12,438	10,691	10,307
Netherlands	1,103	1,001	1,212	1,319	1,250	1,385	1,715	1,922	1,456	1,189	1,208	1,130	1,112	1,142	1,078	1,169
Poland	1,333	1,356	1,658	2,225	2,642	2,493	3,195	3,887	3,116	3,242	3,569	3,137	3,399	3,525	3,063	2,983
Portugal	1,154	1,009	1,113	1,200	887	908	1,056	1,044	1,002	1,098	1,054	759	1,170	1,060	877	889

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Romania	238	241	313	407	512	665	913	1,037	882	1,266	1,303	1,362	1,610	1,852	1,636	1,825
Slovakia	169	189	267	334	338	386	491	618	478	659	758	701	845	885	752	780
Spain	3,451	3,903	4,899	5,734	6,010	7,058	7,901	7,970	6,043	6,028	5,264	4,406	4,321	4,353	3,312	3,252
Sweden	1,900	1,919	2,202	2,253	2,254	2,423	2,955	3,025	2,089	2,278	2,744	2,674	2,817	2,578	2,343	2,261
United Kingdom	7,634	7,170	8,265	8,008	7,282	8,341	8,614	8,984	6,382	6,980	7,450	7,419	7,428	7,612	7,330	6,165
Other Europe																
Norway	456	517	561	690	785	895	1,043	1,169	992	948	1,195	1,181	1,238	1,179	950	868
Russia	4,324	3,470	2,765	4,091	5,283	7,384	9,557	10,751	4,780	6,349	7,950	7,876	7,750	6,907	3,292	3,433
Switzerland	2,912	2,984	3,323	3,707	3,837	4,025	4,772	5,898	5,460	5,332	6,471	5,822	6,104	6,170	5,688	5,450
Turkey	971	1,231	1,543	1,792	2,742	3,243	4,016	4,673	3,773	3,825	4,078	4,229	4,524	4,277	3,748	3,616
Ukraine	278	308	409	439	502	661	920	1,162	562	810	1,158	1,074	1,182	922	271	268
Middle East																
Bahrain	50	52	56	61	82	110	142	180	143	166	192	202	214	220	185	180
Iran	558	682	743	868	1,044	1,152	1,414	1,442	2,229	2,123	3,244	2,433	1,836	2,010	1,911	2,062
Israel	178	160	199	158	156	179	218	260	228	249	260	242	255	248	233	247
Jordan	38	47	46	67	80	100	130	163	168	117	102	118	154	129	108	108
Kuwait	29	45	63	80	106	109	159	207	183	182	171	149	140	200	125	119
Oman	38	39	43	48	60	79	119	147	152	227	419	443	454	425	344	324
Qatar	28	31	35	12	14	17	132	177	291	434	616	762	785	826	762	753

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Saudi Arabia	365	384	463	506	596	678	826	952	923	1,165	1,300	1,392	1,395	1,547	1,229	1,106
United Arab Emirates	52	54	58	65	73	82	89	103	89	96	111	122	127	130	115	116
Africa																
Cameroon	2	1	1	2	2	2	2	4	4	4	5	5	5	6	5	6
Egypt	381	353	290	380	442	486	603	764	840	785	491	483	451	468	484	410
Ghana	27	31	38	42	50	60	64	65	53	62	76	70	73	63	50	54
Kenya	22	21	23	27	31	40	116	120	124	115	136	152	159	169	171	184
Morocco	415	467	529	577	648	654	750	836	783	845	960	927	975	1,066	890	860
Nigeria	97	132	146	175	232	311	364	455	427	536	676	806	1,046	1,238	1,078	855
Senegal	3	3	4	6	7	7	6	7	8	9	10	10	9	11	5	6
South Africa	539	530	754	942	1,056	1,216	1,241	1,166	1,206	1,409	1,400	1,487	1,369	1,290	1,238	1,094
Tunisia	196	210	262	324	391	494	612	755	593	855	947	878	905	916	772	726
Asia																
Bangladesh	326	286	237	185	136	163	170	197	245	280	287	297	336	375	484	553
China	25,943	27,719	32,094	36,381	46,108	57,248	74,417	102,628	113,042	133,301	157,116	174,714	196,140	214,176	226,366	233,987
India	2,428	2,475	2,749	3,314	4,982	5,538	6,323	5,970	6,491	8,104	8,261	7,554	9,636	10,533	11,420	11,812
Indonesia	2,138	970	980	1,475	1,835	2,484	2,323	2,688	2,703	3,137	4,251	5,232	7,235	7,233	7,031	7,605
Japan	29,502	27,726	31,201	38,034	39,738	43,501	44,832	51,391	47,083	56,444	38,585	59,978	51,352	49,816	42,208	45,328
Malaysia	766	853	914	1,159	915	1,119	1,258	1,384	1,029	1,196	1,378	1,560	1,458	1,524	1,518	1,517

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Pakistan	125	137	185	263	313	377	430	491	404	479	606	624	611	670	673	721
Philippines	435	466	424	478	542	526	582	632	691	627	584	524	591	618	773	767
Singapore	264	275	272	313	358	424	467	522	449	464	486	506	528	574	505	491
South Korea	6,105	6,909	7,625	8,393	10,091	11,662	12,953	12,663	11,957	16,042	16,919	16,700	17,660	19,578	18,599	18,100
Sri Lanka	26	30	35	38	50	328	166	90	91	93	112	111	128	153	154	155
Taiwan	2,681	2,633	2,718	2,817	2,990	3,441	3,741	3,521	3,129	4,229	4,322	4,715	4,712	4,782	4,666	4,607
Thailand	1,009	943	1,022	1,256	1,218	1,555	1,861	1,799	1,937	2,658	2,911	3,117	3,515	3,079	3,400	3,512
Vietnam	210	255	293	372	522	683	792	866	1,096	1,054	1,149	1,338	1,412	1,513	1,581	1,730
Australia and Oceania																
Australia	970	1,160	1,477	1,878	2,054	2,128	2,514	2,597	2,105	2,512	3,244	2,584	2,834	2,663	2,075	2,068
New Zealand	179	194	266	317	370	349	407	242	144	199	240	227	229	238	198	203

EU = European Union.

### Note(s)

Value added is the amount contributed by a country, firm, or other entity to the value of a good or service and excludes purchases of domestic and imported materials and inputs. Data are not available for EU members Cyprus, Estonia, Latvia, Lithuania, Luxembourg, Malta, and Slovenia. China includes Hong Kong. Detail may not add to total because of rounding or minor discrepancies. See Appendix Table 6-1 for a full list of countries and economies in each region.

### Source(s)

IHS Global Insight, World Industry Service database, accessed 17 July 2017.

*Science and Engineering Indicators 2018*

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

APPENDIX TABLE 6-24

## Value added of railroad and other transportation equipment, by region, country, or economy: 2001–16

(Millions of current dollars)

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
World	32,387	34,542	39,490	44,637	48,967	54,612	64,727	75,205	71,542	79,972	87,220	89,286	88,885	97,443	92,415	94,031
North America																
Canada	1,518	1,428	1,439	1,384	1,679	1,827	1,786	1,778	1,523	1,414	1,883	1,828	1,761	2,096	1,948	1,778
Mexico	317	351	368	487	548	498	561	595	322	347	714	976	1,012	1,197	1,510	1,418
United States	8,954	8,820	9,215	10,432	12,378	14,090	16,842	18,698	16,885	15,394	15,258	13,863	14,681	15,500	13,530	13,051
Central and South America																
Argentina	28	13	15	20	25	27	32	35	33	33	32	28	28	24	22	19
Bolivia	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2
Brazil	626	568	664	1,062	1,542	2,263	3,126	3,670	2,769	4,041	3,977	2,913	2,784	2,835	2,107	1,921
Chile	6	5	6	4	6	5	5	5	8	9	9	10	13	14	9	9
Colombia	63	72	77	100	126	178	217	224	216	270	356	406	464	480	415	378
Costa Rica	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ecuador	19	20	21	23	22	22	23	27	32	33	35	39	42	52	52	49
Honduras	4	5	5	5	6	6	7	8	8	8	9	11	10	10	10	11
Panama	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Peru	33	37	38	49	57	65	75	86	85	104	120	125	130	108	99	97



## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Uruguay	1	1	2	2	3	4	5	6	1	2	2	2	2	1	1	1
Venezuela	6	4	4	5	6	8	9	14	17	10	12	15	14	11	18	4
Europe																
EU	6,391	7,308	8,972	9,734	10,140	11,258	13,790	15,997	13,473	13,496	14,225	13,087	13,287	13,912	12,346	12,297
Austria	278	414	585	542	526	794	959	1,209	858	965	1,049	893	899	861	600	626
Belgium	55	58	70	77	78	75	105	100	89	88	92	84	87	86	81	81
Bulgaria	5	7	12	14	23	27	38	14	27	20	24	22	18	19	18	18
Czech Republic	120	156	209	222	251	274	389	484	524	504	599	546	586	620	578	598
Denmark	75	87	91	122	138	129	108	176	108	127	109	77	81	86	96	97
Finland	55	64	87	87	121	99	113	130	90	82	84	82	112	106	92	91
France	436	627	595	759	910	999	1,475	1,435	1,340	1,458	1,166	1,142	1,251	1,231	1,076	1,096
Germany	1,249	1,395	1,891	1,898	2,233	2,333	2,962	3,163	2,576	2,826	3,025	2,881	3,061	3,421	3,030	3,104
Greece	29	33	38	46	36	42	62	65	61	127	102	40	46	46	133	138
Hungary	31	55	80	94	85	71	117	204	102	104	122	101	118	143	112	106
Ireland	18	16	18	22	21	23	29	24	14	13	9	10	9	4	4	4
Italy	1,094	1,343	1,651	1,961	1,642	1,758	2,197	2,524	2,007	1,800	1,804	1,445	1,313	1,427	1,178	1,216
Netherlands	148	162	192	197	208	202	359	333	302	284	289	273	271	282	266	256
Poland	231	199	246	341	356	336	431	524	421	394	600	495	520	474	450	406
Portugal	132	172	211	221	215	224	262	678	457	433	443	422	140	121	99	101

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Romania	63	56	97	105	130	187	260	333	228	168	216	200	145	176	141	133
Slovakia	0	0	0	0	0	0	39	55	32	94	79	90	79	83	67	71
Spain	928	791	913	1,006	1,248	1,399	1,571	2,068	1,782	1,606	1,641	1,518	1,369	1,425	1,014	1,065
Sweden	194	282	391	361	408	445	545	536	554	558	709	621	644	625	581	539
United Kingdom	1,251	1,390	1,595	1,661	1,511	1,842	1,770	1,943	1,899	1,843	2,064	2,145	2,540	2,676	2,730	2,553
Other Europe																
Norway	22	18	28	40	48	82	88	90	79	65	76	82	90	89	72	69
Russia	154	195	243	341	449	576	884	1,010	2,037	2,389	3,400	3,434	3,302	3,081	422	511
Switzerland	108	128	161	192	200	224	253	309	299	445	682	670	706	710	657	601
Turkey	67	49	105	208	192	164	186	221	259	258	291	210	178	150	126	116
Ukraine	73	105	160	245	331	449	581	739	795	1,123	1,486	1,563	743	453	123	119
Middle East																
Bahrain	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	0
Iran	78	121	144	192	210	285	154	134	113	124	189	142	107	117	112	123
Israel	105	92	95	112	114	486	609	798	778	748	832	803	915	983	978	1,047
Jordan	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Kuwait	1	2	2	3	4	3	5	9	9	10	13	11	10	11	8	8
Oman	0	0	0	0	0	0	0	0	0	1	2	1	1	1	0	0
Qatar	1	1	1	3	3	4	2	1	1	9	13	16	16	17	16	16

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Saudi Arabia	49	51	62	67	78	89	118	122	128	158	174	185	184	202	165	147
United Arab Emirates	2	2	2	3	3	3	4	4	4	4	5	5	5	5	5	5
Africa																
Cameroon	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Egypt	14	13	11	14	16	18	22	28	31	32	31	20	12	39	242	216
Ghana	3	4	5	5	7	8	8	8	7	8	10	9	9	8	7	7
Kenya	12	12	15	19	15	19	13	14	14	11	13	14	15	16	16	17
Morocco	7	10	11	12	19	23	49	66	56	61	63	42	82	100	81	80
Nigeria	33	46	52	66	93	134	161	211	193	254	336	408	543	654	566	340
Senegal	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
South Africa	100	109	144	168	171	179	194	188	223	235	231	218	196	184	190	177
Tunisia	2	2	3	4	4	6	4	5	5	5	6	5	5	6	5	5
Asia																
Bangladesh	9	13	18	23	30	33	34	43	62	76	77	81	100	232	487	547
China	4,574	5,695	6,001	6,189	7,341	7,750	9,815	13,392	14,427	17,594	21,187	25,071	27,759	34,108	36,284	38,387
India	769	921	1,207	1,498	1,784	2,093	2,420	2,466	3,177	4,374	4,325	4,057	4,125	4,394	4,516	4,787
Indonesia	1,399	1,823	2,336	2,860	2,163	1,936	2,018	2,975	3,119	4,150	5,554	4,994	4,238	4,237	4,011	4,372
Japan	4,159	3,294	4,241	5,030	4,473	4,468	4,239	3,712	4,062	4,735	3,118	4,672	2,518	2,704	2,680	2,979
Malaysia	26	26	28	35	45	48	53	76	53	77	81	133	128	141	133	125

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Pakistan	13	14	19	28	33	154	166	184	162	168	174	168	138	148	144	144
Philippines	50	57	59	67	80	84	150	337	374	421	376	505	464	492	576	598
Singapore	53	60	58	74	84	79	142	181	163	248	304	301	326	289	253	255
South Korea	325	529	504	383	499	552	777	860	802	913	768	628	651	759	710	625
Sri Lanka	18	22	25	28	36	236	119	65	65	67	80	80	92	110	112	114
Taiwan	1,157	1,349	1,445	1,467	1,511	1,258	1,667	1,988	1,639	1,797	2,066	2,113	2,125	2,267	2,384	2,046
Thailand	549	586	751	927	1,127	1,415	1,531	1,548	1,167	1,803	2,069	2,270	2,045	1,696	1,687	1,716
Vietnam	164	200	230	349	506	750	862	1,393	1,042	1,397	1,325	1,390	1,436	1,491	1,530	1,645
Australia and Oceania																
Australia	186	196	283	429	479	502	595	618	604	772	936	1,412	1,118	1,025	816	811
New Zealand	132	163	213	248	281	252	325	266	221	276	292	269	272	282	235	240

EU = European Union.

### Note(s)

Value added is the amount contributed by a country, firm, or other entity to the value of a good or service and excludes purchases of domestic and imported materials and inputs. Data are not available for EU members Cyprus, Estonia, Latvia, Lithuania, Luxembourg, Malta, and Slovenia. China includes Hong Kong. Detail may not add to total because of rounding or minor discrepancies. See Appendix Table 6-1 for a full list of countries and economies in each region.

### Source(s)

IHS Global Insight, World Industry Service database, accessed 17 July 2017.

*Science and Engineering Indicators 2018*

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

APPENDIX TABLE 6-25

### Exports and imports of commercial KI services, by selected region, country, or economy: 2008–16

(Millions of current dollars)

Region, country, or economy	2008	2009	2010	2011	2012	2013	2014	2015	2016
Exports									
World	1,104,730	1,040,876	1,131,790	1,289,883	1,349,566	1,463,289	1,602,508	1,536,916	1,568,398
Selected developed regions, countries, or economies									
Australia	10,052	8,276	9,497	11,540	12,901	13,589	13,503	12,726	13,127
Canada	37,279	35,668	40,164	45,476	47,569	48,061	47,358	42,072	40,927
EU	378,342	351,494	382,135	432,402	452,962	499,459	548,938	503,002	520,048
Hong Kong	24,239	23,288	27,110	29,271	31,666	33,004	34,949	36,911	19,513
Japan	40,706	41,750	38,335	44,462	32,014	35,703	49,442	49,208	55,804
Norway	16,117	13,462	16,879	13,763	18,553	19,381	19,045	15,564	14,042
Singapore	34,285	33,803	38,836	47,293	52,346	59,985	68,403	70,808	68,846
South Korea	16,659	12,940	14,847	17,230	20,141	21,753	26,195	24,937	26,606
Switzerland	53,260	47,991	48,947	55,041	55,228	56,813	61,938	60,610	60,836
Taiwan	7,371	6,342	6,999	8,246	9,610	10,589	11,745	12,246	13,207
United States	186,213	192,381	207,015	228,951	240,052	262,582	283,802	284,529	287,805
Selected developing regions, countries, or economies									
Brazil	17,037	16,348	16,499	20,363	22,329	21,385	24,642	20,792	19,750

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2008	2009	2010	2011	2012	2013	2014	2015	2016
China	30,759	26,817	13,534	74,141	72,485	81,514	98,179	90,345	90,635
India	79,336	66,756	82,652	94,495	103,501	108,976	110,922	112,472	115,748
Malaysia	6,082	5,979	7,517	9,708	11,451	11,829	10,587	8,940	9,001
Philippines	8,972	10,504	13,506	14,060	14,484	16,729	18,264	21,544	23,885
Russia	18,496	15,411	16,448	19,281	21,649	24,836	23,232	18,401	17,181
All others	139,527	131,667	150,871	124,160	130,627	137,102	151,363	151,809	171,438
Imports									
World	NA	NA	NA	NA	NA	NA	NA	NA	NA
Selected developed regions, countries, or economies									
Australia	9,944	8,799	9,832	12,488	13,935	15,510	14,981	14,225	12,991
Canada	28,523	28,749	33,325	35,289	37,142	38,072	37,429	34,830	35,311
EU	268,984	253,804	265,666	291,918	302,196	331,866	365,309	357,200	381,860
Hong Kong	12,361	13,086	15,850	17,011	17,569	18,173	18,976	19,679	6,116
Japan	53,567	50,999	52,483	59,892	61,322	65,282	81,029	85,165	88,294
Norway	16,310	14,865	17,525	16,794	18,349	19,885	20,244	17,634	17,538
Singapore	29,994	28,629	34,310	41,614	47,725	59,581	65,792	63,305	63,694
South Korea	26,121	25,661	28,107	30,024	33,650	32,921	35,030	34,031	34,808
Switzerland	34,736	35,104	36,874	43,442	43,951	47,151	52,537	52,962	54,041
Taiwan	10,349	9,602	12,302	14,577	15,581	14,648	15,454	15,371	15,257

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2008	2009	2010	2011	2012	2013	2014	2015	2016
United States	163,560	167,292	171,987	183,778	186,581	195,870	203,273	203,473	207,234
Selected developing regions, countries, or economies									
Brazil	19,450	21,735	27,188	32,275	35,517	36,281	37,443	34,460	31,981
China	54,029	37,588	21,244	74,726	70,370	80,733	78,873	62,453	70,954
India	31,908	27,915	40,925	42,842	45,166	43,661	41,188	41,958	47,607
Malaysia	8,104	8,419	10,884	12,924	14,499	15,272	14,567	13,448	14,406
Philippines	3,517	2,202	2,366	2,568	3,136	3,900	5,377	7,232	7,441
Russia	24,295	20,719	23,258	27,186	29,397	33,740	34,064	27,373	25,868

NA = not available.

EU = European Union; KI = knowledge intensive.

### Note(s)

Commercial KI services trade consists of communications services, computer and information services, financial services, and other business services. Financial services include finance and insurance. World trade and total EU trade do not include intra-EU trade.

### Source(s)

World Trade Organization, International trade and tariff data, [https://www.wto.org/english/res\\_e/statis\\_e/statis\\_e.htm](https://www.wto.org/english/res_e/statis_e/statis_e.htm), accessed 15 September 2017.

*Science and Engineering Indicators 2018*

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

APPENDIX TABLE 6-26

### Exports and imports of high-technology products, by region, country, or economy: 2001–16

(Millions of current dollars)

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Exports																
World	930,574	968,797	1,113,846	1,367,710	1,545,145	1,758,209	1,833,815	1,919,440	1,718,914	2,089,174	2,248,045	2,308,649	2,404,474	2,480,049	2,465,549	2,555,146
North America	179,954	165,741	167,626	185,081	230,904	271,769	283,541	279,944	259,297	278,653	288,757	307,861	315,239	326,348	328,705	330,720
Canada	6,142	5,570	5,938	7,464	9,133	11,972	12,289	12,769	12,380	13,146	12,612	12,187	12,301	13,154	12,431	12,348
Mexico	4,931	5,245	4,843	6,426	8,310	10,298	10,317	12,590	10,797	13,470	15,099	15,396	15,556	15,460	14,491	15,041
United States	168,881	154,927	156,845	171,190	213,461	249,499	260,935	254,586	236,120	252,038	261,045	280,279	287,381	297,734	301,783	303,331
Central and South America	10,423	10,882	13,199	16,846	18,834	20,470	23,463	25,891	26,492	33,033	37,328	41,825	40,803	34,614	24,687	26,777
Brazil	5,930	5,198	5,118	7,434	8,244	8,772	9,456	10,438	8,525	9,186	9,006	9,245	8,835	8,207	7,810	8,311
Central America	3,092	4,356	6,649	7,866	8,677	9,476	11,505	12,057	14,679	20,451	24,078	28,786	27,844	23,173	13,718	15,093
All others	1,401	1,328	1,431	1,546	1,913	2,222	2,501	3,396	3,288	3,397	4,245	3,793	4,124	3,234	3,159	3,374
Europe																
EU	177,906	185,552	214,771	258,630	287,494	314,208	335,573	363,672	325,325	361,316	405,562	410,753	429,753	437,887	419,888	423,851
France	35,264	33,981	38,255	45,273	47,040	55,725	59,297	69,086	62,209	70,169	73,914	75,532	77,893	76,793	70,894	68,835
Germany	41,143	42,540	50,767	64,440	68,002	78,562	83,278	88,326	78,870	87,630	102,266	109,703	118,974	123,009	117,400	113,754
United Kingdom	33,097	30,074	33,788	37,386	47,554	44,858	45,422	48,458	44,694	47,347	49,271	50,860	52,736	52,603	51,641	49,091
All others	68,403	78,958	91,960	111,531	124,898	135,062	147,576	157,801	139,552	156,170	180,111	174,658	180,150	185,482	179,954	192,171



## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Other Europe	35,046	39,234	44,686	54,628	56,857	65,917	79,384	93,886	87,524	95,785	117,157	122,201	126,672	131,068	123,426	138,467
Russia	3,333	4,674	4,672	4,711	2,223	2,992	3,404	4,744	3,847	4,061	6,267	6,674	7,446	6,854	6,259	6,375
Switzerland	25,935	28,340	33,066	40,627	44,702	51,428	62,301	74,097	69,436	76,685	94,350	96,470	100,619	105,606	99,868	114,288
Turkey	1,771	2,253	2,661	3,941	4,425	4,834	4,531	4,387	3,993	4,395	4,678	5,379	5,530	6,138	6,172	6,400
All others	4,006	3,967	4,287	5,349	5,506	6,664	9,148	10,659	10,247	10,644	11,862	13,677	13,077	12,470	11,127	11,404
Middle East	13,662	12,869	13,758	17,186	20,967	20,290	25,410	30,048	24,353	30,425	33,303	33,341	36,031	31,598	35,255	36,783
Israel	10,627	9,330	9,439	11,229	11,611	13,812	15,004	17,059	18,307	20,524	22,097	22,668	23,511	20,976	23,909	23,886
All others	3,034	3,540	4,319	5,957	9,356	6,479	10,407	12,989	6,046	9,901	11,206	10,673	12,519	10,622	11,346	12,897
Africa	2,210	2,314	3,000	3,869	4,586	5,441	6,013	7,037	5,855	5,718	6,968	7,154	6,963	8,635	9,096	9,436
Asia																
China	89,681	115,961	160,147	231,703	286,336	347,398	365,769	404,399	364,343	488,957	539,717	545,411	564,207	600,611	597,158	615,068
India	2,836	3,067	3,825	4,646	5,416	6,907	9,972	12,915	15,041	17,423	22,621	23,085	25,850	26,672	28,380	31,244
Indonesia	8,435	8,696	8,444	9,407	10,236	9,504	9,842	10,558	9,863	11,300	11,106	10,627	9,801	9,456	9,714	9,737
Japan	122,293	119,445	136,214	159,671	157,312	160,751	152,258	154,025	124,371	153,195	156,145	151,038	133,773	129,155	118,788	122,416
Malaysia	56,040	57,153	62,192	70,414	76,041	83,327	80,570	71,692	71,661	83,798	85,010	80,322	81,048	86,502	83,501	85,309
Philippines	26,401	28,217	30,475	32,902	33,801	33,184	33,721	30,664	22,927	32,488	27,469	28,708	28,810	32,676	33,308	36,869
Singapore	53,767	54,569	61,466	73,449	82,606	97,599	91,665	96,239	77,918	108,957	117,398	117,735	120,976	121,840	119,106	124,036
South Korea	53,140	60,573	73,226	95,970	104,517	116,431	118,300	116,197	106,482	133,715	132,520	131,774	143,318	148,355	143,608	140,347
Taiwan	65,974	74,207	84,441	110,058	120,470	146,908	152,958	150,710	130,266	168,265	177,603	192,195	224,675	233,905	251,086	274,503

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Thailand	21,022	22,328	26,646	33,360	37,687	44,148	47,858	52,639	48,239	58,760	57,223	56,499	54,982	57,964	58,789	60,594
Vietnam	514	592	935	1,063	1,522	2,201	2,983	4,251	4,645	7,814	13,787	29,501	42,089	42,729	57,224	63,436
All others	638	564	631	789	855	1,105	1,062	1,237	946	4,883	1,281	1,224	1,385	1,936	2,032	2,241
Australia	4,080	4,099	4,302	5,067	5,917	6,666	7,658	8,203	7,780	8,536	9,833	9,978	9,208	9,047	8,320	9,992
All others	6,554	2,732	3,863	2,971	2,786	3,986	5,816	5,231	5,586	6,152	7,260	7,416	8,894	9,051	13,477	13,323
Imports																
World	930,574	968,797	1,113,846	1,367,710	1,545,145	1,758,209	1,833,815	1,919,440	1,718,914	2,089,174	2,248,045	2,308,649	2,404,474	2,480,049	2,465,549	2,555,146
North America	232,362	239,485	256,843	308,507	331,837	371,204	355,383	367,057	331,844	390,999	417,955	424,678	431,078	450,813	461,572	463,667
Canada	19,235	17,393	18,620	22,561	26,049	30,163	32,199	34,147	31,261	35,011	38,720	38,080	38,790	37,485	36,015	37,689
Mexico	11,655	14,603	16,211	22,878	26,246	33,799	34,428	41,959	37,168	50,007	52,671	54,733	59,230	59,738	60,304	61,371
United States	201,472	207,490	222,011	263,068	279,542	307,242	288,755	290,950	263,415	305,981	326,564	331,864	333,059	353,590	365,253	364,607
Central and South America	33,895	29,809	29,782	38,758	51,322	66,777	71,223	89,968	80,548	97,647	112,536	114,958	116,576	112,322	103,497	97,551
Brazil	13,966	11,553	10,551	14,589	18,956	24,692	24,936	36,575	30,495	38,864	42,665	44,540	45,708	44,042	36,984	34,138
Central America	7,066	7,983	8,203	8,918	10,203	13,153	13,426	15,054	15,301	16,055	19,852	17,312	16,612	15,940	15,284	15,794
All others	12,863	10,273	11,028	15,251	22,162	28,933	32,862	38,340	34,752	42,728	50,019	53,107	54,256	52,340	51,229	47,619
Europe																
EU	199,190	191,702	228,708	288,818	322,853	364,914	388,620	407,817	356,179	416,916	435,272	416,881	417,745	426,565	417,682	435,927
France	26,170	25,695	28,505	36,670	40,557	44,190	48,136	51,382	48,073	51,972	55,847	57,062	57,987	56,274	57,865	60,261
Germany	48,143	47,222	55,006	69,811	77,228	92,375	94,551	98,040	87,533	105,547	110,759	102,023	99,875	107,018	103,438	107,915

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
United Kingdom	40,637	33,937	35,820	42,404	47,161	50,421	51,000	51,320	43,411	54,071	57,417	52,320	50,531	53,001	54,933	56,846
All others	84,241	84,848	109,377	139,933	157,908	177,928	194,933	207,076	177,162	205,325	211,248	205,476	209,351	210,272	201,446	210,905
Other Europe	42,078	45,627	56,001	72,399	85,152	99,654	112,952	126,643	104,854	124,139	146,541	150,468	159,731	153,530	134,845	142,764
Russia	7,091	7,817	11,120	15,109	19,242	24,388	29,508	36,140	25,358	34,272	40,857	47,320	47,242	42,444	31,511	31,644
Switzerland	17,567	18,790	23,085	26,479	31,134	33,263	35,980	38,083	34,719	37,634	43,406	43,763	47,191	48,137	44,491	46,741
Turkey	6,282	7,429	8,593	12,644	14,942	17,956	18,824	20,474	17,332	22,191	25,325	22,818	25,177	26,716	28,437	30,241
All others	11,138	11,591	13,203	18,166	19,834	24,047	28,639	31,946	27,445	30,043	36,952	36,567	40,121	36,233	30,406	34,137
Middle East	27,794	28,917	35,137	40,937	55,354	58,823	63,605	68,808	66,775	75,621	85,284	93,812	105,900	112,455	117,764	123,228
Israel	6,372	5,481	5,540	7,373	8,313	8,847	9,358	9,740	8,117	8,769	10,023	10,578	10,478	11,199	11,685	12,633
All others	21,421	23,436	29,597	33,563	47,041	49,976	54,247	59,068	58,659	66,852	75,261	83,235	95,422	101,256	106,079	110,596
Africa	18,379	18,247	21,851	27,114	32,674	36,855	40,266	50,504	43,696	47,960	50,602	49,527	52,670	59,255	56,929	58,239
Asia																
China	88,170	108,505	142,364	183,099	220,665	263,788	295,760	301,249	281,742	367,213	393,214	421,722	456,899	482,269	500,632	522,171
India	6,457	7,615	9,923	13,044	16,029	24,169	29,768	30,272	30,846	34,628	38,602	37,498	39,995	40,302	40,457	41,084
Indonesia	3,539	3,858	4,197	5,003	5,013	5,451	7,598	13,553	13,163	17,402	18,391	20,439	21,537	19,482	19,552	18,412
Japan	70,699	69,402	78,055	91,644	98,950	105,943	103,261	106,002	94,146	118,320	127,856	140,112	138,742	139,251	130,279	132,597
Malaysia	30,182	33,056	35,807	39,968	42,341	49,230	50,519	44,710	39,311	54,638	52,135	52,978	54,770	55,726	51,355	54,529
Philippines	17,142	17,329	19,317	21,080	20,726	23,945	23,598	22,287	16,623	21,714	18,793	21,882	22,892	23,388	22,900	26,923
Singapore	50,143	50,400	54,883	69,188	78,471	90,623	86,196	86,215	72,518	93,299	94,565	97,776	103,377	103,248	97,143	98,579

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
South Korea	34,496	37,468	43,661	51,642	56,962	63,333	64,436	65,634	57,051	71,300	77,308	77,984	81,318	89,419	93,136	102,396
Taiwan	35,326	38,306	41,885	50,677	54,169	57,403	54,419	49,991	44,645	59,681	63,240	63,576	66,002	72,445	72,305	80,908
Thailand	16,963	17,326	19,046	22,111	25,619	28,635	29,722	29,420	26,651	33,759	36,851	40,925	41,678	40,118	40,315	41,804
Vietnam	1,579	1,856	2,912	4,017	3,683	4,219	6,146	6,959	8,597	10,494	14,755	21,829	29,245	33,324	40,621	44,731
All others	3,077	3,430	4,161	6,052	6,836	8,445	8,126	8,599	7,734	9,682	11,922	12,261	15,787	17,944	18,519	21,362
Australia	12,909	16,026	18,116	21,866	24,092	26,033	27,353	31,139	29,735	34,191	39,836	38,449	36,348	36,097	34,282	35,034
All others	6,193	10,433	11,196	11,788	12,399	8,764	14,864	12,613	12,254	9,570	12,388	10,893	12,183	12,097	11,765	13,240

EU = European Union.

### Note(s)

Data are not available for EU member Luxembourg. China includes Hong Kong. Detail may not add to total because of rounding. See Appendix Table 6-38 for a full list of countries and economies in each region.

### Source(s)

IHS Global Insight, special tabulations (2017) of the World Trade Service database.

*Science and Engineering Indicators 2018*

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

APPENDIX TABLE 6-27

### Exports and imports of medium-high technology products, by region, country, or economy: 2001–16

(Millions of current dollars)

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Exports																
World	1,068,601	1,129,867	1,323,009	1,638,530	1,857,751	2,126,679	2,548,862	2,956,739	2,248,123	2,895,891	3,479,217	3,527,733	3,561,743	3,590,029	3,404,237	3,390,522
North America	144,407	139,176	145,793	172,424	201,888	234,004	283,341	321,766	243,664	305,647	357,549	366,408	360,497	363,295	339,257	317,309
Canada	6,506	6,781	8,328	10,349	12,638	14,246	19,149	20,277	14,993	16,803	19,923	20,135	19,061	17,865	16,977	16,252
Mexico	7,943	8,092	6,498	7,641	9,275	12,511	16,866	20,919	15,600	21,823	29,370	32,192	31,723	30,481	28,511	28,546
United States	129,957	124,303	130,968	154,434	179,975	207,246	247,326	280,570	213,071	267,021	308,256	314,081	309,713	314,949	293,769	272,512
Central and South America	29,075	28,076	33,399	44,254	56,767	65,401	75,010	90,979	66,774	83,689	99,665	99,699	96,012	85,787	76,531	75,582
Brazil	13,828	14,161	18,375	24,873	31,902	37,077	41,221	46,538	31,836	40,838	48,371	47,302	45,503	38,509	34,797	35,270
Central America	3,600	3,468	4,411	5,509	7,013	7,809	10,003	13,445	10,518	12,580	14,300	14,138	13,763	13,981	13,075	11,928
All others	11,647	10,447	10,612	13,872	17,852	20,515	23,786	30,995	24,421	30,271	36,994	38,259	36,746	33,297	28,659	28,384
Europe																
EU	327,474	349,474	415,257	500,114	543,082	614,164	738,232	840,765	634,120	762,888	922,651	927,193	960,539	960,372	851,859	830,738
France	35,128	36,941	43,270	51,570	53,827	58,874	67,829	76,594	59,762	67,858	77,878	76,120	75,319	74,578	64,038	62,256
Germany	119,297	130,205	154,023	185,904	202,070	232,406	270,554	311,899	229,197	289,674	355,197	355,777	364,721	365,206	321,225	308,001
United Kingdom	34,822	37,032	42,741	49,885	53,395	57,725	64,221	69,165	52,206	63,690	76,126	82,390	82,420	85,638	83,386	78,700
All others	138,227	145,295	175,223	212,755	233,790	265,158	335,628	383,107	292,954	341,666	413,449	412,906	438,079	434,951	383,209	381,781

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Other Europe	68,694	72,446	88,271	113,409	125,861	145,077	183,271	224,037	162,309	187,957	234,355	228,729	230,482	227,085	208,768	215,208
Russia	13,891	13,610	16,651	21,929	24,345	27,163	34,290	46,611	28,190	34,536	46,777	47,230	45,612	41,620	37,890	36,550
Switzerland	33,016	34,431	39,758	47,093	49,563	54,378	62,665	69,403	54,800	61,354	73,184	64,507	66,382	69,630	62,916	71,164
Turkey	7,900	9,838	13,946	19,946	23,702	30,063	39,833	46,545	35,366	41,935	51,094	51,184	56,791	59,186	57,347	57,287
All others	13,886	14,567	17,916	24,441	28,250	33,473	46,482	61,477	43,953	50,132	63,300	65,807	61,697	56,648	50,616	50,208
Middle East	22,647	24,765	26,346	35,476	45,853	47,171	64,939	93,383	66,502	99,291	130,368	122,552	128,732	121,534	129,288	132,866
Israel	6,214	6,447	7,256	8,438	9,160	9,700	11,371	16,435	12,516	14,404	17,312	16,846	16,712	16,700	16,024	15,723
All others	16,433	18,318	19,091	27,038	36,693	37,472	53,568	76,948	53,987	84,887	113,056	105,705	112,020	104,834	113,264	117,143
Africa	14,337	15,530	18,493	22,334	25,253	30,440	36,108	52,659	38,016	47,759	58,093	57,988	59,832	57,252	59,886	61,417
Asia																
China	73,624	86,654	110,174	149,938	191,095	243,176	313,489	387,103	316,598	422,026	526,828	557,829	590,638	642,526	661,674	688,888
India	8,535	9,934	12,770	16,602	21,442	26,852	32,889	41,483	35,337	46,169	60,275	62,782	66,036	68,874	66,570	67,118
Indonesia	8,538	9,242	10,984	13,667	16,023	20,119	24,517	27,915	20,923	31,089	41,955	38,891	37,785	37,455	38,382	38,771
Japan	214,707	225,948	257,610	309,725	332,147	361,963	402,947	437,911	304,120	423,376	463,232	461,712	415,285	399,880	363,794	364,120
Malaysia	11,619	12,618	15,150	19,414	22,027	25,787	29,918	34,729	27,490	37,002	44,987	44,564	45,135	45,662	42,837	40,767
Philippines	3,686	4,243	4,902	6,050	6,925	7,796	8,361	9,017	7,252	10,388	11,548	13,492	13,725	13,298	13,262	13,817
Singapore	19,186	21,428	26,856	33,813	37,705	42,767	49,830	53,993	45,865	61,057	72,117	74,699	70,910	77,220	70,851	67,597
South Korea	49,011	53,211	67,052	90,905	106,192	122,089	140,863	154,437	128,942	173,771	216,506	229,295	238,367	240,179	223,070	207,998
Taiwan	38,744	41,530	46,450	55,946	61,665	65,468	73,711	78,731	61,624	84,086	94,913	92,500	93,329	94,382	100,645	102,721

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Thailand	17,709	19,438	24,370	31,786	38,984	46,777	56,624	67,196	55,160	78,834	94,429	96,898	100,965	99,627	101,490	105,115
Vietnam	1,402	1,650	2,139	2,923	3,516	4,650	5,718	7,506	6,891	10,527	14,165	17,429	19,317	21,259	22,771	25,298
All others	1,341	1,345	1,660	1,949	2,618	2,827	3,401	4,151	3,636	4,858	5,675	5,903	5,675	5,800	5,645	5,850
Australia	7,404	7,373	8,506	9,996	11,049	11,157	13,557	14,723	11,037	12,904	14,720	15,688	14,247	13,270	12,176	13,904
All others	6,462	5,786	6,824	7,805	7,658	8,996	12,137	14,257	11,863	12,573	15,185	13,481	14,236	15,268	15,480	15,437
Imports																
World	1,068,601	1,129,867	1,323,009	1,638,530	1,857,751	2,126,679	2,548,862	2,956,739	2,248,123	2,895,891	3,479,217	3,527,733	3,561,743	3,590,029	3,404,237	3,390,522
North America	269,434	283,071	308,985	354,677	397,478	441,615	466,108	488,951	355,530	448,515	529,774	581,933	588,285	619,852	631,980	620,458
Canada	20,462	22,141	25,658	29,592	34,880	40,648	44,300	47,751	37,472	46,013	52,909	57,791	57,252	56,990	54,555	56,706
Mexico	16,638	18,209	19,612	24,100	28,975	33,463	38,288	43,006	32,063	43,780	51,186	56,780	59,549	64,972	67,769	66,705
United States	232,334	242,721	263,716	300,986	333,623	367,503	383,521	398,194	285,995	358,722	425,679	467,363	471,484	497,890	509,655	497,046
Central and South America	76,028	65,113	67,804	89,275	110,988	135,599	173,988	227,124	167,165	228,392	284,168	296,354	296,693	272,440	238,952	217,916
Brazil	24,058	20,379	20,661	26,656	31,095	36,959	50,560	74,252	56,811	80,492	101,297	100,686	106,884	98,272	76,394	64,964
Central America	15,380	15,045	15,324	17,844	21,544	26,449	31,004	35,857	25,689	32,078	37,696	41,746	39,694	39,769	40,436	41,418
All others	36,590	29,689	31,819	44,775	58,349	72,191	92,424	117,015	84,664	115,822	145,175	153,922	150,115	134,399	122,122	111,534
Europe																
EU	180,974	184,563	226,746	276,232	308,568	351,774	432,264	470,904	338,979	414,239	503,036	469,099	474,179	498,240	473,806	486,751
France	21,645	22,099	27,075	32,915	36,225	39,249	48,156	50,943	41,931	47,750	55,469	53,024	54,441	54,377	50,226	51,677
Germany	42,996	43,220	52,998	63,616	71,818	84,095	100,933	111,837	82,618	98,204	123,161	116,495	117,352	124,083	119,647	125,425

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
United Kingdom	29,860	30,419	35,160	41,992	45,296	48,793	57,672	54,329	38,686	54,727	65,111	57,442	55,409	60,272	58,686	60,626
All others	86,474	88,825	111,513	137,709	155,229	179,637	225,504	253,796	175,744	213,559	259,296	242,138	246,976	259,509	245,248	249,023
Other Europe	84,953	95,629	121,864	164,636	191,216	237,362	314,594	383,948	239,337	303,942	403,295	412,240	424,330	385,428	321,783	326,051
Russia	17,984	20,557	27,027	37,622	48,782	68,897	102,534	136,306	63,244	91,977	134,604	144,784	141,619	121,354	81,171	79,849
Switzerland	27,647	28,084	31,727	37,007	39,505	42,407	49,678	54,726	45,626	52,816	62,985	60,936	62,874	65,323	57,995	56,473
Turkey	12,953	17,274	25,675	38,045	43,200	50,328	60,105	65,690	49,138	66,922	85,153	79,344	87,956	83,919	81,534	84,005
All others	26,369	29,713	37,435	51,962	59,729	75,729	102,276	127,226	81,329	92,227	120,554	127,176	131,880	114,833	101,082	105,724
Middle East	58,283	63,192	72,379	90,801	109,921	121,334	168,096	207,136	157,544	185,254	207,866	217,244	223,391	240,401	239,183	240,996
Israel	7,991	7,451	7,859	9,602	10,532	11,945	15,190	17,714	12,389	16,181	20,478	19,211	19,568	19,413	19,280	21,192
All others	50,292	55,742	64,520	81,198	99,389	109,390	152,906	189,422	145,155	169,073	187,388	198,033	203,822	220,988	219,903	219,804
Africa	45,906	49,446	58,974	74,399	85,720	103,334	130,637	167,817	150,492	165,707	180,435	193,815	206,845	209,433	201,280	197,291
Asia																
China	89,408	108,610	140,611	178,438	193,595	224,156	263,136	291,348	272,420	388,814	465,635	433,003	448,513	462,474	424,539	414,503
India	11,521	12,379	15,998	22,264	30,423	38,580	52,331	76,095	64,115	83,645	102,229	96,178	88,001	89,902	84,819	82,367
Indonesia	12,778	12,872	13,986	19,052	21,134	20,106	24,722	40,543	31,613	46,531	58,731	66,887	62,410	58,934	55,870	54,542
Japan	56,943	58,077	67,218	79,820	88,644	98,657	108,553	123,319	91,925	118,565	144,705	143,657	136,301	139,942	129,368	127,233
Malaysia	16,028	16,239	17,523	22,274	25,176	28,499	32,052	36,956	30,657	42,149	47,650	52,641	52,616	51,876	47,817	48,631
Philippines	8,780	8,567	9,400	10,434	11,077	12,111	13,594	15,733	13,486	18,461	20,426	22,444	21,867	23,495	25,398	29,578
Singapore	23,184	23,994	26,167	33,357	36,630	42,674	47,897	54,530	44,214	55,580	65,343	65,521	63,689	63,618	59,000	58,844



## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
South Korea	31,061	35,353	42,614	54,130	62,090	72,170	83,763	94,036	78,097	104,875	119,675	115,525	119,022	118,628	112,814	115,710
Taiwan	28,877	30,376	35,537	49,457	50,681	53,638	59,120	59,088	46,053	73,082	78,743	70,565	70,707	70,367	67,326	71,416
Thailand	17,392	18,578	22,533	28,674	32,170	34,399	39,223	47,121	36,213	52,652	62,699	76,137	69,290	63,987	62,557	63,497
Vietnam	6,166	7,343	9,099	10,621	11,843	14,164	20,833	25,845	25,318	31,289	38,208	38,352	45,400	52,767	62,008	65,512
All others	10,503	11,331	13,889	17,508	21,304	23,477	27,575	33,120	30,438	40,356	51,942	51,568	53,117	57,266	60,128	64,531
Australia	23,860	26,357	32,420	39,948	44,883	48,718	58,005	68,086	53,904	67,555	79,652	92,832	83,412	79,981	74,689	72,687
All others	16,521	18,776	19,262	22,534	24,210	24,313	32,370	45,041	20,624	26,286	35,005	31,737	33,675	30,999	30,921	32,009

EU = European Union.

### Note(s)

Data are not available for EU member Luxembourg. China includes Hong Kong. Detail may not add to total because of rounding. See Appendix Table 6-38 for a full list of countries and economies in each region.

### Source(s)

IHS Global Insight, special tabulations (2017) of the World Trade Service database.

*Science and Engineering Indicators 2018*

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

APPENDIX TABLE 6-28

### Exports and imports of other business services, by selected region, country, or economy: 2008–16

(Millions of current dollars)

Region, country, or economy	2008	2009	2010	2011	2012	2013	2014	2015	2016
Exports									
World	571,350	538,313	597,425	679,978	712,028	767,047	838,390	807,555	822,210
Selected developed regions, countries, or economies									
Australia	6,688	5,577	6,689	7,835	8,698	8,609	8,130	7,204	7,479
Canada	23,487	22,416	24,396	26,149	27,798	29,509	29,586	26,100	24,756
EU	184,588	175,973	185,661	207,334	214,617	244,177	271,214	260,634	261,549
Hong Kong	10,404	10,103	11,339	11,853	12,774	12,834	13,251	13,581	NA
Japan	32,714	34,528	31,675	36,736	25,442	28,256	37,383	34,089	38,668
Norway	12,068	9,580	12,586	8,801	14,050	14,154	13,958	11,078	9,740
Singapore	18,568	17,817	19,543	23,992	27,936	32,129	37,082	37,231	37,131
South Korea	13,095	10,137	11,655	13,598	16,295	17,660	20,968	19,060	20,648
Switzerland	10,981	10,650	12,262	15,080	16,488	16,631	18,791	19,571	19,966
Taiwan	5,460	4,892	5,252	6,165	6,385	6,837	7,249	7,545	7,940
United States	86,664	89,542	95,232	106,395	114,060	116,336	123,734	129,031	136,049
Selected developing regions, countries, or economies									
Brazil	14,331	13,867	13,773	16,858	18,597	17,462	21,351	17,490	16,423

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2008	2009	2010	2011	2012	2013	2014	2015	2016
China	21,240	17,148	0	56,365	51,023	57,235	68,906	58,425	57,964
India	36,377	27,594	34,529	38,549	47,091	46,651	48,461	50,097	53,202
Malaysia	3,997	3,496	4,861	6,492	7,666	8,205	7,019	5,568	5,766
Philippines	7,208	8,390	11,087	11,113	11,306	13,208	14,473	17,551	17,920
Russia	13,668	11,455	12,342	14,743	16,408	18,449	16,736	12,610	11,660
All others	69,812	65,147	104,545	71,921	75,395	78,707	80,099	80,690	NA
Imports									
World	NA	NA	NA	NA	NA	NA	NA	NA	NA
Selected developed regions, countries, or economies									
Australia	6,647	6,116	6,794	8,578	10,085	11,041	9,743	9,163	8,058
Canada	17,005	16,749	18,445	19,769	21,615	21,801	21,384	18,453	18,472
EU	174,678	167,506	161,842	178,150	190,696	203,054	224,541	229,965	250,125
Hong Kong	7,498	8,269	9,997	10,680	10,952	10,965	11,195	11,512	NA
Japan	39,438	37,909	37,938	44,550	45,035	48,568	59,079	61,005	62,387
Norway	12,328	11,286	13,409	11,666	13,802	15,116	15,256	13,345	13,011
Singapore	22,320	21,390	24,169	29,177	34,210	43,940	48,600	45,075	44,859
South Korea	22,251	21,154	23,869	25,778	29,065	28,124	30,497	28,682	29,515
Switzerland	18,670	18,774	20,381	25,080	27,265	28,914	32,934	33,772	34,138
Taiwan	8,368	7,822	10,381	12,240	12,944	11,940	12,696	12,635	12,344

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2008	2009	2010	2011	2012	2013	2014	2015	2016
United States	62,774	63,292	65,992	78,000	81,586	85,871	90,230	94,099	96,076
Selected developing regions, countries, or economies									
Brazil	13,557	15,348	20,393	24,686	27,541	28,090	31,329	28,775	26,507
China	36,045	21,195	0	49,206	42,354	47,325	40,736	39,580	43,247
India	19,700	16,876	25,496	25,134	29,900	28,066	26,873	29,810	32,750
Malaysia	5,363	5,400	6,233	7,533	8,329	8,860	8,253	7,439	8,499
Philippines	1,825	1,018	1,021	1,014	1,652	2,267	3,561	5,111	4,918
Russia	16,750	14,394	15,635	18,565	20,120	22,876	23,152	18,459	17,477

NA = not available.

EU = European Union.

### Note(s)

Other business services include merchandising and other trade-related services; operational leasing services; legal, accounting, management, and public relations; market research and public opinion polling; R&D; architectural, engineering, and other technical services; and agricultural, mining, and other on-site processing services. World trade and total EU trade do not include intra-EU trade.

### Source(s)

World Trade Organization, International trade and tariff data, [https://www.wto.org/english/res\\_e/statis\\_e/statis\\_e.htm](https://www.wto.org/english/res_e/statis_e/statis_e.htm), accessed 15 September 2017.

*Science and Engineering Indicators 2018*

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

APPENDIX TABLE 6-29

### Exports and imports of telecommunications and computer and information services, by selected region, country, or economy: 2008–16

(Millions of current dollars)

Region, country, or economy	2008	2009	2010	2011	2012	2013	2014	2015	2016
Exports									
World	225,825	221,792	225,444	262,989	282,810	304,906	337,169	330,558	347,285
Selected developed regions, countries, or economies									
Australia	1,629	1,490	1,585	1,750	1,764	1,877	2,034	2,279	2,518
Canada	7,726	7,494	8,419	10,016	10,422	8,951	8,104	6,483	6,682
EU	65,816	65,577	84,459	96,902	103,477	113,683	127,951	116,720	125,376
Hong Kong	1,236	1,278	1,830	2,191	2,402	2,637	2,821	2,842	NA
Japan	1,599	1,534	1,781	1,958	2,323	2,709	3,188	3,252	3,789
Norway	1,629	1,980	2,520	2,480	2,294	2,428	2,347	2,171	2,139
Singapore	2,598	2,615	3,543	3,889	4,219	4,888	5,208	6,424	6,455
South Korea	946	883	1,031	1,319	1,518	2,157	2,994	3,502	3,570
Switzerland	6,855	7,348	8,141	9,132	10,167	10,991	14,074	13,628	13,202
Taiwan	463	468	601	810	1,091	1,378	1,754	2,032	2,380
United States	23,119	23,816	25,038	29,171	32,510	34,419	35,044	35,895	37,262
Selected developing regions, countries, or economies									
Brazil	641	538	611	523	732	708	1,446	1,571	1,804

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2008	2009	2010	2011	2012	2013	2014	2015	2016
China	7,822	7,710	10,476	13,908	16,247	17,098	20,170	24,591	25,425
India	37,107	34,031	40,508	47,113	48,801	53,805	54,535	55,046	55,318
Malaysia	1,628	2,014	2,129	2,421	2,924	2,858	2,760	2,662	2,384
Philippines	1,604	1,897	2,236	2,769	3,003	3,336	3,472	3,461	5,487
Russia	3,045	2,551	2,624	3,102	3,494	4,163	4,504	3,971	3,937
All others	60,364	58,569	27,910	33,534	35,423	36,820	44,765	44,025	NA
Imports									
World	NA	NA	NA	NA	NA	NA	NA	NA	NA
Selected developed regions, countries, or economies									
Australia	1,735	1,685	1,869	2,036	1,989	2,321	2,663	2,541	2,709
Canada	3,602	4,082	4,727	5,506	5,841	6,039	6,022	5,836	5,590
EU	38,355	36,657	52,932	54,431	55,629	63,880	73,166	65,906	67,598
Hong Kong	929	873	1,118	1,257	1,462	1,651	1,902	1,904	NA
Japan	5,035	4,901	4,597	5,191	5,680	6,349	11,568	13,373	14,071
Norway	2,687	1,869	2,462	2,676	2,938	3,062	3,435	3,055	3,279
Singapore	2,393	2,390	3,538	4,793	5,461	7,096	8,635	8,375	8,375
South Korea	1,386	1,327	1,442	1,535	1,516	1,832	2,027	2,799	2,727
Switzerland	8,877	9,548	10,211	11,401	11,344	13,011	14,277	13,789	14,549
Taiwan	671	722	866	1,010	1,168	1,180	1,230	1,234	1,339

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2008	2009	2010	2011	2012	2013	2014	2015	2016
United States	24,655	25,784	29,015	32,756	32,779	35,034	36,313	36,440	37,527
Selected developing regions, countries, or economies									
Brazil	3,083	2,960	3,775	4,238	4,756	5,208	3,670	3,340	3,248
China	4,675	4,442	4,103	5,035	5,490	7,624	10,746	11,419	12,768
India	4,309	3,240	3,617	3,196	3,482	3,743	4,318	3,798	4,768
Malaysia	1,713	1,978	1,983	2,366	2,768	3,192	3,136	3,211	3,079
Philippines	261	208	237	341	349	527	634	773	670
Russia	3,270	3,302	3,955	4,946	5,169	6,080	6,854	5,520	5,395

NA = not available.

EU = European Union.

### Note(s)

World trade and total EU trade do not include intra-EU trade.

### Source(s)

World Trade Organization, International trade and tariff data, [https://www.wto.org/english/res\\_e/statis\\_e/statis\\_e.htm](https://www.wto.org/english/res_e/statis_e/statis_e.htm), accessed 15 September 2017.

*Science and Engineering Indicators 2018*

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

APPENDIX TABLE 6-30

### Exports and imports of financial services, by selected region, country, or economy: 2008–16

(Millions of current dollars)

Region, country, or economy	2008	2009	2010	2011	2012	2013	2014	2015	2016
Exports									
World	307,555	280,771	308,921	346,916	354,728	391,335	426,948	398,803	398,903
Selected developed regions, countries, or economies									
Australia	1,735	1,210	1,223	1,955	2,438	3,103	3,340	3,242	3,129
Canada	6,065	5,758	7,348	9,311	9,349	9,601	9,668	9,488	9,489
EU	127,938	109,944	112,015	128,167	134,868	141,600	149,774	125,648	133,123
Hong Kong	12,599	11,906	13,940	15,226	16,490	17,533	18,877	20,488	19,513
Japan	6,393	5,689	4,880	5,769	4,249	4,738	8,872	11,867	13,348
Norway	2,420	1,902	1,773	2,482	2,209	2,799	2,740	2,315	2,163
Singapore	13,119	13,370	15,750	19,412	20,191	22,968	26,114	27,154	25,259
South Korea	2,617	1,920	2,161	2,313	2,328	1,935	2,233	2,375	2,388
Switzerland	35,423	29,992	28,544	30,828	28,573	29,190	29,073	27,411	27,668
Taiwan	1,448	982	1,146	1,271	2,134	2,374	2,742	2,669	2,887
United States	76,430	79,023	86,745	93,385	93,482	111,827	125,024	119,603	114,494
Selected developing regions, countries, or economies									
Brazil	2,066	1,943	2,115	2,982	3,001	3,215	1,844	1,730	1,523



## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2008	2009	2010	2011	2012	2013	2014	2015	2016
China	1,697	1,959	3,058	3,867	5,215	7,181	9,103	7,330	7,246
India	5,852	5,132	7,615	8,833	7,609	8,520	7,926	7,329	7,228
Malaysia	457	469	527	794	861	766	808	710	850
Philippines	159	216	183	178	175	185	319	533	477
Russia	1,783	1,405	1,483	1,437	1,747	2,224	1,992	1,819	1,584
All others	9,351	7,951	18,416	18,705	19,808	21,576	26,500	27,094	26,534
Imports									
World	NA	NA	NA	NA	NA	NA	NA	NA	NA
Selected developed regions, countries, or economies									
Australia	1,562	998	1,169	1,874	1,861	2,148	2,575	2,521	2,224
Canada	7,916	7,918	10,153	10,015	9,687	10,231	10,023	10,541	11,250
EU	55,952	49,641	50,892	59,338	55,872	64,933	67,602	61,329	64,137
Hong Kong	3,934	3,944	4,735	5,074	5,156	5,557	5,878	6,264	6,116
Japan	9,094	8,189	9,949	10,152	10,607	10,365	10,382	10,788	11,836
Norway	1,295	1,710	1,653	2,453	1,609	1,707	1,553	1,234	1,248
Singapore	5,281	4,850	6,604	7,644	8,053	8,545	8,557	9,855	10,459
South Korea	2,484	3,181	2,796	2,711	3,068	2,965	2,507	2,549	2,567
Switzerland	7,188	6,782	6,283	6,962	5,341	5,225	5,326	5,401	5,354
Taiwan	1,310	1,058	1,055	1,327	1,469	1,528	1,528	1,502	1,574

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2008	2009	2010	2011	2012	2013	2014	2015	2016
United States	76,131	78,216	76,980	73,022	72,216	74,965	76,730	72,934	73,631
Selected developing regions, countries, or economies									
Brazil	2,810	3,427	3,020	3,352	3,220	2,983	2,444	2,345	2,226
China	13,308	11,952	17,142	20,485	22,526	25,784	27,390	11,453	14,939
India	7,899	7,799	11,812	14,511	11,784	11,852	9,997	8,350	10,089
Malaysia	1,029	1,041	2,668	3,025	3,402	3,220	3,178	2,798	2,829
Philippines	1,430	976	1,108	1,213	1,135	1,107	1,182	1,348	1,854
Russia	4,275	3,022	3,667	3,674	4,108	4,784	4,058	3,394	2,997

NA = not available.

EU = European Union.

### Note(s)

Financial services include finance and insurance. World trade and total EU trade do not include intra-EU trade.

### Source(s)

World Trade Organization, International trade and tariff data, [https://www.wto.org/english/res\\_e/statis\\_e/statis\\_e.htm](https://www.wto.org/english/res_e/statis_e/statis_e.htm), accessed 15 September 2017.

*Science and Engineering Indicators 2018*

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

### APPENDIX TABLE 6-31

#### Exports and imports of ICT products, by region, country, or economy: 2001–16

(Millions of current dollars)

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Exports																
World	601,331	626,523	732,515	904,663	1,027,472	1,148,849	1,132,128	1,143,566	979,910	1,250,092	1,304,963	1,309,196	1,362,794	1,402,610	1,385,396	1,432,320
North America	78,993	68,610	70,985	72,507	94,211	106,518	96,971	96,260	74,518	86,312	86,166	83,188	79,147	79,579	74,386	73,566
Canada	2,070	1,900	2,472	3,098	3,748	4,252	4,164	3,550	2,649	2,808	3,051	2,833	2,541	2,527	2,306	2,270
Mexico	3,666	3,964	3,334	4,139	5,388	6,979	6,453	7,936	6,648	8,551	9,594	9,160	8,505	8,572	7,683	7,653
United States	73,256	62,746	65,178	65,270	85,075	95,287	86,355	84,774	65,221	74,954	73,520	71,195	68,101	68,481	64,397	63,644
Central and South America	4,206	5,167	7,201	8,297	10,689	11,830	11,699	12,269	13,584	18,905	21,607	25,874	24,673	19,368	9,212	9,852
Brazil	2,300	2,222	2,141	2,064	3,736	4,081	2,637	2,995	2,168	1,913	1,604	1,163	1,088	814	736	784
Central America	1,741	2,775	4,871	6,055	6,736	7,463	8,696	8,918	11,036	16,624	19,605	24,333	23,156	18,103	8,148	8,771
All others	165	170	189	178	217	286	367	355	379	368	399	378	428	451	328	296
Europe																
EU	66,358	64,044	74,222	90,442	106,564	106,091	101,740	99,159	72,813	80,939	88,800	80,139	76,465	71,771	63,941	66,548
France	8,676	7,917	8,900	10,145	10,541	10,835	9,814	9,610	7,662	8,480	9,785	9,151	8,348	7,221	6,897	7,044
Germany	14,084	14,185	18,074	23,239	24,096	26,122	24,816	22,486	15,745	18,492	20,587	20,239	19,971	20,889	18,505	18,314
United Kingdom	10,932	8,420	9,143	10,669	19,725	13,108	7,837	7,874	6,662	6,776	7,094	6,663	6,875	6,332	5,989	5,638
All others	32,666	33,522	38,106	46,389	52,202	56,027	59,274	59,189	42,743	47,191	51,334	44,086	41,270	37,331	32,550	35,552

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Other Europe	5,553	5,273	6,024	8,226	9,460	9,922	9,917	10,296	9,393	10,450	11,607	12,206	11,768	11,355	10,087	10,664
Russia	317	501	373	575	494	712	746	984	1,005	1,221	1,814	2,139	2,183	2,331	1,751	1,831
Switzerland	2,599	1,923	2,277	2,889	3,429	3,417	3,281	3,562	2,880	3,176	3,202	2,863	2,835	2,726	2,642	2,958
Turkey	1,190	1,764	2,068	3,052	3,496	3,563	2,991	2,635	2,198	2,500	2,577	2,892	2,425	2,631	2,482	2,585
All others	1,446	1,086	1,307	1,710	2,041	2,230	2,899	3,115	3,310	3,553	4,015	4,312	4,325	3,668	3,212	3,290
Middle East	6,567	5,658	6,606	8,001	10,782	8,068	10,279	10,648	8,937	10,679	10,630	10,608	13,015	12,094	13,230	13,520
Israel	5,244	4,193	4,436	5,124	4,531	5,076	4,526	5,407	6,818	6,259	5,404	5,642	7,090	7,214	8,139	8,111
All others	1,322	1,465	2,170	2,877	6,250	2,992	5,752	5,241	2,119	4,420	5,227	4,966	5,925	4,880	5,091	5,409
Africa	1,246	1,302	1,665	2,113	2,438	3,025	3,186	3,233	2,835	2,893	3,418	3,095	3,013	4,230	4,413	4,581
Asia																
China	73,254	98,015	138,474	204,832	256,465	311,923	321,209	349,806	315,811	425,236	467,036	468,316	483,381	514,658	507,771	520,137
India	852	604	751	1,143	1,154	1,612	2,170	3,589	5,542	5,692	7,071	6,130	5,401	3,078	2,746	2,825
Indonesia	7,739	7,892	7,674	8,608	9,319	8,278	8,603	9,227	8,496	9,886	9,438	8,800	7,991	7,512	7,554	7,554
Japan	90,791	89,193	100,419	114,327	111,919	114,974	106,694	105,881	81,688	98,329	93,010	86,717	74,122	69,167	63,291	64,891
Malaysia	53,728	54,737	59,635	67,082	72,330	78,802	75,137	65,937	66,397	76,476	76,908	71,061	72,297	76,945	74,006	76,012
Philippines	25,404	27,180	29,037	31,330	32,229	31,552	31,965	28,852	21,292	30,620	25,486	26,307	25,604	29,543	30,141	33,503
Singapore	48,561	48,860	55,401	66,734	73,052	84,805	76,387	79,292	57,823	85,304	86,998	85,431	89,025	92,715	88,338	88,115
South Korea	50,133	57,791	69,359	89,557	93,465	98,949	96,274	89,876	77,896	97,442	95,439	92,334	104,498	109,756	107,275	103,110
Taiwan	62,327	68,869	76,305	97,055	104,656	126,119	128,747	123,971	111,449	142,527	152,490	165,904	198,020	204,213	216,897	237,804

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Thailand	19,067	20,307	24,074	30,259	34,351	40,379	43,261	47,642	43,725	53,001	51,014	50,162	48,103	50,192	50,832	52,087
Vietnam	420	487	802	902	1,331	1,904	2,578	3,723	4,058	7,080	12,805	28,297	40,615	40,756	54,971	60,756
All others	251	208	250	326	371	559	379	479	237	4,117	290	282	402	513	593	681
Australia	1,210	1,163	1,330	1,558	1,645	1,646	1,650	1,736	1,336	1,653	1,950	1,875	1,874	2,055	2,121	2,392
All others	4,669	1,161	2,300	1,367	1,043	1,892	3,280	1,692	2,080	2,553	2,799	2,469	3,380	3,110	3,591	3,722
Imports																
World	601,331	626,523	732,515	904,663	1,027,472	1,148,849	1,132,128	1,143,566	979,910	1,250,092	1,304,963	1,309,196	1,362,794	1,402,610	1,385,396	1,432,320
North America	149,814	155,766	167,420	202,922	221,683	244,684	211,286	209,687	186,519	230,502	240,007	241,454	240,804	242,806	238,540	235,504
Canada	10,745	7,747	10,187	13,302	15,223	17,015	16,765	17,726	13,894	19,025	21,244	19,647	19,758	18,525	17,630	18,531
Mexico	9,192	11,975	11,999	18,611	21,406	26,883	23,872	28,869	25,543	37,957	39,951	42,931	45,648	46,394	45,886	46,113
United States	129,877	132,584	142,431	171,675	184,642	200,741	171,035	162,735	145,250	179,412	180,071	181,180	174,295	178,079	178,258	169,946
Central and South America	16,167	13,119	14,199	19,801	29,357	37,631	33,986	45,330	36,443	47,860	54,429	54,967	55,523	52,316	44,810	42,610
Brazil	6,531	4,570	4,850	6,999	10,225	12,947	9,018	17,277	13,767	19,165	21,188	20,899	21,622	20,400	14,684	13,179
Central America	3,145	3,899	3,965	4,245	5,357	6,944	6,334	6,764	5,359	6,152	6,732	6,697	6,524	6,109	5,655	5,949
All others	6,490	4,650	5,384	8,557	13,774	17,739	18,634	21,289	17,317	22,543	26,510	27,371	27,377	25,808	24,471	23,482
Europe																
EU	118,664	113,791	142,734	184,696	206,165	229,304	228,209	228,756	181,190	232,795	234,931	209,969	206,281	211,272	199,083	201,506
France	13,043	12,573	15,702	20,012	21,897	23,950	23,668	25,028	21,069	25,141	27,320	25,744	26,169	24,799	22,140	22,331
Germany	30,302	30,987	37,534	50,106	55,159	64,763	58,938	58,156	47,874	63,837	65,910	58,042	54,774	59,596	58,612	59,677

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
United Kingdom	23,195	20,138	20,812	25,456	26,247	27,513	26,064	24,241	19,428	27,708	28,503	22,257	22,096	23,206	22,411	22,483
All others	52,125	50,094	68,687	89,123	102,862	113,077	119,539	121,331	92,818	116,109	113,198	103,926	103,242	103,671	95,919	97,015
Other Europe	18,113	18,469	23,853	33,067	41,342	42,961	46,179	47,906	34,643	43,614	49,764	52,760	54,688	49,215	43,793	45,529
Russia	3,556	4,260	6,309	8,903	11,681	12,651	15,484	17,002	9,454	13,979	15,964	18,408	17,640	13,808	10,683	10,765
Switzerland	6,370	5,725	6,570	8,284	11,326	9,471	7,678	8,144	7,676	8,544	9,279	9,615	10,249	10,256	9,530	9,921
Turkey	2,641	3,390	4,524	6,922	8,021	8,707	9,363	8,804	7,476	8,988	9,891	9,686	11,161	11,450	11,589	12,325
All others	5,546	5,094	6,450	8,959	10,314	12,132	13,655	13,956	10,037	12,103	14,629	15,051	15,638	13,702	11,992	12,518
Middle East	11,849	12,556	15,485	19,729	29,081	25,966	27,405	28,586	24,674	29,165	36,037	37,252	41,022	42,953	44,322	46,274
Israel	3,192	2,527	2,579	3,469	3,813	3,965	3,878	3,870	3,590	4,124	4,986	5,433	4,971	5,082	5,880	5,878
All others	8,657	10,029	12,906	16,260	25,269	22,002	23,527	24,716	21,083	25,040	31,050	31,819	36,051	37,871	38,443	40,397
Africa	7,765	7,449	9,385	12,378	14,881	17,628	16,880	19,067	16,672	18,418	19,570	18,241	18,690	21,045	21,577	21,897
Asia																
China	66,422	83,407	110,619	139,683	166,885	198,676	217,922	215,857	200,832	258,155	266,933	282,720	313,363	332,838	349,988	367,450
India	3,467	4,145	5,963	8,123	9,756	13,436	14,211	17,427	16,386	20,981	23,819	21,723	22,433	23,436	25,272	25,604
Indonesia	2,452	2,647	2,919	3,575	3,215	3,446	4,438	9,911	8,498	11,435	12,093	12,632	12,291	11,456	11,398	11,319
Japan	47,815	45,066	50,904	60,140	63,920	65,537	62,395	64,834	54,721	72,952	76,833	79,551	81,626	82,518	73,006	72,537
Malaysia	26,754	29,271	32,528	35,579	38,001	43,081	44,150	36,971	31,698	45,086	41,679	41,199	42,870	43,755	41,727	44,512
Philippines	15,353	15,692	17,162	18,287	18,020	20,475	20,091	18,584	13,675	17,715	14,671	16,500	16,484	16,875	17,758	20,964
Singapore	40,486	40,977	44,852	56,687	64,957	74,445	69,448	67,089	54,988	72,514	71,972	73,433	78,630	78,490	71,688	73,878

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
South Korea	24,836	27,137	31,824	36,809	39,790	43,071	45,286	47,130	40,669	48,839	51,064	49,285	52,842	58,879	63,049	70,567
Taiwan	26,498	29,648	32,529	35,968	38,214	41,775	40,111	37,991	33,812	44,433	47,150	47,737	49,169	53,527	53,151	59,704
Thailand	13,434	14,089	15,031	17,714	19,567	21,946	22,406	21,690	19,139	24,411	26,018	27,346	27,021	27,320	27,630	29,097
Vietnam	917	983	1,241	2,058	2,063	2,692	3,378	4,028	5,219	6,463	9,725	14,978	22,039	25,584	31,061	34,376
All others	1,443	1,540	1,757	2,659	3,803	4,195	3,666	3,785	3,003	3,999	4,595	4,997	6,297	7,537	7,930	8,852
Australia	7,074	7,490	9,139	11,671	12,788	14,217	14,967	15,239	14,319	17,427	19,671	18,717	16,902	17,146	16,099	16,312
All others	2,007	3,282	2,970	3,117	3,983	3,685	5,713	3,696	2,811	3,327	4,003	3,735	3,820	3,642	3,514	3,828

EU = European Union; ICT = information and communications technology.

### Note(s)

ICT products consists of communications, computers, and semiconductors. Data are not available for EU member Luxembourg. China includes Hong Kong. Detail may not add to total because of rounding. See Appendix Table 6-38 for a full list of countries and economies in each region.

### Source(s)

IHS Global Insight, special tabulations (2017) of the World Trade Service database.

*Science and Engineering Indicators 2018*

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

### APPENDIX TABLE 6-32

#### Exports and imports of communications products, by region, country, or economy: 2001–16

(Millions of current dollars)

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Exports																
World	141,536	153,764	186,144	250,516	305,312	339,320	320,708	330,688	275,540	330,790	357,020	359,305	366,662	369,682	368,127	378,007
North America	13,721	12,365	10,661	13,549	18,601	22,051	15,306	15,098	12,790	15,505	17,070	16,280	15,307	14,056	12,090	12,160
Canada	917	916	1,116	1,560	2,078	2,340	2,107	1,508	1,144	1,322	1,426	1,435	1,294	1,219	1,089	1,076
Mexico	853	1,194	683	1,449	2,253	3,406	3,508	4,617	3,765	5,581	6,203	5,710	5,366	4,456	3,547	3,534
United States	11,951	10,255	8,861	10,540	14,269	16,305	9,691	8,973	7,881	8,602	9,441	9,135	8,647	8,381	7,454	7,550
Central and South America	2,009	2,121	1,892	1,931	3,693	4,043	3,234	3,079	2,189	2,047	1,518	1,262	904	802	678	682
Brazil	1,736	1,715	1,605	1,484	3,020	3,327	2,158	2,416	1,625	1,327	944	582	452	285	232	236
Central America	209	309	218	352	556	522	835	442	368	543	348	460	225	248	270	265
All others	64	98	69	95	117	193	241	222	195	177	226	219	226	268	177	182
Europe																
EU	22,560	22,868	26,650	34,422	47,085	43,534	38,919	36,499	26,444	30,279	34,713	28,699	24,579	20,661	19,307	19,188
France	3,150	2,923	3,614	4,115	3,921	3,813	2,465	2,350	2,272	2,459	3,020	3,197	2,448	1,760	1,801	1,777
Germany	4,583	4,751	5,970	7,937	8,821	9,480	7,979	5,383	3,727	4,553	5,256	5,169	4,761	4,520	4,555	4,395
United Kingdom	3,502	2,543	2,646	3,740	11,553	5,698	2,460	2,608	2,525	2,756	3,099	2,758	2,450	2,231	2,222	2,103
All others	11,324	12,651	14,419	18,630	22,789	24,542	26,015	26,158	17,920	20,512	23,337	17,575	14,920	12,149	10,729	10,914



## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Other Europe	2,697	2,965	3,429	5,154	5,925	5,911	5,698	5,492	5,104	5,761	6,548	7,622	7,159	6,631	5,983	6,379
Russia	154	160	177	255	217	389	353	506	595	855	1,274	1,533	1,563	1,368	1,149	1,212
Switzerland	690	572	621	1,001	1,260	994	982	1,033	745	768	662	630	664	601	574	647
Turkey	1,116	1,688	1,973	2,944	3,363	3,394	2,784	2,414	1,989	2,312	2,270	2,605	2,071	2,187	2,070	2,240
All others	737	546	658	955	1,085	1,134	1,579	1,540	1,775	1,826	2,341	2,855	2,863	2,476	2,190	2,281
Middle East	2,985	2,593	3,301	4,013	6,715	4,233	5,224	5,580	2,630	3,880	4,105	4,615	5,216	4,402	4,605	4,828
Israel	2,223	1,724	1,823	2,065	1,956	2,262	1,374	2,241	1,700	1,808	1,427	1,359	1,097	1,229	1,301	1,273
All others	762	869	1,478	1,948	4,760	1,971	3,851	3,339	931	2,072	2,677	3,256	4,119	3,173	3,304	3,555
Africa	327	365	449	579	768	917	931	979	995	1,078	1,531	1,516	1,589	2,608	2,850	2,860
Asia																
China	25,554	33,819	45,478	70,318	93,008	118,747	120,795	131,641	120,908	152,205	165,435	168,653	179,243	196,121	198,336	206,119
India	108	142	206	298	388	668	1,090	1,930	3,994	3,658	5,251	4,684	4,051	1,671	1,497	1,523
Indonesia	3,556	3,599	3,553	3,816	3,797	3,619	3,956	4,365	4,367	5,111	4,700	4,293	4,146	3,626	3,494	3,571
Japan	23,146	23,995	30,118	35,515	35,111	34,596	32,526	33,168	23,777	25,422	23,402	22,723	17,432	15,099	13,684	13,730
Malaysia	12,141	11,183	12,077	14,025	16,794	18,647	13,521	13,513	9,982	13,046	13,094	11,580	10,138	9,628	7,775	7,422
Philippines	1,423	1,551	1,773	2,378	2,307	2,046	2,132	2,003	1,384	1,607	1,607	1,657	1,581	1,887	2,115	2,183
Singapore	4,594	4,636	4,739	6,957	7,978	10,036	7,633	7,005	3,722	4,515	5,162	5,052	4,965	5,740	6,305	6,115
South Korea	16,647	20,767	27,513	37,702	40,268	42,542	38,058	39,487	31,005	31,256	31,208	29,145	32,550	32,701	30,274	28,150
Taiwan	5,054	5,675	8,176	11,500	13,664	17,110	19,392	18,474	14,471	18,446	21,045	21,244	20,265	17,774	16,761	17,248

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Thailand	3,317	4,158	4,867	6,891	7,690	8,668	8,769	9,683	8,535	10,816	11,093	10,883	10,149	9,762	9,912	9,609
Vietnam	92	111	162	206	280	432	800	1,245	1,815	3,746	8,014	18,051	25,750	24,785	30,616	34,233
All others	74	63	106	137	219	385	246	337	146	1,159	159	143	277	387	477	526
Australia	404	326	381	523	557	548	478	500	468	495	632	623	627	675	730	831
All others	1,129	463	614	601	464	589	2,001	610	815	758	735	580	735	667	638	649
Imports																
World	141,536	153,764	186,144	250,516	305,312	339,320	320,708	330,688	275,540	330,790	357,020	359,305	366,662	369,682	368,127	378,007
North America	41,350	46,918	53,702	68,100	81,915	92,193	67,189	68,322	59,183	68,708	65,027	65,886	62,243	61,766	60,373	59,289
Canada	3,261	2,894	3,650	4,602	5,369	6,371	6,529	6,968	6,054	7,402	8,337	8,861	8,341	7,819	8,416	9,034
Mexico	2,454	2,795	3,752	5,701	7,905	11,935	11,126	13,687	12,894	17,604	18,017	18,173	20,042	18,848	16,653	16,765
United States	35,635	41,229	46,301	57,798	68,641	73,886	49,534	47,667	40,235	43,703	38,673	38,853	33,860	35,099	35,304	33,490
Central and South America	7,023	5,432	5,777	9,203	13,567	17,521	14,962	20,099	13,997	20,721	24,062	24,183	25,362	25,179	22,857	22,092
Brazil	2,248	1,366	1,477	2,415	3,232	4,268	2,505	6,097	4,030	6,532	8,050	7,549	8,590	8,654	6,258	5,478
Central America	1,541	1,722	1,620	1,882	2,163	2,827	2,402	2,630	1,930	2,480	2,518	2,426	2,225	2,509	2,513	2,583
All others	3,234	2,344	2,680	4,906	8,171	10,426	10,055	11,372	8,037	11,709	13,493	14,208	14,547	14,017	14,086	14,030
Europe																
EU	28,006	30,402	40,099	60,991	74,211	84,063	88,100	84,242	69,541	78,555	82,040	78,092	77,033	75,265	73,423	76,816
France	3,282	3,612	5,196	7,265	8,950	9,548	9,830	10,626	9,517	10,313	10,783	11,058	11,098	10,816	9,762	10,033
Germany	6,633	7,478	9,696	15,157	17,470	22,047	18,742	17,102	14,750	16,162	18,597	19,969	18,204	18,110	18,310	19,152

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
United Kingdom	5,191	5,536	6,651	8,902	9,693	10,869	11,219	10,594	9,246	12,574	13,606	9,976	9,630	9,294	9,650	10,139
All others	12,900	13,776	18,555	29,666	38,097	41,599	48,309	45,920	36,028	39,507	39,054	37,090	38,101	37,046	35,701	37,492
Other Europe	6,434	6,969	9,553	14,328	20,072	20,580	22,686	24,259	16,178	20,309	23,160	24,656	25,847	23,259	21,068	22,550
Russia	1,625	2,003	3,070	4,834	6,664	7,078	9,189	10,590	5,280	7,373	8,393	9,594	9,134	7,300	5,574	5,750
Switzerland	1,754	1,787	1,955	2,621	5,475	3,700	2,832	2,780	2,779	2,926	3,112	3,410	3,581	3,539	3,416	3,770
Turkey	1,123	1,081	1,710	2,663	3,009	3,475	3,999	3,704	3,122	4,003	4,612	4,500	5,567	5,686	5,946	6,462
All others	1,932	2,098	2,817	4,210	4,924	6,327	6,666	7,185	4,997	6,008	7,043	7,152	7,566	6,735	6,132	6,567
Middle East	6,344	7,283	9,659	12,235	19,737	16,020	16,446	16,546	13,462	15,121	20,228	20,833	24,895	25,321	26,041	28,000
Israel	1,001	882	805	1,079	1,210	1,219	1,307	1,366	1,324	1,306	1,505	1,260	1,343	1,439	1,456	1,590
All others	5,343	6,400	8,854	11,157	18,526	14,801	15,139	15,181	12,139	13,814	18,723	19,573	23,552	23,882	24,585	26,410
Africa	3,937	3,721	4,755	6,543	8,107	9,788	8,673	9,995	8,347	9,204	10,037	9,066	9,078	11,356	12,119	12,574
Asia																
China	14,296	17,085	20,913	24,363	26,476	29,631	31,899	33,183	28,061	30,867	33,362	36,227	36,203	36,718	36,180	35,578
India	1,055	1,683	3,071	4,063	4,522	6,681	6,920	8,519	7,685	9,817	10,494	9,498	10,442	12,166	13,543	13,904
Indonesia	927	1,066	1,217	1,426	1,325	1,707	2,201	4,734	4,236	5,542	5,750	6,283	6,338	5,831	5,948	6,000
Japan	10,066	9,513	10,518	13,736	15,832	15,406	16,346	18,314	17,850	26,347	30,214	32,078	31,897	30,989	27,058	26,507
Malaysia	2,780	2,751	2,758	3,401	3,659	4,044	3,741	3,936	3,364	5,723	5,554	5,492	5,785	5,096	4,859	5,074
Philippines	1,320	1,196	1,317	1,610	1,627	1,853	1,715	1,707	1,703	1,867	1,846	1,991	2,098	1,912	2,426	2,866
Singapore	5,229	5,237	6,215	8,959	9,954	12,736	12,136	10,058	7,097	8,029	9,575	9,424	8,915	8,426	8,333	8,348

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
South Korea	3,236	3,653	4,521	5,963	6,072	6,952	6,355	7,176	6,097	7,788	8,881	6,906	7,593	10,802	13,776	15,500
Taiwan	2,798	2,762	3,245	3,722	4,025	3,960	3,595	3,684	3,246	3,994	5,215	5,683	6,168	5,664	5,856	6,398
Thailand	2,243	2,825	2,549	3,101	3,409	3,767	3,258	3,432	3,204	4,021	4,661	5,607	5,732	6,209	6,594	7,012
Vietnam	282	344	477	603	744	1,141	1,503	1,755	2,542	3,127	4,302	5,011	8,522	10,132	14,127	14,705
All others	721	789	880	1,651	2,594	2,881	2,440	2,167	1,573	2,102	2,502	2,699	3,632	4,719	5,100	5,776
Australia	2,547	2,790	3,709	5,034	5,524	6,565	6,884	6,924	6,943	7,526	8,359	8,174	7,277	7,468	6,961	7,369
All others	941	1,346	1,207	1,483	1,940	1,832	3,661	1,636	1,231	1,420	1,752	1,514	1,601	1,405	1,486	1,647

EU = European Union.

### Note(s)

Data are not available for EU member Luxembourg. China includes Hong Kong. Detail may not add to total because of rounding. See Appendix Table 6-38 for a full list of countries and economies in each region.

### Source(s)

IHS Global Insight, special tabulations (2017) of the World Trade Service database.

*Science and Engineering Indicators 2018*

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

### APPENDIX TABLE 6-33

#### Exports and imports of computer products, by region, country, or economy: 2001–16

(Millions of current dollars)

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Exports																
World	243,226	248,260	278,085	327,430	367,250	400,240	374,862	381,564	324,408	400,247	412,247	410,894	406,537	410,331	386,327	372,122
North America	33,686	25,388	25,220	24,391	33,972	36,745	35,321	34,388	27,697	29,993	30,351	30,585	28,301	28,949	27,050	25,281
Canada	810	611	841	900	991	1,182	1,301	1,261	1,025	1,020	956	866	801	873	852	811
Mexico	2,086	2,162	2,037	2,010	2,409	2,794	2,370	2,528	1,828	2,139	2,521	2,566	2,199	3,141	3,244	3,153
United States	30,790	22,614	22,341	21,481	30,571	32,769	31,651	30,600	24,844	26,835	26,874	27,153	25,301	24,936	22,954	21,318
Central and South America	926	904	1,131	1,017	2,976	3,594	3,773	4,160	5,704	6,664	4,252	4,591	3,787	3,106	433	432
Brazil	333	205	238	297	459	490	295	359	352	331	331	282	304	181	149	165
Central America	529	635	781	646	2,431	3,031	3,367	3,692	5,204	6,162	3,777	4,188	3,316	2,785	223	204
All others	63	64	111	74	87	73	111	109	148	171	144	121	167	140	62	63
Europe																
EU	24,588	23,418	25,402	29,006	33,429	34,219	32,438	31,596	25,295	26,186	28,118	26,437	26,453	25,385	21,480	20,474
France	2,207	1,985	1,987	2,332	2,215	2,407	2,585	2,625	2,033	1,902	2,251	1,900	1,862	1,717	1,588	1,479
Germany	3,779	3,961	4,909	6,759	7,156	7,896	6,794	7,088	5,006	5,521	6,201	5,712	5,475	5,244	4,381	4,129
United Kingdom	5,265	4,081	4,531	4,540	5,244	4,500	3,197	3,259	2,698	2,561	2,435	2,223	2,534	2,434	2,252	2,019
All others	13,336	13,391	13,976	15,374	18,814	19,416	19,862	18,624	15,559	16,202	17,230	16,601	16,582	15,990	13,258	12,848

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Other Europe	1,745	1,210	1,377	1,493	1,724	1,745	2,048	2,202	1,990	1,787	2,168	2,287	2,421	2,565	2,047	2,009
Russia	50	95	67	96	94	133	164	221	191	125	284	355	387	755	378	372
Switzerland	1,116	667	808	800	987	867	955	974	827	760	811	677	679	692	712	749
Turkey	52	47	47	68	84	109	135	155	101	117	225	225	277	284	254	220
All others	526	401	455	529	559	636	794	852	871	785	847	1,030	1,077	834	702	669
Middle East	1,479	1,373	1,491	1,868	2,420	2,034	2,981	3,006	2,165	3,125	3,286	2,541	2,603	2,547	2,642	2,686
Israel	978	828	855	1,036	1,145	1,140	1,383	1,342	1,075	1,186	1,124	1,034	1,046	1,093	1,091	1,090
All others	501	545	636	832	1,275	894	1,598	1,664	1,090	1,940	2,162	1,507	1,557	1,454	1,551	1,596
Africa	199	172	230	274	319	470	497	517	572	459	420	454	394	478	492	508
Asia																
China	35,986	50,306	75,453	108,647	133,061	154,181	155,906	165,854	150,292	202,488	223,674	225,500	224,408	227,975	216,816	208,414
India	530	238	236	308	275	375	420	629	608	636	734	697	535	462	448	453
Indonesia	3,060	3,080	2,689	3,257	3,409	2,955	2,939	3,128	2,699	2,829	2,524	2,471	1,977	2,052	2,036	1,848
Japan	29,379	27,092	27,195	28,685	27,373	28,035	18,244	17,354	12,881	13,706	12,849	11,494	10,902	10,147	9,013	8,577
Malaysia	20,854	21,303	22,743	25,746	29,195	33,695	32,573	30,906	24,201	26,672	22,052	20,282	19,481	18,445	16,977	16,213
Philippines	9,575	9,912	9,346	8,962	9,198	8,552	7,524	7,002	4,466	5,194	5,711	6,327	6,755	8,659	8,546	8,911
Singapore	24,818	24,795	25,708	27,914	28,767	29,139	19,118	22,801	16,912	20,587	18,756	17,847	16,127	14,875	14,150	12,974
South Korea	14,698	17,494	19,047	22,089	19,136	19,282	19,086	14,119	11,138	14,544	12,671	11,217	11,704	11,828	10,732	9,316
Taiwan	29,898	30,411	28,370	28,655	23,793	23,257	18,506	15,807	12,513	15,782	15,475	13,955	14,386	15,769	15,149	15,695

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Thailand	10,139	9,987	11,003	13,574	16,384	19,582	20,585	24,403	21,922	25,044	23,952	26,922	24,654	25,256	24,702	24,390
Vietnam	64	100	307	272	580	1,063	1,398	2,127	1,854	2,651	3,095	5,402	9,606	9,724	11,313	11,535
All others	98	109	100	105	94	103	79	67	50	190	65	62	46	56	46	46
Australia	673	666	736	773	830	831	859	906	716	967	1,069	1,075	1,074	1,221	1,229	1,368
All others	830	302	301	396	317	383	567	593	732	742	1,024	748	922	833	1,027	994
Imports																
World	243,226	248,260	278,085	327,430	367,250	400,240	374,862	381,564	324,408	400,247	412,247	410,894	406,537	410,331	386,327	372,122
North America	70,164	75,381	81,964	97,174	103,409	113,120	108,067	104,013	96,719	118,465	122,005	123,561	123,669	124,996	119,607	111,999
Canada	4,675	3,167	4,749	6,352	7,386	7,792	7,468	7,713	5,289	8,396	9,225	8,083	8,055	8,173	6,979	7,069
Mexico	2,935	5,093	4,242	6,851	6,611	7,913	7,833	8,254	6,780	11,479	12,192	14,629	14,036	14,988	14,530	13,706
United States	62,553	63,662	70,171	84,637	89,001	97,370	93,152	87,688	82,819	104,482	101,846	103,154	100,476	102,028	101,332	90,311
Central and South America	6,069	4,442	4,642	5,752	9,216	12,038	13,715	16,269	14,908	17,587	19,921	20,335	18,883	17,416	14,672	13,453
Brazil	2,244	1,447	1,357	1,609	2,866	3,855	4,302	5,408	4,966	6,158	6,180	6,681	5,735	5,171	3,793	3,406
Central America	948	921	856	947	1,479	1,733	1,732	2,005	1,654	1,812	2,169	2,109	2,007	1,941	1,961	2,032
All others	2,877	2,073	2,430	3,196	4,871	6,449	7,681	8,857	8,289	9,617	11,572	11,545	11,141	10,304	8,918	8,015
Europe																
EU	62,354	59,422	69,698	84,542	93,915	105,377	97,313	96,412	74,602	92,502	94,287	89,959	92,639	96,123	88,743	85,107
France	6,449	6,244	7,336	9,010	9,398	10,638	10,139	10,505	8,246	8,853	9,985	9,290	10,001	9,431	8,038	7,640
Germany	15,513	15,895	18,042	22,433	25,028	28,149	24,082	22,676	17,369	22,359	22,667	20,842	20,698	23,379	22,699	21,707

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
United Kingdom	11,831	10,127	9,745	11,116	11,880	12,985	11,387	10,330	7,870	11,961	11,734	9,966	10,252	10,677	9,782	9,178
All others	28,561	27,156	34,574	41,982	47,608	53,604	51,704	52,901	41,117	49,329	49,901	49,861	51,688	52,635	48,224	46,582
Other Europe	9,161	8,670	10,736	13,659	16,599	17,762	18,942	18,544	14,610	18,395	20,877	22,226	22,787	20,208	17,313	17,184
Russia	1,678	1,873	2,591	3,133	4,137	4,836	5,499	5,473	3,502	5,597	6,416	7,556	7,057	5,102	3,834	3,665
Switzerland	3,600	3,271	3,770	4,503	4,651	4,357	3,453	3,674	3,561	3,941	4,356	4,443	4,870	4,950	4,431	4,439
Turkey	740	958	1,283	2,029	3,268	3,622	4,025	3,755	3,484	3,983	4,115	4,120	4,486	4,499	4,329	4,393
All others	3,143	2,568	3,093	3,993	4,543	4,946	5,964	5,643	4,064	4,874	5,990	6,108	6,374	5,656	4,719	4,686
Middle East	4,129	4,180	4,593	5,442	7,345	8,110	9,133	9,927	9,444	11,660	12,861	12,782	12,886	13,962	13,686	13,642
Israel	1,289	1,023	1,134	1,267	1,550	1,661	1,608	1,415	1,297	1,500	1,559	1,493	1,477	1,606	1,565	1,692
All others	2,840	3,157	3,460	4,174	5,795	6,449	7,525	8,512	8,148	10,161	11,302	11,289	11,409	12,356	12,121	11,950
Africa	2,979	2,934	3,509	4,433	5,279	5,965	6,065	6,707	6,106	6,596	6,805	6,673	6,557	6,443	6,070	5,698
Asia																
China	19,142	22,166	28,480	32,606	38,615	42,913	37,673	38,361	32,608	42,342	39,829	39,190	36,178	38,055	37,419	37,122
India	1,650	1,599	1,861	2,599	3,569	4,580	4,535	5,798	4,942	6,561	7,142	7,082	7,331	7,055	7,245	7,052
Indonesia	550	578	601	732	796	792	1,088	2,754	2,216	3,182	3,425	3,298	3,264	3,188	3,065	2,924
Japan	22,675	21,208	23,520	26,139	27,174	26,204	22,367	23,104	18,738	23,406	25,000	25,281	24,196	24,170	20,826	19,434
Malaysia	4,441	5,655	6,716	8,609	9,531	9,867	10,325	8,920	7,505	7,625	7,261	6,851	6,338	6,267	5,957	5,991
Philippines	2,710	3,034	2,938	2,925	2,898	2,687	2,655	2,899	2,142	2,446	2,263	2,800	2,525	2,515	2,763	3,214
Singapore	14,015	13,833	13,724	15,730	18,011	17,433	11,198	15,730	12,176	14,873	14,187	14,070	13,100	12,686	12,465	11,920



## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
South Korea	5,896	5,997	6,109	6,543	8,238	8,902	8,758	8,375	7,055	9,530	9,140	8,482	8,322	9,078	9,496	9,982
Taiwan	7,522	8,340	7,318	6,825	6,502	7,162	5,575	5,065	4,458	5,137	4,917	4,860	5,126	5,703	5,652	5,901
Thailand	4,101	4,073	4,649	4,739	6,134	6,913	6,643	6,993	5,872	6,918	7,646	8,626	7,973	7,446	6,777	6,874
Vietnam	280	330	472	1,058	875	945	968	1,322	1,450	1,723	2,043	2,102	2,677	2,899	3,057	3,252
All others	598	624	710	820	975	1,062	961	1,320	1,164	1,538	1,651	1,920	1,735	1,853	1,780	1,816
Australia	3,865	4,036	4,576	5,634	6,335	6,767	7,104	7,296	6,330	8,054	8,964	8,804	8,386	8,317	7,962	7,664
All others	924	1,758	1,269	1,470	1,834	1,639	1,779	1,755	1,364	1,703	2,022	1,992	1,964	1,953	1,773	1,894

EU = European Union.

### Note(s)

Data are not available for EU member Luxembourg. China includes Hong Kong. Detail may not add to total because of rounding. See Appendix Table 6-38 for a full list of countries and economies in each region.

### Source(s)

IHS Global Insight, special tabulations (2017) of the World Trade Service database.

*Science and Engineering Indicators 2018*

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

APPENDIX TABLE 6-34

## Exports and imports of semiconductor products, by region, country, or economy: 2001–16

(Millions of current dollars)

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Exports																
World	216,569	224,498	268,286	326,718	354,910	409,289	436,557	431,314	379,961	519,056	535,697	538,997	589,595	622,597	630,942	682,190
North America	31,585	30,857	35,104	34,566	41,639	47,722	46,344	46,774	34,032	40,814	38,745	36,323	35,539	36,574	35,246	36,125
Canada	343	373	515	638	678	730	757	781	481	466	670	531	447	435	365	383
Mexico	727	607	614	680	726	779	575	791	1,055	831	870	884	940	975	892	965
United States	30,515	29,877	33,976	33,249	40,235	46,213	45,013	45,202	32,496	39,517	37,205	34,907	34,153	35,164	33,989	34,776
Central and South America	1,272	2,142	4,178	5,350	4,020	4,194	4,693	5,029	5,691	10,193	15,837	20,022	19,982	15,460	8,101	8,737
Brazil	230	303	298	283	257	264	184	220	191	255	329	298	332	348	355	383
Central America	1,004	1,831	3,871	5,057	3,750	3,910	4,494	4,785	5,464	9,918	15,479	19,685	19,614	15,069	7,655	8,302
All others	37	8	8	10	13	20	15	25	37	20	29	38	36	43	90	52
Europe																
EU	19,211	17,758	22,171	27,014	26,051	28,339	30,382	31,064	21,074	24,474	25,970	25,003	25,433	25,726	23,155	26,886
France	3,319	3,009	3,298	3,698	4,405	4,615	4,764	4,636	3,357	4,119	4,513	4,054	4,037	3,744	3,507	3,789
Germany	5,721	5,472	7,194	8,543	8,119	8,746	10,043	10,014	7,013	8,418	9,130	9,358	9,736	11,124	9,569	9,791
United Kingdom	2,165	1,796	1,966	2,389	2,927	2,909	2,179	2,007	1,439	1,459	1,561	1,682	1,892	1,666	1,515	1,516
All others	8,006	7,481	9,711	12,385	10,600	12,069	13,397	14,407	9,264	10,478	10,767	9,910	9,767	9,192	8,564	11,791

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Other Europe	1,112	1,098	1,219	1,579	1,811	2,266	2,171	2,601	2,299	2,902	2,892	2,297	2,188	2,159	2,057	2,275
Russia	113	246	129	223	183	190	228	257	218	241	256	252	233	208	224	247
Switzerland	793	683	847	1,088	1,182	1,556	1,345	1,556	1,308	1,648	1,729	1,556	1,492	1,433	1,355	1,562
Turkey	23	29	49	41	49	59	73	65	109	71	81	62	77	159	158	125
All others	183	139	193	226	397	461	525	723	664	942	826	427	386	358	320	341
Middle East	2,102	1,692	1,814	2,120	1,646	1,801	2,073	2,061	4,142	3,674	3,239	3,452	5,196	5,145	5,983	6,006
Israel	2,044	1,641	1,758	2,023	1,430	1,675	1,770	1,824	4,044	3,266	2,852	3,250	4,946	4,892	5,748	5,748
All others	58	51	56	97	216	127	304	237	99	408	388	202	250	253	236	258
Africa	721	766	986	1,261	1,350	1,638	1,758	1,738	1,267	1,356	1,467	1,125	1,031	1,144	1,072	1,213
Asia																
China	11,715	13,890	17,543	25,867	30,396	38,995	44,508	52,311	44,611	70,544	77,927	74,163	79,729	90,562	92,619	105,603
India	215	225	309	536	491	569	660	1,030	940	1,398	1,086	748	815	945	800	850
Indonesia	1,123	1,214	1,433	1,535	2,113	1,704	1,708	1,734	1,430	1,945	2,214	2,036	1,868	1,834	2,024	2,134
Japan	38,266	38,106	43,106	50,128	49,434	52,343	55,924	55,359	45,029	59,201	56,759	52,500	45,789	43,921	40,594	42,583
Malaysia	20,733	22,251	24,816	27,311	26,341	26,460	29,043	21,518	32,213	36,758	41,762	39,199	42,678	48,872	49,254	52,378
Philippines	14,406	15,717	17,918	19,990	20,724	20,954	22,308	19,847	15,442	23,818	18,168	18,322	17,268	18,997	19,480	22,410
Singapore	19,149	19,429	24,954	31,863	36,307	45,630	49,636	49,486	37,189	60,202	63,079	62,532	67,934	72,100	67,883	69,026
South Korea	18,788	19,530	22,800	29,766	34,061	37,125	39,131	36,270	35,753	51,642	51,560	51,972	60,244	65,228	66,269	65,645
Taiwan	27,375	32,783	39,759	56,899	67,199	85,752	90,850	89,689	84,464	108,298	115,970	130,705	163,369	170,669	184,987	204,861

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Thailand	5,611	6,163	8,204	9,794	10,277	12,129	13,907	13,556	13,268	17,142	15,968	12,357	13,299	15,174	16,218	18,088
Vietnam	264	276	333	424	471	409	380	351	389	683	1,697	4,844	5,259	6,247	13,042	14,987
All others	79	35	44	84	58	71	55	75	41	2,768	66	77	79	71	71	109
Australia	133	171	212	262	258	268	312	330	152	191	249	177	173	159	162	193
All others	2,710	396	1,385	371	262	920	712	490	533	1,052	1,040	1,142	1,724	1,610	1,926	2,079
Imports																
World	216,569	224,498	268,286	326,718	354,910	409,289	436,557	431,314	379,961	519,056	535,697	538,997	589,595	622,597	630,942	682,190
North America	38,300	33,467	31,754	37,648	36,358	39,371	36,030	37,352	30,617	43,329	52,976	52,007	54,892	56,043	58,560	64,216
Canada	2,809	1,687	1,788	2,348	2,468	2,851	2,768	3,045	2,552	3,227	3,682	2,704	3,361	2,533	2,235	2,428
Mexico	3,803	4,087	4,006	6,060	6,890	7,035	4,913	6,927	5,869	8,874	9,742	10,129	11,570	12,558	14,703	15,642
United States	31,688	27,693	25,960	29,240	27,000	29,485	28,349	27,380	22,196	31,228	39,552	39,174	39,960	40,952	41,622	46,146
Central and South America	3,074	3,245	3,779	4,847	6,574	8,072	5,309	8,961	7,538	9,552	10,446	10,449	11,278	9,721	7,281	7,065
Brazil	2,039	1,757	2,016	2,975	4,126	4,824	2,210	5,773	4,772	6,474	6,957	6,669	7,297	6,575	4,633	4,295
Central America	656	1,256	1,489	1,417	1,715	2,384	2,200	2,129	1,775	1,860	2,045	2,163	2,292	1,659	1,181	1,334
All others	379	232	274	455	732	864	899	1,059	991	1,217	1,445	1,618	1,689	1,487	1,467	1,437
Europe																
EU	28,304	23,968	32,938	39,163	38,039	39,864	42,797	48,102	37,046	61,739	58,604	41,918	36,609	39,885	36,917	39,583
France	3,311	2,716	3,169	3,737	3,549	3,764	3,699	3,896	3,306	5,976	6,552	5,396	5,069	4,553	4,340	4,658
Germany	8,155	7,614	9,796	12,515	12,660	14,567	16,114	18,378	15,755	25,316	24,646	17,231	15,872	18,107	17,603	18,818

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
United Kingdom	6,173	4,475	4,416	5,438	4,674	3,660	3,458	3,318	2,312	3,173	3,163	2,316	2,214	3,235	2,979	3,166
All others	10,664	9,162	15,557	17,474	17,156	17,873	19,527	22,510	15,673	27,274	24,243	16,975	13,453	13,990	11,994	12,941
Other Europe	2,518	2,830	3,563	5,081	4,672	4,619	4,552	5,103	3,854	4,910	5,727	5,878	6,054	5,748	5,412	5,795
Russia	253	384	648	935	881	737	796	940	672	1,009	1,155	1,258	1,449	1,406	1,275	1,349
Switzerland	1,016	667	844	1,160	1,200	1,414	1,393	1,690	1,336	1,677	1,812	1,763	1,799	1,766	1,683	1,711
Turkey	778	1,350	1,531	2,229	1,744	1,609	1,339	1,344	871	1,003	1,164	1,067	1,108	1,265	1,313	1,469
All others	471	429	540	756	847	858	1,025	1,129	976	1,221	1,595	1,791	1,698	1,311	1,141	1,266
Middle East	1,377	1,092	1,233	2,051	1,999	1,837	1,826	2,113	1,767	2,384	2,948	3,636	3,241	3,670	4,596	4,632
Israel	902	622	641	1,123	1,052	1,085	963	1,090	970	1,318	1,922	2,679	2,150	2,037	2,859	2,596
All others	475	471	592	929	947	752	863	1,023	797	1,065	1,026	957	1,091	1,633	1,737	2,037
Africa	849	793	1,121	1,402	1,495	1,875	2,143	2,365	2,218	2,617	2,728	2,503	3,054	3,245	3,388	3,625
Asia																
China	32,984	44,155	61,226	82,714	101,794	126,132	148,350	144,314	140,163	184,946	193,742	207,303	240,982	258,065	276,389	294,751
India	762	863	1,030	1,461	1,665	2,174	2,755	3,109	3,759	4,603	6,184	5,143	4,660	4,214	4,484	4,647
Indonesia	976	1,003	1,101	1,417	1,094	947	1,150	2,423	2,046	2,711	2,918	3,051	2,690	2,438	2,385	2,396
Japan	15,075	14,344	16,866	20,265	20,914	23,927	23,682	23,416	18,133	23,199	21,619	22,193	25,533	27,360	25,122	26,596
Malaysia	19,533	20,865	23,054	23,569	24,810	29,169	30,084	24,115	20,829	31,738	28,863	28,855	30,747	32,392	30,911	33,447
Philippines	11,322	11,462	12,907	13,752	13,495	15,935	15,722	13,977	9,830	13,402	10,562	11,709	11,861	12,448	12,569	14,883
Singapore	21,241	21,907	24,914	31,998	36,992	44,276	46,114	41,302	35,716	49,612	48,210	49,939	56,615	57,378	50,890	53,610

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
South Korea	15,704	17,487	21,194	24,303	25,480	27,217	30,173	31,579	27,518	31,521	33,043	33,897	36,926	39,000	39,778	45,084
Taiwan	16,178	18,547	21,966	25,421	27,687	30,653	30,941	29,243	26,108	35,301	37,017	37,195	37,875	42,161	41,644	47,405
Thailand	7,090	7,191	7,834	9,874	10,024	11,265	12,505	11,265	10,063	13,472	13,711	13,112	13,315	13,665	14,259	15,210
Vietnam	355	309	292	397	444	605	906	951	1,227	1,613	3,379	7,864	10,840	12,553	13,876	16,419
All others	124	126	167	188	233	251	265	299	266	358	442	377	929	965	1,051	1,260
Australia	662	665	853	1,003	929	885	979	1,019	1,046	1,846	2,348	1,738	1,240	1,362	1,175	1,279
All others	141	178	495	164	209	214	273	306	216	203	229	228	254	284	254	286

EU = European Union.

### Note(s)

Data are not available for EU member Luxembourg. China includes Hong Kong. Detail may not add to total because of rounding. See appendix table 6-38 for a full list of countries and economies in each region.

### Source(s)

IHS Global Insight, special tabulations (2017) of the World Trade Service database.

*Science and Engineering Indicators 2018*

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

APPENDIX TABLE 6-35

## Exports and imports of testing, measuring, and control instrument products, by region, country, or economy: 2001–16

(Millions of current dollars)

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Exports																
World	133,044	135,522	157,762	200,868	225,137	259,370	288,206	318,929	277,872	346,383	394,282	411,557	415,394	430,088	417,188	428,242
North America	31,600	28,635	30,312	36,408	44,007	50,250	54,146	56,062	51,562	59,831	64,360	67,027	67,613	68,398	67,132	66,376
Canada	739	613	918	1,241	1,564	1,875	1,901	2,136	1,911	2,066	2,327	2,297	2,434	2,493	2,349	2,339
Mexico	479	478	664	1,067	1,953	2,268	2,437	2,882	2,468	2,816	3,066	3,303	3,488	3,782	4,091	4,482
United States	30,383	27,544	28,730	34,100	40,490	46,108	49,808	51,044	47,183	54,950	58,966	61,426	61,691	62,123	60,692	59,554
Central and South America	1,321	1,361	1,597	1,696	1,950	2,269	2,617	3,013	2,860	3,116	3,567	3,858	4,050	4,488	4,744	5,432
Brazil	318	293	288	351	419	565	606	718	628	694	860	788	761	708	673	684
Central America	821	897	1,132	1,116	1,226	1,361	1,667	1,844	1,837	2,040	2,268	2,636	2,839	3,399	3,696	4,278
All others	183	172	177	229	304	343	344	450	394	382	439	433	450	381	376	470
Europe																
EU	31,931	34,275	40,330	50,613	54,792	62,259	65,330	72,274	62,394	72,190	85,328	88,858	92,582	95,056	86,714	87,529
France	3,692	3,648	4,198	4,920	5,193	6,125	6,967	7,929	6,649	7,581	8,599	8,635	8,847	8,922	7,968	7,899
Germany	11,303	12,222	14,384	17,955	20,023	23,354	26,706	29,220	24,596	29,424	35,570	36,607	37,933	37,943	34,195	34,209
United Kingdom	5,450	5,393	6,002	6,599	7,242	7,613	8,308	8,507	7,869	8,676	10,052	10,599	11,190	11,538	11,104	10,729
All others	11,486	13,011	15,746	21,139	22,333	25,167	23,349	26,618	23,280	26,510	31,106	33,017	34,611	36,654	33,447	34,693

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Other Europe	12,458	13,200	14,836	17,804	19,179	21,425	25,795	30,340	24,753	29,419	39,732	40,073	41,298	42,614	40,086	41,968
Russia	631	501	563	684	674	831	940	1,270	986	1,107	2,408	1,607	1,568	1,375	1,417	1,448
Switzerland	10,755	11,410	12,796	15,216	16,731	18,575	22,170	25,753	20,602	25,173	33,885	34,609	35,563	36,905	34,770	36,669
Turkey	93	106	123	173	211	258	333	402	396	461	568	684	830	966	908	915
All others	979	1,184	1,354	1,730	1,564	1,762	2,352	2,915	2,769	2,679	2,872	3,174	3,337	3,367	2,991	2,936
Middle East	2,633	2,463	2,421	3,312	3,496	3,868	4,472	4,430	3,856	4,680	5,413	4,970	5,361	5,218	5,480	5,678
Israel	2,167	1,916	1,867	2,595	2,647	3,115	3,449	3,433	2,878	3,409	4,054	4,135	4,417	4,281	4,537	4,688
All others	466	547	553	717	849	753	1,023	997	978	1,272	1,359	835	944	937	942	991
Africa	347	371	483	626	615	682	903	1,177	1,147	1,088	1,273	1,467	1,364	1,551	1,646	1,725
Asia																
China	12,936	14,039	16,783	21,270	23,712	28,096	35,145	41,466	35,539	47,783	55,250	59,710	62,254	65,801	68,144	71,644
India	399	482	616	754	856	1,040	1,227	1,349	1,310	1,567	1,996	2,226	2,231	2,455	2,547	2,736
Indonesia	535	549	530	544	642	791	842	890	865	899	983	1,155	1,128	1,271	1,323	1,277
Japan	24,907	24,053	28,889	37,480	36,941	36,820	35,388	37,294	30,759	42,887	50,225	49,956	44,449	44,577	39,495	40,405
Malaysia	1,804	1,873	2,083	2,706	2,968	3,669	4,124	4,535	3,900	5,999	6,679	7,722	7,430	8,084	7,997	7,856
Philippines	907	953	1,198	1,299	1,370	1,359	1,609	1,647	1,459	1,715	1,835	2,109	2,648	2,689	2,808	2,957
Singapore	2,729	3,137	3,360	3,886	4,231	4,662	5,657	6,252	5,745	7,799	9,475	11,028	11,906	12,739	12,437	13,505
South Korea	1,897	1,837	2,730	5,363	9,870	16,010	20,174	24,317	26,522	33,879	34,324	36,076	34,762	34,495	31,297	30,106
Taiwan	3,313	5,064	7,807	12,627	15,381	20,192	23,548	25,992	18,027	24,889	24,070	25,166	25,434	28,243	32,584	35,059



## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Thailand	1,577	1,675	2,025	2,469	2,717	3,090	3,682	3,909	3,593	4,602	4,968	4,971	5,479	6,281	6,294	6,631
Vietnam	76	89	107	135	149	241	318	441	493	592	835	989	1,241	1,636	1,891	2,273
All others	182	153	184	215	225	275	340	392	373	424	493	530	593	663	708	779
Australia	1,077	933	974	1,115	1,304	1,546	1,836	2,104	1,904	2,173	2,470	2,288	2,157	2,392	2,353	2,745
All others	416	379	499	549	733	827	1,054	1,045	811	850	1,005	1,379	1,413	1,436	1,508	1,560
Imports																
World	133,044	135,522	157,762	200,868	225,137	259,370	288,206	318,929	277,872	346,383	394,282	411,557	415,394	430,088	417,188	428,242
North America	31,658	31,008	34,304	40,815	43,425	48,537	53,354	57,598	47,487	55,337	62,847	64,777	67,214	71,013	72,251	72,983
Canada	2,357	2,189	2,439	2,896	3,271	3,461	3,783	4,257	3,965	4,588	5,286	5,347	5,414	5,288	5,082	5,424
Mexico	1,197	1,377	1,418	1,815	2,118	4,204	6,882	8,782	6,615	7,241	7,512	7,418	8,065	8,495	8,689	8,680
United States	28,104	27,443	30,448	36,104	38,036	40,872	42,689	44,559	36,907	43,507	50,049	52,012	53,735	57,230	58,481	58,879
Central and South America	1,144	1,184	1,290	1,449	1,865	2,050	2,392	2,425	2,014	2,299	2,550	2,856	2,858	2,894	2,949	3,053
Brazil	2,002	1,607	1,607	2,239	2,983	3,804	4,900	5,743	5,105	6,209	7,680	8,133	8,022	7,621	7,219	6,640
Central America	71,734	73,072	84,714	99,792	111,713	129,393	147,974	163,532	139,536	158,089	183,035	177,046	184,851	192,985	179,381	185,298
All others	64,204	64,813	74,934	87,606	98,018	112,353	126,583	139,080	120,457	135,128	153,642	146,717	153,500	161,661	152,077	157,698
Europe																
EU	31,533	29,698	33,023	38,621	44,497	52,680	59,231	66,237	58,004	66,696	74,416	74,175	75,669	79,035	76,027	79,164
France	4,447	4,256	4,765	5,480	6,114	6,931	7,800	8,170	7,182	8,091	9,149	9,488	9,994	10,075	9,664	10,362
Germany	9,096	8,248	9,218	10,602	11,811	13,928	16,509	17,902	15,337	17,707	21,206	20,992	21,230	22,162	21,449	22,654

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
United Kingdom	5,254	4,769	5,016	5,828	6,840	7,204	7,362	7,765	6,265	6,893	7,554	7,354	7,436	7,902	7,825	7,971
All others	12,736	12,425	14,024	16,711	19,732	24,618	27,559	32,400	29,220	34,005	36,507	36,341	37,008	38,896	37,089	38,178
Other Europe	7,530	8,260	9,780	12,186	13,694	17,040	21,391	24,452	19,079	22,961	29,393	30,329	31,351	31,324	27,304	27,599
Russia	1,473	1,515	1,927	2,335	2,699	3,969	5,652	6,992	4,464	6,169	7,977	9,454	8,867	8,350	6,062	6,002
Switzerland	3,380	3,705	4,058	4,683	5,072	5,763	6,593	7,452	6,415	7,221	8,966	9,258	9,814	10,306	9,784	9,849
Turkey	881	1,019	1,320	1,912	2,459	2,869	3,526	3,543	2,903	3,756	4,669	4,426	5,312	5,660	5,292	5,482
All others	1,796	2,020	2,474	3,256	3,465	4,440	5,620	6,465	5,298	5,815	7,780	7,190	7,358	7,008	6,166	6,267
Middle East	5,055	5,338	6,118	7,111	7,676	8,754	10,431	12,202	11,678	12,737	14,616	15,305	16,398	17,181	16,348	16,625
Israel	1,044	1,048	1,126	1,345	1,524	1,768	1,802	1,823	1,527	1,660	2,055	1,915	2,033	1,975	1,943	2,173
All others	4,011	4,290	4,993	5,766	6,152	6,986	8,629	10,380	10,151	11,077	12,561	13,390	14,365	15,206	14,405	14,453
Africa	2,637	2,805	3,322	4,275	4,680	5,333	6,631	7,629	7,517	7,860	8,353	8,795	9,445	10,380	9,740	9,716
Asia																
China	11,473	14,656	21,481	32,266	38,622	44,544	53,731	61,494	56,395	79,514	89,991	95,030	94,052	97,021	96,159	99,671
India	1,357	1,481	1,689	2,204	2,816	3,417	4,191	5,022	5,133	6,272	7,403	7,775	7,759	7,667	7,775	8,090
Indonesia	510	393	522	649	817	853	1,077	1,636	1,430	2,060	2,719	3,162	3,095	2,881	2,856	2,894
Japan	13,376	13,157	14,877	17,536	20,088	23,137	21,421	22,096	18,154	22,202	24,920	27,350	25,520	25,759	24,388	24,495
Malaysia	2,001	2,028	2,054	2,536	2,470	3,217	3,423	4,260	3,866	5,765	5,884	5,406	5,370	6,242	5,223	5,573
Philippines	1,087	967	1,267	1,711	1,584	1,742	1,913	1,679	1,392	1,796	1,909	2,060	1,894	2,036	2,061	2,357
Singapore	3,872	4,123	4,304	6,216	5,850	6,983	7,119	7,756	6,616	8,483	9,677	9,999	10,230	10,472	10,266	10,607

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
South Korea	5,240	5,768	7,732	10,192	11,776	12,616	11,522	11,402	9,360	14,052	16,234	17,768	16,864	18,077	17,662	18,585
Taiwan	5,655	6,158	6,580	11,092	10,552	11,284	9,380	8,070	7,101	10,414	10,680	10,416	10,496	11,259	10,812	11,698
Thailand	1,381	1,426	1,811	2,348	2,759	3,296	3,625	4,333	4,138	5,584	6,557	7,985	7,469	6,849	6,888	7,234
Vietnam	226	297	378	444	490	658	801	1,178	1,227	1,624	1,923	2,889	3,966	4,565	5,067	5,513
All others	515	607	683	839	1,023	1,125	1,393	1,421	1,515	1,778	2,417	2,743	2,964	2,735	2,816	2,919
Australia	1,975	2,095	2,472	3,006	3,429	3,798	4,215	4,800	4,522	5,259	6,089	6,537	6,180	6,551	6,211	6,266
All others	4,818	4,074	4,075	5,370	7,024	8,308	10,966	13,240	11,242	13,693	15,704	16,201	16,600	16,146	14,385	13,199

EU = European Union.

### Note(s)

Data are not available for EU member Luxembourg. China includes Hong Kong. Detail may not add to total because of rounding. See Appendix Table 6-38 for a full list of countries and economies in each region.

### Source(s)

IHS Global Insight, special tabulations (2017) of the World Trade Service database.

*Science and Engineering Indicators 2018*

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

APPENDIX TABLE 6-36

## Exports and imports of pharmaceutical products, by region, country, or economy: 2001–16

(Millions of current dollars)

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Exports																
World	79,882	93,978	113,850	135,625	155,961	177,043	214,676	245,329	262,791	288,325	323,957	331,893	344,641	352,833	360,869	390,813
North America	13,851	14,377	17,178	22,237	27,420	30,560	35,730	40,636	45,481	47,926	45,956	49,132	51,118	52,346	56,277	54,474
Canada	250	317	483	770	1,010	1,171	1,420	1,643	1,734	1,789	1,400	1,393	1,990	2,771	2,252	2,452
Mexico	705	693	734	1,107	845	832	1,030	1,159	1,291	1,669	1,913	2,442	3,014	2,563	2,199	2,374
United States	12,896	13,368	15,961	20,360	25,565	28,557	33,280	37,834	42,455	44,468	42,643	45,297	46,114	47,012	51,826	49,648
Central and South America	1,612	1,713	1,707	1,959	2,213	2,428	3,033	3,789	4,799	5,170	5,882	5,803	5,640	5,606	5,599	6,055
Brazil	304	324	357	440	558	709	877	1,151	1,358	1,679	1,744	1,809	1,838	1,923	1,613	1,762
Central America	446	568	559	601	606	577	897	990	1,656	1,645	2,104	1,739	1,543	1,508	1,746	1,907
All others	863	821	791	918	1,049	1,142	1,259	1,648	1,785	1,846	2,035	2,256	2,259	2,174	2,240	2,386
Europe																
EU	39,760	50,012	61,991	72,059	79,361	87,282	104,387	115,969	117,181	127,094	143,917	144,890	152,921	162,489	164,510	173,732
France	5,829	6,925	8,669	10,700	11,719	13,041	14,577	17,487	17,962	19,175	18,473	17,586	18,299	17,303	16,146	16,959
Germany	8,422	9,072	10,921	13,455	14,404	17,393	21,359	24,522	23,696	24,262	29,124	31,668	36,109	40,053	38,191	38,066
United Kingdom	6,804	7,769	10,261	10,906	10,142	12,199	14,792	15,657	15,575	15,378	14,906	14,747	13,812	13,586	14,736	15,184
All others	18,705	26,245	32,139	36,999	43,095	44,649	53,659	58,302	59,948	68,279	81,413	80,889	84,701	91,546	95,437	103,522

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Other Europe	11,861	13,849	16,329	20,542	23,320	28,263	35,301	42,557	45,129	49,363	58,319	60,343	63,786	66,998	63,562	76,023
Russia	145	158	230	209	217	262	311	345	419	381	523	669	675	589	638	719
Switzerland	11,134	12,997	15,176	19,091	21,749	26,485	32,897	39,818	41,490	45,095	53,513	55,022	58,293	61,558	58,343	70,279
Turkey	124	141	202	263	348	400	451	623	672	830	896	912	1,114	1,138	1,294	1,354
All others	458	553	722	979	1,006	1,116	1,642	1,772	2,548	3,057	3,388	3,741	3,704	3,714	3,287	3,672
Middle East	1,575	1,701	1,872	2,279	3,224	4,301	5,176	6,781	6,970	9,628	11,515	11,376	10,553	7,838	9,744	9,530
Israel	1,194	1,248	1,402	1,737	2,487	3,448	3,843	5,368	5,519	7,802	9,552	9,549	8,371	5,910	7,494	6,794
All others	380	453	470	543	736	853	1,333	1,413	1,452	1,825	1,963	1,827	2,182	1,929	2,250	2,736
Africa	271	312	306	380	433	468	661	769	895	835	857	969	1,082	1,113	1,253	1,330
Asia																
China	2,199	2,568	3,186	3,613	4,223	5,018	6,683	9,140	9,747	12,154	13,036	13,016	13,470	14,382	14,917	16,813
India	1,390	1,845	2,307	2,601	3,251	3,980	6,017	7,056	7,385	9,358	11,711	13,204	14,566	14,706	16,249	18,867
Indonesia	101	168	142	147	131	170	234	286	270	380	430	454	490	552	682	762
Japan	3,261	3,538	4,431	4,760	4,787	4,254	4,648	4,966	5,788	5,898	5,676	5,572	5,622	5,209	5,538	6,583
Malaysia	116	142	160	179	198	216	268	280	360	449	411	462	492	512	527	535
Philippines	28	23	22	32	31	34	42	41	49	46	56	69	58	68	83	105
Singapore	1,467	1,448	1,519	1,594	3,394	5,318	6,510	6,044	10,707	11,430	16,354	16,062	14,556	10,845	11,916	12,311
South Korea	362	396	449	492	568	660	854	1,081	1,233	1,311	1,434	1,674	1,723	1,955	2,764	5,001
Taiwan	95	91	103	145	193	242	249	296	327	369	446	456	497	588	644	745

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Thailand	186	190	220	236	284	325	389	465	447	525	570	694	747	749	857	1,019
Vietnam	13	13	19	15	30	32	45	56	66	82	95	105	124	137	170	211
All others	73	68	72	107	148	154	190	215	257	249	299	283	300	558	537	552
Australia	1,338	1,170	1,490	1,956	2,425	2,949	3,606	3,656	3,810	4,042	4,491	4,968	4,059	3,423	2,756	3,704
All others	321	353	347	292	326	388	652	1,243	1,889	2,016	2,501	2,360	2,839	2,759	2,286	2,463
Imports																
World	79,882	93,978	113,850	135,625	155,961	177,043	214,676	245,329	262,791	288,325	323,957	331,893	344,641	352,833	360,869	390,813
North America	21,457	27,859	34,755	38,906	43,612	50,906	58,232	65,913	69,088	74,444	80,794	79,414	78,934	88,201	99,661	107,278
Canada	2,140	2,511	3,287	3,950	4,800	6,034	7,263	8,143	8,533	7,943	8,516	8,726	8,984	9,272	7,779	8,682
Mexico	1,029	1,186	1,358	1,647	1,827	2,321	2,779	3,119	3,069	3,391	3,528	3,893	4,034	3,856	3,918	4,336
United States	18,288	24,161	30,110	33,309	36,985	42,551	48,190	54,651	57,487	63,111	68,749	66,795	65,916	75,074	87,964	94,260
Central and South America	5,939	5,702	6,029	7,126	7,835	9,295	12,395	14,391	17,598	20,390	24,726	23,852	24,926	24,417	23,272	22,749
Brazil	1,732	1,739	1,836	2,127	2,428	3,053	3,847	4,877	5,026	6,631	6,907	7,431	8,049	8,531	7,527	7,105
Central America	1,471	1,575	1,708	2,111	1,963	2,121	2,825	3,175	5,969	5,630	8,437	5,746	5,525	4,776	4,865	5,265
All others	2,737	2,388	2,485	2,888	3,444	4,121	5,723	6,339	6,604	8,129	9,381	10,676	11,352	11,109	10,880	10,380
Europe																
EU	19,263	21,623	25,735	33,699	39,730	44,826	54,491	63,648	69,498	74,440	79,765	82,136	84,025	82,644	83,342	93,075
France	2,816	2,881	3,410	4,112	4,948	4,590	5,924	6,729	7,765	8,371	8,612	9,773	8,845	8,381	7,695	8,062
Germany	2,994	3,324	3,592	5,059	5,779	7,054	11,343	13,434	15,573	15,623	14,516	13,976	14,581	15,139	13,822	16,613

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
United Kingdom	3,315	2,797	3,282	4,362	5,733	6,875	7,064	7,504	7,539	8,785	10,378	10,414	7,872	7,760	10,160	10,904
All others	10,138	12,621	15,450	20,166	23,269	26,307	30,158	35,982	38,622	41,661	46,259	47,973	52,727	51,363	51,666	57,497
Other Europe	10,343	12,393	16,060	19,745	22,689	28,468	34,021	37,942	35,844	40,986	48,620	48,442	52,983	52,039	44,599	47,984
Russia	1,813	1,632	2,219	2,806	4,015	5,944	6,446	8,805	7,853	11,104	13,227	13,328	14,741	12,905	9,229	9,972
Switzerland	5,643	7,189	9,252	11,041	12,035	14,770	17,834	17,241	16,551	17,442	21,321	20,756	22,820	23,971	21,786	22,709
Turkey	1,225	1,564	2,075	2,758	2,911	3,218	3,874	4,938	4,672	4,792	5,162	4,495	4,587	4,876	4,867	5,454
All others	1,662	2,009	2,515	3,140	3,729	4,536	5,867	6,957	6,769	7,648	8,909	9,863	10,835	10,287	8,718	9,849
Middle East	3,447	3,893	4,502	5,074	5,505	6,349	7,849	9,193	10,101	11,454	12,991	13,305	15,728	15,938	16,235	17,853
Israel	624	677	771	857	918	1,063	1,203	1,384	1,382	1,533	1,663	1,784	1,937	2,050	1,998	2,462
All others	2,823	3,216	3,731	4,217	4,586	5,286	6,645	7,809	8,720	9,921	11,328	11,521	13,791	13,888	14,237	15,391
Africa	3,753	4,117	4,824	5,733	6,431	7,489	9,620	10,709	11,108	12,364	13,387	14,482	16,151	16,830	16,842	17,852
Asia																
China	1,523	1,740	1,927	2,168	2,715	3,195	4,480	6,006	6,873	8,415	11,170	13,312	14,707	16,482	18,155	19,341
India	548	737	819	983	1,215	1,595	1,955	2,409	2,657	3,376	3,750	3,523	3,471	3,630	3,506	3,814
Indonesia	225	291	338	313	318	400	501	559	628	759	824	904	1,057	1,029	1,075	1,158
Japan	4,819	5,099	5,740	6,698	7,611	8,255	9,067	10,414	13,700	15,860	18,590	21,248	20,002	18,814	22,160	24,027
Malaysia	366	423	506	610	644	753	887	981	1,081	1,162	1,347	1,483	1,575	1,611	1,433	1,611
Philippines	399	441	500	541	561	624	732	850	884	978	1,066	1,150	1,263	1,261	1,361	1,622
Singapore	698	756	885	929	1,462	1,550	1,848	1,790	1,772	2,144	2,702	2,683	2,794	3,204	3,144	3,336

CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
South Korea	1,022	1,196	1,399	1,604	1,977	2,557	3,067	3,449	3,495	4,393	4,498	5,117	5,114	5,671	4,963	5,205
Taiwan	924	1,011	1,097	1,342	1,397	1,554	1,730	1,884	2,030	2,347	2,663	2,806	2,992	2,848	3,065	3,460
Thailand	562	539	658	755	931	1,127	1,249	1,517	1,663	1,801	2,054	2,142	2,246	2,185	2,325	2,587
Vietnam	332	373	415	467	552	654	815	1,001	1,187	1,325	1,611	1,816	1,984	2,060	2,385	2,722
All others	751	818	923	1,020	1,219	1,262	1,502	1,707	1,969	2,188	2,429	2,567	3,000	3,242	3,437	3,982
Australia	2,167	2,500	3,325	4,174	4,907	4,999	5,604	5,958	6,551	7,373	8,545	9,023	8,942	8,212	7,510	8,456
All others	1,341	2,467	3,413	3,737	4,649	1,184	4,634	5,010	5,064	2,126	2,427	2,486	2,746	2,516	2,397	2,700

EU = European Union.

**Note(s)**

Data are not available for EU member Luxembourg. China includes Hong Kong. Detail may not add to total because of rounding. See Appendix Table 6-38 for a full list of countries and economies in each region.

**Source(s)**

IHS Global Insight, special tabulations (2017) of the World Trade Service database.

*Science and Engineering Indicators 2018*



## CHAPTER 6 | Industry, Technology, and the Global Marketplace

### APPENDIX TABLE 6-37

#### Exports and imports of aircraft and spacecraft, by region, country, or economy: 2001–16

(Millions of current dollars)

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Exports																
World	116,317	112,775	109,719	126,553	136,575	172,947	198,806	211,616	198,341	204,373	224,843	256,003	281,645	294,517	302,096	303,772
North America	55,509	54,119	49,152	53,930	65,266	84,440	96,694	86,987	87,735	84,583	92,275	108,515	117,361	126,026	130,910	136,304
Canada	3,083	2,740	2,064	2,356	2,812	4,674	4,805	5,440	6,085	6,483	5,833	5,663	5,336	5,363	5,524	5,287
Mexico	81	110	111	114	124	219	397	613	389	434	526	491	550	544	518	532
United States	52,346	51,269	46,976	51,459	62,331	79,547	91,491	80,933	81,260	77,666	85,916	102,360	111,475	120,118	124,868	130,485
Central and South America	3,284	2,641	2,695	4,894	3,982	3,943	6,113	6,820	5,249	5,842	6,272	6,290	6,441	5,152	5,131	5,438
Brazil	3,009	2,358	2,333	4,579	3,532	3,417	5,337	5,573	4,371	4,900	4,799	5,486	5,148	4,761	4,788	5,081
Central America	84	117	88	94	108	75	245	305	149	142	101	78	306	163	128	136
All others	191	166	274	221	343	451	532	943	729	800	1,372	726	987	227	215	221
Europe																
EU	39,857	37,221	38,228	45,515	46,777	58,576	64,116	76,270	72,937	81,094	87,516	96,866	107,786	108,571	104,724	96,042
France	17,067	15,490	16,488	19,508	19,586	25,724	27,940	34,060	29,937	34,934	37,057	40,160	42,399	43,348	39,882	36,933
Germany	7,334	7,061	7,389	9,791	9,478	11,694	10,397	12,097	14,832	15,453	16,985	21,188	24,960	24,124	26,510	23,164
United Kingdom	9,911	8,491	8,382	9,212	10,445	11,938	14,485	16,420	14,588	16,517	17,218	18,852	20,859	21,148	19,812	17,540
All others	5,545	6,179	5,970	7,005	7,267	9,220	11,294	13,693	13,581	14,190	16,257	16,666	19,567	19,951	18,519	18,404

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Other Europe	5,174	6,669	7,228	7,604	4,528	5,695	7,615	9,965	7,522	5,949	6,859	8,687	8,649	8,405	9,489	9,710
Russia	2,240	3,514	3,507	3,243	838	1,187	1,408	2,145	1,438	1,351	1,522	2,260	3,020	2,532	2,930	2,889
Switzerland	1,447	2,011	2,816	3,431	2,794	2,952	3,953	4,963	4,464	3,241	3,749	3,976	3,928	4,194	4,759	5,120
Turkey	364	1,145	905	930	896	1,556	2,254	2,857	1,620	1,356	1,588	2,451	1,701	1,679	1,800	1,701
All others	1,122	3,290	3,128	4,046	3,835	4,667	6,240	8,917	5,317	6,043	6,383	6,973	8,147	7,741	9,074	9,533
Middle East	2,887	1,973	1,733	1,774	1,945	2,173	3,185	2,851	3,091	3,053	3,088	3,342	3,634	3,571	3,875	3,999
Israel	2,021	242	269	453	370	613	756	728	727	604	638	891	1,161	1,403	1,505	1,609
All others	866	1,074	1,126	1,820	1,520	1,881	2,298	5,338	1,498	2,385	2,657	2,740	3,352	2,766	3,695	3,926
Africa	346	329	546	749	1,100	1,266	1,263	1,857	978	901	1,419	1,622	1,503	1,741	1,784	1,800
Asia																
China	1,293	1,338	1,703	1,989	1,937	2,361	2,732	3,987	3,245	3,784	4,395	4,369	5,102	5,769	6,325	6,474
India	195	135	151	149	155	274	559	921	804	806	1,843	1,524	3,652	6,434	6,839	6,815
Indonesia	60	87	98	108	145	264	162	155	232	135	255	218	193	121	156	145
Japan	3,334	2,662	2,475	3,103	3,666	4,702	5,529	5,883	6,136	6,081	7,234	8,793	9,580	10,203	10,465	10,538
Malaysia	391	401	314	448	545	639	1,040	941	1,004	874	1,012	1,077	829	961	970	906
Philippines	62	61	218	241	170	239	105	125	128	108	91	223	500	376	276	304
Singapore	1,009	1,125	1,186	1,234	1,929	2,814	3,111	4,651	3,643	4,424	4,571	5,214	5,488	5,540	6,414	10,104
South Korea	748	549	688	559	614	812	997	923	831	1,082	1,323	1,691	2,335	2,148	2,272	2,130
Taiwan	239	182	226	232	240	354	412	451	463	480	598	669	724	862	961	895

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Thailand	191	156	326	398	336	353	526	622	474	631	671	672	654	742	805	858
Vietnam	5	2	7	11	11	25	41	30	28	61	52	110	109	200	193	196
All others	132	134	125	142	112	117	153	151	78	93	199	129	90	201	194	228
Australia	454	832	507	439	542	526	566	707	730	669	922	847	1,118	1,176	1,091	1,151
All others	1,147	2,156	2,112	3,034	2,575	3,373	3,885	7,317	3,031	3,723	4,249	5,144	5,900	6,319	9,222	9,737
Imports																
World	116,317	112,775	109,719	126,553	136,575	172,947	198,806	211,616	198,341	204,373	224,843	256,003	281,645	294,517	302,096	303,772
North America	29,433	24,852	20,363	25,863	23,117	27,077	32,511	33,858	28,749	30,717	34,308	39,033	44,126	48,793	51,120	47,902
Canada	3,992	3,799	2,352	2,653	3,090	3,424	3,998	3,937	3,773	3,793	4,175	4,127	4,579	4,547	5,183	4,807
Mexico	238	405	477	803	698	859	1,507	1,484	529	1,326	1,367	1,729	1,618	1,571	2,040	2,024
United States	25,203	20,649	17,535	22,407	19,330	22,794	27,007	28,437	24,447	25,597	28,766	33,177	37,929	42,674	43,897	41,071
Central and South America	6,686	6,525	5,061	6,119	6,697	10,835	13,186	16,318	14,668	14,894	16,914	18,792	18,516	18,439	19,864	17,833
Brazil	3,747	3,572	2,270	3,439	3,718	5,530	7,706	8,658	6,982	7,073	8,332	9,852	9,305	8,475	9,390	9,188
Central America	1,306	1,324	1,240	1,113	1,018	2,037	1,876	2,691	1,959	1,975	2,133	2,013	1,706	2,161	1,814	1,528
All others	1,634	1,629	1,551	1,567	1,961	3,268	3,604	4,969	5,726	5,846	6,448	6,927	7,505	7,802	8,659	7,117
Europe																
EU	29,729	26,589	27,216	31,801	32,462	38,105	46,689	49,176	47,487	42,985	46,160	50,602	51,771	53,614	59,230	62,181
France	5,864	5,986	4,627	7,066	7,598	8,719	10,743	11,456	12,058	10,369	10,766	12,058	12,980	13,018	18,366	19,507
Germany	5,751	4,662	4,662	4,043	4,479	6,630	7,760	8,548	8,749	8,380	9,127	9,013	9,290	10,120	9,555	8,971

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
United Kingdom	8,872	6,234	6,711	6,758	8,340	8,829	10,510	11,809	10,179	10,685	10,982	12,294	13,127	14,133	14,537	15,489
All others	9,242	9,708	11,217	13,933	12,045	13,926	17,676	17,363	16,501	13,551	15,285	17,236	16,374	16,342	16,772	18,216
Other Europe	6,092	6,505	6,308	7,400	7,425	11,185	11,360	16,343	15,288	16,578	18,764	18,937	20,709	20,951	19,149	21,652
Russia	249	409	664	1,065	846	1,825	1,927	3,341	3,587	3,021	3,689	6,129	5,994	7,382	5,538	4,906
Switzerland	2,174	2,171	3,205	2,471	2,702	3,259	3,876	5,245	4,077	4,427	3,839	4,133	4,308	3,604	3,391	4,263
Turkey	1,535	1,456	674	1,052	1,551	3,162	2,061	3,189	2,281	4,654	5,602	4,211	4,116	4,731	6,689	6,981
All others	2,134	2,468	1,764	2,811	2,325	2,939	3,497	4,568	5,342	4,477	5,634	4,463	6,291	5,235	3,531	5,503
Middle East	7,442	7,130	9,032	9,023	13,092	17,753	17,921	18,828	20,322	22,266	21,639	27,950	32,752	36,383	40,858	42,476
Israel	1,512	1,229	1,065	1,702	2,057	2,052	2,475	2,663	1,617	1,451	1,318	1,446	1,538	2,092	1,864	2,120
All others	5,930	5,902	7,968	7,320	11,034	15,702	15,446	16,165	18,705	20,814	20,321	26,504	31,214	34,291	38,994	40,356
Africa	4,224	3,876	4,321	4,728	6,682	6,404	7,136	13,100	8,399	9,318	9,292	8,009	8,385	11,000	8,769	8,773
Asia																
China	8,752	8,703	8,336	8,982	12,442	17,374	19,627	17,892	17,641	21,129	25,121	30,660	34,778	35,928	36,330	35,710
India	1,085	1,253	1,452	1,734	2,242	5,721	9,410	5,415	6,671	3,999	3,631	4,476	6,332	5,569	3,904	3,577
Indonesia	352	527	418	465	662	751	1,582	1,447	2,607	3,148	2,755	3,742	5,093	4,115	4,223	3,041
Japan	4,689	6,080	6,534	7,270	7,331	9,015	10,379	8,658	7,571	7,306	7,513	11,964	11,593	12,160	10,725	11,537
Malaysia	1,061	1,335	719	1,243	1,226	2,180	2,059	2,498	2,667	2,626	3,226	4,890	4,955	4,118	2,972	2,832
Philippines	302	229	388	541	560	1,104	862	1,175	673	1,225	1,147	2,172	3,251	3,216	1,719	1,979
Singapore	5,088	4,545	4,841	5,356	6,202	7,645	7,781	9,580	9,142	10,158	10,214	11,661	11,723	11,083	12,045	10,759

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
South Korea	3,398	3,366	2,705	3,037	3,420	5,089	4,561	3,652	3,527	4,015	5,511	5,814	6,497	6,791	7,462	8,039
Taiwan	2,249	1,488	1,678	2,275	4,006	2,790	3,197	2,047	1,702	2,487	2,746	2,616	3,345	4,811	5,277	6,045
Thailand	1,586	1,272	1,546	1,294	2,362	2,267	2,442	1,880	1,711	1,963	2,222	3,453	4,942	3,765	3,473	2,886
Vietnam	104	203	878	1,048	578	216	1,152	752	964	1,082	1,496	2,147	1,255	1,115	2,108	2,119
All others	368	465	798	1,535	791	1,864	1,566	1,686	1,248	1,717	2,481	1,955	3,527	4,430	4,336	5,608
Australia	1,692	3,940	3,181	3,014	2,968	3,019	2,567	5,142	4,342	4,132	5,532	4,171	4,324	4,187	4,461	4,000
All others	1,985	3,889	3,940	3,826	2,311	2,553	2,816	2,171	2,961	2,629	4,171	2,962	3,771	4,050	4,071	4,820

EU = European Union.

### Note(s)

Data are not available for EU member Luxembourg. China includes Hong Kong. Detail may not add to total because of rounding. See Appendix Table 6-38 for a full list of countries and economies in each region.

### Source(s)

IHS Global Insight, special tabulations (2017) of the World Trade Service database.

*Science and Engineering Indicators 2018*

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

APPENDIX TABLE 6-38



### Regions, countries, or economies in world trade data

(Regions, countries, or economies in world trade data)

North America	Central and South America	Europe	Middle East	Africa	Asia	Australia
Canada	Brazil	EU	Israel	Algeria	China	
Mexico	Central America	France	All others	Angola	China	
United States	Belize	Germany	Bahrain	Benin	Hong Kong	
	Costa Rica	United Kingdom	Gaza Strip	Burkina Faso	India	
	El Salvador	All others	Iran	Burundi	Indonesia	
	Guatemala	Austria	Iraq	Cameroon	Japan	
	Honduras	Belgium	Jordan	Cape Verde	Malaysia	
	Nicaragua	Bulgaria	Kuwait	Central African Republic	Philippines	
	Panama	Cyprus	Lebanon	Chad	Singapore	
	All others	Czech Republic	Oman	Congo, Democratic Republic of the	South Korea	
	Argentina	Denmark	Qatar	Congo, Republic of the	Taiwan	
	Bahamas, The	Finland	Saudi Arabia	Côte d'Ivoire	Thailand	
	Barbados	Greece	Syria	Djibouti	Vietnam	
	Bermuda	Hungary	United Arab Emirates	Egypt	All others	
	Bolivia	Ireland	Yemen	Equatorial Guinea	Afghanistan	
	Chile	Italy		Eritrea	Armenia	
	Colombia	Malta		Ethiopia	Azerbaijan	
	Cuba	Netherlands		Gabon	Bangladesh	

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

North America	Central and South America	Europe	Middle East	Africa	Asia	Australia
	Dominican Republic	Poland		Gambia, The	Brunei	
	Ecuador	Portugal		Ghana	Burma	
	French Guiana	Romania		Guinea	Cambodia	
	Grenada	Slovakia		Guinea-Bissau	Georgia	
	Guyana	Slovenia		Kenya	Kazakhstan	
	Haiti	Spain		Liberia	Kyrgyzstan	
	Jamaica	Sweden		Libya	Laos	
	Paraguay	Other Europe		Madagascar	Maldives	
	Peru	Russia		Malawi	Mongolia	
	Suriname	Switzerland		Mali	Nepal	
	Trinidad and Tobago	Turkey		Mauritania	North Korea	
	Uruguay	All others		Morocco	Pakistan	
	Venezuela	Albania		Mauritius	Papua New Guinea	
	Virgin Islands (British)	Belarus		Mozambique	Sri Lanka	
		Bosnia and Herzegovina		Niger	Tajikistan	
		Croatia		Nigeria	Turkmenistan	
		Gibraltar		Rwanda	Uzbekistan	
		Iceland		Senegal		
		Macedonia		Sierra Leone		
		Moldova		Somalia		
		Montenegro		Southern Africa		
		Norway		Botswana		
		Serbia		Lesotho		

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

North America	Central and South America	Europe	Middle East	Africa	Asia	Australia
		Ukraine		Namibia		
				South Africa		
				Sudan		
				Swaziland		
				Tanzania		
				Togo		
				Tunisia		
				Uganda		
				Western Sahara		
				Zambia		
				Zimbabwe		

EU = European Union.

### Note(s)

Data are not available for EU member Luxembourg.

### Source(s)

IHS Global Insight, World Trade Service database.

*Science and Engineering Indicators 2018*



## CHAPTER 6 | Industry, Technology, and the Global Marketplace

### APPENDIX TABLE 6-39

#### Exports and imports of motor vehicles and parts, by region, country, or economy: 2001–16

(Millions of current dollars)

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Exports																
World	233,533	257,413	302,599	361,567	409,949	468,457	564,763	638,984	418,523	592,654	707,926	757,943	765,669	758,959	729,992	725,620
North America	20,361	20,347	23,106	23,012	33,806	40,505	52,989	62,538	38,244	53,628	71,871	79,370	77,162	79,581	72,026	68,833
Canada	1,028	1,145	1,535	1,507	1,775	1,769	2,083	1,643	1,077	1,073	1,368	1,555	1,696	1,747	1,866	1,848
Mexico	2,257	1,735	2,057	2,148	2,978	5,090	8,089	9,703	5,911	9,360	14,174	15,598	14,395	13,632	12,732	12,909
United States	17,076	17,467	19,514	19,357	29,053	33,646	42,816	51,192	31,256	43,195	56,329	62,216	61,072	64,202	57,428	54,076
Central and South America	8,806	8,395	9,782	13,238	17,925	20,858	23,005	26,270	17,846	25,249	28,640	27,637	28,772	22,257	19,199	19,456
Brazil	5,505	5,704	7,336	9,827	13,135	14,798	15,267	16,874	9,584	14,298	16,499	15,386	16,079	11,603	11,101	11,391
Central America	65	87	75	131	143	162	261	730	1,552	1,256	562	438	372	407	410	437
All others	3,236	2,604	2,372	3,279	4,647	5,898	7,476	8,666	6,710	9,694	11,580	11,813	12,322	10,246	7,689	7,629
Europe																
EU	77,987	86,714	105,878	124,105	131,285	145,707	173,296	194,592	127,143	186,506	241,341	256,763	268,353	270,372	252,535	244,075
France	6,987	7,514	9,562	12,135	11,468	11,789	13,116	14,693	10,362	13,006	15,180	13,803	12,300	11,876	9,697	9,301
Germany	41,056	46,470	55,390	61,738	65,531	71,677	81,794	91,381	63,504	97,803	124,169	132,288	135,663	137,809	128,224	120,025
United Kingdom	7,654	9,737	12,043	13,668	15,240	15,299	17,243	19,241	10,776	18,642	24,917	29,626	32,089	33,960	32,774	33,435
All others	22,290	22,993	28,883	36,564	39,047	46,942	61,143	69,278	42,501	57,055	77,075	81,046	88,300	86,727	81,841	81,314

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Other Europe	6,812	8,139	10,732	15,800	18,511	23,009	30,884	34,855	21,802	24,472	31,305	30,641	34,762	34,475	33,861	35,485
Russia	1,224	1,388	1,553	2,222	2,516	3,064	3,976	4,120	1,922	1,824	2,886	3,226	3,781	3,237	3,616	3,766
Switzerland	1,151	1,287	1,418	1,632	1,774	1,986	2,486	2,534	1,742	1,971	2,393	2,326	2,484	2,884	2,477	2,742
Turkey	2,709	3,693	5,636	8,942	10,657	13,531	17,872	20,313	13,567	15,791	18,730	17,468	20,100	20,836	20,912	21,816
All others	1,728	1,770	2,125	3,003	3,563	4,428	6,550	7,887	4,570	4,885	7,297	7,621	8,397	7,518	6,855	7,162
Middle East	1,885	2,031	1,335	2,024	3,429	3,000	7,252	9,862	5,383	6,055	6,344	4,384	6,088	6,385	6,781	7,262
Israel	116	134	152	180	232	226	269	306	339	310	299	269	245	316	320	323
All others	1,769	1,897	1,183	1,844	3,197	2,774	6,983	9,556	5,044	5,745	6,045	4,115	5,843	6,069	6,460	6,939
Africa	2,638	3,248	4,018	4,624	4,939	5,773	6,384	9,106	7,280	8,985	9,894	10,143	11,501	11,868	13,552	14,933
Asia																
China	1,921	2,646	3,552	5,696	9,288	13,804	22,143	28,188	20,280	28,652	38,796	43,291	45,604	50,048	54,944	58,802
India	738	854	1,294	2,161	3,068	3,480	4,246	5,840	5,898	8,592	11,261	11,422	11,355	12,485	12,588	12,763
Indonesia	444	514	655	921	1,351	1,667	2,225	2,861	1,851	2,741	3,190	4,672	4,715	5,201	6,037	6,484
Japan	87,041	97,665	107,717	122,327	129,846	146,059	165,031	180,592	110,587	159,166	162,470	177,036	161,079	149,427	143,121	144,460
Malaysia	240	311	360	498	660	758	895	991	780	1,108	1,141	1,269	1,327	1,353	1,198	1,155
Philippines	337	481	723	851	955	926	1,062	1,357	960	1,361	1,318	1,289	1,048	1,281	1,409	1,535
Singapore	603	763	931	1,196	1,445	1,607	1,808	2,268	1,484	1,879	1,861	2,056	1,967	2,227	1,945	1,857
South Korea	16,001	17,246	22,519	32,157	37,368	42,970	49,900	50,350	37,697	54,103	68,333	71,869	74,085	75,006	70,543	66,094
Taiwan	1,721	1,906	2,356	2,873	2,948	2,967	3,230	3,388	2,807	3,670	4,340	4,925	5,046	5,340	5,682	5,914

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Thailand	2,709	3,058	4,033	5,568	8,435	10,372	14,178	17,988	13,042	20,586	20,296	25,916	27,488	26,319	28,491	29,815
Vietnam	26	34	44	99	175	173	249	370	296	550	569	764	954	1,088	1,161	1,251
All others	69	53	48	91	125	189	364	374	382	192	426	272	184	159	184	198
Australia	2,421	2,406	2,795	3,215	3,607	3,387	3,766	4,448	2,198	2,868	2,900	3,325	3,085	2,877	2,653	3,167
All others	773	603	720	1,112	784	1,244	1,857	2,746	2,567	2,291	1,627	901	1,093	1,210	2,081	2,081
Imports																
World	233,533	257,413	302,599	361,567	409,949	468,457	564,763	638,984	418,523	592,654	707,926	757,943	765,669	758,959	729,992	725,620
North America	94,678	106,049	112,080	122,534	130,705	143,967	145,530	140,975	89,694	122,785	137,741	164,681	168,101	173,331	186,197	183,534
Canada	6,229	7,378	7,977	9,069	10,434	12,330	13,144	13,576	10,671	13,604	13,923	16,672	15,789	14,277	14,156	14,504
Mexico	4,626	5,614	6,070	7,202	8,663	10,059	11,181	11,850	7,140	11,033	12,843	14,431	14,683	16,205	17,477	17,000
United States	83,824	93,057	98,033	106,262	111,608	121,578	121,206	115,549	71,883	98,147	110,976	133,578	137,630	142,849	154,563	152,030
Central and South America	16,276	13,395	13,364	19,185	26,322	33,650	44,513	53,631	36,958	58,598	71,168	71,794	73,496	60,451	52,162	49,142
Brazil	4,691	3,641	3,651	4,663	5,864	7,466	10,434	15,382	12,962	19,777	24,781	23,537	25,599	21,736	15,334	13,283
Central America	2,913	3,312	3,066	3,599	4,486	5,310	6,587	6,843	4,105	5,807	6,222	7,107	6,596	6,653	7,389	7,924
All others	8,672	6,441	6,648	10,923	15,971	20,874	27,492	31,405	19,891	33,015	40,165	41,149	41,302	32,062	29,439	27,936
Europe																
EU	34,227	38,185	49,095	58,973	65,228	76,313	93,772	97,232	61,813	74,177	89,829	78,695	79,929	82,964	85,512	91,234
France	3,193	3,671	4,860	6,446	6,281	7,157	8,722	9,248	7,947	8,014	9,125	8,451	8,501	8,909	8,544	9,273
Germany	8,486	9,666	12,777	13,414	16,107	20,236	23,950	26,919	17,250	17,709	23,327	22,354	20,371	20,852	21,683	23,121

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
United Kingdom	6,632	7,341	8,723	10,096	10,193	10,050	12,096	11,177	6,027	12,750	16,015	11,930	11,837	13,750	14,167	15,473
All others	15,916	17,507	22,735	29,018	32,647	38,870	49,004	49,888	30,589	35,703	41,363	35,961	39,220	39,453	41,117	43,366
Other Europe	17,411	19,504	27,488	39,831	46,441	60,935	87,405	109,168	45,660	72,499	104,618	107,815	108,029	90,987	73,652	73,444
Russia	3,584	4,075	5,761	8,540	12,125	20,802	35,162	50,559	12,286	25,900	43,539	49,758	45,084	33,398	19,612	18,305
Switzerland	6,470	6,428	7,068	7,902	8,097	8,328	9,325	10,662	8,774	11,104	14,519	14,020	13,384	13,792	13,267	12,731
Turkey	1,974	2,965	6,597	12,168	12,325	13,498	15,458	16,596	10,774	17,107	21,100	17,559	20,451	19,264	20,137	20,550
All others	5,382	6,037	8,062	11,222	13,893	18,306	27,460	31,351	13,827	18,387	25,460	26,477	29,110	24,533	20,635	21,857
Middle East	17,795	18,174	20,816	26,512	33,668	34,792	48,308	64,886	41,127	54,851	56,798	66,094	69,823	75,228	74,336	72,099
Israel	1,948	1,684	1,690	2,126	2,562	2,503	3,740	4,456	2,806	4,667	4,783	3,886	5,105	5,087	5,354	5,874
All others	15,848	16,490	19,126	24,386	31,106	32,289	44,568	60,430	38,321	50,185	52,014	62,208	64,718	70,141	68,982	66,225
Africa	10,943	11,851	14,444	18,831	23,649	28,554	35,167	43,057	36,234	40,402	41,790	50,568	50,117	49,906	46,633	45,386
Asia																
China	6,297	9,059	15,423	16,563	17,162	21,950	28,391	33,391	35,034	62,032	79,984	77,863	85,373	97,322	83,488	81,713
India	790	916	1,169	1,636	1,932	2,535	3,758	5,235	4,156	6,347	7,957	7,434	6,473	6,261	6,346	6,169
Indonesia	1,734	1,896	2,295	3,213	3,578	2,338	3,577	6,339	4,118	7,602	9,576	12,065	9,358	7,485	6,619	6,672
Japan	9,474	10,423	11,644	12,581	13,457	14,077	16,036	17,502	10,630	15,212	18,482	21,175	21,349	21,940	20,483	19,788
Malaysia	1,858	2,105	2,677	3,344	3,966	3,602	3,678	4,758	4,236	6,334	6,634	8,115	7,823	7,178	6,292	6,491
Philippines	1,035	1,272	1,397	1,330	1,419	1,543	1,991	2,371	2,306	3,494	3,190	3,877	3,791	3,911	4,815	5,746
Singapore	2,195	2,131	2,529	3,119	3,551	3,763	4,022	4,949	3,546	3,875	5,089	4,834	4,335	4,481	4,238	4,240

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
South Korea	2,210	3,057	3,396	4,026	4,905	6,270	7,789	8,654	6,092	9,682	11,629	11,116	11,958	14,557	15,898	15,878
Taiwan	2,253	2,313	3,026	3,752	4,251	3,587	3,239	3,058	2,907	4,877	6,043	5,708	5,753	6,834	6,923	7,473
Thailand	2,234	2,659	3,561	4,468	4,932	5,036	5,991	7,237	5,691	9,878	11,501	15,575	13,697	10,045	9,991	10,130
Vietnam	646	879	1,048	1,283	1,412	1,236	2,438	3,355	3,618	3,684	3,981	2,872	3,195	4,910	6,346	6,573
All others	1,381	1,746	2,261	2,746	3,525	4,028	4,593	5,367	5,377	7,759	10,625	10,153	8,987	9,470	10,078	10,601
Australia	7,646	8,913	11,433	13,615	15,374	16,245	19,885	22,175	15,778	23,934	26,115	31,879	28,197	25,721	24,515	23,479
All others	2,448	2,887	3,452	4,022	4,472	4,036	4,680	5,644	3,548	4,631	5,175	5,632	5,885	5,976	5,468	5,828

EU = European Union.

### Note(s)

Data are not available for EU member Luxembourg. China includes Hong Kong. Detail may not add to total because of rounding. See Appendix Table 6-38 for a full list of countries and economies in each region.

### Source(s)

IHS Global Insight, special tabulations (2017) of the World Trade Service database.

*Science and Engineering Indicators 2018*

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

### APPENDIX TABLE 6-40

#### Exports and imports of chemicals excluding pharmaceuticals, by region, country, or economy: 2001–16

(Millions of current dollars)

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Exports																
World	367,035	391,896	461,229	568,383	645,490	728,310	869,222	1,028,505	817,414	1,055,252	1,292,854	1,271,036	1,280,032	1,276,684	1,198,250	1,185,477
North America	56,498	56,298	62,188	73,926	78,800	89,301	108,017	123,690	97,661	123,835	142,885	137,636	136,174	134,333	126,080	119,971
Canada	2,697	2,800	3,040	4,162	5,162	5,774	8,818	9,156	5,792	7,709	9,895	9,161	8,794	7,670	7,447	6,708
Mexico	2,910	2,714	2,912	3,391	3,804	4,150	5,040	6,531	5,528	7,017	8,718	9,328	9,446	8,817	7,769	7,557
United States	50,891	50,783	56,236	66,373	69,834	79,377	94,160	108,003	86,341	109,109	124,272	119,146	117,934	117,846	110,864	105,706
Central and South America	13,307	13,019	15,438	19,677	24,676	28,347	32,655	41,474	31,882	38,396	47,615	48,711	45,118	42,216	37,414	35,689
Brazil	4,145	4,385	5,594	7,109	8,931	11,069	12,860	14,838	12,302	14,271	17,333	17,780	16,449	14,762	12,778	12,748
Central America	2,454	2,217	3,049	3,820	4,898	5,464	7,025	9,104	6,033	7,682	9,530	9,373	8,939	8,876	8,072	6,792
All others	6,708	6,417	6,794	8,748	10,847	11,813	12,770	17,531	13,547	16,444	20,752	21,558	19,730	18,578	16,565	16,149
Europe																
EU	105,567	112,672	131,326	155,617	169,293	185,722	216,001	240,657	191,320	221,415	255,522	251,991	259,105	256,873	227,797	221,937
France	12,291	12,845	15,209	17,535	19,049	20,491	23,141	26,501	20,907	24,457	28,742	28,090	29,233	29,470	25,939	25,351
Germany	28,037	30,550	35,336	43,564	47,891	54,469	64,484	74,210	51,185	60,581	70,093	69,865	72,175	71,721	61,689	59,379
United Kingdom	11,319	12,091	12,990	15,327	16,179	18,401	19,922	20,844	19,293	20,363	21,879	21,420	19,635	20,166	21,678	17,997
All others	53,919	57,186	67,791	79,191	86,173	92,361	108,454	119,102	99,936	116,014	134,809	132,616	138,062	135,516	118,491	119,210

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Other Europe	30,610	32,151	38,684	49,164	55,521	62,119	75,828	96,747	69,417	85,704	107,887	105,125	102,427	101,744	91,480	92,487
Russia	8,671	8,587	10,616	14,125	16,163	17,524	22,383	32,032	19,300	25,536	33,821	33,165	31,695	29,599	25,343	23,580
Switzerland	12,992	14,616	16,893	19,877	21,403	23,036	25,671	28,136	23,940	26,717	30,590	28,172	28,860	30,713	28,128	32,492
Turkey	2,354	2,645	3,383	4,445	5,302	6,431	8,240	9,953	8,353	10,610	13,234	13,802	14,975	15,812	15,056	14,493
All others	6,594	6,303	7,791	10,717	12,653	15,127	19,535	26,627	17,824	22,841	30,242	29,985	26,896	25,620	22,953	21,922
Middle East	16,160	18,178	19,880	27,022	33,493	35,260	43,937	66,463	50,474	78,192	105,842	102,930	106,698	98,773	105,365	107,442
Israel	4,057	4,374	5,072	5,754	6,180	6,262	7,446	11,887	8,765	10,194	12,712	11,760	11,727	11,447	10,699	10,360
All others	12,104	13,804	14,807	21,268	27,313	28,998	36,491	54,577	41,710	67,998	93,131	91,170	94,971	87,326	94,666	97,082
Africa	7,308	7,645	8,973	10,668	12,504	14,808	17,011	28,906	18,725	24,454	30,275	31,619	29,861	28,291	28,550	27,785
Asia																
China	21,989	25,241	31,389	41,862	54,774	68,523	89,612	113,884	91,361	124,730	164,487	167,094	176,219	194,199	193,355	198,288
India	5,096	6,001	7,597	9,398	11,701	14,280	17,126	20,868	17,337	22,885	30,289	31,808	33,758	33,758	31,272	31,302
Indonesia	5,179	5,646	6,892	8,686	9,848	12,493	15,046	17,379	12,647	20,310	29,999	24,978	23,645	22,284	22,184	22,172
Japan	40,736	43,834	50,662	61,453	67,900	73,658	83,322	88,010	76,266	97,634	107,885	102,411	98,073	93,506	80,553	79,300
Malaysia	6,045	6,827	8,549	11,013	12,477	14,313	16,585	19,717	15,083	21,057	26,841	25,054	24,660	24,228	21,497	20,380
Philippines	631	660	758	897	1,072	1,399	1,807	2,166	1,864	2,676	3,175	2,817	3,248	2,627	2,506	2,661
Singapore	9,817	11,961	16,415	20,534	22,356	24,998	29,806	29,834	25,984	35,687	42,039	44,456	41,394	45,744	41,207	39,100
South Korea	16,939	18,272	22,229	29,342	34,561	38,847	45,446	51,575	44,840	59,091	74,090	74,874	79,250	79,861	69,699	64,287
Taiwan	16,451	18,067	20,860	25,628	29,173	31,380	37,844	41,297	34,389	46,367	52,069	49,795	50,880	49,892	52,934	54,012

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Thailand	7,668	8,492	10,883	14,222	16,778	20,704	23,705	27,875	23,465	34,293	47,115	43,827	44,476	42,816	41,569	42,528
Vietnam	550	734	943	1,143	1,419	2,141	2,674	3,536	3,083	4,827	6,916	8,178	8,102	8,583	8,973	9,937
All others	802	853	1,135	1,300	1,763	1,735	1,952	2,474	2,113	2,988	3,795	4,087	3,638	3,638	3,416	3,478
Australia	2,528	2,455	2,935	3,388	3,554	3,696	4,911	4,992	4,318	4,855	5,685	5,808	5,380	4,931	4,655	5,139
All others	3,152	2,891	3,492	3,444	3,828	4,588	5,936	6,961	5,183	5,857	8,444	7,837	7,926	8,386	7,742	7,580
Imports																
World	367,035	391,896	461,229	568,383	645,490	728,310	869,222	1,028,505	817,414	1,055,252	1,292,854	1,271,036	1,280,032	1,276,684	1,198,250	1,185,477
North America	69,502	72,677	83,287	95,491	107,505	117,832	126,920	143,337	111,048	135,435	160,960	164,090	164,032	168,904	164,914	161,057
Canada	4,689	5,126	5,969	7,291	8,419	9,652	10,853	11,847	9,346	11,675	13,266	13,695	13,829	13,607	13,032	13,221
Mexico	4,310	4,590	5,122	5,999	7,259	8,101	9,377	10,971	8,805	11,323	13,768	14,521	14,693	16,433	16,292	16,018
United States	60,502	62,961	72,195	82,201	91,827	100,078	106,689	120,518	92,897	112,436	133,925	135,873	135,509	138,864	135,590	131,818
Central and South America	29,804	27,318	30,169	38,493	43,750	50,743	64,452	88,458	64,609	84,437	108,702	112,719	112,766	108,519	95,622	85,858
Brazil	9,436	8,817	9,914	13,164	13,808	15,817	22,045	32,650	22,690	30,648	40,693	40,212	42,980	41,823	34,398	28,871
Central America	6,187	5,904	6,313	7,059	8,483	9,660	11,272	14,160	11,170	13,779	17,209	19,551	17,757	17,602	16,931	17,008
All others	14,181	12,597	13,942	18,270	21,459	25,267	31,136	41,648	30,749	40,011	50,799	52,956	52,029	49,094	44,293	39,979
Europe																
EU	62,095	65,243	80,623	95,606	106,848	122,646	151,938	169,874	127,465	159,608	199,622	187,393	182,368	187,433	173,344	173,870
France	8,244	8,523	10,666	11,800	13,977	14,907	18,330	18,868	15,690	18,666	21,625	20,612	19,290	19,010	17,098	17,190
Germany	11,466	12,180	14,854	18,154	19,955	23,901	30,575	33,986	26,652	33,211	41,220	38,788	40,039	42,432	41,522	43,043



## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
United Kingdom	9,120	9,643	11,705	14,186	15,204	16,921	20,528	18,287	14,607	17,926	21,498	20,051	17,806	17,604	16,477	16,375
All others	33,265	34,896	43,398	51,466	57,712	66,917	82,505	98,733	70,516	89,805	115,279	107,942	105,234	108,387	98,247	97,262
Other Europe	30,203	34,269	41,517	53,936	61,710	71,973	90,753	106,124	80,467	100,974	126,429	128,567	134,948	126,423	107,809	108,484
Russia	5,681	6,197	7,935	10,115	12,751	16,265	21,426	25,252	17,037	22,323	29,259	31,037	31,633	30,233	21,882	21,389
Switzerland	10,704	11,162	12,431	14,153	15,678	16,127	19,881	20,749	18,004	21,096	24,044	24,302	25,791	26,799	21,944	21,230
Turkey	5,424	7,072	9,467	12,886	15,244	17,788	22,075	24,325	18,904	25,262	32,568	31,608	34,209	34,055	32,175	32,749
All others	8,393	9,838	11,684	16,782	18,037	21,792	27,371	35,798	26,521	32,293	40,558	41,620	43,315	35,336	31,808	33,116
Middle East	14,860	16,549	18,994	22,708	27,620	28,929	37,571	44,107	36,746	47,440	54,449	53,682	55,824	58,904	58,074	59,517
Israel	2,606	2,637	3,172	3,751	4,163	4,804	5,619	6,431	4,952	6,075	7,058	7,139	7,361	7,248	6,909	7,426
All others	12,255	13,912	15,821	18,956	23,457	24,125	31,952	37,676	31,794	41,365	47,391	46,543	48,464	51,656	51,165	52,091
Africa	14,327	15,369	17,679	21,731	24,516	28,988	35,818	46,160	41,559	48,475	58,293	59,921	66,113	65,697	65,943	64,627
Asia																
China	40,929	48,849	59,801	77,585	90,049	102,283	120,936	129,182	123,037	166,081	198,811	189,841	197,513	192,414	184,586	180,423
India	6,055	6,385	8,096	10,719	14,794	17,128	22,769	36,835	29,472	39,676	48,680	48,743	46,170	48,818	45,211	43,286
Indonesia	5,933	5,939	6,178	8,306	8,954	9,668	11,147	17,340	13,055	18,167	24,258	26,009	25,431	25,601	24,204	22,921
Japan	22,844	23,281	26,942	32,318	35,969	39,933	43,732	52,233	40,822	52,705	65,402	59,923	53,954	53,394	47,579	47,497
Malaysia	5,411	5,932	6,536	8,581	9,135	10,549	12,271	14,783	11,998	16,586	20,070	20,618	21,442	21,519	19,498	19,753
Philippines	3,355	3,359	3,704	4,350	4,440	4,848	5,431	6,606	5,552	7,288	8,487	8,528	8,425	9,198	9,324	10,704
Singapore	7,047	7,678	8,949	11,284	12,532	14,214	15,584	17,421	14,435	21,012	25,840	26,275	25,783	25,433	22,870	22,752

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
South Korea	13,197	14,572	17,232	22,145	25,715	28,931	33,786	38,367	32,053	43,172	51,315	48,420	47,952	47,292	42,682	44,013
Taiwan	11,672	13,072	15,092	20,052	21,407	24,166	27,382	28,422	23,479	33,996	39,658	35,964	34,580	33,916	30,471	32,036
Thailand	6,353	7,012	8,226	10,619	11,865	13,268	15,566	19,307	14,170	20,161	24,591	25,615	24,781	24,058	23,486	23,509
Vietnam	2,508	3,028	3,702	4,963	5,626	6,819	8,763	10,520	10,713	13,829	17,346	17,601	19,959	21,596	24,401	25,653
All others	4,658	4,736	5,708	7,137	9,033	9,161	11,439	14,010	12,602	16,579	20,971	20,114	21,333	22,777	23,710	25,142
Australia	7,093	7,197	8,270	9,976	10,831	12,046	13,987	17,541	13,595	16,235	19,973	20,538	19,315	19,634	18,337	17,888
All others	9,190	9,432	10,525	12,383	13,189	14,187	18,979	27,879	10,537	13,397	18,999	16,475	17,342	15,152	16,185	16,486

EU = European Union.

### Note(s)

Data are not available for EU member Luxembourg. China includes Hong Kong. Detail may not add to total because of rounding. See Appendix Table 6-38 for a full list of countries and economies in each region.

### Source(s)

IHS Global Insight, special tabulations (2017) of the World Trade Service database.

*Science and Engineering Indicators 2018*

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

### APPENDIX TABLE 6-41

#### Exports and imports of machinery, equipment, and appliances, by region, country, or economy: 2001–16

(Millions of current dollars)

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Exports																
World	307,580	312,737	365,837	464,977	526,974	611,626	751,348	876,685	668,400	822,193	988,652	988,201	989,131	1,012,354	990,289	999,283
North America	51,196	46,575	45,492	56,858	67,484	77,534	93,468	103,606	81,483	97,757	109,571	113,317	110,937	112,286	107,169	102,860
Canada	2,187	2,266	2,980	3,669	4,458	5,200	6,524	7,625	6,608	6,315	7,073	7,787	7,096	6,907	7,390	7,398
Mexico	1,604	1,529	842	1,174	1,494	1,948	2,216	2,840	2,552	3,431	4,128	4,485	4,741	4,661	5,580	5,747
United States	47,404	42,780	41,669	52,015	61,532	70,385	84,729	93,141	72,323	88,011	98,369	101,045	99,099	100,719	94,199	89,715
Central and South America	4,815	4,589	5,759	8,393	10,236	11,515	13,837	16,982	11,951	14,138	17,538	17,594	16,195	15,668	16,376	16,236
Brazil	3,069	3,020	4,096	6,233	7,351	8,194	9,513	11,112	6,950	8,691	10,976	10,933	9,654	8,996	9,725	9,710
Central America	432	495	533	764	1,116	1,176	1,611	2,218	1,818	2,273	2,894	2,902	3,047	3,378	3,445	3,408
All others	1,313	1,074	1,130	1,396	1,770	2,146	2,713	3,652	3,183	3,174	3,668	3,759	3,494	3,294	3,207	3,118
Europe																
EU	105,664	110,696	131,869	163,650	180,566	210,093	259,918	302,008	230,455	258,977	315,340	309,229	319,609	317,282	288,446	286,276
France	10,350	10,953	12,247	14,612	16,004	18,224	21,053	24,386	19,149	20,015	23,087	23,789	23,082	23,110	22,565	22,345
Germany	37,653	39,726	47,116	60,134	66,303	78,952	91,777	108,954	84,178	95,152	118,337	112,481	114,118	112,111	100,979	99,007
United Kingdom	11,040	10,757	12,601	14,993	16,143	17,487	19,725	21,131	15,983	18,084	21,533	23,146	22,962	23,203	21,506	21,018
All others	46,621	49,260	59,906	73,911	82,116	95,430	127,362	147,538	111,145	125,726	152,383	149,813	159,446	158,857	143,396	143,906

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Other Europe	21,052	21,210	24,759	30,078	31,691	35,966	44,963	53,484	40,292	42,763	51,292	47,323	47,901	47,236	46,521	49,151
Russia	2,994	2,726	3,311	3,891	3,989	4,548	5,529	7,055	4,899	4,782	6,140	6,401	6,492	5,581	5,826	5,850
Switzerland	13,878	13,632	15,699	18,625	18,895	21,249	24,917	27,565	19,409	22,618	28,424	22,981	23,356	24,538	24,355	26,483
Turkey	4,180	4,851	5,749	7,562	8,806	10,170	14,516	18,864	15,984	15,364	16,728	17,941	18,052	17,117	16,339	16,818
All others	5,387	5,836	7,303	9,352	12,071	13,872	20,121	24,731	16,758	21,606	26,964	24,712	26,508	27,091	27,714	28,787
Middle East	1,460	1,392	1,415	1,818	1,989	2,276	2,594	2,996	2,273	2,470	2,735	2,922	3,008	3,196	3,253	3,173
Israel	1,970	2,466	3,458	4,546	5,443	7,069	9,708	11,576	9,027	10,592	13,245	14,005	15,092	15,615	15,290	15,793
All others	1,957	1,978	2,429	2,988	4,638	4,527	7,819	10,159	5,458	8,543	10,984	7,786	8,408	8,280	9,171	9,821
Africa	3,425	3,434	4,110	5,064	5,840	7,391	9,721	11,410	9,223	11,102	13,878	12,554	12,955	12,874	13,599	14,305
Asia																
China	15,557	19,070	25,872	38,028	50,195	67,923	92,390	119,469	98,131	126,194	155,744	169,548	179,524	194,519	210,134	217,697
India	1,537	1,748	2,260	3,047	4,150	5,510	7,167	9,021	7,267	9,040	11,742	12,432	13,472	14,313	14,648	15,334
Indonesia	1,494	1,506	1,654	2,088	2,644	3,351	4,443	4,597	3,771	4,516	4,927	5,233	5,434	6,030	6,625	6,714
Japan	58,505	56,781	68,712	87,946	93,320	98,970	110,629	123,170	80,744	121,152	143,541	133,693	113,005	114,092	105,053	105,113
Malaysia	2,597	2,656	3,040	3,879	4,458	5,486	6,288	7,583	6,170	7,427	8,483	9,128	9,952	10,520	10,849	10,788
Philippines	1,090	1,214	1,317	1,602	1,818	1,979	2,260	2,396	1,913	2,690	2,927	3,469	3,896	4,221	4,549	4,608
Singapore	5,122	5,343	6,040	7,628	9,013	10,488	11,978	14,477	12,494	15,588	19,194	19,257	19,580	21,004	21,032	20,844
South Korea	11,133	11,994	14,997	19,634	23,143	28,156	34,771	40,584	34,544	44,615	54,998	57,322	55,947	57,865	54,614	55,200
Taiwan	11,614	12,386	13,403	15,683	16,541	17,345	18,965	19,730	12,941	19,334	23,114	22,899	22,407	23,388	26,082	26,386

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Thailand	3,711	3,960	4,801	6,468	7,654	8,982	11,473	13,167	11,518	14,839	16,801	16,684	17,450	18,538	19,752	20,476
Vietnam	345	392	500	736	915	1,383	1,700	2,259	1,945	2,836	3,594	4,764	5,443	6,331	7,004	7,718
All others	241	247	268	314	434	529	614	811	667	728	820	774	903	992	1,087	1,122
Australia	1,714	1,782	1,963	2,365	2,781	2,942	3,642	3,992	3,443	3,891	4,612	5,004	4,444	4,144	4,708	5,203
All others	5,309	5,763	7,607	9,702	12,102	13,805	20,527	24,941	17,173	22,134	27,801	25,055	27,070	27,855	28,789	30,080
Imports																
World	307,580	312,737	365,837	464,977	526,974	611,626	751,348	876,685	668,400	822,193	988,652	988,201	989,131	1,012,354	990,289	999,283
North America	63,340	61,268	67,770	82,567	97,198	109,676	118,367	125,452	90,372	110,697	141,932	156,662	157,323	171,824	172,075	170,603
Canada	6,490	6,484	7,916	8,691	10,672	12,492	13,530	14,474	10,829	12,632	17,039	17,865	17,872	18,808	18,801	19,894
Mexico	5,231	5,053	5,348	6,619	7,759	9,065	10,334	12,085	9,128	11,822	13,850	15,779	17,860	18,531	19,348	19,640
United States	51,619	49,731	54,507	67,258	78,767	88,118	94,504	98,893	70,414	86,244	111,043	123,019	121,591	134,485	133,926	131,069
Central and South America	21,722	17,889	17,894	23,345	29,871	36,554	47,181	62,703	47,398	60,164	75,706	79,667	78,254	72,318	68,633	64,195
Brazil	7,013	5,868	5,374	6,570	8,535	10,134	13,526	19,708	15,411	21,534	25,984	26,208	27,343	24,280	20,756	19,055
Central America	4,428	3,990	4,082	4,840	5,584	7,157	8,671	9,946	7,018	8,346	9,476	9,789	10,112	10,099	11,010	11,402
All others	10,282	8,030	8,437	11,935	15,753	19,263	24,984	33,050	24,969	30,284	40,247	43,669	40,799	37,939	36,867	33,739
Europe																
EU	51,676	47,993	56,200	69,319	79,357	90,099	114,024	125,204	86,317	102,382	125,039	117,779	119,867	130,102	127,521	134,374
France	6,212	5,874	6,671	8,264	8,807	9,603	12,018	12,732	9,722	11,040	13,402	12,869	13,419	13,905	13,813	14,534
Germany	13,232	11,760	13,532	16,629	19,060	22,483	27,649	30,405	21,728	26,527	33,785	31,248	31,162	33,108	32,168	34,047

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
United Kingdom	8,520	7,740	8,156	9,608	11,908	12,721	14,888	14,905	10,070	12,980	15,425	15,001	14,832	16,447	16,307	17,410
All others	23,711	22,620	27,841	34,817	39,583	45,293	59,469	67,162	44,797	51,835	62,427	58,661	60,454	66,643	65,233	68,383
Other Europe	23,010	24,830	30,612	40,479	47,836	61,052	81,074	103,609	65,913	72,070	96,500	98,155	100,960	94,148	79,094	79,883
Russia	6,672	7,715	9,821	13,827	17,500	23,438	33,471	44,257	24,582	30,199	43,570	44,498	44,874	40,465	29,154	29,033
Switzerland	6,935	6,988	8,010	9,429	10,082	11,601	13,120	15,232	11,853	12,938	15,389	14,051	14,895	15,175	14,790	14,391
Turkey	9,403	10,127	12,781	17,224	20,254	26,013	34,482	44,120	29,478	28,933	37,541	39,606	41,191	38,507	35,150	36,459
All others	22,544	26,389	30,940	39,034	46,196	56,230	77,250	89,228	68,507	74,119	89,034	89,175	90,117	93,863	95,316	98,818
Middle East	2,124	2,016	1,903	2,311	2,356	2,847	3,845	4,654	2,984	3,575	5,996	5,421	4,537	4,455	4,534	5,047
Israel	4,170	5,677	7,449	9,547	11,254	13,677	16,202	16,685	11,796	15,562	20,955	20,563	22,961	20,950	20,598	21,870
All others	16,250	18,697	21,588	27,176	32,585	39,706	57,202	67,890	53,728	54,982	62,083	63,191	62,618	68,458	70,185	71,901
Africa	15,533	16,491	19,926	25,028	27,737	33,333	43,774	57,145	52,296	54,894	56,871	58,285	64,025	64,212	63,710	64,215
Asia																
China	29,879	36,495	47,307	60,845	59,959	67,435	78,489	90,927	79,400	113,792	134,779	111,667	108,877	113,474	108,028	106,623
India	3,448	3,774	5,102	7,584	10,508	14,728	20,477	26,738	23,298	28,293	34,404	29,869	25,165	24,513	23,807	23,371
Indonesia	3,995	3,869	4,191	5,629	6,748	6,307	7,793	12,797	10,933	15,568	18,729	21,898	20,807	19,646	19,640	20,366
Japan	13,726	13,172	15,668	19,706	22,847	26,229	30,032	33,061	23,735	30,092	35,972	36,567	36,172	38,380	36,682	36,243
Malaysia	5,587	4,907	5,079	6,358	7,183	8,300	9,889	10,784	8,689	11,507	13,220	14,375	14,654	14,756	14,809	14,970
Philippines	2,491	2,222	2,433	2,778	3,020	3,261	3,757	4,290	3,455	4,956	5,366	6,196	6,201	6,526	7,101	7,719
Singapore	8,534	8,623	8,577	11,828	12,667	15,329	18,986	21,989	18,221	20,535	22,721	22,946	22,264	22,399	22,327	23,037

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
South Korea	10,360	11,387	14,224	17,916	19,778	23,403	28,082	31,352	25,956	35,958	38,371	37,217	38,223	38,691	38,584	38,121
Taiwan	10,641	10,210	12,003	18,132	16,796	17,201	21,269	20,332	14,746	26,812	24,566	21,479	22,740	21,682	21,890	21,695
Thailand	5,923	6,159	7,556	9,522	10,960	11,428	12,176	14,243	11,030	15,406	18,565	24,706	21,454	20,700	21,127	20,468
Vietnam	1,974	2,631	3,426	3,291	3,664	4,596	7,264	9,097	8,230	10,007	11,769	11,586	14,355	17,250	20,280	23,016
All others	3,382	3,466	4,314	5,635	6,566	7,468	8,351	9,695	8,706	11,135	14,410	14,940	15,862	16,916	18,553	20,449
Australia	6,321	6,997	8,700	11,342	13,122	14,464	16,911	19,419	16,568	18,063	22,957	28,074	23,881	23,859	23,922	23,878
All others	23,915	28,337	32,954	41,360	48,799	57,916	79,608	93,195	70,151	76,287	90,777	90,713	93,509	96,503	97,974	101,010

EU = European Union.

### Note(s)

Data are not available for EU member Luxembourg. China includes Hong Kong. Detail may not add to total because of rounding. See Appendix Table 6-38 for a full list of countries and economies in each region.

### Source(s)

IHS Global Insight, special tabulations (2017) of the World Trade Service database.

*Science and Engineering Indicators 2018*

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

### APPENDIX TABLE 6-42

#### Exports and imports of electrical machinery, by region, country, or economy: 2001–16

(Millions of current dollars)

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Exports																
World	144,492	151,061	173,586	218,856	246,092	285,882	325,334	369,173	310,073	386,535	441,221	457,430	477,254	492,093	477,894	473,770
North America	15,158	14,818	13,691	17,138	19,711	24,119	25,825	28,060	23,158	27,314	30,285	32,581	32,469	33,570	32,987	31,019
Canada	478	481	646	922	1,101	1,298	1,372	1,383	1,191	1,329	1,432	1,472	1,361	1,418	1,422	1,386
Mexico	1,157	2,102	674	912	984	1,309	1,491	1,791	1,439	1,860	2,266	2,669	3,020	3,231	3,247	3,223
United States	13,524	12,235	12,371	15,304	17,626	21,513	22,961	24,885	20,528	24,126	26,587	28,440	28,088	28,920	28,318	26,410
Central and South America	1,987	1,928	2,172	2,600	3,272	4,011	4,775	5,560	4,637	5,050	5,187	5,273	5,353	5,311	5,419	5,650
Brazil	990	935	1,142	1,397	1,894	2,436	2,949	3,193	2,636	2,815	3,047	2,872	2,888	2,802	2,472	2,459
Central America	634	662	747	789	847	986	1,076	1,346	1,071	1,333	1,253	1,368	1,362	1,460	1,450	1,482
All others	362	331	283	414	531	589	750	1,022	930	902	886	1,033	1,103	1,049	1,497	1,709
Europe																
EU	35,150	35,962	42,097	52,175	57,086	67,103	81,447	95,422	76,881	87,451	100,924	99,301	103,501	105,040	91,685	88,152
France	5,005	5,102	5,715	6,844	6,828	7,720	9,166	10,036	8,575	9,589	10,210	9,805	9,801	9,278	8,060	7,649
Germany	11,538	12,337	14,830	18,744	20,738	25,392	30,317	34,779	27,727	33,280	39,407	37,789	39,519	40,148	34,477	32,788
United Kingdom	4,606	4,295	4,835	5,617	5,576	6,240	7,046	7,616	5,831	6,258	7,413	7,802	7,303	7,855	7,420	6,963
All others	14,001	14,228	16,716	20,969	23,944	27,751	34,917	42,990	34,749	38,324	43,893	43,904	46,879	47,758	41,727	40,753



## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Other Europe	7,412	7,413	8,906	11,348	12,087	14,143	17,960	21,804	18,677	20,139	23,438	23,152	24,230	23,849	21,647	22,081
Russia	788	628	694	1,053	1,049	1,332	1,537	2,051	1,461	1,645	2,424	2,577	2,730	2,399	2,375	2,397
Switzerland	4,699	4,592	5,361	6,442	6,850	7,526	8,925	10,320	8,571	9,345	10,585	9,593	9,857	9,803	8,619	9,235
Turkey	806	968	1,362	1,887	2,159	2,892	3,797	4,519	4,224	4,779	5,585	5,593	6,240	6,561	6,269	6,064
All others	1,119	1,225	1,489	1,966	2,029	2,394	3,701	4,914	4,421	4,370	4,844	5,389	5,403	5,086	4,384	4,384
Middle East	1,136	1,121	1,208	1,527	2,177	1,955	3,101	3,690	2,783	3,823	4,151	3,973	4,193	4,557	4,723	4,806
Israel	570	534	599	666	738	916	1,034	1,228	1,126	1,413	1,549	1,869	1,709	1,709	1,747	1,712
All others	566	588	609	861	1,439	1,040	2,067	2,462	1,657	2,411	2,602	2,103	2,484	2,849	2,977	3,094
Africa	847	1,050	1,217	1,575	1,618	2,164	2,639	2,897	2,496	2,906	3,610	3,131	4,980	3,700	3,876	3,840
Asia																
China	31,412	36,704	45,304	58,998	70,057	84,660	99,425	114,355	98,873	131,379	152,667	161,059	174,010	187,071	191,796	196,096
India	955	1,095	1,369	1,674	2,177	3,122	3,824	5,077	4,183	4,708	5,529	5,501	5,734	6,329	6,246	6,191
Indonesia	1,329	1,473	1,698	1,882	2,063	2,478	2,664	2,901	2,521	3,356	3,615	3,682	3,732	3,733	3,707	3,540
Japan	22,986	22,300	25,049	31,207	33,000	35,363	36,433	38,910	31,587	40,945	44,583	44,111	38,906	38,638	35,060	33,587
Malaysia	2,653	2,750	3,136	3,954	4,330	5,075	5,895	5,978	5,254	7,256	8,351	8,965	9,052	9,390	9,173	8,498
Philippines	1,591	1,848	2,061	2,659	3,039	3,450	3,183	3,061	2,486	3,620	4,085	5,868	5,475	5,114	5,208	5,418
Singapore	3,606	3,327	3,429	4,388	4,812	5,558	6,109	7,176	5,691	7,764	8,927	8,829	7,818	7,985	7,689	7,158
South Korea	4,670	5,359	6,998	9,448	10,805	11,577	10,145	11,218	11,403	15,061	18,296	24,259	28,485	26,672	26,346	24,563
Taiwan	7,834	8,085	8,605	10,248	11,201	12,004	11,676	11,983	9,358	12,282	12,667	12,260	12,387	13,157	13,905	13,937

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Thailand	3,437	3,735	4,391	5,145	5,650	6,112	6,472	7,116	6,180	8,095	8,961	9,020	9,661	10,328	10,482	10,575
Vietnam	396	378	483	694	786	835	1,021	1,259	1,496	2,223	2,849	3,513	4,426	4,758	5,277	5,869
All others	177	141	173	196	213	223	314	267	252	652	337	304	356	394	423	455
Australia	687	676	761	968	1,037	1,033	1,148	1,189	986	1,151	1,319	1,323	1,179	1,126	981	1,101
All others	1,070	898	838	1,032	971	894	1,279	1,251	1,172	1,359	1,442	1,328	1,306	1,371	1,263	1,233
Imports																
World	144,492	151,061	173,586	218,856	246,092	285,882	325,334	369,173	310,073	386,535	441,221	457,430	477,254	492,093	477,894	473,770
North America	37,468	38,407	40,925	48,235	55,016	62,650	67,983	71,911	59,420	74,588	82,719	88,906	92,112	98,576	101,759	101,191
Canada	2,656	2,774	3,298	4,005	4,653	5,369	5,924	7,014	5,957	7,494	7,895	8,557	8,898	9,407	8,770	9,064
Mexico	2,384	2,831	2,941	4,015	4,831	5,876	6,847	7,725	6,744	9,373	10,293	11,396	11,863	13,250	13,744	13,371
United States	32,428	32,802	34,686	40,215	45,531	51,405	55,212	57,172	46,719	57,721	64,530	68,953	71,351	75,919	79,245	78,757
Central and South America	7,312	5,792	5,600	7,283	9,146	12,329	14,624	18,955	15,975	21,730	24,352	26,547	26,993	26,264	24,320	22,404
Brazil	2,777	1,939	1,648	2,048	2,562	3,158	4,079	5,641	5,247	7,598	8,928	9,271	9,994	9,292	7,546	6,522
Central America	1,582	1,605	1,553	2,036	2,479	3,640	3,688	4,073	2,965	3,253	3,826	4,020	3,996	4,337	4,514	4,668
All others	2,954	2,248	2,399	3,198	4,105	5,531	6,857	9,241	7,764	10,879	11,598	13,256	13,004	12,636	12,260	11,215
Europe																
EU	28,859	28,984	35,386	45,645	49,863	55,182	63,323	69,016	55,793	69,884	79,717	76,636	83,317	88,701	84,757	85,366
France	3,426	3,432	4,074	5,458	6,145	6,531	7,989	9,028	7,605	9,143	10,286	10,120	12,268	11,503	11,053	11,063
Germany	8,896	8,636	10,694	14,139	15,141	15,792	17,130	18,888	15,547	19,424	23,334	22,359	23,797	25,737	23,646	23,970

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
United Kingdom	5,022	5,154	5,878	7,299	7,122	8,173	9,049	8,887	6,985	9,727	10,778	9,479	9,942	11,269	11,136	11,072
All others	11,515	11,762	14,741	18,750	21,455	24,685	29,154	32,212	25,657	31,590	35,318	34,679	37,309	40,192	38,922	39,261
Other Europe	8,918	9,748	12,497	17,307	20,268	25,350	33,429	40,406	30,045	36,206	44,593	45,245	47,878	45,591	39,817	40,230
Russia	1,838	2,162	3,030	4,293	5,473	7,234	10,434	13,327	8,205	11,002	14,047	15,349	16,128	14,931	10,751	10,675
Switzerland	3,093	3,018	3,523	4,436	4,620	5,298	6,207	6,924	5,550	6,485	7,573	7,293	7,669	8,203	7,941	7,946
Turkey	1,276	1,495	1,990	3,171	3,953	4,814	6,003	7,472	6,622	8,209	9,625	8,965	9,339	8,688	8,546	8,739
All others	2,711	3,072	3,955	5,407	6,223	8,003	10,785	12,683	9,669	10,511	13,349	13,638	14,741	13,769	12,579	12,870
Middle East	6,664	6,950	8,353	10,936	12,378	13,802	19,697	23,658	21,427	22,424	25,814	26,798	28,650	30,706	31,541	31,650
Israel	1,106	903	991	1,163	1,224	1,421	1,584	1,704	1,499	1,720	2,275	2,323	2,303	2,251	2,149	2,279
All others	5,559	6,047	7,362	9,774	11,154	12,382	18,113	21,953	19,928	20,704	23,539	24,475	26,347	28,455	29,392	29,371
Africa	4,527	5,081	5,949	7,583	8,363	10,594	13,243	18,100	17,132	18,501	19,429	20,574	22,353	24,512	23,703	23,007
Asia																
China	11,763	13,491	17,468	22,848	25,735	30,963	33,538	36,387	33,428	44,605	49,844	52,079	55,311	57,087	53,819	51,373
India	1,201	1,237	1,500	2,200	3,022	3,997	5,038	6,894	6,577	8,783	10,749	9,612	9,715	9,762	9,148	8,888
Indonesia	1,049	1,116	1,274	1,843	1,785	1,655	2,117	3,887	3,364	4,980	5,810	6,517	6,070	5,835	5,814	5,672
Japan	9,949	10,201	11,820	13,912	14,985	16,901	17,078	18,562	14,926	18,801	22,728	23,687	22,653	24,089	22,529	21,348
Malaysia	3,008	3,184	3,109	3,801	4,732	5,849	6,011	6,186	5,187	7,200	7,254	8,420	8,156	7,965	7,858	7,822
Philippines	1,743	1,533	1,634	1,768	1,940	2,052	2,112	2,217	1,945	2,526	3,104	3,524	3,163	3,529	3,576	4,134
Singapore	5,171	5,383	5,947	6,907	7,710	9,110	8,996	9,731	7,783	9,953	11,022	11,018	10,784	10,605	10,174	9,683

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
South Korea	5,013	6,102	7,558	9,803	11,401	13,228	13,607	15,034	13,510	15,493	17,656	18,148	20,183	17,389	17,129	17,855
Taiwan	4,070	4,533	5,125	6,988	6,774	7,894	6,549	6,630	4,686	6,966	7,856	7,007	6,722	7,006	6,849	7,117
Thailand	2,802	2,687	3,063	3,955	4,307	4,561	5,350	6,034	5,184	7,017	7,858	9,827	8,811	8,738	8,867	8,912
Vietnam	489	581	818	973	1,031	1,348	1,998	2,575	2,503	3,526	4,871	6,130	7,762	8,731	9,880	10,248
All others	840	1,035	1,098	1,467	1,721	2,213	2,572	3,306	3,105	3,818	4,575	4,863	5,339	6,350	6,612	7,042
Australia	2,339	2,636	3,233	4,070	4,526	4,870	5,796	7,072	6,421	7,317	8,695	9,618	9,230	8,460	7,738	7,735
All others	1,305	2,380	1,227	1,332	1,387	1,334	2,273	2,611	1,660	2,216	2,574	2,273	2,051	2,196	2,003	2,091

EU = European Union.

### Note(s)

Data are not available for EU member Luxembourg. China includes Hong Kong. Detail may not add to total because of rounding. See Appendix Table 6-38 for a full list of countries and economies in each region.

### Source(s)

IHS Global Insight, special tabulations (2017) of the World Trade Service database.

*Science and Engineering Indicators 2018*

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

### APPENDIX TABLE 6-43

#### Exports and imports of railroad equipment and other transportation products, by region, country, or economy: 2001–16

(Millions of current dollars)

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Exports																
World	5,956	6,402	7,990	10,543	13,106	14,680	18,754	22,000	17,870	21,324	27,312	31,148	26,971	26,260	25,144	24,470
North America	672	595	749	831	1,318	1,621	1,854	2,441	2,066	2,004	1,774	2,330	2,483	2,149	2,007	1,606
Canada	108	80	114	66	125	191	331	418	282	319	97	110	68	63	65	63
Mexico	14	10	12	12	13	13	25	45	162	145	74	80	67	44	42	42
United States	550	505	623	753	1,180	1,417	1,498	1,978	1,622	1,541	1,603	2,140	2,348	2,043	1,900	1,502
Central and South America	69	61	84	121	347	358	431	369	265	680	463	222	296	234	275	282
Brazil	54	49	64	99	310	303	377	283	224	620	362	117	212	146	151	141
Central America	3	2	3	2	4	14	11	11	13	14	23	33	21	20	22	23
All others	12	10	16	20	33	41	43	75	29	46	79	72	63	68	102	118
Europe																
EU	2,327	2,564	3,137	3,545	3,728	4,251	6,072	6,412	6,989	7,177	7,748	7,928	7,841	8,371	6,841	6,579
France	438	479	488	394	426	607	1,310	937	736	759	625	594	866	780	800	724
Germany	827	887	1,055	1,429	1,283	1,555	1,775	2,099	2,203	2,413	2,576	2,690	2,483	2,528	2,102	2,021
United Kingdom	133	107	193	176	149	166	211	234	247	248	240	236	248	277	252	235
All others	928	1,091	1,402	1,546	1,870	1,923	2,776	3,142	3,803	3,757	4,306	4,408	4,244	4,785	3,688	3,598

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Other Europe	765	989	1,644	2,363	2,508	2,674	3,819	5,442	2,986	4,170	7,055	8,333	5,897	3,934	3,380	3,565
Russia	208	271	470	619	615	687	856	1,342	604	742	1,496	1,846	896	773	863	840
Switzerland	285	285	378	504	627	566	651	834	1,122	687	1,173	1,412	1,796	1,635	1,317	1,530
Turkey	43	50	76	85	98	101	171	136	152	114	253	270	323	293	282	273
All others	229	383	720	1,155	1,168	1,320	2,142	3,129	1,109	2,627	4,132	4,805	2,882	1,233	917	923
Middle East	23	38	45	50	79	95	128	130	73	114	261	252	263	250	283	303
Israel	10	13	17	20	20	20	24	17	13	16	17	27	23	28	29	31
All others	13	25	28	31	59	75	105	113	60	98	244	226	240	223	254	272
Africa	102	123	141	367	303	259	282	252	195	217	299	415	410	396	368	403
Asia																
China	789	903	1,173	1,711	2,536	3,257	4,070	4,092	2,786	4,458	7,205	8,919	7,228	8,325	9,301	9,284
India	62	50	54	77	95	144	152	168	111	131	205	238	272	215	203	204
Indonesia	17	35	31	38	60	51	38	22	13	14	25	30	18	31	30	32
Japan	563	481	410	852	1,507	1,007	802	1,034	1,128	849	816	870	885	790	805	645
Malaysia	64	60	52	57	58	96	179	390	180	130	147	134	135	143	88	87
Philippines	3	5	6	6	6	7	9	7	5	6	7	10	7	6	7	6
Singapore	28	22	25	46	53	81	79	188	195	121	82	74	69	138	148	144
South Korea	195	286	255	244	207	422	475	627	394	845	734	899	542	650	755	649
Taiwan	140	104	97	115	122	120	137	113	91	132	137	141	157	166	183	194

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Thailand	16	14	14	22	31	53	58	73	46	54	61	53	66	68	72	76
Vietnam	2	4	5	7	7	9	13	23	29	38	81	31	37	42	58	63
All others	6	4	3	4	35	38	30	43	17	15	10	10	20	18	17	17
Australia	37	37	35	48	60	88	75	91	80	124	149	200	144	144	121	126
All others	77	27	30	39	46	48	53	81	219	46	53	59	199	192	205	207
Imports																
World	5,956	6,402	7,990	10,543	13,106	14,680	18,754	22,000	17,870	21,324	27,312	31,148	26,971	26,260	25,144	24,470
North America	974	1,013	1,026	1,342	1,842	2,080	2,331	2,172	1,646	2,077	2,779	3,251	2,522	3,019	3,399	2,921
Canada	134	78	115	148	210	313	318	289	185	199	357	505	321	354	362	389
Mexico	17	30	31	138	307	138	304	141	161	106	266	436	227	237	284	283
United States	822	905	880	1,056	1,325	1,629	1,708	1,742	1,300	1,772	2,156	2,311	1,974	2,428	2,753	2,250
Central and South America	524	416	517	561	1,245	1,289	1,759	1,527	1,182	1,826	2,129	3,408	2,890	2,875	3,286	2,885
Brazil	116	97	53	166	267	291	324	595	386	694	617	1,207	780	965	1,205	933
Central America	144	107	208	188	317	415	448	458	245	608	584	848	806	598	685	753
All others	264	213	256	206	662	583	987	474	551	525	928	1,354	1,304	1,313	1,396	1,198
Europe																
EU	1,002	899	1,602	1,825	1,966	2,092	3,077	3,186	2,676	2,669	3,312	3,736	3,807	3,689	3,120	3,384
France	86	66	110	135	189	213	332	282	221	214	327	328	301	302	267	287
Germany	277	257	358	425	617	637	589	589	590	593	649	901	1,121	1,119	975	1,021

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
United Kingdom	156	164	274	307	361	386	496	426	499	282	394	313	285	441	342	412
All others	483	412	860	957	798	857	1,660	1,890	1,365	1,580	1,943	2,193	2,100	1,827	1,536	1,663
Other Europe	892	1,248	1,817	2,897	2,901	3,361	4,673	6,689	4,682	5,703	8,915	10,419	7,929	5,854	4,588	4,567
Russia	165	352	395	739	823	1,004	1,770	2,581	972	2,318	3,808	3,633	3,359	2,049	998	998
Switzerland	258	303	460	830	769	811	835	826	1,106	822	988	803	663	854	907	848
Turkey	94	56	150	178	188	189	309	556	1,012	724	816	538	835	775	739	741
All others	375	537	812	1,150	1,121	1,358	1,759	2,725	1,592	1,839	3,304	5,444	3,072	2,175	1,944	1,980
Middle East	373	559	425	829	1,007	920	1,061	1,474	982	1,273	1,926	1,398	1,194	1,673	1,664	1,849
Israel	174	179	76	217	188	327	342	394	81	70	290	368	169	255	260	279
All others	199	380	349	612	819	593	719	1,080	901	1,203	1,636	1,029	1,025	1,418	1,403	1,570
Africa	240	233	317	469	516	725	1,113	1,494	1,771	1,466	1,331	1,876	1,501	2,102	2,158	1,990
Asia																
China	458	606	524	462	535	1,366	1,595	1,308	1,396	2,162	2,018	1,276	1,139	1,779	1,625	1,550
India	27	65	129	122	161	176	259	343	573	481	362	460	414	475	489	453
Indonesia	31	25	22	29	37	73	50	94	80	102	166	187	464	189	228	165
Japan	261	229	255	316	396	444	451	498	445	434	475	527	474	495	542	582
Malaysia	125	76	66	100	87	111	112	327	450	373	255	810	124	161	414	432
Philippines	27	57	96	10	15	126	15	32	44	25	18	28	18	21	26	30
Singapore	179	111	97	150	104	177	210	310	165	127	565	235	297	499	521	538



## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
South Korea	240	161	135	150	167	165	249	350	273	341	441	328	382	306	303	327
Taiwan	226	213	241	464	1,358	713	593	505	137	343	526	297	759	736	777	843
Thailand	56	31	112	98	86	83	120	266	103	134	98	199	280	167	188	194
Vietnam	15	45	14	41	14	41	138	35	51	48	77	54	41	57	69	77
All others	98	73	113	151	115	176	171	219	162	273	325	464	439	244	284	302
Australia	185	302	424	468	472	478	698	1,047	905	1,288	1,191	1,923	1,983	1,525	1,134	991
All others	24	40	58	61	82	84	79	122	145	178	403	273	314	394	331	392

EU = European Union.

### Note(s)

Data are not available for EU member Luxembourg. China includes Hong Kong. Detail may not add to total because of rounding. See Appendix Table 6-38 for a full list of countries and economies in each region.

### Source(s)

IHS Global Insight, special tabulations (2017) of the World Trade Service database.

*Science and Engineering Indicators 2018*

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

APPENDIX TABLE 6-44

### Later-stage sustainable energy investment in all technologies and solar, by region, country, or economy: 2006–16

(Millions of current dollars)

Region, country, or economy	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
All technologies											
World	104,711	151,151	167,225	170,494	235,953	276,812	252,172	232,771	279,554	311,806	252,145
United States	27,086	37,813	30,835	22,421	34,036	48,596	39,708	34,471	39,712	50,608	46,424
EU	43,982	64,304	78,673	77,096	107,702	118,739	83,501	53,299	58,835	55,725	63,566
France	4,971	3,277	4,596	3,012	4,799	8,769	5,543	3,572	5,808	2,240	2,714
Germany	14,332	16,262	18,129	24,359	36,806	32,228	23,010	14,532	15,390	14,615	12,271
Italy	1,544	3,455	7,626	7,662	23,861	31,259	15,176	3,682	1,349	1,630	1,936
Spain	9,863	23,311	22,527	9,809	8,137	9,715	2,760	1,092	696	-31	659
United Kingdom	4,902	5,855	4,892	10,785	9,360	11,803	10,464	14,207	16,508	24,349	25,024
All others	8,371	12,144	20,904	21,469	24,740	24,965	26,547	16,213	19,085	12,922	20,962
Selected Asia											
China	9,649	15,420	23,904	37,296	42,945	46,989	60,417	64,660	89,793	116,880	83,530
India	4,913	6,552	5,262	4,031	8,868	13,379	7,848	6,392	8,290	9,105	9,261
Japan	3,215	2,691	3,090	5,175	7,590	10,341	17,571	31,061	36,668	33,715	16,479
Other selected countries											
Brazil	5,047	8,904	10,995	7,147	6,740	10,066	7,947	3,922	7,833	6,945	6,649
Mexico	338	332	893	471	3,004	597	3,233	2,434	2,121	4,519	1,952
South Africa	12	122	19	128	91	277	5,668	5,017	1,361	4,297	919
ROW	10,468	15,014	13,556	16,728	24,978	27,827	26,279	31,517	34,941	30,012	23,365
Solar											
World	17,931	33,336	52,905	58,233	97,250	147,617	134,605	113,659	137,871	164,851	107,876
United States	2,749	5,410	7,764	6,702	8,778	29,265	18,265	15,829	23,095	32,771	27,125
EU	10,272	21,683	38,398	37,948	67,120	79,270	55,607	21,778	16,462	11,378	7,184
France	103	385	873	1,005	2,656	7,346	4,340	1,671	3,336	857	676

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Germany	6,385	10,049	13,825	18,325	28,212	21,272	19,327	4,791	3,201	2,136	1,562
Italy	159	835	3,586	5,417	20,559	29,549	13,873	3,019	915	671	677
Spain	3,281	9,133	17,522	6,995	5,145	7,508	1,703	793	54	-386	159
United Kingdom	118	468	35	149	340	4,629	4,156	4,342	6,993	6,007	1,708
All others	227	813	2,557	6,057	10,207	8,966	12,209	7,162	1,964	2,092	2,403
Selected Asia											
China	23	220	914	3,084	5,153	12,546	23,604	27,422	40,005	60,188	38,607
India	37	101	64	149	625	5,792	2,702	1,492	2,993	5,093	5,444
Japan	1,932	1,373	1,463	3,715	6,627	8,612	16,592	29,487	33,771	30,605	11,917
Other selected countries											
Australia	112	163	237	699	2,454	4,890	3,412	2,419	1,963	1,498	1,601
Brazil	16	16	16	6	11	13	54	47	20	562	985
Mexico	8	7	8	40	17	71	65	170	231	284	265
South Africa	0	0	0	17	22	35	4,133	3,221	1,218	2,695	918
ROW	2,781	4,363	4,041	5,876	6,444	7,122	10,171	11,795	18,112	19,777	13,830

EU = European Union; ROW = rest of world.

### Note(s)

Later stage investment consists of asset finance, public markets, small-scale distributed solar, and re-invested equity. All technologies include biofuels, biomass and waste, energy smart, geothermal, low carbon services, marine, small hydropower, solar, and wind. China includes Hong Kong.

### Source(s)

Bloomberg New Energy Finance, special tabulations (2017).

*Science and Engineering Indicators 2018*

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

APPENDIX TABLE 6-45

### Later-stage sustainable energy investment in wind and energy smart technologies, by region, country, or economy: 2004–16

(Millions of current dollars)

Region, country, or economy	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Wind											
World	38,028	59,560	71,823	76,951	98,713	82,293	82,342	86,610	106,804	122,466	110,729
United States	8,523	12,500	17,490	9,385	18,461	10,619	14,320	12,825	11,185	13,767	15,123
EU	21,911	31,988	32,307	30,889	33,131	28,526	21,346	24,806	35,304	38,552	46,621
France	2,710	2,082	3,241	1,917	1,720	1,059	1,118	1,119	2,155	1,295	1,426
Germany	4,921	4,521	3,418	5,258	7,860	10,350	3,507	9,514	12,026	12,307	10,548
Italy	1,237	1,780	3,738	1,625	1,811	1,049	1,117	393	224	547	947
Spain	5,637	12,835	4,236	2,453	2,807	1,781	635	28	312	0	132
United Kingdom	2,144	3,111	2,632	9,541	7,476	2,673	4,140	5,845	6,278	15,168	19,432
All others	5,262	7,658	15,042	10,097	11,457	11,613	10,829	7,907	14,309	9,235	14,137
Selected Asia											
China	4,112	7,477	17,458	29,079	29,674	25,981	27,395	29,160	40,756	50,388	34,770
India	1,532	3,735	2,045	1,799	5,998	5,721	4,043	3,595	4,603	3,786	3,598
Japan	521	648	662	1,215	94	450	557	688	231	295	758
Other selected countries											
Brazil	112	478	992	1,506	1,685	5,068	3,768	2,874	5,856	5,300	5,362
Mexico	0	143	857	206	2,573	489	2,876	1,832	1,682	4,093	1,283
South Africa	12	0	0	17	25	173	1,534	1,699	125	1,602	0
ROW	1,305	2,591	13	2,855	7,071	5,265	6,503	9,130	7,061	4,683	3,215
Energy smart											
World	980	2,795	2,337	6,144	9,117	9,983	9,821	9,839	12,591	11,614	21,270
United States	288	2,080	1,579	3,997	4,306	3,931	3,439	3,178	4,483	2,839	3,742
EU	417	361	150	1,207	593	875	841	1,293	1,487	2,264	4,928
France	8	0	8	0	31	118	0	18	66	45	437

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Germany	3	78	1	16	60	61	11	211	81	167	102
Italy	0	0	0	194	131	117	73	119	163	412	312
Spain	0	0	0	49	37	113	232	271	313	355	368
United Kingdom	405	264	141	81	115	147	153	212	355	464	1,205
All others	0	19	0	867	218	320	372	461	509	822	2,503
Selected Asia											
China	12	189	213	475	3,026	2,736	3,649	2,961	3,782	2,559	7,222
India	0	0	0	0	1	1	3	3	6	16	15
Japan	179	123	12	91	309	928	262	621	1,113	1,990	3,500
Other selected countries											
Brazil	0	0	58	56	78	71	89	81	74	68	77
Mexico	0	0	0	0	17	18	13	0	2	141	404
South Africa	0	0	0	17	22	22	0	0	0	0	0
ROW	84	42	325	301	766	1,401	1,526	1,703	1,645	1,738	1,383

EU = European Union; ROW = rest of world.

### Note(s)

Later-stage investment consists of asset finance, public markets, small-scale distributed solar, and re-invested equity. China includes Hong Kong.

### Source(s)

Bloomberg New Energy Finance.

*Science and Engineering Indicators 2018*

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

APPENDIX TABLE 6-46

### Government RD&D in sustainable energy technologies, by region, country, or economy: 2005–14

(Millions of dollars)

Region, country, or economy	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
World	8,567	8,871	9,871	10,120	16,152	14,385	13,992	13,763	12,568	12,031
Australia	90	91	99	108	171	332	382	527	675	166
Canada	376	432	422	440	706	789	652	739	740	563
EU	2,108	2,448	2,816	2,929	3,839	4,550	4,620	4,491	4,264	3,588
Austria	41	49	37	75	101	138	135	132	130	157
Belgium	0	0	110	0	0	67	172	237	210	182
Czech Republic	5	5	3	34	37	30	46	46	43	38
Denmark	72	89	112	101	119	191	181	156	167	163
Estonia	0	0	0	0	0	0	8	2	2	2
Finland	80	116	165	181	217	289	257	248	234	221
France	817	866	893	938	1,058	941	1,125	1,112	1,064	1,021
Germany	350	353	363	426	672	706	796	790	882	861
Greece	12	12	0	0	0	5	4	0	0	0
Hungary	46	57	72	103	99	101	104	98	0	0
Ireland	10	26	40	59	58	41	20	37	22	0
Italy	282	393	378	413	389	365	475	492	434	0

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Luxembourg	0	0	0	0	0	0	30	80	0	0
Netherlands	138	146	236	154	228	393	157	195	189	120
Poland	0	0	0	3	86	112	126	84	81	69
Portugal	2	2	2	2	4	2	1	3	10	9
Slovakia	0	0	0	13	15	16	27	27	23	21
Spain	53	62	80	93	152	148	288	172	75	102
Sweden	62	96	100	104	167	173	146	139	161	168
United Kingdom	137	178	225	229	439	832	521	441	535	453
Japan	3,016	3,024	2,956	2,977	2,845	2,767	2,988	3,117	2,356	2,685
New Zealand	9	10	12	21	22	21	16	12	12	13
Norway	46	54	59	53	293	418	355	296	235	423
South Korea	347	455	487	385	440	493	486	536	526	502
Switzerland	146	150	149	179	192	176	211	223	228	287
Turkey	2	4	5	3	4	0	0	0	0	47
United States	2,427	2,202	2,865	3,026	7,638	4,839	4,282	3,820	3,532	3,758

EU = European Union; RD&D = research, development, and demonstration.

### Note(s)

Sustainable energy technologies include renewables (solar, wind, biofuels, ocean energy, and hydropower), nuclear, hydrogen and fuel cells, CO<sub>2</sub> capture and storage, other power and storage, and energy efficiency.

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

### Source(s)

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International Energy Agency, Statistics and Balances, <https://www.iea.org/stats/index.asp>, accessed 15 August 2015.

*Science and Engineering Indicators 2018*



## CHAPTER 6 | Industry, Technology, and the Global Marketplace

APPENDIX TABLE 6-47

### Government RD&D in nuclear energy, by region, country, or economy: 2005–14

(Millions of dollars)

Region, country, or economy	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
World	4,564	4,384	4,629	4,543	4,513	4,543	4,366	4,152	3,319	3,517
Australia	21	16	14	22	2	2	5	9	7	6
Canada	208	205	219	183	286	283	107	83	77	99
EU	1,001	1,023	1,044	1,005	1,051	1,086	1,124	1,263	1,227	1,004
Austria	4	5	4	6	4	4	3	3	3	2
Belgium	0	0	55	0	0	67	81	93	111	75
Czech Republic	3	3	2	15	15	14	16	20	23	23
Denmark	2	2	3	0	0	3	2	6	3	3
Estonia	0	0	0	0	0	0	0	0	0	0
Finland	13	20	15	14	17	19	23	18	17	17
France	612	602	574	554	529	481	539	610	573	535
Germany	174	178	176	194	259	244	263	244	250	243
Greece	0	0	0	0	0	0	0	0	0	0
Hungary	1	1	0	0	0	0	0	0	0	0
Ireland	1	1	1	1	1	0	0	0	0	0
Italy	103	111	107	90	100	95	88	109	109	0

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Luxembourg	0	0	0	0	0	0	0	0	0	0
Netherlands	19	19	24	20	15	21	16	12	9	9
Poland	0	0	0	1	3	5	6	7	7	4
Portugal	1	1	1	1	3	0	0	0	0	0
Slovakia	0	0	0	6	6	6	6	7	4	2
Spain	19	21	27	27	30	0	1	28	24	2
Sweden	7	7	6	8	10	8	4	4	3	3
United Kingdom	42	53	48	68	61	117	74	101	91	86
Japan	2,160	2,075	2,090	2,122	2,096	2,053	1,645	1,810	1,086	1,367
New Zealand	0	0	0	0	0	0	0	0	0	0
Norway	12	11	11	11	12	12	11	11	11	11
South Korea	212	232	241	66	77	83	109	108	97	93
Switzerland	52	54	55	58	56	52	51	53	49	45
Turkey	0	1	0	0	0	0	0	0	0	0
United States	899	767	956	1,078	933	971	1,313	815	765	891

EU = European Union; RD&D = research, development, and demonstration.

### Note(s)

Data for China do not include expenditures on demonstration.

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

### Source(s)

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International Energy Agency, Statistics and Balances, <https://www.iea.org/stats/index.asp>, accessed 15 August 2015.

*Science and Engineering Indicators 2018*

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

APPENDIX TABLE 6-48

### Government RD&D in energy efficiency technology, by region, country, or economy: 2005–14

(Millions of dollars)

Region, country, or economy	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
World	1,461	1,539	1,862	2,085	4,112	3,588	2,976	3,037	3,180	3,276
Australia	30	28	30	36	32	102	75	54	54	22
Canada	60	75	75	76	121	124	112	107	109	111
EU	313	430	605	726	1,154	1,448	1,427	1,385	1,134	977
Austria	13	13	10	29	46	67	76	65	64	70
Belgium	0	0	29	0	0	0	52	89	58	58
Czech Republic	0	0	0	9	10	5	6	4	2	2
Denmark	9	14	17	16	8	30	23	27	39	50
Estonia	0	0	0	0	0	0	0	1	0	0
Finland	33	32	87	91	119	199	140	161	134	150
France	80	102	120	146	176	202	267	227	187	174
Germany	23	26	30	50	123	154	156	181	210	217
Greece	2	2	0	0	0	1	1	0	0	0
Hungary	41	51	66	97	93	95	98	93	0	0
Ireland	5	13	27	28	26	27	3	22	3	0
Italy	31	78	75	109	165	59	105	104	83	0

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Luxembourg	0	0	0	0	0	0	29	67	0	0
Netherlands	45	50	72	51	101	168	55	54	57	39
Poland	0	0	0	0	40	57	54	37	26	22
Portugal	1	0	0	0	0	0	0	1	2	2
Slovakia	0	0	0	1	1	2	1	1	2	5
Spain	4	6	9	11	18	28	54	36	8	19
Sweden	25	36	47	45	78	63	61	70	74	72
United Kingdom	0	6	16	42	147	290	245	147	186	97
Japan	400	413	401	381	303	227	252	279	352	426
New Zealand	2	2	1	1	1	1	1	1	1	2
Norway	4	3	5	5	19	27	25	28	55	229
South Korea	41	72	93	89	94	97	89	107	99	99
Switzerland	25	26	26	31	35	39	50	59	68	75
Turkey	0	0	1	0	0	0	0	0	0	14
United States	585	491	623	740	2,352	1,523	945	1,016	1,309	1,321

EU = European Union; RD&D = research, development, and demonstration.

### Source(s)

International Energy Agency, Statistics and Balances, <https://www.iea.org/stats/index.asp>, accessed 15 August 2015.

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## CHAPTER 6 | Industry, Technology, and the Global Marketplace

### APPENDIX TABLE 6-49

#### Government RD&D in other power and storage technologies, by region, country, or economy: 2005–14

(Millions of dollars)

Region, country, or economy	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
World	446	555	524	555	1,541	867	914	815	805	990
Australia	11	12	12	12	14	11	9	14	18	8
Canada	10	13	14	20	61	55	70	72	91	113
EU	140	204	180	207	224	268	439	409	398	328
Austria	5	5	3	6	8	21	15	27	25	40
Belgium	0	0	6	0	0	0	17	32	20	14
Czech Republic	1	1	0	4	4	4	11	11	9	7
Denmark	1	6	7	7	22	24	33	21	17	17
Estonia	0	0	0	0	0	0	1	1	1	1
Finland	17	21	18	30	25	19	23	25	25	16
France	3	3	14	29	38	25	25	25	35	45
Germany	3	4	4	3	23	33	47	43	79	79
Greece	3	2	0	0	0	1	0	0	0	0
Hungary	0	0	0	0	0	0	0	0	0	0
Ireland	1	2	2	8	12	2	2	4	1	0
Italy	85	131	92	78	18	66	111	115	94	0

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Luxembourg	0	0	0	0	0	0	0	5	0	0
Netherlands	5	8	9	11	14	4	20	22	18	17
Poland	0	0	0	0	13	20	23	15	15	17
Portugal	0	0	0	0	0	0	0	0	0	0
Slovakia	0	0	0	0	0	0	5	5	3	0
Spain	0	0	5	5	11	15	67	14	0	13
Sweden	9	8	8	8	12	12	13	14	17	16
United Kingdom	8	12	11	17	26	21	27	32	40	46
Japan	59	97	114	101	108	121	104	87	45	74
New Zealand	0	3	3	3	5	5	0	0	1	1
Norway	4	4	6	2	15	17	15	15	18	17
South Korea	12	34	28	52	71	75	69	92	105	113
Switzerland	22	19	17	23	24	15	16	16	14	42
Turkey	0	0	0	0	0	0	0	0	0	14
United States	188	169	149	135	1,019	301	191	107	116	281

EU = European Union; RD&D = research, development, and demonstration.

### Source(s)

International Energy Agency, Statistics and Balances, <https://www.iea.org/statistics/topics/rdd/>, accessed 15 August 2015.

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## CHAPTER 6 | Industry, Technology, and the Global Marketplace

### APPENDIX TABLE 6-50

#### Government RD&D in renewable energy, by region, country, or economy: 2005–14

(Billions of dollars)

Region, country, or economy	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
World	1,163	1,256	1,732	1,683	4,103	3,481	3,934	4,104	3,673	3,020
Australia	28	35	43	38	73	76	150	195	387	71
Canada	45	74	65	79	129	129	151	172	103	90
EU	488	570	696	736	1,069	1,343	1,296	1,157	1,226	986
Austria	16	18	19	30	40	41	39	33	34	37
Belgium	0	0	19	0	0	0	20	20	22	30
Czech Republic	1	2	1	6	7	7	11	9	6	6
Denmark	37	39	50	55	66	97	90	73	93	63
Estonia	0	0	0	0	0	0	6	0	1	1
Finland	17	42	44	45	55	52	71	45	58	37
France	53	65	83	106	175	131	176	166	192	198
Germany	116	112	114	146	223	228	290	280	294	284
Greece	7	8	0	0	0	3	2	0	0	0
Hungary	4	5	5	5	5	5	5	5	0	0
Ireland	4	9	10	23	19	11	15	11	18	0
Italy	64	45	66	95	73	116	143	146	129	0



## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Luxembourg	0	0	0	0	0	0	1	4	0	0
Netherlands	50	57	80	55	71	161	62	105	101	54
Poland	0	0	0	1	26	26	30	17	13	17
Portugal	1	0	1	0	1	1	0	2	6	6
Slovakia	0	0	0	4	5	6	16	14	15	14
Spain	30	33	34	41	84	92	157	85	42	61
Sweden	18	42	37	39	63	86	65	46	62	71
United Kingdom	70	92	134	83	156	281	96	95	142	108
Japan	201	220	165	163	105	173	796	693	646	611
New Zealand	4	4	5	15	14	14	12	9	10	10
Norway	6	7	13	15	84	102	77	75	61	79
South Korea	52	72	76	89	128	160	143	168	160	147
Switzerland	37	35	35	47	56	52	66	67	64	89
Turkey	1	2	1	1	2	0	0	0	0	15
United States	301	237	633	500	2,443	1,433	1,244	1,569	1,017	921

EU = European Union; RD&D = research, development, and demonstration.

### Note(s)

Renewable energy consists of solar, wind, ocean, biofuels, hydropower, and geothermal.

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

### Source(s)

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International Energy Agency, Statistics and Balances, <https://www.iea.org/stats/index.asp>, accessed 15 August 2015.

*Science and Engineering Indicators 2018*

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

### APPENDIX TABLE 6-51

#### Government RD&D in solar energy, by region, country, or economy: 2005–14

(Millions of dollars)

Region, country, or economy	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
World	504	485	498	576	978	930	1,129	915	1,033	689
Australia	12	12	12	14	21	19	25	17	21	18
Canada	11	17	19	15	51	44	39	75	203	31
EU	222	203	221	272	308	286	395	358	359	287
Austria	3	2	3	5	10	17	20	14	16	22
Belgium	0	0	11	0	0	0	9	10	8	8
Czech Republic	1	0	0	0	0	0	1	1	1	1
Denmark	5	7	8	8	7	12	13	12	11	10
Estonia	0	0	0	0	0	0	1	0	1	1
Finland	0	1	2	3	9	3	4	8	24	6
France	28	32	41	45	58	54	63	68	74	76
Germany	66	65	57	79	72	77	86	93	83	74
Greece	0	0	0	0	0	0	0	0	0	0
Hungary	0	0	0	0	0	0	0	0	0	0
Ireland	0	1	1	5	3	3	4	2	0	0
Italy	61	40	46	77	40	0	64	50	54	0

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Luxembourg	0	0	0	0	0	0	0	0	0	0
Netherlands	17	14	14	17	33	34	35	33	28	22
Poland	0	0	0	0	6	5	10	6	3	7
Portugal	0	0	0	0	0	0	0	1	3	2
Slovakia	0	0	0	2	2	2	3	3	4	0
Spain	14	17	19	24	34	24	60	36	22	19
Sweden	1	4	4	5	7	9	8	9	12	22
United Kingdom	28	19	14	0	26	45	16	14	16	16
Japan	125	151	3	1	39	78	105	128	108	103
New Zealand	0	1	1	1	1	1	1	1	1	1
Norway	2	2	6	7	18	22	20	15	13	13
South Korea	17	23	21	60	71	70	78	75	62	60
Switzerland	25	22	22	26	30	33	41	39	36	45
Turkey	0	0	0	0	1	0	0	0	0	10
United States	88	54	193	179	440	377	424	207	230	121

EU = European Union; RD&D = research, development, and demonstration.

### Source(s)

International Energy Agency, Statistics and Balances, <https://www.iea.org/stats/index.asp>, accessed 15 February 2015.

*Science and Engineering Indicators 2018*

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

APPENDIX TABLE 6-52

### Government RD&D in wind energy, by region, country, or economy: 2005–14

(Millions of dollars)

Region, country, or economy	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
World	167	165	171	145	402	469	410	392	388	313
Australia	1	3	4	3	1	3	2	0	3	0
Canada	7	8	7	6	7	12	20	15	5	4
EU	91	108	99	84	127	258	208	157	200	163
Austria	0	0	0	1	1	3	1	1	1	1
Belgium	0	0	0	0	0	0	7	3	3	5
Czech Republic	0	0	0	0	0	0	0	0	0	0
Denmark	16	14	20	13	20	43	24	18	30	28
Estonia	0	0	0	0	0	0	3	0	0	0
Finland	1	4	4	8	16	6	13	3	5	2
France	1	2	2	2	1	6	5	6	11	8
Germany	21	13	20	37	34	44	51	45	61	60
Greece	0	0	0	0	0	0	0	0	0	0
Hungary	0	0	0	0	0	0	0	0	0	0
Ireland	2	1	0	1	7	1	1	1	1	0
Italy	0	3	4	4	6	0	8	9	13	0

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Luxembourg	0	0	0	0	0	0	1	0	0	0
Netherlands	6	6	8	7	11	36	12	15	14	5
Poland	0	0	0	0	1	1	1	1	1	1
Portugal	0	0	0	0	0	0	0	0	0	0
Slovakia	0	0	0	1	1	2	1	1	0	0
Spain	10	8	6	7	8	15	42	20	4	18
Sweden	0	3	3	3	6	5	8	6	6	6
United Kingdom	32	54	31	0	16	96	28	26	50	29
Japan	10	8	3	2	7	21	38	50	43	56
New Zealand	0	0	0	0	0	0	0	0	0	0
Norway	2	2	3	2	18	43	21	20	19	34
South Korea	11	17	17	17	36	37	34	46	47	40
Switzerland	1	1	1	2	2	2	3	7	7	4
Turkey	0	0	0	0	0	0	0	0	0	1
United States	44	18	38	30	205	92	83	98	65	10

EU = European Union; RD&D = research, development, and demonstration.

### Source(s)

International Energy Agency, Statistics and Balances, <https://www.iea.org/stats/index.asp>, accessed 15 February 2015.

*Science and Engineering Indicators 2018*

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

### APPENDIX TABLE 6-53

#### Government RD&D in biofuels, by region, country, or economy: 2005–14

(Millions of dollars)

Region, country, or economy	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
World	364	442	734	556	1,874	1,448	1,063	1,185	1,031	980
Australia	1	2	6	5	7	10	97	29	44	5
Canada	22	48	40	46	52	53	61	110	38	28
EU	132	207	324	261	432	434	430	391	394	325
Austria	12	15	15	21	25	18	16	16	10	11
Belgium	0	0	5	0	0	0	4	6	9	12
Czech Republic	1	1	1	5	6	6	7	5	3	2
Denmark	14	17	20	28	28	31	51	33	41	21
Estonia	0	0	0	0	0	0	1	0	0	0
Finland	14	37	38	32	25	39	52	28	25	23
France	13	26	34	51	103	60	83	70	93	101
Germany	13	16	19	21	33	35	48	39	39	38
Greece	0	0	0	0	0	0	0	0	0	0
Hungary	4	5	5	5	5	5	5	5	0	0
Ireland	1	5	8	15	5	4	4	2	3	0
Italy	3	3	14	14	20	14	30	34	25	0

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Luxembourg	0	0	0	0	0	0	0	4	0	0
Netherlands	28	37	58	30	26	76	9	54	48	23
Poland	0	0	0	0	11	9	10	7	7	7
Portugal	1	0	0	0	0	0	0	1	3	3
Slovakia	0	0	0	1	1	1	8	7	2	9
Spain	5	6	7	7	37	28	31	19	9	11
Sweden	15	32	26	27	46	60	39	28	40	36
United Kingdom	8	8	74	3	61	47	34	32	39	28
Japan	66	59	20	16	50	56	66	61	45	49
New Zealand	1	1	1	6	5	5	4	4	4	4
Norway	1	2	3	3	10	12	13	12	11	12
South Korea	4	8	7	5	8	12	11	19	16	15
Switzerland	6	5	7	9	10	6	10	10	9	17
Turkey	1	1	0	1	1	0	0	0	0	1
United States	130	110	328	203	1,299	860	370	549	470	524

EU = European Union; RD&D = research, development, and demonstration.

### Source(s)

International Energy Agency, Statistics and Balances, <https://www.iea.org/stats/index.asp>, accessed 15 February 2015.

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## CHAPTER 6 | Industry, Technology, and the Global Marketplace

APPENDIX TABLE 6-54

### Government RD&D in carbon capture and storage, by region, country, or economy: 2005–14

(Millions of dollars)

Region, country, or economy	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
World	142	255	267	357	1,041	1,095	1,104	1,164	1,103	753
Australia	0	0	0	0	49	140	141	255	209	55
Canada	12	13	15	19	60	152	172	284	347	139
EU	41	39	81	61	161	192	131	121	122	152
Austria	0	0	0	1	0	1	1	1	0	0
Belgium	0	0	0	0	0	0	0	3	0	1
Czech Republic	0	0	0	0	1	1	0	1	1	1
Denmark	1	2	1	1	4	0	0	0	0	0
Estonia	0	0	0	0	0	0	1	0	0	0
Finland	0	0	0	0	0	0	0	0	0	0
France	12	31	33	36	78	49	61	44	37	28
Germany	5	0	0	4	16	15	7	20	19	12
Greece	0	0	0	0	0	0	0	0	0	0
Hungary	0	0	0	0	0	0	0	0	0	0
Ireland	0	0	0	0	0	0	0	0	0	0
Italy	0	1	3	10	13	0	0	0	6	0

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Luxembourg	0	0	0	0	0	0	0	0	0	0
Netherlands	10	4	42	7	15	33	4	3	2	0
Poland	0	0	0	0	2	2	5	0	14	8
Portugal	0	0	0	0	0	0	0	0	1	1
Slovakia	0	0	0	0	0	0	0	0	0	0
Spain	0	0	1	3	5	0	0	2	0	2
Sweden	0	0	0	0	0	0	1	1	2	2
United Kingdom	13	0	0	1	28	89	51	45	41	97
Japan	0	21	11	31	103	90	104	130	129	102
New Zealand	0	0	1	1	1	0	0	0	0	0
Norway	9	17	13	13	150	246	212	160	84	79
South Korea	4	4	6	15	16	27	30	25	32	23
Switzerland	0	1	1	2	4	2	2	1	3	5
Turkey	0	0	0	0	0	0	0	0	0	0
United States	76	159	139	215	497	246	311	189	177	198

EU = European Union; RD&D = research, development, and demonstration.

### Source(s)

International Energy Agency, Statistics and Balances, <https://www.iea.org/stats/index.asp>, accessed 15 August 2015.

*Science and Engineering Indicators 2018*

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

APPENDIX TABLE 6-55

### Government RD&D in hydrogen and fuel cells, by region, country, or economy: 2005–14

(Millions of dollars)

Region, country, or economy	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
World	792	881	858	897	842	811	699	491	488	475
Australia	0	0	1	0	1	2	2	0	1	3
Canada	40	52	36	63	48	46	41	21	14	11
EU	126	181	210	195	180	213	204	157	156	141
Austria	2	8	1	3	3	4	3	4	4	9
Belgium	0	0	1	0	0	0	2	0	0	4
Czech Republic	0	0	0	0	0	0	1	1	2	1
Denmark	22	25	35	22	19	38	34	28	15	30
Estonia	0	0	0	0	0	0	1	0	0	0
Finland	0	0	0	0	0	0	0	0	0	0
France	56	62	69	67	61	53	57	40	41	42
Germany	28	32	39	30	29	31	33	22	31	25
Greece	0	0	0	0	0	1	1	0	0	0
Hungary	0	0	0	0	0	0	0	0	0	0
Ireland	0	0	0	0	0	1	0	0	0	0
Italy	0	25	34	30	20	29	27	18	14	0

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Luxembourg	0	0	0	0	0	0	0	3	0	0
Netherlands	9	8	9	10	13	5	0	0	2	0
Poland	0	0	0	1	3	2	7	6	6	2
Portugal	0	0	0	0	0	0	0	0	1	1
Slovak Republic	0	0	0	1	1	2	0	0	0	0
Spain	0	3	4	7	5	12	9	7	1	5
Sweden	3	3	2	4	3	3	2	4	3	4
United Kingdom	5	13	17	19	21	33	27	22	35	19
Japan	197	198	174	180	130	103	87	119	98	105
New Zealand	2	2	2	1	1	1	1	1	0	0
Norway	11	11	11	7	14	14	14	8	7	7
South Korea	26	41	43	74	55	50	46	35	34	27
Switzerland	10	16	15	17	17	17	26	26	28	32
Turkey	1	2	3	1	1	0	0	0	0	4
United States	379	379	365	358	394	364	278	125	149	146

EU = European Union; RD&D = research, development, and demonstration.

### Source(s)

International Energy Agency, Statistics and Balances, <https://www.iea.org/stats/index.asp>, accessed 15 August 2015.

*Science and Engineering Indicators 2018*

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

APPENDIX TABLE 6-56

## USPTO patents granted in sustainable energy technologies, by region, country, or economy: 1998–2016

(Number)

Region, country, or economy	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
World	3,698	3,717	3,701	4,116	4,129	4,207	4,056	3,521	3,866	3,806	3,904	4,496	6,598	7,355	9,060	10,152	11,428	11,424	11,011
North America	2,036	2,057	2,005	2,206	2,100	2,140	2,079	1,813	2,078	1,962	2,018	2,304	3,215	3,630	4,423	4,924	5,293	4,997	4,941
Canada	103	126	128	123	136	128	150	138	126	123	131	116	158	173	226	217	224	245	207
Mexico	3	0	1	4	7	2	2	2	1	1	6	0	7	3	8	16	10	6	7
Puerto Rico	0	0	1	0	0	2	0	1	0	1	1	1	1	1	3	2	4	0	2
United States	1,931	1,931	1,875	2,080	1,957	2,008	1,928	1,672	1,950	1,837	1,880	2,187	3,049	3,453	4,187	4,689	5,055	4,746	4,725
Central and South America	5	10	1	8	7	8	8	5	4	5	6	9	7	27	23	23	28	25	29
Argentina	0	1	1	1	1	4	0	0	0	0	0	0	1	3	4	2	1	3	1
Brazil	3	2	0	2	4	3	4	3	2	3	3	3	4	16	10	14	14	7	16
All others	1	7	0	5	3	1	4	2	2	3	4	6	1	8	10	7	12	15	12
Europe	667	694	664	752	741	729	665	605	556	618	644	677	1,083	1,166	1,469	1,789	2,084	2,027	1,933
EU	608	636	615	677	703	690	618	548	510	582	598	629	1,021	1,096	1,382	1,658	1,970	1,909	1,797
Austria	11	13	8	11	14	11	13	17	14	19	12	16	18	15	31	28	29	45	41
Belgium	6	6	8	10	14	9	9	7	13	8	6	13	16	16	15	33	34	31	41
Denmark	13	13	11	22	15	23	18	20	8	21	28	27	58	103	133	118	172	154	156
Finland	12	15	12	19	14	20	14	13	14	17	16	15	17	16	25	24	46	37	34

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
France	109	96	110	104	114	97	78	71	62	91	78	94	151	161	158	237	279	241	285
Germany	280	293	306	326	313	335	304	264	249	257	278	308	484	477	603	726	779	787	654
Hungary	2	1	1	0	2	2	0	2	0	0	2	0	5	1	2	4	7	6	4
Ireland	0	1	2	0	1	2	1	4	3	1	3	3	3	4	6	7	14	9	17
Italy	29	24	29	25	38	30	35	26	29	23	34	28	45	47	65	77	87	108	84
Netherlands	25	41	22	28	34	31	25	18	9	23	23	22	34	51	58	60	88	71	50
Spain	5	5	10	5	8	10	11	10	6	12	8	13	21	30	40	54	63	75	66
Sweden	36	53	38	54	64	37	38	31	32	30	33	20	51	47	71	88	119	101	103
United Kingdom	76	73	51	68	66	73	66	61	68	73	69	64	93	109	142	169	225	217	232
All others	4	3	6	7	4	10	7	6	2	8	8	4	25	18	31	33	29	28	30
Other Europe	60	58	49	74	38	39	47	56	45	36	46	48	62	70	87	131	114	118	136
Former Soviet Union	2	2	1	1	2	2	1	2	1	3	0	2	0	2	2	3	1	1	4
Norway	6	11	8	13	3	8	10	15	9	8	11	8	17	13	16	30	25	30	37
Russia	9	11	6	16	13	8	7	11	5	6	14	10	14	13	13	23	16	11	14
Switzerland	40	31	34	43	18	21	27	29	29	18	21	27	30	40	51	71	69	71	78
All others	3	3	1	1	1	0	1	0	1	1	0	2	1	2	5	5	3	5	4
Asia	941	906	984	1,104	1,233	1,273	1,248	1,053	1,172	1,179	1,188	1,449	2,211	2,429	3,016	3,251	3,831	4,158	3,897
China	10	6	12	9	10	15	15	14	24	26	27	47	87	98	171	191	248	295	311
India	1	1	5	7	8	10	7	12	5	16	8	13	21	37	52	46	61	87	79

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Japan	813	797	882	941	1064	1,087	1,061	882	966	910	915	1,042	1,511	1,645	2,039	2,033	2,304	2,387	2,237
Malaysia	1	0	2	2	0	0	3	0	1	2	0	1	2	2	5	4	6	5	8
Singapore	1	1	1	4	3	3	5	2	2	5	6	5	8	7	16	10	19	26	27
South Korea	67	58	46	91	94	93	94	84	101	145	160	241	442	473	537	725	950	1096	1014
Taiwan	44	40	35	46	52	63	61	57	72	74	70	96	132	161	194	234	235	250	217
All others	4	3	1	4	2	3	3	2	2	1	1	3	8	4	1	8	9	11	5
Middle East	21	17	18	21	20	29	26	19	19	14	20	26	41	48	74	103	111	134	144
Israel	21	14	14	19	16	28	23	15	18	10	17	23	32	39	52	57	74	75	77
All others	1	3	4	2	3	1	3	3	1	4	3	4	9	9	23	45	37	59	66
Africa	2	6	7	9	4	1	4	4	12	6	4	4	10	8	7	11	14	7	10
South Africa	2	6	7	9	3	1	3	4	11	6	4	3	9	8	7	8	12	6	7
All others	0	0	0	0	1	0	1	0	1	1	0	1	1	0	1	3	2	1	3
Australia and Oceania	24	26	20	16	24	26	26	22	24	20	24	26	32	47	47	51	66	74	58
Australia	18	22	17	15	24	23	24	21	23	20	21	22	27	44	40	42	60	67	46
New Zealand	6	4	3	1	0	4	2	1	1	0	3	4	5	3	7	8	7	7	13
Unclassified	2	1	3	1	0	0	0	0	1	0	0	1	0	0	1	1	0	2	0

EU = European Union; USPTO = U.S. Patent and Trademark Office.

**Note(s)**

CHAPTER 6 | Industry, Technology, and the Global Marketplace

Patents are fractionally allocated among regions, countries, or economies based on the proportion of residences of all named inventors. The EU includes 28 member countries. China includes Hong Kong. Sustainable energy technologies include alternative energy, energy storage, smart grid, and pollution mitigation. Alternative energy includes bioenergy, solar, wind, nuclear, fuel cells, hydropower, wave/tidal/ocean, geothermal, and electric/hybrid. Energy storage includes batteries, compressed air, flywheels, superconducting magnet energy systems, ultracapacitors, hydrogen production and storage, and thermal energy. Pollution mitigation includes recycling; control of air, water, and solid waste pollution; environmental remediation; cleaner coal; and capture and storage of carbon and other greenhouse gases. Technologies are based on a classification developed by The Patent Board.

Source(s)

Science-Metrix, PatentsView and USPTO patent data.

*Science and Engineering Indicators 2018*



## CHAPTER 6 | Industry, Technology, and the Global Marketplace

APPENDIX TABLE 6-57

## USPTO patents granted in alternative energy technologies, by region, country, or economy: 1998–2016

(Number)

Region, country, or economy	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
World	975	991	1,051	1,238	1,389	1,420	1,407	1,322	1,459	1,450	1,525	1,835	2,921	3,638	4,781	5,234	6,010	5,873	5,567
North America	482	482	516	610	642	684	681	631	738	713	728	858	1,352	1,740	2,263	2,512	2,715	2,540	2,453
Canada	23	25	32	23	37	49	59	64	55	39	47	41	59	76	85	101	102	127	98
Mexico	1	0	0	1	3	0	1	1	0	0	1	0	2	1	1	8	5	2	4
Puerto Rico	0	0	0	0	0	2	0	0	0	0	1	0	1	1	3	1	3	0	1
United States	458	457	484	586	602	634	621	566	682	674	679	817	1,290	1,661	2,175	2,402	2,605	2,412	2,350
Central and South America	0	4	0	1	0	1	3	2	2	2	0	2	1	8	12	9	14	16	13
Argentina	0	0	0	1	0	0	0	0	0	0	0	0	1	1	2	0	0	2	1
Brazil	0	1	0	0	0	0	1	2	1	2	0	1	0	5	7	6	10	3	6
All others	0	3	0	0	0	1	2	0	1	0	0	1	0	1	3	3	4	12	6
Europe	207	199	198	233	257	262	242	257	221	258	298	305	503	600	854	982	1,177	1,134	1,099
EU	194	181	184	209	245	253	232	236	208	247	279	294	479	575	817	920	1,120	1,087	1,043
Austria	2	5	3	4	2	1	4	4	7	3	5	8	8	8	16	12	16	17	18
Belgium	2	0	0	2	5	4	2	4	5	3	3	5	6	7	7	12	14	15	16
Denmark	5	2	0	2	4	12	11	12	4	15	11	17	43	87	120	98	150	135	136
Finland	3	4	1	2	1	2	2	3	3	1	1	2	2	4	10	12	19	22	19

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
France	53	30	30	26	38	38	29	27	24	40	30	31	58	64	82	117	169	135	170
Germany	97	96	106	120	130	136	131	131	120	122	158	173	257	261	361	418	449	456	373
Hungary	0	1	1	0	1	0	0	0	0	0	0	0	1	1	2	2	4	1	2
Ireland	0	0	1	0	1	0	0	2	0	0	2	1	1	2	3	3	11	2	8
Italy	5	7	6	7	15	9	8	9	10	8	16	11	22	27	38	45	52	63	46
Netherlands	1	4	8	12	8	10	10	6	3	12	13	8	12	22	41	30	43	43	26
Spain	3	0	4	1	4	9	7	7	5	7	3	8	11	22	36	41	47	58	57
Sweden	4	13	9	15	18	13	11	6	10	8	10	6	12	16	19	30	48	37	51
United Kingdom	19	20	13	15	16	19	16	22	16	26	26	23	33	44	64	78	89	96	106
All others	0	0	2	4	1	1	1	1	0	1	3	0	13	8	17	21	10	6	16
Other Europe	13	18	14	24	12	8	11	20	14	11	18	11	24	26	37	62	57	47	56
Former Soviet Union	0	0	0	0	0	1	0	2	0	0	0	1	0	1	1	2	1	1	1
Norway	1	1	4	2	0	1	0	2	2	2	6	2	4	6	5	17	14	11	6
Russia	1	1	1	1	6	2	3	4	1	2	2	2	5	4	5	8	6	5	6
Switzerland	11	16	8	20	5	5	7	13	11	7	10	6	15	13	22	33	34	26	39
All others	0	0	1	0	1	0	1	0	0	0	0	0	0	2	4	2	2	4	4
Asia	270	282	319	378	471	460	463	421	478	468	486	657	1,033	1,244	1,609	1,666	2,023	2,093	1,887
China	1	0	2	3	2	3	4	5	5	7	10	12	27	29	62	81	91	113	128
India	0	0	0	1	1	2	0	3	0	5	1	4	7	25	25	22	22	36	26

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Japan	250	257	297	346	436	423	414	374	421	407	405	493	738	868	1,113	1,093	1,273	1,308	1,114
Malaysia	0	0	1	1	0	0	1	0	0	0	0	0	0	1	2	2	5	2	7
Singapore	0	0	0	1	2	0	0	0	0	0	2	3	5	6	13	8	15	18	17
South Korea	10	13	10	15	13	19	24	28	24	28	42	89	183	210	257	299	458	473	481
Taiwan	8	9	8	7	18	11	20	12	26	21	26	54	66	103	136	157	154	137	112
All others	1	3	1	4	0	2	0	0	2	0	0	2	7	2	1	4	6	7	3
Middle East	8	9	7	9	8	6	11	7	7	4	8	6	16	22	24	40	50	52	74
Israel	8	8	6	8	7	6	10	5	7	3	8	4	12	19	16	26	38	35	41
All others	0	1	1	1	1	0	1	1	0	1	1	1	4	3	8	14	13	16	33
Africa	0	2	1	0	1	0	0	2	2	1	0	1	3	3	1	4	7	2	4
South Africa	0	2	1	0	1	0	0	2	2	1	0	1	3	3	1	3	5	2	3
All others	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	0	1
Australia and Oceania	7	13	9	6	10	8	6	3	11	4	5	7	12	20	17	21	23	34	37
Australia	4	11	7	6	10	8	6	3	9	4	4	6	11	19	15	18	19	30	27
New Zealand	3	2	2	0	0	0	0	0	1	0	1	1	1	1	2	3	4	4	10
Unclassified	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0

EU = European Union; USPTO = U.S. Patent and Trademark Office.

**Note(s)**



CHAPTER 6 | Industry, Technology, and the Global Marketplace

Patents are fractionally allocated among regions, countries, or economies based on the proportion of residences of all named inventors. The EU includes 28 member countries. China includes Hong Kong. Alternative energy includes bioenergy, solar, wind, nuclear, fuel cells, hydropower, wave/ tidal/ocean, geothermal, and electric/hybrid. Technologies are based on a classification developed by The Patent Board.

Source(s)

Science-Metrix, PatentsView, and USPTO patent data.

*Science and Engineering Indicators 2018*

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

APPENDIX TABLE 6-58

## USPTO patents granted in energy storage technologies, by region, country, or economy: 1998–2016

(Number)

Region, country, or economy	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
World	449	478	521	582	649	688	656	505	569	566	579	667	1,016	1,046	1,180	1,383	1,729	1,847	1,810
North America	204	213	214	244	222	281	263	207	236	222	246	245	366	357	401	451	548	510	516
Canada	11	16	18	11	11	17	16	12	15	15	17	15	19	21	24	24	23	25	26
Mexico	0	0	0	1	0	0	0	0	0	0	1	0	1	0	0	1	2	0	0
Puerto Rico	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
United States	193	197	196	232	211	264	247	194	220	207	229	230	346	336	377	426	523	485	491
Central and South America	0	0	0	3	0	2	0	0	2	0	1	1	0	0	2	2	4	1	1
Argentina	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	1	0	0
Brazil	0	0	0	1	0	1	0	0	0	0	0	1	0	0	0	1	1	1	0
All others	0	0	0	2	0	0	0	0	2	0	1	0	0	0	1	1	2	0	1
Europe	48	48	54	59	73	62	75	51	42	45	59	53	88	104	95	119	177	177	157
EU	46	40	53	53	66	57	60	44	35	41	49	45	78	93	79	101	163	164	141
Austria	0	1	1	1	1	1	2	4	0	0	0	1	0	1	1	1	3	3	2
Belgium	0	0	0	2	1	0	1	0	0	0	0	0	1	2	0	1	2	3	1
Denmark	4	1	2	4	4	2	2	2	0	1	5	2	3	3	0	3	3	3	2
Finland	0	1	0	3	3	1	1	0	0	0	1	0	1	0	3	1	4	0	1

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
France	7	9	15	12	18	10	9	6	5	7	9	16	21	33	24	26	46	50	38
Germany	15	13	23	15	18	23	28	14	12	20	12	14	31	26	25	36	46	54	49
Hungary	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0
Ireland	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Italy	5	2	2	1	4	1	4	5	4	0	4	3	4	4	6	5	6	9	8
Netherlands	5	1	1	3	5	4	4	4	1	1	5	3	3	4	3	7	12	4	5
Spain	1	1	1	2	1	1	3	1	1	2	1	1	2	2	0	0	3	2	0
Sweden	0	5	2	2	2	3	2	1	2	2	2	0	5	3	3	3	6	8	4
United Kingdom	8	6	5	8	9	5	5	5	9	6	7	3	7	13	8	13	24	21	24
All others	0	0	1	0	1	3	1	1	0	1	2	1	1	2	5	3	7	6	6
Other Europe	2	7	1	6	6	5	15	7	8	5	10	8	10	12	16	19	14	13	16
Former Soviet Union	0	1	0	0	1	0	1	1	0	1	0	0	0	1	1	0	0	0	1
Norway	0	3	0	1	0	1	4	2	1	1	2	0	2	1	4	3	2	0	3
Russia	0	2	0	3	4	2	3	3	2	1	4	2	4	5	4	10	3	3	3
Switzerland	2	1	1	3	2	2	8	2	5	2	4	5	3	5	8	6	9	10	8
All others	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0
Asia	193	212	250	272	350	337	311	243	282	294	267	358	554	573	671	802	985	1,148	1,109
China	1	3	4	2	0	1	4	2	3	3	3	6	24	20	38	29	47	54	54
India	0	0	0	0	0	1	0	1	1	2	0	1	5	0	3	1	7	6	7

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Japan	172	186	220	228	294	278	259	196	226	224	208	243	331	350	427	448	527	563	618
Malaysia	0	0	0	1	0	0	1	0	0	1	0	0	0	0	1	0	0	1	0
Singapore	0	1	0	0	1	0	2	1	1	2	1	0	1	0	0	1	2	4	6
South Korea	13	15	16	33	47	44	32	30	39	50	44	91	170	175	182	290	368	466	378
Taiwan	7	7	10	8	8	13	12	13	12	13	11	17	24	27	20	33	33	52	46
All others	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	2	0
Middle East	1	2	2	3	2	1	4	1	3	1	1	3	0	6	5	4	9	7	18
Israel	1	2	2	3	2	1	3	1	3	0	0	3	0	6	3	4	5	4	12
All others	0	0	0	0	0	0	1	0	0	1	1	0	0	0	2	0	4	3	6
Africa	1	2	0	0	1	0	1	0	0	0	1	1	4	1	0	0	0	1	1
South Africa	1	2	0	0	0	0	1	0	0	0	1	1	4	1	0	0	0	1	1
All others	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Australia and Oceania	2	2	1	1	2	5	2	3	4	3	5	6	4	6	5	5	6	4	7
Australia	2	2	1	1	2	3	2	2	4	3	5	5	3	5	4	5	5	4	6
New Zealand	0	0	0	0	0	2	0	1	0	0	0	1	2	1	1	0	1	0	1
Unclassified	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

EU = European Union; USPTO = U.S. Patent and Trademark Office.

**Note(s)**

CHAPTER 6 | Industry, Technology, and the Global Marketplace

Patents are fractionally allocated among regions, countries, or economies based on the proportion of residences of all named inventors. The EU includes 28 member countries. China includes Hong Kong. Energy storage includes batteries, compressed air, flywheels, superconducting magnet energy systems, ultracapacitors, hydrogen production and storage, and thermal energy. Technologies are based on a classification developed by The Patent Board.

Source(s)

Science-Metrix, PatentsView and USPTO patent data.

*Science and Engineering Indicators 2018*



## CHAPTER 6 | Industry, Technology, and the Global Marketplace

APPENDIX TABLE 6-59



### USPTO patents granted in smart grid technology, by region, country, or economy: 1998–2016

(Number)

Region, country, or economy	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
World	454	471	404	456	456	481	473	408	551	545	564	603	823	906	1,141	1,298	1,480	1,550	1,695
North America	279	290	243	287	287	278	292	241	344	332	336	369	499	549	670	739	839	837	948
Canada	10	15	6	16	19	17	23	14	17	30	17	18	28	21	38	33	36	29	36
Mexico	0	0	0	0	0	0	0	1	1	0	0	0	4	0	2	2	1	2	1
Puerto Rico	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0
United States	269	276	238	272	268	261	269	226	327	301	319	350	467	528	630	705	802	806	910
Central and South America	2	0	0	0	2	1	1	0	0	0	0	2	0	1	4	2	3	2	2
Argentina	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0
Brazil	2	0	0	0	2	1	1	0	0	0	0	1	0	1	3	2	2	1	2
All others	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	1	0
Europe	67	81	80	59	84	80	71	76	73	73	87	87	109	144	169	228	280	276	294
EU	54	76	69	50	78	71	64	67	63	67	80	80	103	124	154	204	260	252	262
Austria	0	2	1	1	2	2	2	0	1	2	3	3	1	0	4	4	1	3	5
Belgium	0	2	0	0	0	0	0	1	0	0	1	0	2	1	3	2	5	1	7
Denmark	0	0	0	4	1	1	2	4	2	1	7	2	11	10	5	13	19	17	24
Finland	1	1	2	0	2	1	2	5	5	7	7	7	3	9	3	3	16	7	9

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
France	5	14	12	6	6	9	9	9	9	4	8	11	15	20	14	32	28	26	31
Germany	25	23	25	16	29	28	22	21	19	26	26	34	35	38	54	75	88	103	85
Hungary	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	1	4	1
Ireland	0	0	0	0	0	1	0	2	1	0	2	1	1	0	3	1	3	5	7
Italy	2	3	7	4	4	4	8	8	7	5	7	3	3	7	9	8	11	12	10
Netherlands	6	7	3	0	2	3	1	0	1	2	2	2	1	3	1	3	4	5	8
Spain	0	1	4	0	1	0	1	1	0	1	3	4	5	5	8	7	13	13	10
Sweden	8	17	8	12	19	12	6	6	7	7	4	3	11	14	31	30	36	24	21
United Kingdom	6	5	7	7	12	10	9	10	9	9	9	9	13	17	14	23	32	31	41
All others	0	1	1	0	1	1	2	1	1	2	0	1	0	1	4	3	5	2	4
Other Europe	14	5	11	9	5	9	8	9	10	6	7	8	6	20	15	25	20	24	32
Former Soviet Union	0	0	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1
Norway	0	0	1	0	0	0	1	2	1	1	0	0	1	0	2	1	1	4	6
Russia	0	0	1	1	0	0	0	0	0	0	0	2	0	1	0	1	2	0	1
Switzerland	13	2	8	8	5	8	7	7	8	5	7	6	5	19	13	22	17	20	23
All others	1	2	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Asia	100	96	74	110	78	114	98	81	126	135	136	133	202	196	272	296	331	405	428
China	1	2	3	2	3	4	3	3	8	5	7	16	16	29	46	46	69	87	80
India	1	1	0	3	2	1	1	1	1	3	3	2	5	5	13	13	15	32	26

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Japan	83	83	60	82	63	84	64	51	78	64	57	63	96	74	125	144	128	145	153
Malaysia	0	0	0	1	0	0	0	0	1	0	0	1	1	0	1	0	0	1	2
Singapore	0	0	1	1	0	1	1	0	0	0	2	0	1	0	3	0	5	6	8
South Korea	11	7	5	12	4	11	12	14	19	44	51	39	54	67	64	67	75	78	104
Taiwan	4	3	6	10	4	13	16	11	18	19	16	13	29	21	20	26	39	54	54
All others	0	0	0	0	1	0	2	0	0	0	0	0	0	0	0	0	0	2	0
Middle East	3	0	2	0	4	5	5	6	6	3	5	8	9	10	19	23	21	23	17
Israel	3	0	2	0	3	5	5	5	6	3	5	8	7	10	19	15	19	21	15
All others	0	0	0	0	0	0	0	1	0	0	0	0	2	0	0	8	2	2	2
Africa	0	1	0	0	1	0	0	0	0	1	0	1	1	0	0	2	1	0	1
South Africa	0	1	0	0	0	0	0	0	0	1	0	1	0	0	0	2	1	0	1
All others	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Australia and Oceania	3	2	4	0	1	2	5	4	2	1	1	2	2	5	6	7	5	8	5
Australia	0	1	2	0	1	1	3	4	2	1	1	2	1	4	3	4	4	7	2
New Zealand	3	1	2	0	0	1	2	0	0	0	0	0	1	0	3	3	1	1	3
Unclassified	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

EU = European Union; USPTO = U.S. Patent and Trademark Office.

**Note(s)**

CHAPTER 6 | Industry, Technology, and the Global Marketplace

Patents are fractionally allocated among regions, countries, or economies based on the proportion of residences of all named inventors. The EU includes 28 member countries. China includes Hong Kong. Technologies are based on a classification developed by The Patent Board.

Source(s)

Science-Metrix; PatentsView and USPTO patent data.

*Science and Engineering Indicators 2018*

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

### APPENDIX TABLE 6-60

#### USPTO patents granted in pollution mitigation technologies, by region, country, or economy: 1998–2016

(Number)

Region, country, or economy	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
World	1,975	1,924	1,887	2,002	1,810	1,802	1,692	1,442	1,459	1,439	1,409	1,605	2,143	2,129	2,416	2,788	2,825	2,781	2,590
North America	1,160	1,156	1,118	1,160	1,049	1,011	939	823	861	813	808	951	1,189	1,193	1,333	1,514	1,513	1,413	1,346
Canada	62	74	77	76	73	52	56	52	49	45	54	47	58	64	84	76	74	76	64
Mexico	2	0	1	3	5	2	1	1	0	1	4	0	1	2	5	6	3	2	3
Puerto Rico	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	1
United States	1,097	1,082	1,039	1,082	971	957	882	770	812	767	750	904	1,130	1,127	1,244	1,430	1,435	1,334	1,278
Central and South America	3	6	1	3	5	4	4	3	1	4	5	4	5	17	6	11	8	10	15
Argentina	0	1	1	0	1	3	0	0	0	0	0	0	0	1	0	2	0	1	0
Brazil	2	1	0	1	2	1	2	1	1	1	2	0	4	9	0	6	2	2	7
All others	1	4	0	2	3	0	2	2	0	3	3	4	1	7	6	3	6	6	7
Europe	366	390	363	421	356	346	298	250	232	268	238	259	420	371	410	553	568	549	494
EU	328	361	336	385	340	330	283	227	215	253	222	235	398	353	389	519	536	511	453
Austria	10	5	3	6	9	7	5	10	7	13	4	5	9	7	10	13	10	22	20
Belgium	4	4	8	6	8	5	6	3	8	5	2	8	7	6	6	20	15	11	17
Denmark	4	12	9	12	8	10	3	5	2	4	11	9	8	11	11	10	13	11	10
Finland	8	10	10	13	8	16	10	5	6	9	6	6	11	4	9	9	10	12	8

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
France	47	48	60	65	55	43	35	32	25	45	33	39	61	49	45	74	54	44	57
Germany	149	166	164	183	144	157	134	108	103	98	93	101	174	170	184	238	233	212	183
Hungary	2	0	0	0	1	2	0	1	0	0	1	0	3	1	0	2	3	1	1
Ireland	0	0	1	0	0	1	1	0	0	1	0	1	2	2	1	3	1	2	2
Italy	18	13	14	12	17	16	15	8	9	11	10	13	19	11	18	21	29	32	25
Netherlands	12	30	12	14	21	14	12	8	4	7	7	8	19	26	14	22	34	21	15
Spain	2	3	2	3	2	1	2	1	0	3	3	2	4	2	2	9	9	7	2
Sweden	24	21	21	26	28	12	21	18	14	15	19	13	28	17	21	29	31	38	31
United Kingdom	45	47	30	40	34	40	36	25	34	38	28	29	42	40	60	64	84	83	74
All others	3	2	3	4	4	6	4	4	1	4	5	2	10	7	7	7	8	14	8
Other Europe	38	29	26	36	16	16	15	23	17	15	16	24	22	18	20	34	32	39	40
Former Soviet Union	2	1	0	1	1	0	0	1	1	2	0	1	0	0	0	1	1	0	1
Norway	5	6	3	10	3	5	6	10	5	4	3	6	11	7	6	10	9	16	21
Russia	8	9	4	11	4	5	3	5	3	3	8	5	5	5	4	8	6	3	5
Switzerland	21	11	20	13	7	6	6	7	8	6	5	10	6	6	9	12	16	20	14
All others	2	1	0	1	1	0	1	0	1	1	0	2	0	0	1	2	1	0	0
Asia	418	350	381	390	375	410	426	345	339	330	335	369	496	512	610	640	658	720	672
China	7	2	4	4	5	7	7	6	10	13	9	15	24	25	34	42	53	56	64
India	1	0	5	3	5	6	5	7	3	7	4	8	6	8	13	11	22	17	25

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Japan	344	303	339	322	306	343	365	290	287	254	273	290	390	412	472	456	473	500	462
Malaysia	1	0	1	0	0	0	1	0	0	1	0	0	1	0	1	2	1	1	0
Singapore	1	0	0	2	0	2	3	1	1	3	2	2	2	1	2	1	0	4	3
South Korea	35	24	18	34	34	23	28	14	20	24	25	33	50	41	58	94	83	111	95
Taiwan	27	21	13	24	23	29	17	24	18	26	21	20	21	21	29	30	23	28	20
All others	3	0	0	0	2	1	1	2	0	0	1	1	1	3	0	3	3	2	2
Middle East	12	8	9	9	8	17	9	5	6	8	7	10	15	14	28	43	38	56	45
Israel	12	6	6	8	6	16	7	4	5	4	5	8	12	9	14	15	16	16	15
All others	1	2	3	1	2	1	2	1	1	4	2	2	3	5	14	27	22	40	30
Africa	1	2	6	9	2	1	3	3	10	4	3	1	2	4	6	5	7	3	3
South Africa	1	2	6	9	2	1	2	3	9	4	3	0	2	4	6	3	7	3	2
All others	0	0	0	0	0	0	1	0	1	1	0	1	0	0	0	2	0	1	1
Australia and Oceania	15	12	8	9	15	12	13	13	9	12	13	11	16	17	23	21	33	29	16
Australia	13	10	8	8	15	11	13	13	9	12	11	9	13	16	21	18	32	28	14
New Zealand	1	2	0	1	0	1	0	0	0	0	2	2	3	1	2	3	1	2	1
Unclassified	1	0	2	1	0	0	0	0	1	0	0	1	0	0	0	1	0	1	0

EU = European Union; USPTO = U.S. Patent and Trademark Office.

**Note(s)**



CHAPTER 6 | Industry, Technology, and the Global Marketplace

Patents are fractionally allocated among regions, countries, or economies based on the proportion of residences of all named inventors. The EU includes 28 member countries. China includes Hong Kong. Pollution mitigation technologies include recycling; control of air, water, and solid waste pollution; environmental remediation; cleaner coal; and capture and storage of carbon and other greenhouse gases. Technologies are based on a classification developed by The Patent Board.

Source(s)

Science-Metrix; PatentsView and USPTO patent data.

*Science and Engineering Indicators 2018*



CHAPTER 6 | Industry, Technology, and the Global Marketplace

APPENDIX TABLE 6-61

USPTO patents granted in fuel cell technology, by region, country, or economy: 1998–2016																			
(Number)																			
Region, country, or economy	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
World	119	159	201	264	353	444	520	481	555	503	525	641	1,031	964	1,106	907	918	853	745
North America	65	98	122	171	218	269	294	272	291	244	229	257	389	360	352	312	317	286	251
Canada	8	7	9	10	18	34	41	44	31	23	23	25	18	21	29	20	29	26	13
Mexico	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Puerto Rico	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
United States	57	90	113	161	199	235	253	228	259	221	206	232	370	339	324	292	287	260	238
Central and South America	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Argentina	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Brazil	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
All others	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Europe	20	29	41	34	44	68	65	61	55	66	81	66	122	96	110	101	116	114	94
EU	18	26	40	28	42	65	63	57	52	66	78	64	116	94	105	93	112	106	86
Austria	1	0	0	0	0	0	1	1	2	0	0	2	1	1	0	1	3	2	1
Belgium	0	0	0	0	0	0	0	0	0	1	0	1	1	1	0	0	0	2	0
Denmark	2	0	0	0	0	1	3	2	0	2	2	3	4	3	6	4	7	7	6
Finland	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1	2	3	2	3

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
France	1	0	1	2	4	1	4	1	5	8	3	7	11	16	17	15	23	14	18
Germany	11	21	32	25	30	55	43	42	35	45	51	39	72	51	55	48	51	56	22
Hungary	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ireland	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1
Italy	0	2	2	0	3	1	3	2	2	2	3	3	7	8	7	5	4	2	4
Netherlands	0	1	1	1	3	2	2	2	2	2	4	1	3	1	1	1	0	6	0
Spain	0	0	0	0	0	1	1	0	0	0	0	1	0	1	0	0	2	0	0
Sweden	0	0	0	0	0	0	0	0	1	0	1	0	1	1	1	1	3	2	3
United Kingdom	3	2	4	0	1	4	6	7	3	6	11	7	10	10	15	15	14	12	27
All others	0	0	0	0	1	1	0	0	0	0	0	0	5	1	1	1	1	0	0
Other Europe	2	3	1	6	2	3	2	4	3	0	3	2	6	2	5	8	4	9	8
Former Soviet Union	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Norway	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	2	1
Russia	0	0	0	0	0	2	0	2	0	0	1	0	1	0	1	2	0	0	0
Switzerland	1	3	1	6	2	1	2	2	3	0	2	2	5	2	4	5	4	6	7
All others	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Asia	33	31	36	57	84	105	156	146	203	192	211	313	514	501	637	489	484	445	390
China	0	0	0	0	0	1	1	0	1	2	3	4	5	8	2	6	3	21	10
India	0	0	0	0	0	0	0	0	0	1	0	0	2	0	3	0	2	2	4

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Japan	33	29	33	55	81	100	147	137	184	168	178	240	361	337	483	341	332	296	244
Malaysia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Singapore	0	0	0	0	0	0	0	0	0	0	0	0	2	0	1	0	1	0	0
South Korea	0	1	3	2	2	4	6	7	11	15	24	52	124	131	125	117	127	110	121
Taiwan	0	1	0	0	1	0	2	2	7	6	6	17	19	24	24	25	18	15	11
All others	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Middle East	0	0	0	0	4	2	3	1	3	0	2	2	3	3	4	3	1	6	5
Israel	0	0	0	0	4	2	3	1	3	0	2	2	2	3	2	3	1	4	2
All others	0	0	0	0	0	0	0	1	0	0	0	0	1	0	1	0	0	2	3
Africa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1
South Africa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1
All others	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Australia and Oceania	1	1	1	2	4	0	2	1	3	1	2	2	3	4	1	1	0	1	1
Australia	1	1	1	2	4	0	2	1	3	1	2	2	3	4	0	1	0	1	1
New Zealand	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Unclassified	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

EU = European Union; USPTO = U.S. Patent and Trademark Office.

**Note(s)**

CHAPTER 6 | Industry, Technology, and the Global Marketplace

Patents are fractionally allocated among regions, countries, or economies based on the proportion of residences of all named inventors. The EU includes 28 member countries. Technologies are based on a classification developed by The Patent Board.

Source(s)

Science-Metrix; PatentsView and USPTO patent data.

*Science and Engineering Indicators 2018*

CHAPTER 6 | Industry, Technology, and the Global Marketplace

APPENDIX TABLE 6-62

USPTO patents granted in bioenergy technology, by region, country, or economy: 1998–2016																			
(Number)																			
Region, country, or economy	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
World	76	55	68	67	66	65	64	58	59	92	77	130	195	312	461	606	637	584	579
North America	54	35	40	44	41	41	43	32	41	66	53	93	138	241	347	428	449	396	398
Canada	5	3	6	4	4	2	3	3	6	5	5	4	9	24	15	24	18	36	23
Mexico	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	1	2	0	0
Puerto Rico	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
United States	49	32	34	40	35	39	40	29	35	62	47	89	128	217	332	403	429	360	375
Central and South America	0	0	0	0	0	1	1	2	1	1	0	1	0	4	6	5	9	10	6
Argentina	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Brazil	0	0	0	0	0	0	0	2	1	1	0	1	0	4	4	5	7	3	4
All others	0	0	0	0	0	1	1	0	0	0	0	0	0	0	1	0	2	7	2
Europe	16	13	17	11	12	13	12	17	13	17	13	22	36	44	72	102	115	90	92
EU	11	12	14	8	11	13	11	12	10	14	11	21	30	38	67	96	108	86	86
Austria	0	1	0	1	0	0	0	1	1	0	0	1	0	0	1	0	0	2	2
Belgium	0	0	0	0	0	0	0	1	0	0	0	0	0	2	2	3	1	0	1
Denmark	0	1	0	0	2	2	0	0	0	2	2	3	2	5	7	5	11	8	5
Finland	1	2	0	0	0	1	2	2	2	0	0	2	2	2	5	7	7	11	7

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
France	2	1	1	2	1	1	0	0	1	2	0	2	5	6	4	17	17	17	21
Germany	5	3	6	1	3	5	3	3	3	2	4	8	8	10	22	24	30	23	12
Hungary	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	2	0	1
Ireland	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	3	0	0
Italy	1	2	1	1	1	1	0	3	0	2	3	1	6	4	4	7	4	3	6
Netherlands	0	1	2	2	0	2	3	1	0	2	1	1	2	3	7	9	11	9	7
Spain	0	0	0	1	0	0	0	0	0	0	0	1	1	0	1	4	4	2	6
Sweden	1	0	2	0	3	0	2	0	2	1	0	1	0	2	2	4	6	2	3
United Kingdom	1	2	1	0	0	0	1	1	1	3	0	1	2	2	7	10	9	6	8
All others	0	0	0	1	1	1	0	0	0	0	1	0	0	0	3	4	3	0	6
Other Europe	5	1	3	3	1	0	1	5	3	3	2	1	6	6	5	7	7	5	6
Former Soviet Union	0	0	0	0	0	0	0	1	0	0	0	0	0	1	1	2	1	0	0
Norway	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	3	1	0
Russia	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	2	2	2
Switzerland	5	1	3	3	1	0	1	4	3	3	2	1	6	4	2	3	2	1	3
All others	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Asia	4	7	10	12	11	7	7	6	4	4	8	12	18	20	34	58	54	73	64
China	0	0	1	1	1	0	0	0	0	1	0	2	1	2	3	7	7	13	18
India	0	0	0	0	0	1	0	1	0	0	0	2	2	1	3	4	6	9	8

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Japan	3	5	8	9	6	4	6	5	4	3	6	5	10	11	17	34	21	30	24
Malaysia	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	1	2	0	2
Singapore	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
South Korea	0	1	1	1	3	2	1	0	0	1	0	0	2	2	8	9	16	18	12
Taiwan	1	1	0	1	1	0	0	0	0	0	2	2	3	2	0	1	2	2	1
All others	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	1	1	0	0
Middle East	1	0	0	0	1	2	1	1	0	3	2	0	2	0	2	6	3	4	10
Israel	1	0	0	0	1	2	1	1	0	2	2	0	2	0	1	4	2	3	3
All others	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	2	1	2	6
Africa	0	0	0	0	1	0	0	1	0	0	0	1	0	0	0	1	1	2	1
South Africa	0	0	0	0	1	0	0	1	0	0	0	1	0	0	0	1	1	2	1
All others	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Australia and Oceania	0	0	1	0	1	1	0	0	0	0	1	1	2	2	1	6	5	8	8
Australia	0	0	1	0	1	1	0	0	0	0	0	1	1	1	1	4	3	6	6
New Zealand	0	0	0	0	0	0	0	0	0	0	1	0	1	1	0	2	2	2	2
Unclassified	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

EU = European Union; USPTO = U.S. Patent and Trademark Office.

**Note(s)**



CHAPTER 6 | Industry, Technology, and the Global Marketplace

Patents are fractionally allocated among regions, countries, or economies based on the proportion of residences of all named inventors. The EU includes 28 member countries. Technologies are based on a classification developed by The Patent Board.

Source(s)

Science-Metrix; PatentsView and USPTO patent data.

*Science and Engineering Indicators 2018*



## CHAPTER 6 | Industry, Technology, and the Global Marketplace

APPENDIX TABLE 6-63

## USPTO patents granted in solar energy technology, by region, country, or economy: 1998–2016

(Number)

Region, country, or economy	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
World	165	212	304	308	303	289	207	160	163	173	163	241	502	813	1,169	1,352	1,755	1,674	1,551
North America	77	96	138	128	112	117	94	79	83	91	92	145	283	463	673	775	937	845	770
Canada	1	2	4	2	2	3	1	1	2	3	3	4	4	11	14	13	16	26	32
Mexico	0	0	0	0	0	0	1	1	0	0	0	0	0	1	0	1	2	1	0
Puerto Rico	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0
United States	76	94	134	126	110	113	92	77	81	88	89	141	279	451	659	761	918	818	739
Central and South America	0	2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	2	1	2
Argentina	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Brazil	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
All others	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1	2
Europe	27	40	45	42	49	46	23	27	29	27	26	31	75	93	155	166	236	232	230
EU	26	35	40	34	47	41	22	23	27	25	22	27	71	84	142	148	208	216	209
Austria	0	2	2	1	0	0	1	1	0	2	1	2	2	3	4	3	5	5	4
Belgium	1	0	0	1	4	2	0	2	3	1	2	1	3	4	2	4	6	7	11
Denmark	0	0	0	0	1	0	0	0	0	0	0	0	2	2	2	1	2	1	1
Finland	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1	3	3	4

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
France	2	5	5	1	4	3	3	2	3	3	4	3	9	9	15	22	30	28	42
Germany	21	21	22	20	30	23	14	9	15	10	10	16	35	44	66	66	92	93	84
Hungary	0	1	1	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	0
Ireland	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	2	0	1
Italy	0	1	1	2	1	2	0	1	2	1	2	0	3	8	9	8	18	18	11
Netherlands	1	0	3	5	1	3	2	2	0	3	2	2	3	1	8	9	15	16	7
Spain	0	0	2	0	1	3	0	1	1	2	0	0	1	2	12	11	7	22	16
Sweden	0	1	1	2	1	1	0	1	0	0	1	0	3	5	1	2	7	4	4
United Kingdom	2	3	3	1	3	4	2	1	3	2	0	4	6	3	14	13	16	15	19
All others	0	0	0	2	0	0	0	1	0	0	1	0	3	3	7	8	3	4	6
Other Europe	1	6	5	7	2	4	1	5	2	2	4	3	3	9	14	18	28	16	21
Former Soviet Union	0	0	0	0	0	1	0	1	0	0	0	1	0	0	1	0	0	1	0
Norway	0	0	2	0	0	0	0	0	0	0	2	0	0	3	0	2	3	1	1
Russia	0	0	0	1	0	0	0	0	0	0	0	1	1	0	1	1	3	1	1
Switzerland	1	6	3	6	2	4	1	4	2	2	2	2	2	5	10	14	20	13	17
All others	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	2	2	1	2
Asia	56	62	111	132	137	120	84	52	43	49	41	62	134	240	324	383	541	553	490
China	0	0	0	1	1	1	0	0	1	2	2	3	7	9	24	31	38	41	44
India	0	0	0	0	1	0	0	1	0	1	1	1	0	1	5	0	4	7	6

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Japan	56	53	103	128	126	111	75	44	35	39	32	37	74	134	142	174	244	261	221
Malaysia	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	1	3	0	2
Singapore	0	0	0	1	2	0	0	0	0	0	0	3	2	2	1	0	0	2	3
South Korea	0	3	2	0	1	5	2	1	0	3	1	7	18	38	66	82	152	159	149
Taiwan	0	5	4	3	7	1	6	6	6	5	5	10	27	56	86	94	96	78	62
All others	0	1	1	0	0	1	0	0	1	0	0	1	7	1	1	3	3	5	2
Middle East	1	3	3	4	1	1	5	1	2	3	2	1	6	6	11	22	33	30	44
Israel	1	3	3	4	0	1	5	1	2	3	2	1	4	6	6	15	25	24	27
All others	0	0	0	0	1	0	0	0	0	0	0	0	2	0	4	7	8	5	17
Africa	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	1
South Africa	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
All others	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
Australia and Oceania	3	8	4	2	3	6	1	1	5	2	1	2	5	9	5	5	6	13	15
Australia	3	7	3	2	3	6	1	1	5	2	1	2	5	9	4	5	6	12	14
New Zealand	0	1	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	2	1
Unclassified	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

EU = European Union; USPTO = U.S. Patent and Trademark Office.

**Note(s)**

CHAPTER 6 | Industry, Technology, and the Global Marketplace

Patents are fractionally allocated among regions, countries, or economies based on the proportion of residences of all named inventors. The EU includes 28 member countries. Technologies are based on a classification developed by The Patent Board.

Source(s)

Science-Metrix; PatentsView and USPTO patent data.

*Science and Engineering Indicators 2018*

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

APPENDIX TABLE 6-64

## USPTO patents granted in hybrid and electric vehicle technology, by region, country, or economy: 1998–2016

(Number)

Region, country, or economy	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
World	322	311	286	352	438	407	371	368	435	439	452	515	718	796	1,088	1,335	1,543	1,767	1,724
North America	110	107	95	121	148	143	119	127	183	187	184	210	300	319	458	497	529	588	599
Canada	5	7	4	6	5	11	5	6	6	7	5	5	12	6	9	17	16	12	15
Mexico	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	4
Puerto Rico	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
United States	104	101	91	114	143	132	114	121	177	181	179	204	287	313	450	479	513	575	580
Central and South America	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0
Argentina	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Brazil	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0
All others	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Europe	71	49	54	92	89	74	77	61	58	56	83	61	109	94	163	258	258	302	313
EU	69	42	53	87	89	73	73	59	56	56	80	60	108	91	160	246	252	299	304
Austria	1	1	0	1	1	0	1	1	1	1	2	1	3	1	7	6	3	5	8
Belgium	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	1	2
Denmark	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Finland	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1	4	2

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
France	12	6	11	12	17	11	16	7	6	13	13	11	19	13	32	31	44	41	47
Germany	44	26	35	62	51	46	47	38	36	33	56	42	70	64	100	162	153	180	165
Hungary	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	1	0	0
Ireland	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Italy	3	3	1	5	7	4	3	1	6	1	3	2	4	4	10	15	14	24	15
Netherlands	0	0	0	0	1	1	1	0	0	0	1	0	2	1	0	2	5	4	4
Spain	1	0	1	0	1	4	0	3	3	3	0	1	0	1	1	1	2	3	3
Sweden	0	1	1	2	5	4	4	2	1	2	3	0	4	2	4	14	22	16	32
United Kingdom	6	5	3	5	4	3	2	4	3	2	3	3	5	4	4	10	5	20	22
All others	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1	1	0	1	3
Other Europe	2	7	1	4	0	1	4	2	2	0	3	1	1	3	3	12	7	3	9
Former Soviet Union	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Norway	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Russia	1	1	1	0	0	1	1	1	0	0	1	0	0	0	0	3	0	0	1
Switzerland	1	6	0	4	0	0	3	1	2	0	2	1	1	3	3	9	6	3	7
All others	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Asia	137	150	136	138	200	190	174	178	193	195	185	244	308	378	465	574	745	871	806
China	1	0	1	0	0	0	1	2	2	3	2	1	5	4	15	20	20	14	29
India	0	0	0	0	0	0	0	0	0	1	0	0	1	1	4	10	4	7	3

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Japan	129	145	129	133	193	179	158	165	178	178	166	201	265	340	392	460	578	675	574
Malaysia	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Singapore	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	1	0	1	1
South Korea	5	4	3	3	4	2	6	8	5	8	12	23	25	27	43	68	128	155	175
Taiwan	2	1	3	1	3	9	9	3	8	6	4	19	12	5	11	14	14	20	22
All others	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Middle East	1	1	0	0	0	0	0	1	0	0	1	0	0	4	1	4	4	1	1
Israel	1	0	0	0	0	0	0	1	0	0	1	0	0	4	1	3	4	1	1
All others	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Africa	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
South Africa	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
All others	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Australia and Oceania	3	1	1	1	1	0	0	1	1	0	0	0	1	1	1	2	6	4	6
Australia	0	0	0	1	1	0	0	1	1	0	0	0	1	1	1	2	5	3	0
New Zealand	3	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	6
Unclassified	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0

EU = European Union; USPTO = U.S. Patent and Trademark Office.

**Note(s)**

CHAPTER 6 | Industry, Technology, and the Global Marketplace

Patents are fractionally allocated among regions, countries, or economies based on the proportion of residences of all named inventors. The EU includes 28 member countries. Technologies are based on a classification developed by The Patent Board.

Source(s)

Science-Metrix; PatentsView and USPTO patent data.

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## CHAPTER 6 | Industry, Technology, and the Global Marketplace

APPENDIX TABLE 6-65

## USPTO patents granted in wind energy technology, by region, country, or economy: 1998–2016

(Number)

Region, country, or economy	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
World	30	34	48	57	60	64	87	126	137	153	172	185	293	525	713	657	689	606	576
North America	20	25	34	33	30	30	43	58	69	72	86	71	130	224	272	268	230	190	204
Canada	1	3	5	0	3	1	7	6	4	2	6	6	9	10	7	15	10	11	7
Mexico	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	5	0	0	0
Puerto Rico	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	0	1
United States	19	22	29	33	26	29	36	52	66	70	80	65	120	213	265	248	218	179	196
Central and South America	0	1	0	0	0	0	1	0	1	0	0	0	0	2	2	0	1	2	2
Argentina	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	2	1
Brazil	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	1
All others	0	1	0	0	0	0	1	0	1	0	0	0	0	1	0	0	1	1	0
Europe	7	4	8	17	20	24	33	53	41	65	58	90	122	217	297	265	334	310	282
EU	7	4	7	17	19	24	33	52	41	62	56	89	121	213	289	257	328	303	276
Austria	0	0	0	0	1	0	0	0	1	0	0	1	2	1	5	1	5	2	2
Belgium	0	0	0	1	1	1	0	0	2	1	1	2	2	0	2	4	5	4	1
Denmark	1	0	0	2	1	8	8	9	4	10	7	10	33	76	104	87	129	117	122
Finland	0	1	0	2	1	0	0	0	0	1	0	0	0	0	1	0	2	0	1

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
France	1	1	0	3	0	1	0	6	3	2	0	0	0	1	3	7	15	6	8
Germany	2	0	2	5	9	7	19	29	27	35	37	61	67	82	106	97	95	92	77
Hungary	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Ireland	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	1
Italy	0	0	0	0	1	0	0	1	0	1	3	2	1	2	6	8	7	13	6
Netherlands	0	0	2	1	2	2	2	1	0	3	2	3	3	15	24	9	11	6	6
Spain	2	0	1	0	2	1	3	2	0	2	2	5	9	17	20	22	29	30	31
Sweden	0	1	0	2	1	3	0	2	2	1	1	0	0	2	3	5	2	3	3
United Kingdom	1	1	2	1	0	1	1	2	2	6	3	6	1	16	11	12	26	29	18
All others	0	0	0	0	0	0	0	0	0	0	0	0	3	1	3	4	1	1	0
Other Europe	0	0	1	0	1	0	0	1	0	3	2	1	1	3	8	8	5	7	6
Former Soviet Union	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Norway	0	0	0	0	0	0	0	1	0	2	1	0	1	1	3	5	4	3	2
Russia	0	0	0	0	1	0	0	0	0	1	0	1	0	1	2	1	0	1	1
Switzerland	0	0	0	0	0	0	0	0	0	0	1	0	0	1	2	2	1	1	1
All others	0	0	1	0	0	0	0	0	0	0	0	0	0	1	2	0	0	2	1
Asia	2	4	5	6	9	9	8	14	22	15	27	21	33	79	135	117	116	95	77
China	0	0	0	1	0	1	0	1	1	0	2	2	11	7	16	12	15	19	20
India	0	0	0	0	0	0	0	1	0	0	1	1	1	21	11	4	3	11	4

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Japan	0	1	4	4	7	6	5	7	14	12	15	10	16	36	81	67	58	29	20
Malaysia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2
Singapore	0	0	0	0	0	0	0	0	0	0	0	1	0	3	11	7	10	12	12
South Korea	0	1	0	1	0	1	1	4	4	0	2	2	4	1	4	9	14	11	10
Taiwan	2	1	1	0	2	1	2	1	2	3	7	5	1	10	13	16	14	10	9
All others	0	1	0	0	0	0	0	0	1	0	0	0	0	1	0	1	1	2	0
Middle East	0	0	1	0	1	0	0	1	3	0	0	1	5	3	4	3	7	7	10
Israel	0	0	1	0	1	0	0	1	3	0	0	1	4	2	4	0	5	2	5
All others	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	3	2	5	5
Africa	0	0	0	0	0	0	0	0	0	0	0	1	2	0	0	0	1	1	0
South Africa	0	0	0	0	0	0	0	0	0	0	0	1	2	0	0	0	0	1	0
All others	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Australia and Oceania	0	0	0	1	0	1	2	0	1	1	1	1	1	0	2	4	0	1	1
Australia	0	0	0	1	0	1	2	0	1	1	1	1	1	0	2	3	0	1	1
New Zealand	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Unclassified	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

EU = European Union; USPTO = U.S. Patent and Trademark Office.

**Note(s)**

CHAPTER 6 | Industry, Technology, and the Global Marketplace

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Source(s)

Science-Metrix; PatentsView and USPTO patent data.

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## CHAPTER 6 | Industry, Technology, and the Global Marketplace

APPENDIX TABLE 6-66 

## USPTO patents granted in nuclear energy technology, by region, country, or economy: 1998–2016

(Number)

[illegible]

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
France	37	15	10	6	12	19	6	11	5	11	9	8	12	15	9	17	32	18	27
Germany	17	25	12	10	8	10	6	11	3	1	9	6	7	6	6	10	12	6	11
Hungary	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Ireland	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Italy	1	0	0	0	0	1	1	1	0	0	0	0	0	0	0	1	3	1	0
Netherlands	0	1	0	1	0	0	0	0	1	2	0	0	0	1	0	0	0	0	0
Spain	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	1	0	0
Sweden	3	11	3	8	8	5	4	1	2	2	1	3	4	4	3	1	4	5	4
United Kingdom	5	7	1	7	6	3	2	2	1	3	2	1	0	0	2	1	0	1	2
All others	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Other Europe	3	0	0	1	6	0	3	1	1	2	0	1	3	2	2	0	3	1	2
Former Soviet Union	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Norway	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Russia	0	0	0	1	5	0	2	0	1	1	0	1	3	2	1	0	1	1	1
Switzerland	2	0	0	0	0	0	0	1	0	1	0	0	0	0	1	0	2	0	1
All others	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Asia	33	23	20	26	25	35	30	27	10	11	14	12	30	35	40	56	73	53	45
China	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	4	4
India	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	1	0	0	0

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Japan	29	20	18	17	20	28	22	19	6	8	11	6	18	22	21	31	48	27	29
Malaysia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Singapore	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
South Korea	3	3	2	8	3	6	8	8	3	2	3	6	10	10	15	21	22	22	12
Taiwan	1	0	0	0	2	0	0	0	1	0	0	0	2	3	3	3	2	0	0
All others	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Middle East	1	2	1	0	0	0	0	0	0	0	0	1	0	0	0	1	0	1	0
Israel	1	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
All others	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	1	0
Africa	0	1	0	0	0	0	0	1	2	1	0	0	0	1	0	2	4	0	1
South Africa	0	1	0	0	0	0	0	1	2	1	0	0	0	1	0	2	4	0	1
All others	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Australia and Oceania	0	1	0	0	0	0	0	0	1	0	0	0	0	0	1	0	2	1	2
Australia	0	1	0	0	0	0	0	0	1	0	0	0	0	0	1	0	2	1	2
New Zealand	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Unclassified	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

EU = European Union; USPTO = U.S. Patent and Trademark Office.

**Note(s)**



CHAPTER 6 | Industry, Technology, and the Global Marketplace

Patents are fractionally allocated among regions, countries, or economies based on the proportion of residences of all named inventors. The EU includes 28 member countries. Technologies are based on a classification developed by The Patent Board.

Source(s)

Science-Metrix; PatentsView and USPTO patent data.

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## CHAPTER 6 | Industry, Technology, and the Global Marketplace

APPENDIX TABLE 6-67 

## USPTO patents granted in battery technology, by region, country, or economy: 1998–2016

(Number)

[illegible]

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

[illegible]

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Japan	75	72	104	93	136	123	121	77	74	87	82	97	160	164	196	195	255	295	343
Malaysia	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Singapore	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	2	3
South Korea	5	8	10	25	35	30	26	26	31	43	36	69	142	142	134	232	334	427	330
Taiwan	3	2	2	3	1	0	2	0	3	0	0	4	6	5	4	7	5	17	14
All others	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Middle East	0	0	0	1	1	0	0	0	1	0	0	0	0	2	1	1	0	1	3
Israel	0	0	0	1	1	0	0	0	1	0	0	0	0	2	1	1	0	1	3
All others	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Africa	1	1	0	0	0	0	1	0	0	0	1	1	4	1	0	0	0	0	0
South Africa	1	1	0	0	0	0	1	0	0	0	1	1	4	1	0	0	0	0	0
All others	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Australia and Oceania	0	0	1	0	1	2	1	1	1	0	1	2	2	1	0	2	0	1	0
Australia	0	0	1	0	1	2	1	0	1	0	1	1	0	1	0	2	0	1	0
New Zealand	0	0	0	0	0	0	0	1	0	0	0	1	2	0	0	0	0	0	0
Unclassified	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

EU = European Union; USPTO = U.S. Patent and Trademark Office.

**Note(s)**



CHAPTER 6 | Industry, Technology, and the Global Marketplace

Patents are fractionally allocated among regions, countries, or economies based on the proportion of residences of all named inventors. The EU includes 28 member countries. Technologies are based on a classification developed by The Patent Board.

Source(s)

Science-Metrix; PatentsView and USPTO patent data.

*Science and Engineering Indicators 2018*

CHAPTER 6 | Industry, Technology, and the Global Marketplace

APPENDIX TABLE 6-68

USPTO patents granted in hydrogen production and storage technology, by region, country, or economy: 1998–2016																			
(Number)																			
Region, country, or economy	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
World	82	118	109	135	118	167	165	119	166	146	165	173	262	251	252	274	279	275	236
North America	39	56	51	69	60	94	98	65	105	81	104	104	164	141	132	141	143	131	113
Canada	2	6	3	4	3	9	8	6	9	3	2	6	8	5	8	12	13	14	14
Mexico	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Puerto Rico	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
United States	37	50	48	65	57	86	89	59	96	78	102	98	155	136	124	129	130	118	99
Central and South America	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	3	1	0
Argentina	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Brazil	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0
All others	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	2	0	0
Europe	12	18	17	20	18	18	22	23	14	15	26	23	28	39	25	31	56	52	34
EU	12	14	17	20	18	17	20	20	13	12	24	22	26	37	22	28	54	52	29
Austria	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	1	1	0
Belgium	0	0	0	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Denmark	2	1	2	2	2	0	2	1	0	0	3	2	0	1	0	1	1	1	1
Finland	0	1	0	0	1	0	0	0	0	0	0	0	1	0	0	0	1	0	0

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
France	1	7	3	6	3	3	1	2	2	3	4	8	7	13	11	7	18	18	5
Germany	5	5	10	8	6	11	12	10	3	6	5	7	13	7	5	10	13	11	4
Hungary	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ireland	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Italy	0	1	0	0	2	0	1	1	2	0	1	0	1	1	2	0	1	2	4
Netherlands	3	0	1	0	0	1	2	4	0	0	5	3	1	4	1	5	9	4	3
Spain	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	2	0
Sweden	0	0	0	1	0	0	1	0	1	0	0	0	1	0	0	0	0	6	1
United Kingdom	1	0	1	1	2	1	0	1	5	3	4	2	2	8	3	5	8	7	10
All others	0	0	0	0	1	1	0	0	0	0	1	0	0	0	0	0	0	0	1
Other Europe	0	3	0	1	0	1	3	3	1	2	2	1	2	2	2	4	2	1	4
Former Soviet Union	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Norway	0	3	0	1	0	1	3	1	1	1	1	0	1	0	0	2	2	0	0
Russia	0	0	0	0	0	0	0	1	0	0	0	0	1	1	1	2	0	0	3
Switzerland	0	0	0	0	0	0	0	0	0	1	0	1	0	1	1	0	0	1	1
All others	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Asia	30	42	40	45	40	54	43	29	45	48	34	42	68	65	90	98	71	86	77
China	0	0	1	1	0	1	0	0	0	1	1	0	3	0	1	1	1	6	4
India	0	0	0	0	0	1	0	0	1	1	0	0	2	0	0	0	1	2	3

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Japan	28	36	35	40	35	49	42	26	43	36	28	34	39	40	63	69	54	62	54
Malaysia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Singapore	0	0	0	0	1	0	0	1	0	1	0	0	0	0	0	0	2	1	2
South Korea	2	6	4	3	4	2	0	1	0	4	2	6	20	22	23	18	4	9	11
Taiwan	0	0	0	1	0	1	1	1	1	5	3	2	4	3	3	9	8	6	2
All others	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Middle East	0	0	0	0	0	0	2	0	1	1	0	2	0	2	3	2	4	2	8
Israel	0	0	0	0	0	0	1	0	1	0	0	2	0	2	1	2	3	1	3
All others	0	0	0	0	0	0	1	0	0	1	0	0	0	0	2	0	1	1	6
Africa	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
South Africa	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
All others	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Australia and Oceania	1	2	0	0	0	1	0	2	0	2	2	2	1	3	1	2	2	2	3
Australia	1	2	0	0	0	0	0	2	0	2	2	2	1	3	1	2	1	2	3
New Zealand	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0
Unclassified	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

EU = European Union; USPTO = U.S. Patent and Trademark Office.

**Note(s)**

CHAPTER 6 | Industry, Technology, and the Global Marketplace

Patents are fractionally allocated among regions, countries, or economies based on the proportion of residences of all named inventors. The EU includes 28 member countries. Technologies are based on a classification developed by The Patent Board.

Source(s)

Science-Metrix; PatentsView and USPTO patent data.

*Science and Engineering Indicators 2018*



CHAPTER 6 | Industry, Technology, and the Global Marketplace

APPENDIX TABLE 6-69

USPTO patents granted in cleaner coal technology, by region, country, or economy: 1998–2016																			
(Number)																			
Region, country, or economy	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
World	68	47	51	37	38	52	32	42	30	23	31	43	66	71	70	118	93	88	83
North America	43	31	35	26	29	43	22	29	23	19	23	27	42	49	52	65	58	57	43
Canada	2	0	2	0	1	0	3	0	1	1	0	1	0	1	0	2	1	1	1
Mexico	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Puerto Rico	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
United States	41	31	33	26	28	43	19	29	22	18	23	27	42	48	52	62	57	56	42
Central and South America	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Argentina	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Brazil	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
All others	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Europe	7	7	5	4	5	3	2	4	1	2	3	7	4	7	7	15	16	9	10
EU	7	7	4	4	4	3	2	4	1	2	3	4	4	7	7	14	14	8	8
Austria	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	2	0
Belgium	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0
Denmark	0	0	1	0	0	1	0	0	0	0	1	0	0	1	0	0	0	0	0
Finland	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
France	0	1	2	0	1	0	1	1	0	1	0	0	0	0	2	1	1	0	2
Germany	5	5	1	1	3	1	1	2	1	0	0	1	2	2	3	7	9	3	1
Hungary	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ireland	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Italy	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0
Netherlands	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0
Spain	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Sweden	1	0	0	0	0	0	0	1	0	0	0	2	1	1	0	0	1	1	2
United Kingdom	1	1	0	1	0	0	0	0	0	0	2	0	0	3	1	3	2	1	1
All others	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	1
Other Europe	0	0	1	0	1	0	0	0	0	0	0	4	1	0	0	1	2	1	2
Former Soviet Union	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Norway	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1	0	1
Russia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Switzerland	0	0	1	0	1	0	0	0	0	0	0	4	0	0	0	0	1	0	1
All others	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Asia	15	8	9	7	2	4	7	8	5	1	4	6	17	13	8	33	16	16	29
China	0	0	0	0	1	0	0	0	0	0	0	0	2	2	2	4	2	1	7
India	0	0	0	0	0	0	0	0	0	0	0	0	1	1	2	2	3	2	3

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Japan	15	6	9	7	1	4	7	6	4	1	3	5	14	10	5	25	10	13	17
Malaysia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Singapore	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
South Korea	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	2	1	1	2
Taiwan	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
All others	0	0	0	0	0	0	0	2	0	0	1	1	0	0	0	0	0	0	0
Middle East	2	0	0	0	0	2	1	0	0	0	0	0	1	1	0	1	1	2	1
Israel	2	0	0	0	0	2	1	0	0	0	0	0	1	1	0	1	1	2	0
All others	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Africa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0
South Africa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0
All others	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Australia and Oceania	1	1	2	0	2	0	0	1	2	1	1	2	2	1	1	3	2	3	0
Australia	1	1	2	0	2	0	0	1	2	1	1	2	2	1	1	3	2	3	0
New Zealand	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Unclassified	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0

EU = European Union; USPTO = U.S. Patent and Trademark Office.

**Note(s)**

CHAPTER 6 | Industry, Technology, and the Global Marketplace

Patents are fractionally allocated among regions, countries, or economies based on the proportion of residences of all named inventors. The EU includes 28 member countries. Technologies are based on a classification developed by The Patent Board.

Source(s)

Science-Metrix; PatentsView and USPTO patent data.

*Science and Engineering Indicators 2018*

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

APPENDIX TABLE 6-70

## USPTO patents granted in capture and storage of carbon and other greenhouse gases technologies, by region, country, or economy: 1998–2016

(Number)

Region, country, or economy	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
World	70	89	101	99	97	98	87	79	63	61	70	103	165	166	210	346	346	294	300
North America	31	58	69	55	56	64	55	49	38	34	46	69	111	121	144	206	196	164	149
Canada	1	2	2	2	1	3	0	4	4	3	0	2	8	4	8	12	6	8	9
Mexico	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Puerto Rico	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
United States	30	56	68	53	55	61	54	45	34	31	46	67	102	117	136	193	190	155	140
Central and South America	0	0	1	0	1	0	0	0	0	0	0	0	0	1	0	0	1	2	1
Argentina	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Brazil	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	2	0
All others	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	1
Europe	18	14	16	26	24	18	14	12	14	16	15	18	31	28	34	70	78	59	52
EU	15	13	15	21	22	15	12	9	10	15	14	15	28	22	31	62	69	47	43
Austria	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1	2
Belgium	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	1	1	0	0
Denmark	0	0	0	0	0	0	1	1	0	0	1	0	1	1	4	3	3	1	2
Finland	0	1	0	0	0	0	1	0	0	0	0	1	0	1	0	0	2	2	0

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
France	5	2	6	12	9	7	6	4	4	8	2	4	7	3	7	11	10	4	13
Germany	7	2	7	3	7	3	4	2	2	4	6	8	10	10	5	24	21	19	16
Hungary	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0
Ireland	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Italy	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	1	1	2	4
Netherlands	1	4	0	0	2	0	0	1	0	2	2	1	5	5	4	6	11	5	1
Spain	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	2	1	0
Sweden	0	1	0	1	0	0	0	0	0	0	1	0	0	0	2	1	3	2	2
United Kingdom	2	4	2	3	1	4	1	1	2	2	2	1	4	3	9	12	14	11	2
All others	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	1	0	0	1
Other Europe	3	1	1	5	2	3	2	3	4	1	1	3	3	5	3	8	9	12	9
Former Soviet Union	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Norway	2	1	0	4	0	2	2	2	1	1	0	2	3	3	1	5	6	8	5
Russia	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1	0	1
Switzerland	1	0	1	1	2	1	0	0	3	0	0	0	1	2	1	3	3	5	4
All others	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Asia	19	14	15	16	15	14	16	17	9	11	7	14	22	15	29	57	62	57	84
China	1	0	0	0	0	0	0	0	0	0	0	0	5	2	2	2	2	0	5
India	0	0	0	0	0	0	1	0	0	0	0	0	1	0	1	0	1	2	5

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Japan	16	14	15	14	15	12	14	16	9	8	7	10	10	9	15	42	45	39	53
Malaysia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Singapore	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
South Korea	1	0	0	0	0	1	0	0	0	2	0	2	5	4	8	12	13	11	19
Taiwan	1	0	0	2	0	1	1	1	0	0	0	2	1	0	3	1	1	3	2
All others	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0
Middle East	1	1	0	1	0	1	1	0	0	0	1	0	0	0	0	1	3	6	9
Israel	1	1	0	0	0	1	1	0	0	0	0	0	0	0	0	0	1	0	2
All others	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	1	2	6	7
Africa	0	1	0	1	0	0	0	1	0	0	0	0	0	0	1	1	0	1	0
South Africa	0	1	0	1	0	0	0	1	0	0	0	0	0	0	1	1	0	1	0
All others	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Australia and Oceania	1	1	0	0	1	0	0	0	2	0	0	2	1	1	2	11	7	5	6
Australia	1	1	0	0	1	0	0	0	2	0	0	2	1	1	1	7	7	4	5
New Zealand	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	3	0	1	1
Unclassified	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

EU = European Union; USPTO = U.S. Patent and Trademark Office.

**Note(s)**

CHAPTER 6 | Industry, Technology, and the Global Marketplace

Patents are fractionally allocated among regions, countries, or economies based on the proportion of residences of all named inventors. The EU includes 28 member countries. Technologies are based on a classification developed by The Patent Board.

Source(s)

Science-Metrix; PatentsView and USPTO patent data.

*Science and Engineering Indicators 2018*



CHAPTER 6 | Industry, Technology, and the Global Marketplace

APPENDIX TABLE 6-71

USPTO patents granted in air pollution control technology, by region, country, or economy: 1998–2016																			
(Number)																			
Region, country, or economy	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
World	826	807	813	888	814	860	864	761	759	702	724	864	1,165	1,203	1,359	1,554	1,585	1,550	1,447
North America	407	383	405	430	426	399	409	377	391	343	358	437	573	596	666	740	754	708	658
Canada	11	13	17	18	22	14	16	17	15	14	17	13	22	20	27	22	26	29	25
Mexico	0	0	0	0	0	0	1	0	0	0	1	0	0	1	2	1	0	1	2
Puerto Rico	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
United States	396	370	388	412	404	385	393	360	376	329	340	424	551	575	636	717	727	678	630
Central and South America	1	2	0	0	0	1	0	2	1	0	1	0	2	1	2	5	3	1	4
Argentina	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0
Brazil	0	0	0	0	0	0	0	1	1	0	0	0	2	1	0	2	1	1	2
All others	1	2	0	0	0	0	0	1	0	0	1	0	0	0	2	2	1	0	2
Europe	168	204	179	224	177	195	174	152	148	152	145	172	250	243	254	366	369	341	316
EU	160	193	174	212	171	188	170	143	144	146	140	161	243	237	251	355	352	326	304
Austria	3	3	0	3	3	2	3	4	3	4	1	2	5	5	6	9	4	10	7
Belgium	1	3	5	3	3	2	2	2	3	1	0	4	4	2	2	10	6	8	11
Denmark	3	4	3	5	1	6	2	3	1	4	3	5	2	5	3	6	11	9	7
Finland	3	2	6	5	1	6	5	2	1	5	4	4	5	4	4	4	6	4	4

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
France	23	28	33	33	26	19	17	11	15	22	21	27	33	30	24	46	31	24	28
Germany	85	101	97	123	89	108	98	84	87	75	72	80	130	130	142	187	177	147	148
Hungary	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	1	0	0	0
Ireland	0	0	1	0	0	0	1	0	0	1	0	1	1	1	0	0	0	0	1
Italy	6	7	4	6	9	7	6	6	5	4	4	8	3	6	9	9	17	17	7
Netherlands	2	12	4	9	5	5	4	4	2	2	3	5	11	11	9	15	19	14	7
Spain	1	1	0	0	1	0	0	0	0	0	0	1	0	0	1	1	3	3	0
Sweden	11	10	8	11	16	10	12	10	9	9	15	10	17	13	13	21	28	34	27
United Kingdom	22	22	11	13	15	22	21	16	18	17	18	15	28	25	34	44	47	54	55
All others	0	1	1	0	1	2	1	0	1	2	0	0	3	4	4	2	1	1	2
Other Europe	8	11	5	12	6	7	4	8	4	6	5	11	7	5	3	10	17	16	12
Former Soviet Union	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Norway	1	1	0	5	2	3	1	4	1	2	2	3	3	3	0	4	6	6	6
Russia	1	3	0	2	0	0	1	2	2	0	1	2	1	0	1	2	1	1	1
Switzerland	5	6	5	5	4	3	2	2	1	4	2	4	2	2	2	2	9	8	5
All others	1	1	0	0	0	0	0	0	1	0	0	1	0	0	0	1	0	0	0
Asia	244	212	225	228	206	262	277	225	217	202	217	252	337	358	422	421	447	476	451
China	3	0	2	2	2	5	3	1	2	7	5	4	13	12	11	16	17	16	26
India	0	0	3	1	0	0	2	0	0	1	1	0	1	1	5	5	9	6	9

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Japan	220	196	206	201	186	229	253	205	199	175	190	229	292	316	370	348	368	389	359
Malaysia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0
Singapore	0	0	0	1	0	1	1	1	0	0	0	1	0	0	0	1	0	3	3
South Korea	11	7	9	11	10	15	12	7	9	12	16	12	20	20	29	44	47	52	44
Taiwan	9	9	5	12	8	12	6	10	8	7	5	4	9	7	6	6	4	9	10
All others	1	0	0	0	1	0	0	0	0	0	0	1	1	1	0	0	2	1	0
Middle East	1	2	0	4	3	3	2	2	0	3	2	3	3	3	6	12	9	14	13
Israel	1	1	0	3	3	3	1	2	0	0	1	2	2	1	2	3	2	3	2
All others	1	1	0	1	0	0	1	0	0	3	1	1	1	2	4	9	7	11	10
Africa	1	2	2	0	0	0	0	0	2	1	1	0	0	0	2	0	1	0	0
South Africa	1	2	2	0	0	0	0	0	2	1	1	0	0	0	2	0	1	0	0
All others	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Australia and Oceania	4	4	1	2	2	0	1	3	0	1	0	0	1	2	7	10	3	10	6
Australia	4	4	1	1	2	0	1	3	0	1	0	0	1	2	6	9	3	9	5
New Zealand	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	1	0	1	1
Unclassified	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

EU = European Union; USPTO = U.S. Patent and Trademark Office.

**Note(s)**

CHAPTER 6 | Industry, Technology, and the Global Marketplace

Patents are fractionally allocated among regions, countries, or economies based on the proportion of residences of all named inventors. The EU includes 28 member countries. Technologies are based on a classification developed by The Patent Board.

Source(s)

Science-Metrix; PatentsView and USPTO patent data.

*Science and Engineering Indicators 2018*

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

APPENDIX TABLE 6-72

## USPTO patents granted in solid waste control technology, by region, country, or economy: 1998–2016

(Number)

Region, country, or economy	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
World	368	311	305	281	279	218	189	171	172	151	156	150	210	178	224	222	244	222	207
North America	238	197	198	163	170	119	112	105	112	103	101	115	118	123	150	132	155	130	136
Canada	8	12	17	10	15	6	9	10	8	5	8	9	7	11	13	7	7	7	12
Mexico	1	0	0	0	2	1	0	0	0	0	0	0	0	0	3	2	1	0	0
Puerto Rico	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
United States	230	185	180	153	153	113	103	95	105	98	93	107	111	112	134	123	147	123	124
Central and South America	2	1	0	0	2	1	2	0	0	0	2	0	0	1	1	0	0	0	1
Argentina	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Brazil	2	1	0	0	0	0	1	0	0	0	1	0	0	1	0	0	0	0	0
All others	0	0	0	0	1	0	1	0	0	0	1	0	0	0	1	0	0	0	1
Europe	75	62	61	58	50	44	40	31	25	24	25	14	45	24	23	45	34	38	26
EU	61	56	54	46	43	42	36	25	23	21	21	12	39	22	19	41	31	34	22
Austria	1	1	2	2	2	2	1	2	0	0	0	0	2	0	0	0	0	3	2
Belgium	2	0	0	1	2	1	0	1	3	1	1	0	0	1	2	1	0	0	1
Denmark	1	4	1	4	3	1	0	2	0	0	0	0	2	2	1	1	0	0	1
Finland	3	4	2	4	2	3	2	1	0	1	0	1	0	0	0	1	0	1	1

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
France	13	10	9	4	8	8	7	7	6	7	3	3	5	3	1	7	7	6	5
Germany	19	17	25	10	10	14	14	6	7	4	7	3	10	4	3	14	8	7	1
Hungary	1	0	0	0	1	0	0	0	0	0	1	0	0	0	0	1	1	0	0
Ireland	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	2	1	1	0
Italy	3	1	1	4	3	3	3	2	1	1	0	1	3	2	4	1	7	4	1
Netherlands	1	1	3	2	0	3	3	0	0	1	0	0	1	3	0	1	1	0	0
Spain	1	1	1	1	0	0	1	0	0	1	0	0	1	0	0	1	1	1	0
Sweden	6	5	1	5	4	0	2	3	1	1	0	1	3	1	1	3	0	1	1
United Kingdom	7	10	9	8	7	5	3	1	5	4	6	2	8	5	5	7	2	8	7
All others	2	1	1	2	0	2	1	0	0	1	3	0	3	0	1	1	1	2	2
Other Europe	14	7	7	11	6	1	4	6	2	2	4	2	6	2	4	4	3	4	5
Former Soviet Union	2	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1
Norway	0	1	1	1	0	0	0	3	0	0	0	0	2	0	1	0	1	2	1
Russia	1	2	2	5	2	1	1	1	1	2	2	1	1	1	2	3	1	0	2
Switzerland	10	4	5	6	3	0	2	1	1	0	2	1	3	1	1	1	1	2	1
All others	1	0	0	0	1	0	1	0	0	0	0	0	0	0	0	1	0	0	0
Asia	51	45	41	55	52	48	30	31	28	18	23	17	38	21	42	42	46	44	35
China	1	0	1	1	0	1	1	3	3	2	1	5	1	3	6	7	12	9	10
India	0	0	0	0	0	0	1	2	0	0	1	0	1	0	3	0	3	3	0

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Japan	34	35	37	40	39	34	25	20	17	12	14	5	20	13	13	18	20	14	13
Malaysia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Singapore	1	0	0	1	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0
South Korea	4	4	2	7	6	4	3	0	5	3	4	3	8	5	11	10	8	12	10
Taiwan	10	6	1	6	6	8	0	5	2	1	3	4	6	0	8	4	2	5	2
All others	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	2	0	0	0
Middle East	1	4	3	1	1	2	1	1	2	1	1	2	5	2	6	2	6	5	6
Israel	1	4	3	1	1	2	1	1	2	1	1	1	4	0	4	2	3	3	4
All others	0	0	0	0	0	0	0	0	0	0	0	0	1	2	2	0	3	2	2
Africa	0	0	1	0	0	0	0	1	3	1	1	0	2	0	0	0	1	1	0
South Africa	0	0	1	0	0	0	0	1	3	1	1	0	2	0	0	0	1	1	0
All others	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Australia and Oceania	1	2	1	4	4	4	3	2	3	4	2	1	1	7	3	1	2	5	2
Australia	1	1	1	4	4	4	3	2	3	4	1	1	1	6	3	1	2	5	2
New Zealand	0	1	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0
Unclassified	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

EU = European Union; USPTO = U.S. Patent and Trademark Office.

**Note(s)**



CHAPTER 6 | Industry, Technology, and the Global Marketplace

Patents are fractionally allocated among regions, countries, or economies based on the proportion of residences of all named inventors. The EU includes 28 member countries. Technologies are based on a classification developed by The Patent Board.

Source(s)

Science-Metrix; PatentsView and USPTO patent data.

*Science and Engineering Indicators 2018*



CHAPTER 6 | Industry, Technology, and the Global Marketplace

APPENDIX TABLE 6-73

USPTO patents granted in water pollution control technology, by region, country, or economy: 1998–2016																			
(Number)																			
Region, country, or economy	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
World	362	404	460	484	444	402	382	326	336	412	367	381	457	443	482	487	506	521	520
North America	236	274	312	318	284	271	261	225	247	272	249	258	288	284	293	312	303	313	327
Canada	21	23	33	30	31	21	23	16	17	15	22	21	18	23	27	24	17	24	19
Mexico	0	0	1	3	1	1	0	1	0	0	1	0	0	0	1	2	2	1	0
Puerto Rico	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
United States	214	252	278	285	252	249	238	208	230	257	227	236	270	261	265	285	284	288	308
Central and South America	0	0	0	2	2	1	2	1	0	3	2	4	0	9	0	2	2	7	8
Argentina	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0
Brazil	0	0	0	0	1	1	1	0	0	1	1	0	0	4	0	0	0	0	3
All others	0	0	0	2	1	0	1	1	0	2	1	4	0	5	0	1	2	6	5
Europe	63	70	73	87	73	51	47	44	28	52	43	44	78	56	66	63	82	70	77
EU	56	60	68	78	70	48	43	40	25	46	39	40	71	48	56	52	75	62	63
Austria	4	1	0	1	2	1	1	2	1	1	3	1	3	0	1	0	1	3	2
Belgium	1	0	2	1	1	1	3	0	1	1	1	2	1	1	2	3	5	2	3
Denmark	0	4	4	5	3	2	0	1	0	0	6	5	3	3	4	1	0	2	0
Finland	1	1	1	2	2	2	2	0	2	1	1	0	5	0	0	3	4	2	1

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
France	7	9	10	17	14	10	6	7	5	12	8	6	12	10	11	13	7	8	9
Germany	20	24	25	28	24	16	8	15	6	12	8	10	19	15	17	16	23	21	19
Hungary	0	0	0	0	0	0	0	0	0	0	1	0	2	1	0	0	1	1	0
Ireland	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	1	0
Italy	4	1	5	1	2	2	2	0	1	2	4	1	5	0	3	4	2	4	8
Netherlands	3	8	4	5	11	4	4	3	0	1	1	2	4	6	0	1	8	6	6
Spain	0	1	0	2	1	0	1	1	0	1	2	1	2	1	0	1	3	0	2
Sweden	7	2	8	6	4	1	6	4	2	3	3	2	9	3	5	1	2	2	4
United Kingdom	6	7	6	9	4	7	9	6	6	9	2	10	4	6	11	6	15	7	4
All others	3	2	2	1	1	0	0	2	0	2	1	0	2	1	1	1	3	3	5
Other Europe	7	9	6	10	3	4	4	4	3	6	3	5	7	8	10	12	8	8	13
Former Soviet Union	0	0	0	1	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0
Norway	2	2	1	1	0	1	2	1	1	2	0	3	5	2	4	3	0	2	9
Russia	4	4	2	5	2	3	1	1	1	1	3	1	2	3	2	4	3	0	1
Switzerland	1	3	3	2	1	0	1	2	0	2	0	0	1	2	4	4	5	6	3
All others	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Asia	55	54	62	64	72	63	60	45	52	74	63	66	73	76	97	84	84	101	84
China	2	1	1	2	2	0	1	1	4	4	3	4	6	7	14	10	20	19	15
India	1	0	1	0	1	6	0	4	2	4	2	5	1	5	3	3	4	4	6

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Japan	31	38	49	50	47	47	42	29	35	45	44	32	46	45	56	37	35	44	39
Malaysia	0	0	0	0	0	0	0	0	0	1	0	0	1	0	1	1	0	1	0
Singapore	0	0	0	0	0	0	1	0	0	0	2	1	0	1	1	0	0	2	1
South Korea	17	11	5	6	14	7	10	3	7	7	4	13	14	7	11	23	17	25	18
Taiwan	4	4	6	6	8	2	6	8	4	12	10	11	4	9	11	10	6	6	4
All others	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	1	1	0	1
Middle East	3	2	6	3	3	7	3	3	3	5	2	5	7	10	14	19	15	22	18
Israel	3	1	3	3	1	6	2	2	2	3	1	4	6	7	7	7	7	6	7
All others	0	1	3	0	2	1	1	1	1	2	1	1	1	3	7	11	8	16	11
Africa	0	0	2	7	2	1	2	2	4	3	0	1	1	2	2	4	1	2	3
South Africa	0	0	2	7	2	1	1	2	3	2	0	0	1	2	2	2	1	1	2
All others	0	0	0	0	0	0	1	0	1	1	0	1	0	0	0	2	0	1	1
Australia and Oceania	4	3	3	3	8	7	7	6	2	4	7	4	10	6	9	2	18	7	4
Australia	4	2	3	3	8	6	7	6	2	4	6	3	7	6	9	2	17	7	4
New Zealand	1	1	0	0	0	1	0	0	0	0	1	1	3	0	0	0	1	0	0
Unclassified	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0

EU = European Union; USPTO = U.S. Patent and Trademark Office.

**Note(s)**

CHAPTER 6 | Industry, Technology, and the Global Marketplace

Patents are fractionally allocated among regions, countries, or economies based on the proportion of residences of all named inventors. The EU includes 28 member countries. Technologies are based on a classification developed by The Patent Board.

Source(s)

Science-Metrix; PatentsView and USPTO patent data.

*Science and Engineering Indicators 2018*

# CHAPTER 6 | Industry, Technology, and the Global Marketplace

APPENDIX TABLE 6-74

## USPTO patents granted in recycling technology, by region, country, or economy: 1998–2016

(Number)

Region, country, or economy	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
World	330	288	242	257	235	226	197	133	125	129	111	141	186	204	225	275	282	285	248
North America	199	191	135	151	132	124	108	68	58	55	65	83	100	109	120	147	153	135	132
Canada	17	19	10	12	10	9	11	8	8	5	9	5	4	7	11	8	18	10	6
Mexico	1	0	0	0	2	1	0	0	0	1	0	0	1	1	3	2	0	0	1
Puerto Rico	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
United States	181	172	125	139	119	114	97	60	50	49	55	78	95	100	106	137	135	125	125
Central and South America	0	1	0	1	1	1	1	0	0	1	0	0	2	6	2	4	2	1	4
Argentina	0	1	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0
Brazil	0	0	0	1	1	0	0	0	0	0	0	0	1	4	0	4	1	1	3
All others	0	0	0	0	0	0	1	0	0	1	0	0	1	1	2	0	1	0	2
Europe	62	55	53	60	51	49	31	22	24	37	16	23	40	42	50	53	56	69	56
EU	53	53	45	55	51	47	28	19	20	34	13	19	37	42	47	49	54	67	51
Austria	2	2	1	0	4	3	1	3	3	8	0	3	0	2	3	3	5	7	9
Belgium	0	1	1	2	1	2	1	0	4	3	0	1	2	2	1	6	5	1	2
Denmark	0	2	0	0	2	1	0	0	0	0	1	0	2	2	0	0	0	0	1
Finland	2	3	1	5	3	5	0	2	1	1	2	1	1	0	5	0	1	3	2

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
France	4	5	9	9	5	1	2	1	0	2	1	3	8	4	4	4	3	8	7
Germany	24	24	21	23	17	18	12	5	4	5	5	5	7	19	18	12	18	27	10
Hungary	0	0	0	0	1	1	0	1	0	0	0	0	0	0	0	0	0	0	1
Ireland	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0
Italy	7	4	5	1	3	5	6	0	3	3	2	2	9	3	5	6	4	6	6
Netherlands	5	5	1	1	4	1	0	1	2	2	0	0	0	4	2	2	3	3	1
Spain	0	0	1	1	0	1	0	0	0	1	1	0	0	1	1	7	2	1	0
Sweden	2	2	3	3	3	2	1	2	2	2	0	1	1	0	0	4	1	0	1
United Kingdom	7	5	2	8	6	6	3	2	1	7	1	2	3	2	5	2	9	6	9
All others	0	0	0	1	2	2	2	2	0	1	1	1	3	2	2	2	2	6	1
Other Europe	9	2	8	5	0	2	2	3	4	3	3	4	3	0	3	4	2	2	5
Former Soviet Union	2	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	1	0	1
Norway	0	1	0	1	0	0	2	0	1	0	0	0	0	0	0	1	0	0	1
Russia	1	0	0	0	0	1	0	1	1	2	2	1	1	0	1	0	0	1	1
Switzerland	6	1	8	4	0	1	1	2	2	0	1	2	2	0	2	2	0	1	3
All others	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Asia	62	40	50	42	50	46	53	41	41	33	25	30	42	44	45	63	56	66	49
China	3	0	0	0	2	2	2	1	3	1	0	2	0	2	5	5	10	12	11
India	0	0	1	2	3	0	2	2	1	2	0	3	1	2	1	0	3	0	3

## CHAPTER 6 | Industry, Technology, and the Global Marketplace

Region, country, or economy	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Japan	48	31	46	29	34	36	40	31	32	21	19	21	32	30	26	34	27	30	25
Malaysia	1	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Singapore	0	0	0	0	0	0	1	0	1	3	0	0	1	0	1	0	0	0	0
South Korea	3	5	2	10	7	0	3	4	1	1	3	4	5	6	7	14	12	18	6
Taiwan	6	3	1	1	3	8	5	3	3	5	3	0	3	5	5	8	5	6	4
All others	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1
Middle East	3	0	1	1	1	3	1	0	1	0	2	1	1	0	5	8	8	11	5
Israel	3	0	1	1	1	3	1	0	1	0	2	1	1	0	2	3	4	4	2
All others	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	6	5	7	3
Africa	0	0	1	1	0	0	1	1	1	0	1	0	0	1	1	0	2	0	0
South Africa	0	0	1	1	0	0	1	1	1	0	1	0	0	1	1	0	2	0	0
All others	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Australia and Oceania	3	1	1	0	1	2	2	1	0	3	2	2	1	2	2	0	5	3	1
Australia	3	1	1	0	1	2	2	1	0	3	2	1	1	2	2	0	4	3	1
New Zealand	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1
Unclassified	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0

EU = European Union; USPTO = U.S. Patent and Trademark Office.

**Note(s)**



CHAPTER 6 | Industry, Technology, and the Global Marketplace

Patents are fractionally allocated among regions, countries, or economies based on the proportion of residences of all named inventors. The EU includes 28 member countries. Technologies are based on a classification developed by The Patent Board.

Source(s)

Science-Metrix; PatentsView and USPTO patent data.

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## CHAPTER 7

# Science and Technology: Public Attitudes and Understanding

## List of Appendix Tables

Appendix Table 7-1	Public interest in selected issues: 1979–2016 .....	7-3
Appendix Table 7-2	Public interest in selected issues, by respondent characteristic: 2016 .....	7-7
Appendix Table 7-3	Primary source of information about current news events, by respondent characteristic: 2016.....	7-11
Appendix Table 7-4	Primary source of information about science and technology, by respondent characteristic: 2016 .....	7-14
Appendix Table 7-5	Primary source respondents used to learn about specific scientific issues, by respondent characteristic: 2016.....	7-17
Appendix Table 7-6	Public interest in selected issues: 1981–2016 .....	7-20
Appendix Table 7-7	Visitors to informal science institutions: 2016 .....	7-22
Appendix Table 7-8	Correct answers to trend factual knowledge of science questions, by respondent characteristic: 1992–2016.....	7-24
Appendix Table 7-9	Correct answers to factual knowledge questions in physical and biological sciences: 1985–2016 .....	7-27
Appendix Table 7-10	Correct answers to factual knowledge questions in physical and biological sciences, by respondent characteristic: 2016 .....	7-29
Appendix Table 7-11	Correct answers to scientific process questions, by respondent characteristic: 2016.....	7-35
Appendix Table 7-12	Public assessment of astrology, by respondent characteristic: 1979–2016 .....	7-38
Appendix Table 7-13	Understanding of the term "scientific study," by respondent characteristic: 2016.....	7-45
Appendix Table 7-14	Understanding of the term "scientific study": 1979–2016.....	7-47
Appendix Table 7-15	Public assessment of benefits and harms of scientific research, by respondent characteristic: 2016 .....	7-48
Appendix Table 7-16	Public assessment of benefits and harms of scientific research: 1979–2016 .....	7-50
Appendix Table 7-17	Public assessment of whether science and technology result in more opportunities for the next generation, by respondent characteristic: 2016 .....	7-51
Appendix Table 7-18	Public assessment of whether science and technology result in more opportunities for the next generation: 1985–2016 .....	7-53
Appendix Table 7-19	Public assessment of whether science makes life change too fast, by respondent characteristic: 2016 .....	7-54
Appendix Table 7-20	Public assessment of whether science makes life change too fast: 1979–2016 .....	7-56
Appendix Table 7-21	Public opinion on whether the federal government should fund basic scientific research, by respondent characteristic: 2016 .....	7-57
Appendix Table 7-22	Public opinion on whether the federal government should fund basic scientific research: 1985–2016 .....	7-59
Appendix Table 7-23	Public assessment of spending, by policy area: 1983–2016.....	7-60

Appendix Table 7-24	Public assessment of spending on science, by respondent characteristic: 2016.....	7-69
Appendix Table 7-25	Public assessment of spending on health, by respondent characteristic: 2016.....	7-71
Appendix Table 7-26	Public assessment of spending on the environment, by respondent characteristic: 2016.....	7-73
Appendix Table 7-27	Public assessment of spending on space, by respondent characteristic: 2016 .....	7-75
Appendix Table 7-28	Public confidence in institutional leaders, by type of institution: 1973–2016 .....	7-77
Appendix Table 7-29	Public confidence in science leaders, by respondent characteristic: 2016 .....	7-81
Appendix Table 7-30	Public perception of scientists: 1983, 1985, 2001, 2012, 2016 .....	7-83
Appendix Table 7-31	Public perception of scientists, by respondent characteristic: 2016 .....	7-85
Appendix Table 7-32	Public assessment of the danger of river, lake, and stream pollution to the environment, by respondent characteristic: 1993, 1994, 2000, 2010, 2016.....	7-87
Appendix Table 7-33	Public assessment of the danger of air pollution from industry to the environment, by respondent characteristic: 1993, 1994, 2000, 2010, 2016 .....	7-91
Appendix Table 7-34	Public assessment of the danger of climate change to the environment, by respondent characteristic: 1993, 1994, 2000, 2010, 2016 .....	7-96
Appendix Table 7-35	Public assessment of the danger of nuclear power stations to the environment, by respondent characteristic: 1993, 1994, 2010, 2016 .....	7-101
Appendix Table 7-36	Public assessment of the danger of modifying genes of crops to the environment, by respondent characteristic: 2000, 2010, 2016.....	7-106
Appendix Table 7-37	Public assessment of the benefits and harms of nanotechnology, by respondent characteristic: 2006, 2008, 2010, 2016 .....	7-111

## CHAPTER 7 | Science and Technology: Public Attitudes and Understanding

APPENDIX TABLE 7-1

## Public interest in selected issues: 1979–2016

(Percent)

Issue	1979 (n = 1,635)	1981 (n = 3,192)	1983 (n = 1,615)	1985 (n = 1,986)	1988 (n = 2,041)	1990 (n = 2,005)	1992 (n = 1,995)	1995 (n = 2,006)	1997 (n = 2,000)	1999 (n = 1,882)	2001 (n = 1,574)	2008 (n = 2,021)	2010 (n = 1,461)	2012 (n = 2,256)	2014 (n = 2,130)	2016 (n = 1,390)
New medical discoveries																
Very interested	NA	NA	NA	68	72	68	66	69	70	68	65	58	60	58	59	60
Moderately interested	NA	NA	NA	29	25	29	31	27	26	28	32	36	35	36	36	35
Not at all interested	NA	NA	NA	3	3	3	3	4	4	4	4	6	5	5	5	5
Don't know or refused to answer	NA	NA	NA	0	*	0	*	*	*	*	0	1	1	1	*	*
Local school issues																
Very interested	38	46	46	47	51	50	54	57	58	54	59	46	54	51	50	44
Moderately interested	37	36	36	39	33	34	35	31	30	34	31	40	36	37	38	43
Not at all interested	25	18	18	14	15	16	12	12	11	12	10	15	9	11	12	13
Don't know or refused to answer	*	*	*	*	*	0	*	*	*	*	*	*	1	1	*	*
Environmental pollution																
Very interested	NA	NA	NA	NA	NA	64	59	52	52	51	48	47	46	45	43	42

## CHAPTER 7 | Science and Technology: Public Attitudes and Understanding

Issue	1979 (n = 1,635)	1981 (n = 3,192)	1983 (n = 1,615)	1985 (n = 1,986)	1988 (n = 2,041)	1990 (n = 2,005)	1992 (n = 1,995)	1995 (n = 2,006)	1997 (n = 2,000)	1999 (n = 1,882)	2001 (n = 1,574)	2008 (n = 2,021)	2010 (n = 1,461)	2012 (n = 2,256)	2014 (n = 2,130)	2016 (n = 1,390)
Moderately interested	NA	NA	NA	NA	NA	31	36	41	40	41	43	42	46	45	47	48
Not at all interested	NA	NA	NA	NA	NA	5	5	6	8	8	8	10	7	9	10	10
Don't know or refused to answer	NA	NA	NA	NA	NA	*	*	*	*	*	0	1	1	1	*	*
Use of new inventions and technologies																
Very interested	33	33	42	39	40	39	37	43	47	41	42	40	40	42	43	42
Moderately interested	51	51	45	49	49	49	53	46	43	48	47	46	48	46	45	46
Not at all interested	15	16	12	12	12	12	10	11	10	10	10	13	10	11	12	12
Don't know or refused to answer	1	*	*	*	*	*	*	*	*	*	1	*	1	1	*	*
New scientific discoveries																
Very interested	36	37	48	44	43	39	36	44	49	45	47	38	41	40	41	42
Moderately interested	49	45	41	43	46	49	49	45	42	43	45	47	50	45	46	42
Not at all interested	15	17	11	12	12	12	15	11	9	11	8	15	8	14	13	15
Don't know or refused to answer	1	*	*	*	0	0	*	*	*	1	*	*	1	1	*	*
Economic issues and business conditions																
Very interested	35	52	57	48	48	51	56	47	47	42	45	46	44	49	43	39

## CHAPTER 7 | Science and Technology: Public Attitudes and Understanding

Issue	1979 (n = 1,635)	1981 (n = 3,192)	1983 (n = 1,615)	1985 (n = 1,986)	1988 (n = 2,041)	1990 (n = 2,005)	1992 (n = 1,995)	1995 (n = 2,006)	1997 (n = 2,000)	1999 (n = 1,882)	2001 (n = 1,574)	2008 (n = 2,021)	2010 (n = 1,461)	2012 (n = 2,256)	2014 (n = 2,130)	2016 (n = 1,390)
Moderately interested	48	37	33	41	42	40	36	42	42	45	45	43	45	40	44	46
Not at all interested	17	10	10	11	10	10	8	11	11	13	10	11	10	10	13	14
Don't know or refused to answer	1	*	1	*	*	*	*	0	*	*	*	*	1	1	*	*
Military and defense policy																
Very interested	NA	NA	43	47	47	55	47	37	35	42	38	38	37	37	35	34
Moderately interested	NA	NA	42	42	42	35	43	46	48	44	44	47	47	47	50	49
Not at all interested	NA	NA	15	11	11	9	10	17	18	14	17	15	15	15	15	17
Don't know or refused to answer	NA	NA	1	*	*	*	*	*	*	*	*	1	1	1	*	*
Space exploration																
Very interested	NA	25	27	29	34	26	22	25	32	28	26	21	23	23	23	24
Moderately interested	NA	43	45	46	44	48	50	49	45	46	47	45	49	44	45	44
Not at all interested	NA	31	28	25	22	26	28	26	22	25	27	34	27	32	31	31
Don't know or refused to answer	NA	*	*	0	1	0	*	*	1	1	*	*	1	1	*	*
International and foreign policy issues																
Very interested	22	35	30	33	33	48	38	21	23	30	28	23	22	21	23	21

## CHAPTER 7 | Science and Technology: Public Attitudes and Understanding

Issue	1979 (n = 1,635)	1981 (n = 3,192)	1983 (n = 1,615)	1985 (n = 1,986)	1988 (n = 2,041)	1990 (n = 2,005)	1992 (n = 1,995)	1995 (n = 2,006)	1997 (n = 2,000)	1999 (n = 1,882)	2001 (n = 1,574)	2008 (n = 2,021)	2010 (n = 1,461)	2012 (n = 2,256)	2014 (n = 2,130)	2016 (n = 1,390)
Moderately interested	53	47	47	51	50	39	47	53	50	47	49	48	48	47	48	49
Not at all interested	24	18	22	16	16	12	15	26	28	23	22	29	29	31	29	29
Don't know or refused to answer	1	*	*	*	*	*	*	*	*	*	*	1	2	1	1	*
Agricultural and farm issues																
Very interested	23	24	NA	30	40	24	NA	21	24	22	29	22	25	22	24	21
Moderately interested	49	47	NA	48	45	48	NA	53	50	50	46	52	55	49	50	48
Not at all interested	28	29	NA	22	15	28	NA	26	26	28	25	26	20	28	26	30
Don't know or refused to answer	*	*	NA	*	0	0	NA	1	*	*	*	*	1	1	*	1

\* = < 0.5% responded. NA = not available; question was not asked.

### Note(s)

Responses to *There are a lot of issues in the news, and it is hard to keep up with every area. I'm going to read you a short list of issues, and for each one I would like you to tell me if you are very interested, moderately interested, or not at all interested.* Percentages may not add to 100% because of rounding.

### Source(s)

National Science Foundation, National Center for Science and Engineering Statistics, Survey of Public Attitudes Toward and Understanding of Science and Technology (1979–2001); NORC at the University of Chicago, General Social Survey (2008–16).

*Science and Engineering Indicators 2018*



## CHAPTER 7 | Science and Technology: Public Attitudes and Understanding

Characteristic	New medical discoveries			Local school issues			Economic issues/ business conditions			Environmental pollution			Use of new inventions/ technologies			New scientific discoveries			Military/ defense policy			Agricultural/ farm issues			Space exploration			International/ foreign policy issues		
	Very interested	Moderately interested	Not at all interested	Very interested	Moderately interested	Not at all interested	Very interested	Moderately interested	Not at all interested	Very interested	Moderately interested	Not at all interested	Very interested	Moderately interested	Not at all interested	Very interested	Moderately interested	Not at all interested	Very interested	Moderately interested	Not at all interested	Very interested	Moderately interested	Not at all interested	Very interested	Moderately interested	Not at all interested	Very interested	Moderately interested	Not at all interested
Science and mathematics education <sup>a</sup>																														
Low ( <i>n</i> = 776)	60	34	6	44	43	12	36	47	17	41	48	10	40	44	15	38	42	19	36	47	17	22	47	30	21	43	35	17	48	35
Middle ( <i>n</i> = 262)	59	37	4	47	41	11	44	43	13	43	48	9	41	47	11	42	45	14	30	51	18	23	46	31	29	40	31	29	44	27
High ( <i>n</i> = 275)	61	36	3	40	46	14	44	48	8	43	48	9	49	48	3	55	39	5	32	52	16	18	52	30	32	50	19	30	57	13
Family income (quartile) <sup>b</sup>																														
Bottom ( <i>n</i> = 336)	61	31	8	44	39	17	32	43	25	49	39	12	47	36	16	46	34	20	36	44	20	31	40	29	29	36	34	17	43	40
Third ( <i>n</i> = 281)	64	31	5	48	42	10	35	49	16	42	48	11	39	48	13	40	43	17	32	50	18	21	51	28	23	43	34	18	51	31
Second ( <i>n</i> = 324)	65	30	4	45	44	11	42	44	14	43	47	10	39	51	9	44	44	13	33	51	17	22	50	28	21	47	32	22	50	27
Top ( <i>n</i> = 318)	55	43	2	41	48	11	48	47	6	40	54	6	41	49	9	43	47	10	35	53	12	14	52	34	24	51	25	28	55	17
Age (years) <sup>b</sup>																														
18–24 ( <i>n</i> = 115)	65	31	4	35	54	11	36	42	21	50	44	6	53	34	12	52	31	16	31	44	25	21	35	44	40	34	26	12	44	44
25–34 ( <i>n</i> = 269)	61	36	2	50	41	9	34	52	14	38	55	7	48	43	9	48	42	10	23	58	19	23	45	31	31	40	28	16	49	34
35–44 ( <i>n</i> = 206)	59	35	6	57	31	12	38	43	19	33	53	14	32	55	13	38	42	20	28	50	22	22	51	27	22	43	35	16	50	34
45–54 ( <i>n</i> = 223)	51	42	6	44	41	14	44	45	10	39	47	13	41	48	10	40	45	14	35	51	13	20	47	32	16	50	32	25	48	26
55–64 ( <i>n</i> = 264)	61	34	5	40	46	14	43	46	11	47	46	7	44	45	11	38	49	13	41	49	10	22	56	22	19	47	34	28	46	26
65 or older ( <i>n</i> = 310)	64	30	5	36	47	16	40	44	15	49	40	10	35	48	16	39	41	19	44	40	15	21	51	28	22	49	29	28	53	19
Trend factual knowledge of science scale (quartile)																														



CHAPTER 7 | Science and Technology: Public Attitudes and Understanding

Characteristic	New medical discoveries			Local school issues			Economic issues/ business conditions			Environmental pollution			Use of new inventions/ technologies			New scientific discoveries			Military/ defense policy			Agricultural/ farm issues			Space exploration			International/ foreign policy issues		
	Very interested	Moderately interested	Not at all interested	Very interested	Moderately interested	Not at all interested	Very interested	Moderately interested	Not at all interested	Very interested	Moderately interested	Not at all interested	Very interested	Moderately interested	Not at all interested	Very interested	Moderately interested	Not at all interested	Very interested	Moderately interested	Not at all interested	Very interested	Moderately interested	Not at all interested	Very interested	Moderately interested	Not at all interested	Very interested	Moderately interested	Not at all interested
Bottom ( <i>n</i> = 250)	62	27	9	50	35	13	35	41	22	43	41	15	35	41	22	31	41	26	36	43	20	24	41	33	14	40	45	12	36	51
Third ( <i>n</i> = 387)	60	36	4	45	43	12	38	49	13	40	51	9	33	52	14	34	47	19	36	47	17	22	51	27	15	44	40	17	48	35
Second ( <i>n</i> = 437)	62	36	3	44	43	13	37	46	17	42	49	9	44	47	9	44	45	11	31	53	15	22	48	29	26	47	27	22	53	26
Top ( <i>n</i> = 316)	56	39	4	39	49	12	46	47	7	46	47	8	53	40	6	58	34	8	34	50	16	18	50	32	42	44	15	34	54	12

<sup>a</sup> For science and mathematics education, "low" equates to five or fewer high school and college science or mathematics courses, "middle" is six through eight courses, and "high" means nine or more courses. Categories do not add to total *n* because "don't know" responses and refusals to respond are not shown.

<sup>b</sup> Categories do not add to total *n* because "don't know" responses and refusals to respond are not shown.

Note(s)

Responses to *There are a lot of issues in the news, and it is hard to keep up with every area. I'm going to read you a short list of issues, and for each one I would like you to tell me if you are very interested, moderately interested, or not at all interested.* Percentages may not add to 100% because of rounding and because "don't know" responses and refusals to respond are not shown.

This table shows the percentage of the nine questions in the trend factual knowledge of science scale that were answered correctly. "Don't know" responses and refusals to respond count as incorrect. Questions in the trend factual knowledge of science scale are:

- *The center of the Earth is very hot.* (True)
- *All radioactivity is man-made.* (False)
- *It is the father's gene that decides whether the baby is a boy or a girl.* (True) or (in 2008) *It is the mother's gene that decides whether the baby is a boy or a girl.* (False) (Split ballot in 2008; 1,506 survey respondents were asked about "father's gene"; 515 survey respondents were asked about "mother's gene.")
- *Lasers work by focusing sound waves.* (False)
- *Electrons are smaller than atoms.* (True)
- *Antibiotics kill viruses as well as bacteria.* (False)
- *The continents on which we live have been moving their locations for millions of years and will continue to move in the future.* (True)
- *Does the Earth go around the Sun, or does the Sun go around the Earth?*(Earth around Sun)
- *How long does it take for the Earth to go around the Sun?*(One year) (Asked only if the respondent answered correctly that the Earth goes around the Sun.)

Source(s)

NORC at the University of Chicago, General Social Survey (2016).



CHAPTER 7 | Science and Technology: Public Attitudes and Understanding

*Science and Engineering Indicators 2018*

## CHAPTER 7 | Science and Technology: Public Attitudes and Understanding

APPENDIX TABLE 7-3

### Primary source of information about current news events, by respondent characteristic: 2016

(Percent)

Characteristic	Newspaper	Magazine	Internet	Book or other print	Television	Radio	Government agency	Family	Friend or colleague	Other	Don't know
All adults ( <i>n</i> = 1,390)	7	*	45	*	37	4	*	2	2	1	*
Sex											
Male ( <i>n</i> = 571)	7	*	49	*	35	5	0	1	3	1	*
Female ( <i>n</i> = 819)	7	1	42	*	40	4	*	4	1	1	*
Formal education											
Less than high school diploma ( <i>n</i> = 169)	4	*	17	1	71	2	0	4	1	0	0
High school diploma ( <i>n</i> = 415)	8	0	39	0	42	5	0	3	2	1	*
Some college ( <i>n</i> = 388)	5	0	54	1	30	4	*	2	3	1	*
Bachelor's degree ( <i>n</i> = 263)	8	1	56	0	26	5	0	3	1	1	0
Graduate or professional degree ( <i>n</i> = 151)	13	2	54	0	26	4	0	*	*	0	0
Science and mathematics education <sup>a</sup>											
Low ( <i>n</i> = 776)	7	*	34	*	48	4	*	3	2	1	*
Middle ( <i>n</i> = 262)	7	1	58	0	24	3	0	2	3	1	0
High ( <i>n</i> = 275)	7	*	65	*	19	5	0	1	2	1	0

## CHAPTER 7 | Science and Technology: Public Attitudes and Understanding

Characteristic	Newspaper	Magazine	Internet	Book or other print	Television	Radio	Government agency	Family	Friend or colleague	Other	Don't know
Family income (quartile) <sup>b</sup>											
Bottom ( <i>n</i> = 336)	5	1	40	0	44	5	0	2	3	1	0
Third ( <i>n</i> = 281)	6	*	39	1	44	4	0	2	2	2	0
Second ( <i>n</i> = 324)	5	*	47	0	38	3	*	3	3	1	0
Top ( <i>n</i> = 318)	10	1	54	*	26	6	0	2	1	*	0
Age (years) <sup>b</sup>											
18–24 ( <i>n</i> = 115)	1	0	74	1	13	*	0	4	5	1	0
25–34 ( <i>n</i> = 269)	2	0	72	*	17	3	*	2	2	1	0
35–44 ( <i>n</i> = 206)	5	0	59	0	28	3	0	2	2	1	0
45–54 ( <i>n</i> = 223)	5	1	43	0	36	6	0	6	2	1	1
55–64 ( <i>n</i> = 264)	8	1	23	*	58	7	0	1	1	1	*
65 or older ( <i>n</i> = 310)	19	1	13	*	62	4	0	*	1	*	1
Verbal ability <sup>c</sup>											
0–4 ( <i>n</i> = 276)	7	1	33	*	49	3	0	2	2	1	1
5 ( <i>n</i> = 256)	5	0	47	1	39	4	0	3	1	*	0
6 ( <i>n</i> = 317)	6	0	44	0	37	4	0	4	3	1	*
7 ( <i>n</i> = 256)	6	0	51	*	33	4	0	2	2	2	0
8–10 ( <i>n</i> = 285)	12	1	50	0	28	5	*	1	2	*	0

## CHAPTER 7 | Science and Technology: Public Attitudes and Understanding

Characteristic	Newspaper	Magazine	Internet	Book or other print	Television	Radio	Government agency	Family	Friend or colleague	Other	Don't know
Trend factual knowledge of science scale (quartile) <sup>d</sup>											
Bottom ( <i>n</i> = 250)	7	1	26	*	54	3	0	4	4	1	2
Third ( <i>n</i> = 387)	10	*	39	0	41	4	0	3	1	1	0
Second ( <i>n</i> = 437)	6	*	48	*	38	4	0	2	2	1	0
Top ( <i>n</i> = 316)	6	1	63	*	21	6	*	1	2	*	0

\* = < 0.5% responded.

<sup>a</sup> For science and mathematics education, "low" equates to five or fewer high school and college science or mathematics courses, "middle" is six through eight courses, and "high" means nine or more courses. Categories do not add to total *n* because "don't know" responses and refusals to respond are not shown.

<sup>b</sup> Categories do not add to total *n* because "don't know" responses and refusals to respond are not shown.

<sup>c</sup> Measure is based on correct responses to a 10-item, multiple-choice test of vocabulary knowledge completed by 1,390 survey respondents. Categories represent the number of correct responses.

<sup>d</sup> See notes to Appendix Table 7-2 for an explanation of the trend factual knowledge of science scale.

### Note(s)

Responses to *We are interested in how people get information about events in the news. Where do you get most of your information about current news events?* Percentages may not add to 100% because of rounding.

### Source(s)

NORC at the University of Chicago, General Social Survey (2016).

*Science and Engineering Indicators 2018*

## CHAPTER 7 | Science and Technology: Public Attitudes and Understanding

APPENDIX TABLE 7-4

### Primary source of information about science and technology, by respondent characteristic: 2016

(Percent)

Characteristic	Newspaper	Magazine	Internet	Book or other print	Television	Radio	Government agency	Family	Friend or colleague	Library	Don't know
All adults ( <i>n</i> = 1,390)	4	6	55	3	24	2	*	3	2	1	1
Sex											
Male ( <i>n</i> = 571)	4	6	59	3	23	2	*	2	1	*	1
Female ( <i>n</i> = 819)	4	6	52	3	25	2	*	4	2	1	1
Formal education											
Less than high school diploma ( <i>n</i> = 169)	4	5	24	4	51	3	0	2	3	1	4
High school diploma ( <i>n</i> = 415)	4	5	51	3	29	1	0	4	2	1	*
Some college ( <i>n</i> = 388)	3	6	63	3	18	2	*	2	1	1	1
Bachelor's degree ( <i>n</i> = 263)	5	6	67	2	13	3	*	2	1	1	0
Graduate or professional degree ( <i>n</i> = 151)	5	8	61	4	15	3	0	3	0	0	0
Science and mathematics education <sup>a</sup>											
Low ( <i>n</i> = 776)	5	5	45	3	34	2	*	2	2	1	1
Middle ( <i>n</i> = 262)	3	6	67	3	13	2	0	2	2	1	0
High ( <i>n</i> = 275)	5	7	73	2	6	3	*	3	1	1	0

## CHAPTER 7 | Science and Technology: Public Attitudes and Understanding

Characteristic	Newspaper	Magazine	Internet	Book or other print	Television	Radio	Government agency	Family	Friend or colleague	Library	Don't know
Family income (quartile) <sup>b</sup>											
Bottom ( <i>n</i> = 336)	2	5	44	4	33	3	*	4	2	1	2
Third ( <i>n</i> = 281)	4	5	50	2	32	2	0	3	2	*	0
Second ( <i>n</i> = 324)	3	7	57	3	23	2	*	3	2	*	0
Top ( <i>n</i> = 318)	6	6	69	2	12	2	0	1	1	1	*
Age (years) <sup>b</sup>											
18–24 ( <i>n</i> = 115)	0	1	81	3	9	1	0	3	1	1	1
25–34 ( <i>n</i> = 269)	2	3	73	*	12	1	*	4	2	2	0
35–44 ( <i>n</i> = 206)	1	3	69	2	19	1	0	2	3	*	*
45–54 ( <i>n</i> = 223)	2	8	53	3	28	2	0	2	2	*	1
55–64 ( <i>n</i> = 264)	4	8	46	4	31	2	*	3	1	*	*
65 or older ( <i>n</i> = 310)	13	9	19	6	40	5	0	2	2	1	3
Trend factual knowledge of science scale (quartile) <sup>c</sup>											
Bottom ( <i>n</i> = 250)	3	4	36	2	41	2	0	4	4	1	4
Third ( <i>n</i> = 387)	6	6	49	4	29	2	0	3	1	1	*
Second ( <i>n</i> = 437)	4	5	60	3	20	2	0	3	1	1	1
Top ( <i>n</i> = 316)	3	6	70	2	12	4	*	1	1	*	0

\* = < 0.5% responded.

## CHAPTER 7 | Science and Technology: Public Attitudes and Understanding

<sup>a</sup> For science and mathematics education, "low" equates to five or fewer high school and college science or mathematics courses, "middle" is six through eight courses, and "high" means nine or more courses. Categories do not add to total  $n$  because "don't know" responses and refusals to respond are not shown.

<sup>b</sup> Categories do not add to total  $n$  because "don't know" responses and refusals to respond are not shown.

<sup>c</sup> See notes to Appendix Table 7-2 for an explanation of the trend factual knowledge of science scale.

### Note(s)

Responses to *We are interested in how people get information about science and technology. Where do you get most of your information about science and technology?*  
Percentages may not add to 100% because of rounding.

### Source(s)

NORC at the University of Chicago, General Social Survey (2016).

*Science and Engineering Indicators 2018*



## CHAPTER 7 | Science and Technology: Public Attitudes and Understanding

APPENDIX TABLE 7-5

### Primary source respondents used to learn about specific scientific issues, by respondent characteristic: 2016

(Percent)

Characteristic	Newspaper	Magazine	Internet	Book or other print	Television	Radio	Government agency	Family	Friend or colleague	Library	Don't know
All adults ( <i>n</i> = 1,390)	3	3	69	7	12	1	2	1	1	1	1
Sex											
Male ( <i>n</i> = 571)	2	3	72	6	12	1	1	1	1	*	1
Female ( <i>n</i> = 819)	3	3	67	7	12	1	2	2	1	1	2
Formal education											
Less than high school diploma ( <i>n</i> = 169)	6	2	44	6	28	2	4	1	1	1	5
High school diploma ( <i>n</i> = 415)	4	3	64	7	14	1	1	2	2	*	1
Some college ( <i>n</i> = 388)	1	3	75	6	8	1	2	2	*	1	1
Bachelor's degree ( <i>n</i> = 263)	2	3	82	5	7	0	1	1	*	0	*
Graduate or professional degree ( <i>n</i> = 151)	4	4	74	10	5	1	1	*	0	*	0
Science and mathematics education <sup>a</sup>											
Low ( <i>n</i> = 776)	4	4	61	7	17	1	2	2	1	1	2
Middle ( <i>n</i> = 262)	2	1	81	5	7	1	2	1	0	*	0
High ( <i>n</i> = 275)	2	4	81	8	4	0	1	*	*	*	0

## CHAPTER 7 | Science and Technology: Public Attitudes and Understanding

Characteristic	Newspaper	Magazine	Internet	Book or other print	Television	Radio	Government agency	Family	Friend or colleague	Library	Don't know
Family income (quartile) <sup>b</sup>											
Bottom ( <i>n</i> = 336)	4	3	55	6	21	2	2	1	2	1	4
Third ( <i>n</i> = 281)	4	2	70	7	12	1	2	2	*	1	0
Second ( <i>n</i> = 324)	2	4	73	7	10	*	2	1	*	*	0
Top ( <i>n</i> = 318)	1	2	82	6	5	1	1	1	1	0	*
Age (years) <sup>b</sup>											
18–24 ( <i>n</i> = 115)	0	4	83	8	3	0	0	0	0	1	1
25–34 ( <i>n</i> = 269)	1	3	81	8	5	0	*	1	*	1	0
35–44 ( <i>n</i> = 206)	2	2	79	5	6	1	2	1	2	1	0
45–54 ( <i>n</i> = 223)	2	4	74	4	10	1	1	1	1	1	2
55–64 ( <i>n</i> = 264)	2	3	61	6	20	2	2	3	1	0	1
65 or older ( <i>n</i> = 310)	9	3	44	10	24	2	3	2	*	1	4
Trend factual knowledge of science scale (quartile) <sup>c</sup>											
Bottom ( <i>n</i> = 250)	4	2	47	7	26	2	3	2	1	*	4
Third ( <i>n</i> = 387)	5	4	67	6	14	1	1	1	1	1	2
Second ( <i>n</i> = 437)	2	3	73	9	7	*	2	2	*	1	1
Top ( <i>n</i> = 316)	1	3	83	5	6	1	1	*	1	*	0

\* = < 0.5% responded.

## CHAPTER 7 | Science and Technology: Public Attitudes and Understanding

<sup>a</sup> For science and mathematics education, "low" equates to five or fewer high school and college science or mathematics courses, "middle" is six through eight courses, and "high" means nine or more courses. Categories do not add to total  $n$  because "don't know" responses and refusals to respond are not shown.

<sup>b</sup> Categories do not add to total  $n$  because "don't know" responses and refusals to respond are not shown.

<sup>c</sup> See notes to Appendix Table 7-2 for an explanation of the trend factual knowledge of science scale.

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**Note(s)**

Responses to *If you wanted to learn about scientific issues such as global warming or biotechnology, where would you get information?* Percentages may not add to 100% because of rounding.

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**Source(s)**

NORC at the University of Chicago, General Social Survey (2016).

*Science and Engineering Indicators 2018*

## CHAPTER 7 | Science and Technology: Public Attitudes and Understanding

APPENDIX TABLE 7-6

### Public interest in selected issues: 1981–2016

(Percent)

Institution	1981 (n = 1,235)	1983 (n = 1,615)	1985 (n = 1,986)	1988 (n = 2,041)	1990 (n = 2,005)	1992 (n = 1,995)	1995 (n = 2,006)	1997 (n = 2,000)	1999 (n = 1,882)	2001 (n = 1,574)	2008 (n = 2,021)	2012 (n = 2,256)	2016 (n = 1,390)
Informal science institution													
Zoo or aquarium	64	49	48	51	51	54	52	51	51	58	52	47	48
Natural history museum	37	29	29	30	30	31	29	30	27	30	28	28	30
Science or technology museum	39	26	24	26	25	21	28	27	30	30	27	25	26
Any informal science institution <sup>a</sup>	72	61	58	59	59	62	61	60	61	66	61	58	58
Public library	NA	NA	67	68	65	69	69	70	72	75	64	60	NA
Art museum	43	32	31	33	31	29	31	30	30	32	34	33	NA

NA = not available; question was not asked.

<sup>a</sup> Visited zoo or aquarium, natural history museum, or science or technology museum at least once.

**Note(s)**

## CHAPTER 7 | Science and Technology: Public Attitudes and Understanding

Responses to *I am going to read you a short list of places and ask you to tell me how many times you visited each type of place during the last year, that is, the last 12 months.* Percentages indicate individuals who visited an institution at least once. Percentages are based on total in the sample, including those who responded "don't know" or refused to respond.

### Source(s)

National Science Foundation, National Center for Science and Engineering Statistics, Survey of Public Attitudes Toward and Understanding of Science and Technology (1981–2001); NORC at the University of Chicago, General Social Survey (2008–16).

*Science and Engineering Indicators 2018*

## CHAPTER 7 | Science and Technology: Public Attitudes and Understanding

APPENDIX TABLE 7-7

### Visitors to informal science institutions: 2016

(Percent)

Characteristic	Informal science institution			
	Zoo or aquarium	Natural history museum	Science or technology museum	Any informal science institution <sup>a</sup>
All adults ( <i>n</i> = 1,390)	48	30	26	58
Sex				
Male ( <i>n</i> = 571)	49	30	28	60
Female ( <i>n</i> = 819)	47	29	25	57
Formal education				
Less than high school diploma ( <i>n</i> = 169)	41	20	13	45
High school diploma ( <i>n</i> = 415)	44	23	18	53
Some college ( <i>n</i> = 388)	52	31	30	62
Bachelor's degree ( <i>n</i> = 263)	49	37	37	64
Graduate or professional degree ( <i>n</i> = 151)	51	46	36	70
Science and mathematics education <sup>b</sup>				
Low ( <i>n</i> = 776)	41	24	18	51
Middle ( <i>n</i> = 262)	54	31	29	66
High ( <i>n</i> = 275)	61	43	47	74
Family income (quartile) <sup>c</sup>				
Bottom ( <i>n</i> = 336)	35	18	16	43
Third ( <i>n</i> = 281)	49	26	18	58
Second ( <i>n</i> = 324)	54	30	27	65
Top ( <i>n</i> = 318)	55	42	42	71
Age (years) <sup>c</sup>				
18–24 ( <i>n</i> = 115)	60	32	36	68
25–34 ( <i>n</i> = 269)	62	33	31	71

## CHAPTER 7 | Science and Technology: Public Attitudes and Understanding

Characteristic	Informal science institution			
	Zoo or aquarium	Natural history museum	Science or technology museum	Any informal science institution <sup>a</sup>
35–44 ( <i>n</i> = 206)	63	36	33	73
45–54 ( <i>n</i> = 223)	44	30	25	58
55–64 ( <i>n</i> = 264)	39	27	22	51
65 or older ( <i>n</i> = 310)	25	22	14	35
Trend factual knowledge of science scale (quartile) <sup>d</sup>				
Bottom ( <i>n</i> = 250)	41	24	15	45
Third ( <i>n</i> = 387)	42	23	18	50
Second ( <i>n</i> = 437)	50	32	30	62
Top ( <i>n</i> = 316)	56	39	39	73

<sup>a</sup> Visited zoo or aquarium, natural history museum, or science or technology museum at least once.

<sup>b</sup> For science and mathematics education, "low" equates to five or fewer high school and college science or mathematics courses, "middle" is six through eight courses, and "high" means nine or more courses. Categories do not add to total *n* because "don't know" responses and refusals to respond are not shown.

<sup>c</sup> Categories do not add to total *n* because "don't know" responses and refusals to respond are not shown.

<sup>d</sup> See notes to Appendix Table 7-2 for an explanation of the trend factual knowledge of science scale.

### Note(s)

Responses to *I am going to read you a short list of places and ask you to tell me how many times you visited each type of place during the last year, that is, the last 12 months*. Percentages indicate individuals who visited an institution at least once. Percentages are based on the *n* in each row, including those who responded "don't know" or refused to respond.

### Source(s)

NORC at the University of Chicago, General Social Survey (2016).

*Science and Engineering Indicators 2018*

## CHAPTER 7 | Science and Technology: Public Attitudes and Understanding

APPENDIX TABLE 7-8 

Correct answers to trend factual knowledge of science questions, by respondent characteristic: 1992–2016

(Percent)

Characteristic	1992 (n = 1,995)	1995 (n = 2,006)	1997 (n = 2,000)	1999 (n = 1,882)	2001 (n = 1,574)	2006 (n = 1,864)	2008 (n = 2,021)	2010 (n = 1,932)	2012 (n = 2,256)	2014 (n = 2,130)	2016 (n = 1,390)
All adults	59	60	60	61	64	64	64	63	65	65	63
Sex											
Male	64	65	66	66	69	69	68	67	70	69	67
Female	55	55	55	57	59	60	60	59	60	61	60
Formal education											
Less than high school diploma	44	44	43	44	45	44	43	42	45	47	43
High school diploma	59	59	60	62	62	62	63	60	62	62	61
Bachelor's degree	73	68	75	77	80	74	77	78	78	77	74
Graduate or professional degree	80	77	80	83	80	82	81	80	81	81	75
Science and mathematics education <sup>a</sup>											
Low	52	52	51	53	55	56	57	54	56	57	55
Middle	66	68	66	71	72	69	70	68	70	72	70
High	79	80	83	82	84	82	82	83	83	82	80
Family income (quartile)											



## CHAPTER 7 | Science and Technology: Public Attitudes and Understanding

Characteristic	1992 (n = 1,995)	1995 (n = 2,006)	1997 (n = 2,000)	1999 (n = 1,882)	2001 (n = 1,574)	2006 (n = 1,864)	2008 (n = 2,021)	2010 (n = 1,932)	2012 (n = 2,256)	2014 (n = 2,130)	2016 (n = 1,390)
Bottom	NA	NA	NA	NA	NA	56	56	54	55	54	57
Third	NA	NA	NA	NA	NA	65	63	63	63	62	58
Second	NA	NA	NA	NA	NA	69	69	69	69	67	64
Top	NA	NA	NA	NA	NA	71	74	73	76	76	73
Age (years)											
18–24	59	63	64	65	66	68	67	64	67	61	61
25–34	64	64	63	65	68	64	67	67	67	66	67
35–44	65	64	66	66	66	67	63	63	67	65	64
45–54	61	62	61	64	68	68	67	65	64	67	65
55–64	53	51	57	58	61	64	65	63	64	68	62
65 or older	47	47	45	46	49	53	54	54	61	59	55
Verbal ability <sup>b</sup>											
0–4	NA	NA	NA	NA	NA	48	47	46	46	50	46
5	NA	NA	NA	NA	NA	60	58	55	59	61	57
6	NA	NA	NA	NA	NA	66	63	63	66	65	62
7	NA	NA	NA	NA	NA	70	73	67	73	70	68
8–10	NA	NA	NA	NA	NA	77	80	80	81	80	79

NA = not available; question was not asked.

## CHAPTER 7 | Science and Technology: Public Attitudes and Understanding

<sup>a</sup> For science and mathematics education, "low" equates to five or fewer high school and college science or mathematics courses, "middle" is six through eight courses, and "high" means nine or more courses.

<sup>b</sup> Measure is based on correct responses to a 10-item, multiple-choice test of vocabulary knowledge. Categories represent the number of correct responses.

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### Note(s)

See notes to Appendix Table 7-2 for an explanation of the trend factual knowledge of science scale.

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### Source(s)

National Science Foundation, National Center for Science and Engineering Statistics, Survey of Public Attitudes Toward and Understanding of Science and Technology (1992–2001); NORC at the University of Chicago, General Social Survey (2006–16).

*Science and Engineering Indicators 2018*

## CHAPTER 7 | Science and Technology: Public Attitudes and Understanding

APPENDIX TABLE 7-9

## Correct answers to factual knowledge questions in physical and biological sciences: 1985–2016

(Percent)

Question	1985 (n = 1,986)	1988 (n = 2,041)	1990 (n = 2,005)	1992 (n = 1,995)	1995 (n = 2,006)	1997 (n = 2,000)	1999 (n = 1,882)	2001 (n = 1,574)	2004 (n = 2,025)	2006 (n = 1,864)	2008 (n = 2,021)	2010 (n = 1,932)	2012 (n = 2,256)	2014 (n = 2,130)	2016 (n = 1,390)
Physical science															
1. <i>The center of the Earth is very hot.</i> (True)	NA	80	79	81	78	82	80	80	78	80	84	84	84	84	85
2. <i>The continents on which we live have been moving their locations for millions of years and will continue to move in the future.</i> (True)	79	80	77	79	78	78	80	79	77	80	78	80	83	82	81
3a. <i>Does the Earth go around the Sun, or does the Sun go around the Earth?</i> (Earth around Sun)	NA	73	73	71	73	73	72	75	71	76	72	73	74	76	73
3b. <i>How long does it take for the Earth to go around the Sun?</i> (One year) <sup>a</sup>	NA	45	48	46	47	48	49	54	NA	55	52	52	55	54	51
4. <i>All radioactivity is man-made.</i> (False)	NA	65	63	73	72	71	71	76	73	70	71	67	72	72	70
5. <i>Electrons are smaller than atoms.</i> (True)	NA	43	41	46	44	43	46	48	45	53	54	51	53	51	48
6. <i>Lasers work by focusing sound waves.</i> (False)	NA	36	37	37	40	39	43	45	42	45	49	47	47	50	45
7. <i>The universe began with a huge explosion.</i> (True) <sup>b</sup>	NA	54	32	38	35	32	33	33	33	33	33	38	39	42	39
Biological science															
1a. <i>It is the father's gene that decides whether the baby is a boy or a girl.</i> (True) <sup>c</sup>	NA	NA	NA	65	64	62	66	65	62	64	62	61	63	59	59
1b. <i>It is the mother's gene that decides whether the baby is a boy or a girl.</i> (False) <sup>d</sup>	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	72	NA	NA	NA	NA

## CHAPTER 7 | Science and Technology: Public Attitudes and Understanding

Question	1985 (n = 1,986)	1988 (n = 2,041)	1990 (n = 2,005)	1992 (n = 1,995)	1995 (n = 2,006)	1997 (n = 2,000)	1999 (n = 1,882)	2001 (n = 1,574)	2004 (n = 2,025)	2006 (n = 1,864)	2008 (n = 2,021)	2010 (n = 1,932)	2012 (n = 2,256)	2014 (n = 2,130)	2016 (n = 1,390)
2. Antibiotics kill viruses as well as bacteria. (False)	NA	25	30	35	40	43	45	51	54	56	54	50	51	55	51
3. Human beings, as we know them today, developed from earlier species of animals. (True) <sup>b</sup>	45	46	45	45	44	44	45	53	42	43	46	47	48	49	52

NA = not available; question was not asked.

<sup>a</sup> Question was asked only of survey respondents who answered correctly that the Earth goes around the Sun. Individuals who responded incorrectly that the Sun goes around the Earth also count as having responded incorrectly to the question on the length of the Earth's revolution around the Sun.

<sup>b</sup> Question was asked of 1,558 survey respondents in 2004 and 1,152 respondents in 2012.

<sup>c</sup> Question was asked of 1,506 survey respondents in 2008.

<sup>d</sup> Question was asked of 515 survey respondents in 2008.

### Note(s)

"Don't know" responses and refusals to respond count as incorrect.

### Source(s)

National Science Foundation, National Center for Science and Engineering Statistics, Survey of Public Attitudes Toward and Understanding of Science and Technology (1985–2001); University of Michigan, Survey of Consumer Attitudes (2004); NORC at the University of Chicago, General Social Survey (2006–16).

*Science and Engineering Indicators 2018*

## CHAPTER 7 | Science and Technology: Public Attitudes and Understanding

APPENDIX TABLE 7-10

## Correct answers to factual knowledge questions in physical and biological sciences, by respondent characteristic: 2016

(Percent)

Characteristic	Physical science								Biological science		
	<i>The center of the Earth is very hot. (True)</i>	<i>The continents on which we live have been moving their locations for millions of years and will continue to move in the future. (True)</i>	<i>Does the Earth go around the Sun, or does the Sun go around the Earth? (Earth around Sun)</i>	<i>All radioactivity is man-made. (False)</i>	<i>How long does it take for the Earth to go around the Sun: one day, one month, or one year?<sup>a</sup> (one year)</i>	<i>Electrons are smaller than atoms. (True)</i>	<i>Lasers work by focusing sound waves. (False)</i>	<i>The universe began with a huge explosion.<sup>b</sup> (True)</i>	<i>It is the father's gene that decides whether the baby is a boy or a girl. (True)</i>	<i>Human beings, as we know them today, developed from earlier species of animals.<sup>c</sup> (True)</i>	<i>Antibiotics kill viruses as well as bacteria. (False)</i>
All adults ( <i>n</i> = 1,390)	85	81	73	70	51	48	45	39	59	52	51
Sex											
Male ( <i>n</i> = 571)	90	86	81	75	61	53	62	46	46	60	45
Female ( <i>n</i> = 819)	82	77	67	66	44	44	33	33	68	48	55
Formal education											
Less than high school ( <i>n</i> = 169)	72	67	49	52	27	23	30	32	45	44	20

## CHAPTER 7 | Science and Technology: Public Attitudes and Understanding

	Physical science								Biological science		
Characteristic	<i>The center of the Earth is very hot. (True)</i>	<i>The continents on which we live have been moving their locations for millions of years and will continue to move in the future. (True)</i>	<i>Does the Earth go around the Sun, or does the Sun go around the Earth? (Earth around Sun)</i>	<i>All radioactivity is man-made. (False)</i>	<i>How long does it take for the Earth to go around the Sun: one day, one month, or one year?<sup>a</sup> (one year)</i>	<i>Electrons are smaller than atoms. (True)</i>	<i>Lasers work by focusing sound waves. (False)</i>	<i>The universe began with a huge explosion.<sup>b</sup> (True)</i>	<i>It is the father's gene that decides whether the baby is a boy or a girl. (True)</i>	<i>Human beings, as we know them today, developed from earlier species of animals.<sup>c</sup> (True)</i>	<i>Antibiotics kill viruses as well as bacteria. (False)</i>
High school diploma ( <i>n</i> = 415)	84	76	68	63	41	42	42	34	50	47	43
Some college ( <i>n</i> = 388)	88	85	77	73	53	52	50	38	61	50	52
Bachelor's degree ( <i>n</i> = 263)	89	87	83	80	71	59	52	44	71	63	73
Graduate or professional degree ( <i>n</i> = 151)	91	88	87	86	70	61	51	50	71	67	68
Science and mathematics education <sup>d</sup>											
Low ( <i>n</i> = 776)	83	76	66	62	41	39	37	35	55	46	41

## CHAPTER 7 | Science and Technology: Public Attitudes and Understanding

	Physical science								Biological science		
Characteristic	The center of the Earth is very hot. (True)	The continents on which we live have been moving their locations for millions of years and will continue to move in the future. (True)	Does the Earth go around the Sun, or does the Sun go around the Earth? (Earth around Sun)	All radioactivity is man-made. (False)	How long does it take for the Earth to go around the Sun: one day, one month, or one year? <sup>a</sup> (one year)	Electrons are smaller than atoms. (True)	Lasers work by focusing sound waves. (False)	The universe began with a huge explosion. <sup>b</sup> (True)	It is the father's gene that decides whether the baby is a boy or a girl. (True)	Human beings, as we know them today, developed from earlier species of animals. <sup>c</sup> (True)	Antibiotics kill viruses as well as bacteria. (False)
Middle ( $n = 262$ )	90	84	85	78	61	52	53	33	64	51	62
High ( $n = 275$ )	92	92	88	88	80	72	64	57	71	70	72
Family income (quartile) <sup>e</sup>											
Bottom ( $n = 336$ )	87	79	64	60	46	47	43	33	51	52	38
Third ( $n = 281$ )	79	80	70	66	46	43	41	32	56	45	44
Second ( $n = 324$ )	85	78	79	70	51	49	43	37	62	45	56
Top ( $n = 318$ )	93	87	84	82	65	55	57	43	68	66	66
Age (years)											

## CHAPTER 7 | Science and Technology: Public Attitudes and Understanding

	Physical science								Biological science		
Characteristic	<i>The center of the Earth is very hot. (True)</i>	<i>The continents on which we live have been moving their locations for millions of years and will continue to move in the future. (True)</i>	<i>Does the Earth go around the Sun, or does the Sun go around the Earth? (Earth around Sun)</i>	<i>All radioactivity is man-made. (False)</i>	<i>How long does it take for the Earth to go around the Sun: one day, one month, or one year?<sup>a</sup> (one year)</i>	<i>Electrons are smaller than atoms. (True)</i>	<i>Lasers work by focusing sound waves. (False)</i>	<i>The universe began with a huge explosion.<sup>b</sup> (True)</i>	<i>It is the father's gene that decides whether the baby is a boy or a girl. (True)</i>	<i>Human beings, as we know them today, developed from earlier species of animals.<sup>c</sup> (True)</i>	<i>Antibiotics kill viruses as well as bacteria. (False)</i>
18–24 ( <i>n</i> = 115)	86	82	78	65	46	56	51	52	45	70	41
25–34 ( <i>n</i> = 269)	89	86	82	65	67	54	52	47	58	61	54
35–44 ( <i>n</i> = 206)	86	84	72	67	55	47	46	43	65	47	51
45–54 ( <i>n</i> = 223)	87	78	76	75	52	51	48	33	65	49	54
55–64 ( <i>n</i> = 264)	87	79	71	72	47	43	46	34	63	42	52
65 or older ( <i>n</i> = 310)	78	75	60	73	40	39	33	27	53	45	48
Verbal ability <sup>f</sup>											
0–4 ( <i>n</i> = 276)	77	73	53	52	31	36	31	38	41	51	25



## CHAPTER 7 | Science and Technology: Public Attitudes and Understanding

	Physical science								Biological science		
Characteristic	<i>The center of the Earth is very hot. (True)</i>	<i>The continents on which we live have been moving their locations for millions of years and will continue to move in the future. (True)</i>	<i>Does the Earth go around the Sun, or does the Sun go around the Earth? (Earth around Sun)</i>	<i>All radioactivity is man-made. (False)</i>	<i>How long does it take for the Earth to go around the Sun: one day, one month, or one year?<sup>a</sup> (one year)</i>	<i>Electrons are smaller than atoms. (True)</i>	<i>Lasers work by focusing sound waves. (False)</i>	<i>The universe began with a huge explosion.<sup>b</sup> (True)</i>	<i>It is the father's gene that decides whether the baby is a boy or a girl. (True)</i>	<i>Human beings, as we know them today, developed from earlier species of animals.<sup>c</sup> (True)</i>	<i>Antibiotics kill viruses as well as bacteria. (False)</i>
5 ( <i>n</i> = 256)	87	77	69	65	43	40	39	35	60	47	38
6 ( <i>n</i> = 317)	86	81	72	69	49	48	41	29	64	43	48
7 ( <i>n</i> = 256)	87	83	81	74	58	50	54	45	58	57	63
8–10 ( <i>n</i> = 285)	91	90	89	91	76	65	64	50	70	66	80
Trend factual knowledge of science scale (quartile) <sup>g</sup>											
Bottom ( <i>n</i> = 250)	53	46	26	30	2	13	15	19	29	30	13
Third ( <i>n</i> = 387)	82	76	58	59	25	35	28	31	52	51	37
Second ( <i>n</i> = 437)	96	91	91	82	69	48	49	40	65	53	56
Top ( <i>n</i> = 316)	99	98	100	97	97	89	85	60	81	70	90

## CHAPTER 7 | Science and Technology: Public Attitudes and Understanding

- <sup>a</sup> Question was asked only of survey respondents who answered correctly that the Earth goes around the Sun. Individuals who responded incorrectly that the Sun goes around the Earth also count as having responded incorrectly to the question on the length of the Earth's revolution around the Sun.
- <sup>b</sup> Question was asked of 457 survey respondents.
- <sup>c</sup> Question was asked of 704 survey respondents.
- <sup>d</sup> For science and mathematics education, "low" equates to five or fewer high school and college science or mathematics courses, "middle" is six through eight courses, and "high" means nine or more courses. Categories do not add to total *n* because "don't know" responses and refusals to respond are not shown.
- <sup>e</sup> Categories do not add to total *n* because "don't know" responses and refusals to respond are not shown.
- <sup>f</sup> Measure is based on correct responses to a 10-item, multiple-choice test of vocabulary knowledge. Categories represent the number of correct responses.
- <sup>g</sup> See notes to Appendix Table 7-2 for an explanation of the trend factual knowledge of science scale.

### Note(s)

"Don't know" responses and refusals to respond count as incorrect.

### Source(s)

NORC at the University of Chicago, General Social Survey (2016).

*Science and Engineering Indicators 2018*

## CHAPTER 7 | Science and Technology: Public Attitudes and Understanding

APPENDIX TABLE 7-11

### Correct answers to scientific process questions, by respondent characteristic: 2016

(Percent)

Characteristic	Scientific inquiry <sup>a</sup>	Probability <sup>b</sup>	Experiment <sup>c</sup>	Scientific study <sup>d</sup>
All adults ( <i>n</i> = 1,390)	43	64	51	23
Sex				
Male ( <i>n</i> = 571)	46	68	52	25
Female ( <i>n</i> = 819)	41	62	50	21
Formal education				
Less than high school diploma ( <i>n</i> = 169)	13	41	26	2
High school diploma ( <i>n</i> = 415)	29	57	37	9
Some college ( <i>n</i> = 388)	48	69	55	26
Bachelor's degree ( <i>n</i> = 263)	61	76	68	42
Graduate or professional degree ( <i>n</i> = 151)	73	80	80	42
Science and mathematics education <sup>e</sup>				
Low ( <i>n</i> = 776)	32	57	41	10
Middle ( <i>n</i> = 262)	52	71	61	35
High ( <i>n</i> = 275)	74	84	77	50
Family income (quartile) <sup>f</sup>				
Bottom ( <i>n</i> = 336)	25	50	34	14
Third ( <i>n</i> = 281)	35	58	50	16
Second ( <i>n</i> = 324)	44	68	52	24
Top ( <i>n</i> = 318)	67	81	71	38
Age (years) <sup>f</sup>				
18–24 ( <i>n</i> = 115)	42	57	51	24
25–34 ( <i>n</i> = 269)	53	70	59	30
35–44 ( <i>n</i> = 206)	45	62	56	24
45–54 ( <i>n</i> = 223)	47	70	54	28
55–64 ( <i>n</i> = 264)	40	65	49	18

## CHAPTER 7 | Science and Technology: Public Attitudes and Understanding

Characteristic	Scientific inquiry <sup>a</sup>	Probability <sup>b</sup>	Experiment <sup>c</sup>	Scientific study <sup>d</sup>
65 or older ( <i>n</i> = 310)	31	59	37	13
Verbal ability <sup>g</sup>				
0–4 ( <i>n</i> = 276)	16	42	22	4
5 ( <i>n</i> = 256)	36	63	45	12
6 ( <i>n</i> = 317)	43	63	55	22
7 ( <i>n</i> = 256)	53	73	61	29
8–10 ( <i>n</i> = 285)	67	82	70	45
Trend factual knowledge of science scale (quartile) <sup>h</sup>				
Bottom ( <i>n</i> = 250)	12	41	21	5
Third ( <i>n</i> = 387)	27	52	41	9
Second ( <i>n</i> = 437)	51	71	56	28
Top ( <i>n</i> = 316)	75	86	77	46

<sup>a</sup> To be classified as understanding scientific inquiry, the survey respondent had to (1) answer correctly the two probability questions stated in footnote b and (2) either provide a theory-testing response to the open-ended question about what it means to study something scientifically (see footnote d) or a correct response to the open-ended question about experiment (i.e., explain why it is better to test a drug using a control group [see footnote c]).

<sup>b</sup> To be classified as understanding probability, the survey respondent had to answer two questions correctly: *A doctor tells a couple that their genetic makeup means that they've got one in four chances of having a child with an inherited illness. (1) Does this mean that if their first child has the illness, the next three will not have the illness?*(No) and (2) *Does this mean that each of the couple's children will have the same risk of suffering from the illness?*(Yes).

<sup>c</sup> To be classified as understanding experiment, the survey respondent had to answer correctly (1) *Two scientists want to know if a certain drug is effective against high blood pressure. The first scientist wants to give the drug to 1,000 people with high blood pressure and see how many of them experience lower blood pressure levels. The second scientist wants to give the drug to 500 people with high blood pressure and not give the drug to another 500 people with high blood pressure, and see how many in both groups experience lower blood pressure levels. Which is the better way to test this drug?*and (2) *Why is it better to test the drug this way?*(The second way because a control group is used for comparison.)

<sup>d</sup> To be classified as understanding scientific study, the survey respondent had to answer (1) *When you read news stories, you see certain sets of words and terms. We are interested in how many people recognize certain kinds of terms. First, some articles refer to the results of a scientific study. When you read or hear the term scientific study, do you have a clear understanding of what it means, a general sense of what it means, or little understanding of what it means?*and (2) (If "clear understanding" or "general sense" response) *In your own words, could you tell me what it means to study something scientifically?*(Formulation of theories/test hypothesis, experiments/control group, or rigorous/systematic comparison.)

## CHAPTER 7 | Science and Technology: Public Attitudes and Understanding

<sup>e</sup> For science and mathematics education, "low" equates to five or fewer high school and college science or mathematics courses, "middle" is six through eight courses, and "high" means nine or more courses. Categories do not add to total *n* because "don't know" responses and refusals to respond are not shown.

<sup>f</sup> Categories do not add to total *n* because "don't know" responses and refusals to respond are not shown.

<sup>g</sup> Measure is based on correct responses to a 10-item, multiple-choice test of vocabulary knowledge completed by 1,390 survey respondents. Categories represent the number of correct responses.

<sup>h</sup> See notes to Appendix Table 7-2 for an explanation of the trend factual knowledge of science scale.

### Source(s)

NORC at the University of Chicago, General Social Survey (2016).

*Science and Engineering Indicators 2018*

## CHAPTER 7 | Science and Technology: Public Attitudes and Understanding

APPENDIX TABLE 7-12

## Public assessment of astrology, by respondent characteristic: 1979–2016

(Percent)

Characteristic	1979 (n = 1,635)	1983 (n = 1,615)	1985 (n = 1,986)	1988 (n = 2,041)	1990 (n = 2,005)	1992 (n = 1,995)	1995 (n = 2,006)	1997 (n = 2,000)	1999 (n = 1,882)	2001 (n = 1,574)	2004 (n = 2,025)	2006 (n = 1,864)	2008 (n = 2,021)	2010 (n = 1,434)	2012 (n = 2,256)	2014 (n = 2,130)	2016 (n = 1,390)
All adults																	
Very scientific	8	10	8	6	6	7	7	7	7	9	6	5	5	6	10	6	8
Sort of scientific	34	35	31	31	29	29	28	29	29	31	26	26	28	28	32	26	29
Not at all scientific	50	51	57	60	60	62	60	59	59	56	66	65	63	62	55	65	60
Don't know	9	4	4	3	5	3	5	5	5	4	3	4	4	3	4	3	3
Sex																	
Male																	
Very scientific	7	9	7	5	5	6	7	7	7	9	5	5	5	7	10	5	8
Sort of scientific	30	29	29	25	23	25	24	27	25	27	21	23	28	24	27	25	26
Not at all scientific	54	58	60	67	66	66	65	63	63	60	72	68	64	67	60	69	64
Don't know	9	4	3	3	5	2	4	2	5	4	2	4	4	2	3	2	2
Female																	
Very scientific	8	10	9	7	6	7	7	7	7	8	6	5	5	6	10	6	9
Sort of scientific	37	41	32	36	35	32	32	31	32	36	30	29	28	32	36	28	32
Not at all scientific	46	44	55	53	55	58	56	55	56	52	61	63	63	58	50	62	57
Don't know	9	5	4	3	5	3	6	7	5	4	3	4	4	4	4	4	3

## CHAPTER 7 | Science and Technology: Public Attitudes and Understanding

[illegible]

## CHAPTER 7 | Science and Technology: Public Attitudes and Understanding

Characteristic	1979 (n = 1,635)	1983 (n = 1,615)	1985 (n = 1,986)	1988 (n = 2,041)	1990 (n = 2,005)	1992 (n = 1,995)	1995 (n = 2,006)	1997 (n = 2,000)	1999 (n = 1,882)	2001 (n = 1,574)	2004 (n = 2,025)	2006 (n = 1,864)	2008 (n = 2,021)	2010 (n = 1,434)	2012 (n = 2,256)	2014 (n = 2,130)	2016 (n = 1,390)
Very scientific	5	5	1	*	1	3	2	4	2	3	*	*	3	2	3	2	2
Sort of scientific	15	23	23	19	17	14	22	15	19	13	16	12	12	16	24	11	23
Not at all scientific	76	69	74	78	80	82	74	78	77	83	83	84	83	79	72	84	73
Don't know	4	3	2	2	2	*	2	2	2	*	1	4	3	3	1	2	1
Age (years)																	
18–24																	
Very scientific	9	13	10	10	5	14	9	11	7	17	10	5	5	11	14	10	11
Sort of scientific	40	43	39	36	37	37	33	38	40	39	36	34	38	43	44	40	33
Not at all scientific	47	42	51	54	56	49	53	50	50	42	52	56	55	46	42	48	54
Don't know	4	3	*	0	2	1	5	1	3	1	2	5	1	0	1	2	2
25–34																	
Very scientific	7	7	6	6	6	4	9	6	5	10	6	8	6	8	10	6	7
Sort of scientific	36	39	32	32	32	33	30	32	30	33	33	28	30	33	35	35	37
Not at all scientific	52	51	60	60	61	62	59	59	61	54	60	60	62	58	52	56	53
Don't know	4	3	1	1	2	1	2	3	3	3	1	4	2	1	2	2	3
35–44																	
Very scientific	6	11	8	6	5	7	4	4	7	7	4	5	5	8	10	8	9
Sort of scientific	37	32	29	31	26	27	32	26	32	32	24	28	31	27	33	26	27



## CHAPTER 7 | Science and Technology: Public Attitudes and Understanding

Characteristic	1979 (n = 1,635)	1983 (n = 1,615)	1985 (n = 1,986)	1988 (n = 2,041)	1990 (n = 2,005)	1992 (n = 1,995)	1995 (n = 2,006)	1997 (n = 2,000)	1999 (n = 1,882)	2001 (n = 1,574)	2004 (n = 2,025)	2006 (n = 1,864)	2008 (n = 2,021)	2010 (n = 1,434)	2012 (n = 2,256)	2014 (n = 2,130)	2016 (n = 1,390)
Not at all scientific	53	54	61	60	68	64	61	66	59	58	69	65	61	64	51	64	62
Don't know	5	3	2	2	1	3	3	4	1	3	2	2	3	1	5	2	2
45–54																	
Very scientific	8	7	5	4	7	6	4	4	5	5	4	3	4	5	10	7	8
Sort of scientific	28	40	32	26	25	27	26	28	23	27	18	24	24	23	28	22	28
Not at all scientific	54	50	59	66	64	63	67	65	67	66	74	70	68	69	58	69	61
Don't know	10	3	5	4	4	4	3	4	5	3	3	3	4	3	4	2	3
55–64																	
Very scientific	10	8	11	5	5	3	8	7	10	6	6	3	4	6	8	2	9
Sort of scientific	32	33	24	33	25	18	20	17	27	27	25	24	26	24	31	20	27
Not at all scientific	44	56	56	56	59	77	66	69	58	62	66	68	67	65	57	75	62
Don't know	15	3	9	5	10	2	6	7	6	5	3	5	4	5	4	3	1
65 or older																	
Very scientific	5	12	11	6	5	7	10	11	11	6	6	5	5	2	8	5	6
Sort of scientific	26	24	26	27	29	27	22	31	20	31	26	21	21	24	25	21	24
Not at all scientific	50	52	55	60	53	60	55	47	57	54	64	68	65	67	62	70	66
Don't know	19	12	8	6	13	6	12	11	13	9	3	7	9	8	5	4	4
Trend factual knowledge of science scale (quartile) <sup>a</sup>																	

## CHAPTER 7 | Science and Technology: Public Attitudes and Understanding

Characteristic	1979 (n = 1,635)	1983 (n = 1,615)	1985 (n = 1,986)	1988 (n = 2,041)	1990 (n = 2,005)	1992 (n = 1,995)	1995 (n = 2,006)	1997 (n = 2,000)	1999 (n = 1,882)	2001 (n = 1,574)	2004 (n = 2,025)	2006 (n = 1,864)	2008 (n = 2,021)	2010 (n = 1,434)	2012 (n = 2,256)	2014 (n = 2,130)	2016 (n = 1,390)
Bottom																	
Very scientific	NA	NA	NA	NA	NA	10	8	11	13	10	NA	5	6	9	12	8	12
Sort of scientific	NA	NA	NA	NA	NA	34	34	31	31	38	NA	36	34	32	39	37	30
Not at all scientific	NA	NA	NA	NA	NA	50	45	44	38	42	NA	50	47	52	35	48	49
Don't know	NA	NA	NA	NA	NA	6	14	14	18	10	NA	8	13	6	13	7	8
Third																	
Very scientific	NA	NA	NA	NA	NA	8	11	8	9	9	NA	7	6	11	14	9	8
Sort of scientific	NA	NA	NA	NA	NA	30	30	38	35	38	NA	33	37	33	40	34	38
Not at all scientific	NA	NA	NA	NA	NA	60	55	50	54	49	NA	55	55	53	44	55	52
Don't know	NA	NA	NA	NA	NA	2	4	3	2	4	NA	5	2	2	3	3	2
Second																	
Very scientific	NA	NA	NA	NA	NA	5	6	6	6	13	NA	5	5	5	9	3	9
Sort of scientific	NA	NA	NA	NA	NA	30	28	25	27	31	NA	25	27	30	32	27	28
Not at all scientific	NA	NA	NA	NA	NA	63	64	66	65	54	NA	66	67	62	57	67	61
Don't know	NA	NA	NA	NA	NA	2	2	3	2	2	NA	4	2	3	2	2	2
Top																	
Very scientific	NA	NA	NA	NA	NA	2	3	2	2	3	NA	2	3	1	6	3	3
Sort of scientific	NA	NA	NA	NA	NA	20	18	21	21	20	NA	14	18	18	19	12	20

## CHAPTER 7 | Science and Technology: Public Attitudes and Understanding

Characteristic	1979 (n = 1,635)	1983 (n = 1,615)	1985 (n = 1,986)	1988 (n = 2,041)	1990 (n = 2,005)	1992 (n = 1,995)	1995 (n = 2,006)	1997 (n = 2,000)	1999 (n = 1,882)	2001 (n = 1,574)	2004 (n = 2,025)	2006 (n = 1,864)	2008 (n = 2,021)	2010 (n = 1,434)	2012 (n = 2,256)	2014 (n = 2,130)	2016 (n = 1,390)
Not at all scientific	NA	NA	NA	NA	NA	76	78	76	75	75	NA	82	78	79	74	84	76
Don't know	NA	NA	NA	NA	NA	2	1	1	1	2	NA	1	1	1	1	1	1
Understanding of scientific inquiry <sup>b</sup>																	
Understands scientific inquiry																	
Very scientific	NA	NA	NA	NA	NA	NA	2	3	4	4	2	4	3	2	5	3	5
Sort of scientific	NA	NA	NA	NA	NA	NA	24	26	22	29	19	19	18	24	26	20	23
Not at all scientific	NA	NA	NA	NA	NA	NA	74	70	73	66	78	75	77	73	68	76	72
Don't know	NA	NA	NA	NA	NA	NA	1	1	2	1	1	2	2	1	1	1	1
Doesn't understand scientific inquiry																	
Very scientific	NA	NA	NA	NA	NA	NA	9	9	9	12	8	5	6	11	12	7	11
Sort of scientific	NA	NA	NA	NA	NA	NA	29	31	32	33	31	31	33	32	35	32	34
Not at all scientific	NA	NA	NA	NA	NA	NA	55	53	53	49	58	58	56	54	48	57	51
Don't know	NA	NA	NA	NA	NA	NA	6	7	7	6	3	5	5	4	5	4	4

\* = < 0.5% responded. NA = not available; question was not asked.

<sup>a</sup> See notes to Appendix Table 7-2 for an explanation of the trend factual knowledge of science scale.

<sup>b</sup> See notes to Appendix Table 7-11 for an explanation of scientific inquiry. Because 41 survey respondents in 2001 were not asked all of the questions related to understanding scientific inquiry, it is not possible to conclude whether they understood scientific inquiry.

**Note(s)**



CHAPTER 7 | Science and Technology: Public Attitudes and Understanding

Responses to *Would you say that astrology is very scientific, sort of scientific, or not at all scientific?* Table includes all years for which data were collected. Percentages may not add to 100% because of rounding. For 1979 data, see *Science and Engineering Indicators 2014*, Appendix Table 7-13.

Source(s)

National Science Foundation, National Center for Science and Engineering Statistics, Survey of Public Attitudes Toward and Understanding of Science and Technology (1979–2001); University of Michigan, Survey of Consumer Attitudes (2004); NORC at the University of Chicago, General Social Survey (2006–16).

*Science and Engineering Indicators 2018*

## CHAPTER 7 | Science and Technology: Public Attitudes and Understanding

APPENDIX TABLE 7-13



### Understanding of the term "scientific study," by respondent characteristic: 2016

(Percent)

Characteristic	Clear understanding	General understanding	Little understanding	Don't know
All adults ( <i>n</i> = 1,390)	31	48	19	2
Sex				
Male ( <i>n</i> = 571)	34	47	18	1
Female ( <i>n</i> = 819)	29	49	19	3
Formal education				
Less than high school diploma ( <i>n</i> = 169)	14	31	50	5
High school diploma ( <i>n</i> = 415)	25	49	24	2
Some college ( <i>n</i> = 388)	30	55	13	2
Bachelor's degree ( <i>n</i> = 263)	46	49	5	0
Graduate or professional degree ( <i>n</i> = 151)	48	44	7	1
Science and mathematics education <sup>a</sup>				
Low ( <i>n</i> = 776)	23	49	26	3
Middle ( <i>n</i> = 262)	35	55	10	*
High ( <i>n</i> = 275)	54	42	4	0
Family income (quartile) <sup>b</sup>				
Bottom ( <i>n</i> = 336)	23	40	33	4
Third ( <i>n</i> = 281)	27	54	18	1
Second ( <i>n</i> = 324)	33	50	15	1
Top ( <i>n</i> = 318)	40	52	7	0
Age (years) <sup>b</sup>				
18–24 ( <i>n</i> = 115)	36	45	17	2
25–34 ( <i>n</i> = 269)	43	42	13	2
35–44 ( <i>n</i> = 206)	37	43	18	3
45–54 ( <i>n</i> = 223)	33	48	19	1
55–64 ( <i>n</i> = 264)	24	56	19	1

## CHAPTER 7 | Science and Technology: Public Attitudes and Understanding

Characteristic	Clear understanding	General understanding	Little understanding	Don't know
65 or older ( $n = 310$ )	19	54	25	3
Trend factual knowledge of science scale (quartile) <sup>c</sup>				
Bottom ( $n = 250$ )	15	35	44	6
Third ( $n = 387$ )	22	54	23	1
Second ( $n = 437$ )	34	53	12	1
Top ( $n = 316$ )	51	44	4	1

\* = < 0.5% responded.

<sup>a</sup> For science and mathematics education, "low" equates to five or fewer high school and college science or mathematics courses, "middle" is six through eight courses, and "high" means nine or more courses. Categories do not add to total  $n$  because "don't know" responses and refusals to respond are not shown.

<sup>b</sup> Categories do not add to total  $n$  because "don't know" responses and refusals to respond are not shown.

<sup>c</sup> See notes to Appendix Table 7-2 for an explanation of the trend factual knowledge of science scale.

### Note(s)

Responses to *When you read or hear the term scientific study, do you have a clear understanding of what it means, a general sense of what it means, or little understanding of what it means?* Percentages may not add to 100% because of rounding.

### Source(s)

NORC at the University of Chicago, General Social Survey (2016).

*Science and Engineering Indicators 2018*

## CHAPTER 7 | Science and Technology: Public Attitudes and Understanding

APPENDIX TABLE 7-14 

### Understanding of the term "scientific study": 1979–2016

(Percent)

Assessment	1979 ( <i>n</i> = 1,635)	1981 ( <i>n</i> = 1,235)	1983 ( <i>n</i> = 1,615)	1985 ( <i>n</i> = 1,986)	1988 ( <i>n</i> = 2,041)	1990 ( <i>n</i> = 2,005)	1992 ( <i>n</i> = 1,995)	1995 ( <i>n</i> = 2,006)	1997 ( <i>n</i> = 2,000)	1999 ( <i>n</i> = 1,882)	2001 ( <i>n</i> = 1,574)	2004 ( <i>n</i> = 2,205)	2006 ( <i>n</i> = 1,864)	2008 ( <i>n</i> = 2,021)	2010 ( <i>n</i> = 1,454)	2012 ( <i>n</i> = 2,256)	2014 ( <i>n</i> = 2,130)	2016 ( <i>n</i> = 1,390)
Clear understanding	22	34	18	29	31	33	31	34	37	37	35	33	30	29	26	24	28	30
General understanding	61	51	49	50	49	47	50	46	46	47	49	51	52	50	52	54	51	49
Little understanding	17	14	32	20	19	19	18	18	16	17	14	16	17	20	21	20	20	19
Don't know	1	1	*	*	*	*	*	2	1	0	1	1	1	1	2	2	1	1

\* = < 0.5% responded.

**Note(s)**

Responses to *When you read or hear the term scientific study, do you have a clear understanding of what it means, a general sense of what it means, or little understanding of what it means?* Percentages may not add to 100% because of rounding.

## Source(s)

National Science Foundation, National Center for Science and Engineering Statistics, Survey of Public Attitudes Toward and Understanding of Science and Technology (1979–2001); University of Michigan, Survey of Consumer Attitudes (2004); NORC at the University of Chicago, General Social Survey (2006–16).

Science and Engineering Indicators 2018

## CHAPTER 7 | Science and Technology: Public Attitudes and Understanding

APPENDIX TABLE 7-15

### Public assessment of benefits and harms of scientific research, by respondent characteristic: 2016

(Percent)

Characteristic	Benefits strongly outweigh harmful results	Benefits slightly outweigh harmful results	Benefits are about equal to harmful results	Harmful results slightly outweigh benefits	Harmful results strongly outweigh benefits	Don't know
All adults ( <i>n</i> = 1,390)	45	27	12	6	2	8
Sex						
Male ( <i>n</i> = 571)	47	27	13	7	2	4
Female ( <i>n</i> = 819)	44	27	12	6	2	10
Formal education						
Less than high school diploma ( <i>n</i> = 169)	18	34	15	9	4	20
High school diploma ( <i>n</i> = 415)	38	29	17	8	2	7
Some college ( <i>n</i> = 388)	42	30	13	6	2	7
Bachelor's degree ( <i>n</i> = 263)	62	22	6	4	1	5
Graduate or professional degree ( <i>n</i> = 151)	77	17	2	*	2	2
Science and mathematics education <sup>a</sup>						
Low ( <i>n</i> = 776)	37	28	15	7	2	11
Middle ( <i>n</i> = 262)	50	29	10	6	3	2
High ( <i>n</i> = 275)	65	25	7	1	*	1
Family income (quartile) <sup>b</sup>						
Bottom ( <i>n</i> = 336)	33	30	13	8	4	12
Third ( <i>n</i> = 281)	39	28	15	7	2	9
Second ( <i>n</i> = 324)	48	31	10	6	2	4



## CHAPTER 7 | Science and Technology: Public Attitudes and Understanding

Characteristic	Benefits strongly outweigh harmful results	Benefits slightly outweigh harmful results	Benefits are about equal to harmful results	Harmful results slightly outweigh benefits	Harmful results strongly outweigh benefits	Don't know
Top ( $n = 318$ )	63	23	8	3	1	3
Age (years) <sup>b</sup>						
18–24 ( $n = 115$ )	33	38	17	8	0	5
25–34 ( $n = 269$ )	44	29	15	6	2	5
35–44 ( $n = 206$ )	43	28	12	8	1	9
45–54 ( $n = 223$ )	50	25	10	4	4	7
55–64 ( $n = 264$ )	50	21	11	7	3	8
65 or older ( $n = 310$ )	47	25	10	4	2	12
Trend factual knowledge of science scale (quartile) <sup>c</sup>						
Bottom ( $n = 250$ )	26	30	14	9	2	20
Third ( $n = 387$ )	37	30	14	6	3	9
Second ( $n = 437$ )	49	28	11	7	2	3
Top ( $n = 316$ )	64	19	10	2	1	3

\* = < 0.5% responded.

<sup>a</sup> For science and mathematics education, "low" equates to five or fewer high school and college science or mathematics courses, "middle" is six through eight courses, and "high" means nine or more courses. Categories do not add to total  $n$  because "don't know" responses and refusals to respond are not shown.

<sup>b</sup> Categories do not add to total  $n$  because "don't know" responses and refusals to respond are not shown.

<sup>c</sup> See notes to Appendix Table 7-2 for an explanation of the trend factual knowledge of science scale.

### Note(s)

Responses to *People have frequently noted that scientific research has produced benefits and harmful results. Would you say that, on balance, the benefits of scientific research have outweighed the harmful results, or have the harmful results of scientific research been greater than its benefits?* Percentages may not add to 100% because of rounding.

### Source(s)

NORC at the University of Chicago, General Social Survey (2016).

*Science and Engineering Indicators 2018*

## CHAPTER 7 | Science and Technology: Public Attitudes and Understanding

APPENDIX TABLE 7-16

## Public assessment of benefits and harms of scientific research: 1979–2016

(Percent)

Assessment	1979 (n = 1,635)	1981 (n = 1,581)	1985 (n = 1,986)	1988 (n = 1,021)	1990 (n = 2,005)	1992 (n = 974)	1995 (n = 2,006)	1997 (n = 2,000)	1999 (n = 1,882)	2001 (n = 1,574)	2004 (n = 2,205)	2006 (n = 1,864)	2008 (n = 2,021)	2010 (n = 1,434)	2012 (n = 2,256)	2014 (n = 2,130)	2016 (n = 1,390)
Benefits strongly outweigh harmful results	46	42	44	53	47	42	43	47	47	47	52	48	42	46	50	43	45
Benefits slightly outweigh harmful results	24	28	25	23	25	30	29	28	27	25	27	22	26	23	22	26	27
Benefits are about equal to harmful results	13	12	4	5	7	6	3	6	5	12	3	17	16	14	13	16	12
Harmful results slightly outweigh benefits	7	12	13	8	10	12	10	8	10	7	10	4	7	7	6	7	6
Harmful results strongly outweigh benefits	4	6	6	4	3	5	3	4	5	3	3	2	2	2	2	2	2
Don't know	6	1	8	7	8	5	13	7	6	6	5	6	7	8	8	6	8

## Note(s)

Responses to *People have frequently noted that scientific research has produced benefits and harmful results. Would you say that, on balance, the benefits of scientific research have outweighed the harmful results, or have the harmful results of scientific research been greater than its benefits?*

Percentages may not add to 100% because of rounding.

## Source(s)

National Science Foundation, National Center for Science and Engineering Statistics, Survey of Public Attitudes Toward and Understanding of Science and Technology (1979–2001); University of Michigan, Survey of Consumer Attitudes (2004); NORC at the University of Chicago, General Social Survey (2006–16).

*Science and Engineering Indicators 2018*

## CHAPTER 7 | Science and Technology: Public Attitudes and Understanding

APPENDIX TABLE 7-17

### Public assessment of whether science and technology result in more opportunities for the next generation, by respondent characteristic: 2016

(Percent)

Characteristic	Strongly agree	Agree	Disagree	Strongly disagree	Don't know
All adults ( <i>n</i> = 1,390)	39	52	7	1	1
Sex					
Male ( <i>n</i> = 571)	40	50	8	1	1
Female ( <i>n</i> = 819)	38	54	6	1	2
Formal education					
Less than high school ( <i>n</i> = 169)	33	57	6	3	2
High school diploma ( <i>n</i> = 415)	32	57	8	2	1
Some college ( <i>n</i> = 388)	39	50	9	*	1
Bachelor's degree ( <i>n</i> = 263)	47	48	5	*	0
Graduate or professional degree ( <i>n</i> = 151)	48	48	4	0	0
Science and mathematics education <sup>a</sup>					
Low ( <i>n</i> = 776)	32	56	9	1	2
Middle ( <i>n</i> = 262)	41	51	7	1	0
High ( <i>n</i> = 275)	54	42	3	*	0
Family income (quartile) <sup>b</sup>					
Bottom ( <i>n</i> = 336)	33	56	8	2	1
Third ( <i>n</i> = 281)	42	50	6	1	1
Second ( <i>n</i> = 324)	37	54	8	*	1
Top ( <i>n</i> = 318)	46	46	6	1	*
Age (years) <sup>b</sup>					
18–24 ( <i>n</i> = 115)	41	48	9	1	*
25–34 ( <i>n</i> = 269)	42	51	5	1	1
35–44 ( <i>n</i> = 206)	39	54	6	1	0
45–54 ( <i>n</i> = 223)	37	55	6	*	1

## CHAPTER 7 | Science and Technology: Public Attitudes and Understanding

Characteristic	Strongly agree	Agree	Disagree	Strongly disagree	Don't know
55–64 ( <i>n</i> = 264)	40	50	9	*	1
65 or older ( <i>n</i> = 310)	33	54	7	2	3
Trend factual knowledge of science scale (quartile) <sup>c</sup>					
Bottom ( <i>n</i> = 250)	34	49	10	1	5
Third ( <i>n</i> = 387)	33	58	6	2	*
Second ( <i>n</i> = 437)	38	54	7	1	*
Top ( <i>n</i> = 316)	49	45	5	0	0

\* = < 0.5% responded.

<sup>a</sup> For science and mathematics education, "low" equates to five or fewer high school and college science or mathematics courses, "middle" is six through eight courses, and "high" means nine or more courses. Categories do not add to total *n* because "don't know" responses and refusals to respond are not shown.

<sup>b</sup> Categories do not add to total *n* because "don't know" responses and refusals to respond are not shown.

<sup>c</sup> See notes to Appendix Table 7-2 for an explanation of the trend factual knowledge of science scale.

### Note(s)

Responses to *Because of science and technology, there will be more opportunities for the next generation*. Percentages may not add to 100% because of rounding.

### Source(s)

NORC at the University of Chicago, General Social Survey (2016).

*Science and Engineering Indicators 2018*

## CHAPTER 7 | Science and Technology: Public Attitudes and Understanding

APPENDIX TABLE 7-18

### Public assessment of whether science and technology result in more opportunities for the next generation: 1985–2016

(Percent)

Assessment	1985 (n = 1,986)	1992 (n = 1,995)	1995 (n = 2,006)	1997 (n = 2,000)	1999 (n = 1,882)	2001 (n = 1,574)	2004 (n = 2,025)	2006 (n = 1,864)	2008 (n = 2,021)	2010 (n = 1,434)	2012 (n = 2,256)	2014 (n = 2,130)	2016 (n = 1,390)
Strongly agree	5	16	10	13	12	21	24	41	37	35	26	33	39
Agree	71	66	71	68	72	64	62	49	53	56	61	56	52
Disagree	18	14	14	14	13	12	12	8	7	6	9	8	7
Strongly disagree	1	2	1	1	1	2	1	1	1	1	1	1	1
Don't know	4	3	3	3	3	2	2	2	3	2	3	1	1

#### Note(s)

Responses to *Because of science and technology, there will be more opportunities for the next generation*. Percentages may not add to 100% because of rounding.

#### Source(s)

National Science Foundation, National Center for Science and Engineering Statistics, Survey of Public Attitudes Toward and Understanding of Science and Technology (1985–2001); University of Michigan, Survey of Consumer Attitudes (2004); NORC at the University of Chicago, General Social Survey (2006–16).

*Science and Engineering Indicators 2018*

## CHAPTER 7 | Science and Technology: Public Attitudes and Understanding

APPENDIX TABLE 7-19

### Public assessment of whether science makes life change too fast, by respondent characteristic: 2016

(Percent)

Characteristic	Strongly agree	Agree	Disagree	Strongly disagree	Don't know
All adults ( <i>n</i> = 1,390)	12	40	39	8	2
Sex					
Male ( <i>n</i> = 571)	12	38	39	10	1
Female ( <i>n</i> = 819)	11	41	38	7	3
Formal education					
Less than high school diploma ( <i>n</i> = 169)	21	48	23	5	3
High school diploma ( <i>n</i> = 415)	12	47	35	4	2
Some college ( <i>n</i> = 388)	9	40	40	9	2
Bachelor's degree ( <i>n</i> = 263)	9	27	50	12	2
Graduate or professional degree ( <i>n</i> = 151)	10	31	46	12	2
Science and mathematics education <sup>a</sup>					
Low ( <i>n</i> = 776)	12	47	34	4	2
Middle ( <i>n</i> = 262)	12	33	45	8	1
High ( <i>n</i> = 275)	8	25	48	19	0
Family income (quartile) <sup>b</sup>					
Bottom ( <i>n</i> = 336)	15	42	33	8	2
Third ( <i>n</i> = 281)	15	42	34	8	1
Second ( <i>n</i> = 324)	10	39	43	5	3
Top ( <i>n</i> = 318)	10	33	46	11	*
Age (years) <sup>b</sup>					
18–24 ( <i>n</i> = 115)	14	42	34	8	1
25–34 ( <i>n</i> = 269)	12	36	40	12	*
35–44 ( <i>n</i> = 206)	10	38	41	10	2
45–54 ( <i>n</i> = 223)	12	39	40	7	2

## CHAPTER 7 | Science and Technology: Public Attitudes and Understanding

Characteristic	Strongly agree	Agree	Disagree	Strongly disagree	Don't know
55–64 ( <i>n</i> = 264)	11	40	39	8	2
65 or older ( <i>n</i> = 310)	12	45	35	4	4
Trend factual knowledge of science scale (quartile) <sup>c</sup>					
Bottom ( <i>n</i> = 250)	17	52	21	4	6
Third ( <i>n</i> = 387)	11	48	35	4	2
Second ( <i>n</i> = 437)	12	38	42	7	1
Top ( <i>n</i> = 316)	7	23	52	18	1

\* = < 0.5% responded.

<sup>a</sup> For science and mathematics education, "low" equates to five or fewer high school and college science or mathematics courses, "middle" is six through eight courses, and "high" means nine or more courses. Categories do not add to total *n* because "don't know" responses and refusals to respond are not shown.

<sup>b</sup> Categories do not add to total *n* because "don't know" responses and refusals to respond are not shown.

<sup>c</sup> See notes to Appendix Table 7-2 for an explanation of the trend factual knowledge of science scale.

### Note(s)

Responses to *Science makes our way of life change too fast*. Percentages may not add to 100% because of rounding.

### Source(s)

NORC at the University of Chicago, General Social Survey (2016).

*Science and Engineering Indicators 2018*

Science and Engineering Indicators 2018



## CHAPTER 7 | Science and Technology: Public Attitudes and Understanding

APPENDIX TABLE 7-21

### Public opinion on whether the federal government should fund basic scientific research, by respondent characteristic: 2016

(Percent)

Characteristic	Strongly agree	Agree	Disagree	Strongly disagree	Don't know
All adults ( <i>n</i> = 1,390)	30	54	13	1	2
Sex					
Male ( <i>n</i> = 571)	34	49	14	1	1
Female ( <i>n</i> = 819)	26	57	13	1	3
Formal education					
Less than high school diploma ( <i>n</i> = 169)	17	61	15	2	5
High school diploma ( <i>n</i> = 415)	24	53	19	1	3
Some college ( <i>n</i> = 388)	31	56	12	0	2
Bachelor's degree ( <i>n</i> = 263)	38	50	10	2	0
Graduate or professional degree ( <i>n</i> = 151)	43	49	6	1	0
Science and mathematics education <sup>a</sup>					
Low ( <i>n</i> = 776)	25	56	15	1	3
Middle ( <i>n</i> = 262)	32	52	13	3	*
High ( <i>n</i> = 275)	42	48	9	*	*
Family income (quartile) <sup>b</sup>					
Bottom ( <i>n</i> = 336)	25	55	17	1	3
Third ( <i>n</i> = 281)	29	57	12	1	1
Second ( <i>n</i> = 324)	31	56	12	1	1
Top ( <i>n</i> = 318)	36	50	12	1	1
Age (years) <sup>b</sup>					
18–24 ( <i>n</i> = 115)	33	51	11	1	4
25–34 ( <i>n</i> = 269)	34	54	9	1	2
35–44 ( <i>n</i> = 206)	26	57	16	*	1
45–54 ( <i>n</i> = 223)	30	57	11	1	1

## CHAPTER 7 | Science and Technology: Public Attitudes and Understanding

Characteristic	Strongly agree	Agree	Disagree	Strongly disagree	Don't know
55–64 ( <i>n</i> = 264)	31	47	19	1	2
65 or older ( <i>n</i> = 310)	24	56	15	2	3
Trend factual knowledge of science scale (quartile) <sup>c</sup>					
Bottom ( <i>n</i> = 250)	22	53	15	1	8
Third ( <i>n</i> = 387)	19	63	17	1	1
Second ( <i>n</i> = 437)	32	52	13	1	1
Top ( <i>n</i> = 316)	45	45	9	1	*

\* = < 0.5% responded.

<sup>a</sup> For science and mathematics education, "low" equates to five or fewer high school and college science or mathematics courses, "middle" is six through eight courses, and "high" means nine or more courses. Categories do not add to total *n* because "don't know" responses and refusals to respond are not shown.

<sup>b</sup> Categories do not add to total *n* because "don't know" responses and refusals to respond are not shown.

<sup>c</sup> See notes to Appendix Table 7-2 for an explanation of the trend factual knowledge of science scale.

### Note(s)

Responses to *Even if it brings no immediate benefits, scientific research that advances the frontiers of knowledge is necessary and should be supported by the federal government.* Percentages may not add to 100% because of rounding.

### Source(s)

NORC at the University of Chicago, General Social Survey (2016).

*Science and Engineering Indicators 2018*

## CHAPTER 7 | Science and Technology: Public Attitudes and Understanding

APPENDIX TABLE 7-22

### Public opinion on whether the federal government should fund basic scientific research: 1985–2016

(Percent)

Opinion	1985 (n = 1,986)	1988 (n = 2,041)	1990 (n = 2,005)	1992 (n = 1,995)	1995 (n = 2,006)	1997 (n = 2,000)	1999 (n = 1,882)	2001 (n = 1,574)	2004 (n = 2,025)	2006 (n = 1,864)	2008 (n = 2,021)	2010 (n = 1,434)	2012 (n = 2,256)	2014 (n = 2,130)	2016 (n = 1,390)
Strongly agree	9	16	18	14	17	22	21	19	29	32	24	23	21	25	30
Agree	70	65	63	63	61	57	61	62	53	55	60	59	62	60	54
Disagree	16	14	15	18	17	15	13	14	15	8	11	12	12	12	13
Strongly disagree	*	1	1	2	2	3	2	1	2	1	1	2	2	1	1
Don't know	5	4	4	3	3	3	3	4	1	3	4	4	4	2	2

\* = < 0.5% responded.

#### Note(s)

Responses to *Even if it brings no immediate benefits, scientific research that advances the frontiers of knowledge is necessary and should be supported by the federal government*. Percentages may not add to 100% because of rounding.

#### Source(s)

National Science Foundation, National Center for Science and Engineering Statistics, Survey of Public Attitudes Toward and Understanding of Science and Technology (1985–2001); University of Michigan, Survey of Consumer Attitudes (2004); NORC at the University of Chicago, General Social Survey (2006–16).

*Science and Engineering Indicators 2018*

## CHAPTER 7 | Science and Technology: Public Attitudes and Understanding

APPENDIX TABLE 7-23

## Public assessment of spending, by policy area: 1983–2016

(Percent)

Policy area	1983 (n = 1,615)	1985 (n = 1,986)	1988 (n = 2,041) <sup>a</sup>	1990 (n = 2,005)	1992 (n = 1,995)	1997 (n = 2,000)	1999 (n = 1,882)	2001 (n = 1,574)	2002 (n = 1,358) <sup>b</sup>	2004 (n = 1,401) <sup>c</sup>	2006 (n = 2,992) <sup>d</sup>	2008 (n = 3,559) <sup>e</sup>	2010 (n = 4,901) <sup>f</sup>	2012 (n = 4,820) <sup>g</sup>	2014 (n = 2,130) <sup>h</sup>	2016 (n = 2,867) <sup>i</sup>
Education																
Too little	71	73	76	77	81	76	75	76	73	73	73	74	74	75	74	72
About right	23	22	19	17	14	16	18	17	20	21	20	21	20	18	19	20
Too much	5	3	4	4	4	6	6	5	6	5	5	5	5	7	6	6
Don't know	2	2	1	2	1	2	1	1	1	1	1	1	1	1	1	1
Assistance for the poor																
Too little	NA	54	55	57	56	43	49	53	66	69	68	68	61	61	63	71
About right	NA	29	30	25	26	30	30	29	24	23	22	23	27	26	23	21
Too much	NA	13	12	15	17	23	19	15	8	6	8	7	10	10	12	7
Don't know	NA	3	3	3	2	4	2	2	2	1	2	2	2	3	2	2
Environment																
Too little	54	69	76	76	72	65	65	63	58	63	67	66	57	58	60	63

## CHAPTER 7 | Science and Technology: Public Attitudes and Understanding

Policy area	1983 (n = 1,615)	1985 (n = 1,986)	1988 (n = 2,041) <sup>a</sup>	1990 (n = 2,005)	1992 (n = 1,995)	1997 (n = 2,000)	1999 (n = 1,882)	2001 (n = 1,574)	2002 (n = 1,358) <sup>b</sup>	2004 (n = 1,401) <sup>c</sup>	2006 (n = 2,992) <sup>d</sup>	2008 (n = 3,559) <sup>e</sup>	2010 (n = 4,901) <sup>f</sup>	2012 (n = 4,820) <sup>g</sup>	2014 (n = 2,130) <sup>h</sup>	2016 (n = 2,867) <sup>i</sup>
About right	31	21	18	17	20	23	25	28	32	29	23	23	30	30	27	27
Too much	11	6	4	5	7	8	7	6	7	6	7	8	10	10	10	8
Don't know	4	3	2	2	2	4	3	3	2	2	3	3	2	3	3	2
Health																
Too little	NA	68	67	75	79	68	71	70	73	77	72	75	58	61	57	62
About right	NA	26	28	20	15	23	22	24	21	17	19	17	22	23	24	23
Too much	NA	3	2	3	4	7	6	4	4	4	7	7	17	14	16	12
Don't know	NA	2	2	1	1	2	2	2	1	1	2	2	2	2	3	2
Developing alternative energy sources																
Too little	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	61	60	56	54
About right	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	28	27	31	34
Too much	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	7	9	9	8
Don't know	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	4	4	4	4

## CHAPTER 7 | Science and Technology: Public Attitudes and Understanding

Policy area	1983 (n = 1,615)	1985 (n = 1,986)	1988 (n = 2,041) <sup>a</sup>	1990 (n = 2,005)	1992 (n = 1,995)	1997 (n = 2,000)	1999 (n = 1,882)	2001 (n = 1,574)	2002 (n = 1,358) <sup>b</sup>	2004 (n = 1,401) <sup>c</sup>	2006 (n = 2,992) <sup>d</sup>	2008 (n = 3,559) <sup>e</sup>	2010 (n = 4,901) <sup>f</sup>	2012 (n = 4,820) <sup>g</sup>	2014 (n = 2,130) <sup>h</sup>	2016 (n = 2,867) <sup>i</sup>
Drug rehabilitation																
Too little	NA	NA	NA	NA	NA	NA	NA	NA	56	53	55	51	49	48	54	61
About right	NA	NA	NA	NA	NA	NA	NA	NA	31	34	31	34	36	34	30	26
Too much	NA	NA	NA	NA	NA	NA	NA	NA	10	9	9	10	10	13	11	9
Don't know	NA	NA	NA	NA	NA	NA	NA	NA	3	4	5	5	5	6	5	4
Social Security																
Too little	NA	NA	NA	NA	NA	NA	NA	NA	59	63	61	58	53	54	52	58
About right	NA	NA	NA	NA	NA	NA	NA	NA	33	27	30	32	35	34	37	33
Too much	NA	NA	NA	NA	NA	NA	NA	NA	4	5	5	5	8	7	6	5
Don't know	NA	NA	NA	NA	NA	NA	NA	NA	4	4	4	4	4	4	6	4
Law enforcement																
Too little	NA	NA	NA	NA	NA	NA	NA	NA	56	56	57	54	53	52	49	59
About right	NA	NA	NA	NA	NA	NA	NA	NA	35	36	33	35	36	36	37	30

## CHAPTER 7 | Science and Technology: Public Attitudes and Understanding

Policy area	1983 ( <i>n</i> = 1,615)	1985 ( <i>n</i> = 1,986)	1988 ( <i>n</i> = 2,041) <sup>a</sup>	1990 ( <i>n</i> = 2,005)	1992 ( <i>n</i> = 1,995)	1997 ( <i>n</i> = 2,000)	1999 ( <i>n</i> = 1,882)	2001 ( <i>n</i> = 1,574)	2002 ( <i>n</i> = 1,358) <sup>b</sup>	2004 ( <i>n</i> = 1,401) <sup>c</sup>	2006 ( <i>n</i> = 2,992) <sup>d</sup>	2008 ( <i>n</i> = 3,559) <sup>e</sup>	2010 ( <i>n</i> = 4,901) <sup>f</sup>	2012 ( <i>n</i> = 4,820) <sup>g</sup>	2014 ( <i>n</i> = 2,130) <sup>h</sup>	2016 ( <i>n</i> = 2,867) <sup>i</sup>
Too much	NA	NA	NA	NA	NA	NA	NA	NA	7	5	8	8	9	9	11	9
Don't know	NA	NA	NA	NA	NA	NA	NA	NA	3	3	2	2	2	3	2	2
Assistance for child care																
Too little	NA	NA	NA	NA	NA	NA	NA	NA	56	54	51	49	46	45	47	54
About right	NA	NA	NA	NA	NA	NA	NA	NA	31	34	35	39	41	39	38	35
Too much	NA	NA	NA	NA	NA	NA	NA	NA	7	6	7	6	7	8	8	5
Don't know	NA	NA	NA	NA	NA	NA	NA	NA	6	6	7	6	6	7	7	6
Highways and bridges																
Too little	NA	NA	NA	NA	NA	NA	NA	NA	35	29	35	43	43	43	45	48
About right	NA	NA	NA	NA	NA	NA	NA	NA	50	55	52	45	45	43	42	40
Too much	NA	NA	NA	NA	NA	NA	NA	NA	12	13	11	9	10	12	11	11
Don't know	NA	NA	NA	NA	NA	NA	NA	NA	3	3	3	3	2	2	2	2
Supporting scientific research																

## CHAPTER 7 | Science and Technology: Public Attitudes and Understanding

Policy area	1983 (n = 1,615)	1985 (n = 1,986)	1988 (n = 2,041) <sup>a</sup>	1990 (n = 2,005)	1992 (n = 1,995)	1997 (n = 2,000)	1999 (n = 1,882)	2001 (n = 1,574)	2002 (n = 1,358) <sup>b</sup>	2004 (n = 1,401) <sup>c</sup>	2006 (n = 2,992) <sup>d</sup>	2008 (n = 3,559) <sup>e</sup>	2010 (n = 4,901) <sup>f</sup>	2012 (n = 4,820) <sup>g</sup>	2014 (n = 2,130) <sup>h</sup>	2016 (n = 2,867) <sup>i</sup>
Too little	NA	29	34	30	34	34	37	36	34	38	41	36	36	38	39	38
About right	NA	46	48	47	43	46	43	44	46	45	41	46	47	45	45	45
Too much	NA	18	15	16	19	14	14	14	13	12	11	11	12	12	10	11
Don't know	NA	7	4	6	4	7	6	7	6	5	7	7	5	6	6	6
Mass transportation																
Too little	NA	NA	NA	NA	NA	NA	NA	NA	34	35	39	45	40	38	37	35
About right	NA	NA	NA	NA	NA	NA	NA	NA	50	50	47	42	46	46	48	52
Too much	NA	NA	NA	NA	NA	NA	NA	NA	10	10	8	8	9	10	9	8
Don't know	NA	NA	NA	NA	NA	NA	NA	NA	6	6	6	5	4	6	6	5
Parks and recreation																
Too little	NA	NA	NA	NA	NA	NA	NA	NA	34	31	33	30	32	31	32	34
About right	NA	NA	NA	NA	NA	NA	NA	NA	58	60	59	63	60	61	62	59
Too much	NA	NA	NA	NA	NA	NA	NA	NA	5	7	6	5	6	6	5	6



## CHAPTER 7 | Science and Technology: Public Attitudes and Understanding

Policy area	1983 (n = 1,615)	1985 (n = 1,986)	1988 (n = 2,041) <sup>a</sup>	1990 (n = 2,005)	1992 (n = 1,995)	1997 (n = 2,000)	1999 (n = 1,882)	2001 (n = 1,574)	2002 (n = 1,358) <sup>b</sup>	2004 (n = 1,401) <sup>c</sup>	2006 (n = 2,992) <sup>d</sup>	2008 (n = 3,559) <sup>e</sup>	2010 (n = 4,901) <sup>f</sup>	2012 (n = 4,820) <sup>g</sup>	2014 (n = 2,130) <sup>h</sup>	2016 (n = 2,867) <sup>i</sup>
Don't know	NA	NA	NA	NA	NA	NA	NA	NA	3	2	2	2	2	2	2	2
National defense																
Too little	19	11	11	15	15	23	31	29	33	33	26	23	25	24	31	36
About right	31	36	35	42	42	42	40	41	44	38	33	34	39	40	36	34
Too much	47	50	52	40	40	32	25	25	20	26	39	40	33	32	30	26
Don't know	3	3	3	3	2	4	4	5	3	3	3	3	3	3	3	3
Assistance to blacks																
Too little	NA	NA	NA	NA	NA	NA	NA	NA	30	32	29	29	26	27	27	41
About right	NA	NA	NA	NA	NA	NA	NA	NA	45	46	42	44	46	45	43	36
Too much	NA	NA	NA	NA	NA	NA	NA	NA	17	13	18	15	16	16	18	12
Don't know	NA	NA	NA	NA	NA	NA	NA	NA	8	9	11	11	11	13	12	10
Assistance to big cities																
Too little	NA	NA	NA	NA	NA	NA	NA	NA	41	40	32	31	28	27	26	35

## CHAPTER 7 | Science and Technology: Public Attitudes and Understanding

Policy area	1983 (n = 1,615)	1985 (n = 1,986)	1988 (n = 2,041) <sup>a</sup>	1990 (n = 2,005)	1992 (n = 1,995)	1997 (n = 2,000)	1999 (n = 1,882)	2001 (n = 1,574)	2002 (n = 1,358) <sup>b</sup>	2004 (n = 1,401) <sup>c</sup>	2006 (n = 2,992) <sup>d</sup>	2008 (n = 3,559) <sup>e</sup>	2010 (n = 4,901) <sup>f</sup>	2012 (n = 4,820) <sup>g</sup>	2014 (n = 2,130) <sup>h</sup>	2016 (n = 2,867) <sup>i</sup>
About right	NA	NA	NA	NA	NA	NA	NA	NA	37	38	36	38	38	38	39	35
Too much	NA	NA	NA	NA	NA	NA	NA	NA	13	12	22	20	24	24	25	22
Don't know	NA	NA	NA	NA	NA	NA	NA	NA	9	10	10	11	10	11	10	9
Space exploration																
Too little	17	9	17	9	12	14	15	11	12	14	14	14	16	22	24	21
About right	42	43	38	37	36	38	36	38	47	43	45	45	44	41	41	45
Too much	39	45	43	52	50	45	46	48	35	37	35	36	35	29	28	25
Don't know	2	2	2	2	1	3	3	3	6	6	6	6	5	7	7	9
Welfare																
Too little	NA	NA	NA	NA	NA	NA	NA	NA	20	23	24	23	22	20	18	22
About right	NA	NA	NA	NA	NA	NA	NA	NA	37	34	36	37	35	33	34	33
Too much	NA	NA	NA	NA	NA	NA	NA	NA	40	40	37	36	41	43	45	42
Don't know	NA	NA	NA	NA	NA	NA	NA	NA	3	2	3	4	3	3	3	3

CHAPTER 7 | Science and Technology: Public Attitudes and Understanding

Policy area	1983 (n = 1,615)	1985 (n = 1,986)	1988 (n = 2,041) <sup>a</sup>	1990 (n = 2,005)	1992 (n = 1,995)	1997 (n = 2,000)	1999 (n = 1,882)	2001 (n = 1,574)	2002 (n = 1,358) <sup>b</sup>	2004 (n = 1,401) <sup>c</sup>	2006 (n = 2,992) <sup>d</sup>	2008 (n = 3,559) <sup>e</sup>	2010 (n = 4,901) <sup>f</sup>	2012 (n = 4,820) <sup>g</sup>	2014 (n = 2,130) <sup>h</sup>	2016 (n = 2,867) <sup>i</sup>
Assistance to other countries																
Too little	NA	NA	NA	NA	NA	NA	NA	NA	7	10	11	11	8	7	6	9
About right	NA	NA	NA	NA	NA	NA	NA	NA	27	26	24	26	28	23	23	28
Too much	NA	NA	NA	NA	NA	NA	NA	NA	63	61	62	59	60	65	68	58
Don't know	NA	NA	NA	NA	NA	NA	NA	NA	3	4	4	4	3	4	3	4

NA = not available; question was not asked.

<sup>a</sup> In 1988, "national defense" was asked of 1,021 survey respondents.

<sup>b</sup> In 2002, "assistance for the poor" was asked of 1,407 survey respondents; "education," "environment," "Social Security," "child care," "highways and bridges," "mass transportation," "parks and recreation," and "national defense" were asked of 2,765 respondents.

<sup>c</sup> In 2004, "assistance for the poor" was asked of 1,411 survey respondents; "education," "environment," "Social Security," "child care," "highways and bridges," "mass transportation," "parks and recreation," and "national defense" were asked of 2,812 respondents.

<sup>d</sup> In 2006, "assistance for the poor" was asked of 1,508 survey respondents; "welfare" was asked of 1,484 respondents.

<sup>e</sup> In 2008, "assistance for the poor" was asked of 1,781 survey respondents; "welfare" was asked of 1,778 respondents; "environment," "health," "law enforcement," "drug rehabilitation," "assistance to big cities," and "space exploration" were asked of 3,558 respondents.

<sup>f</sup> In 2010, "assistance for the poor" was asked of 2,480 survey respondents; "welfare" was asked of 2,421 respondents; "developing alternative energy sources" was asked of 2,044 respondents; "environment," "health," "law enforcement," and "national defense" were asked of 4,900 respondents; "assistance to big cities" was asked of 4,899 respondents; "assistance to blacks" was asked of 4,892 respondents.

<sup>g</sup> In 2012, "assistance for the poor" was asked of 2,435 survey respondents; "welfare" was asked of 2,385 respondents; "developing alternative energy sources" was asked of 1,974 respondents.

<sup>h</sup> In 2014, "assistance for the poor" was asked of 1,297 survey respondents; "welfare" was asked of 833 respondents; "developing alternative energy sources" was asked of 1,239 respondents.

<sup>i</sup> In 2016, "assistance for the poor" was asked of 1,430 survey respondents; "welfare" was asked of 1,437 respondents.

## CHAPTER 7 | Science and Technology: Public Attitudes and Understanding

**Note(s)**

Responses to *We are faced with many problems in this country, none of which can be solved easily or inexpensively. I'm going to name some of these problems, and for each one, I'd like you to tell me if you think we're spending too little money on it, about the right amount, or too much.* Beginning in 2002, two versions of the question were administered with different wording for some policy areas. Wording also varied for some policy areas in 1983–2001. Table combines data for policy areas with similar wording or meaning (see below). Percentages may not add to 100% because of rounding.

Policy areas with different wording in 1983–2001 or alternate wording in the second version of the question in 2002–16:

- *Education*: "improving education" in 1983–2001; alternate wording "improving the nation's education system" in 2002–16.
- *Assistance for the poor*: "helping low-income persons" in 1983–2001; no alternate wording in 2002–16.
- *Environment*: "reducing pollution" in 1983–2001; alternate wording "improving and protecting the environment" in 2002–16.
- *Health*: "improving health care" in 1983–2001; alternate wording "improving and protecting the nation's health" in 2002–16.
- *Law enforcement*: alternate wording "halting the rising crime rate" in 2002–16.
- *Drug rehabilitation*: alternate wording "dealing with drug addiction" in 2002–16.
- *Assistance to big cities*: alternate wording "solving the problems of the big cities" in 2002–16.
- *Assistance to blacks*: alternate wording "improving the conditions of blacks" in 2002–16.
- *National defense*: "improving national defense" in 1981–2001; alternate wording "military, armaments, and defense" in 2002–16.
- *Space exploration*: alternate wording "space exploration program" in 2002–16.
- *Assistance to other countries*: alternate wording "foreign aid" in 2002–16.

**Source(s)**

National Science Foundation, National Center for Science and Engineering Statistics, Survey of Public Attitudes Toward and Understanding of Science and Technology (1983–2001); University of Michigan, Survey of Consumer Attitudes (2004); NORC at the University of Chicago, General Social Survey (2002–16).

*Science and Engineering Indicators 2018*

## CHAPTER 7 | Science and Technology: Public Attitudes and Understanding

APPENDIX TABLE 7-24

### Public assessment of spending on science, by respondent characteristic: 2016

(Percent)

Characteristic	Supporting scientific research			
	Too little	About right	Too much	Don't know
All adults ( <i>n</i> = 2,867)	38	45	11	6
Sex				
Male ( <i>n</i> = 1,276)	41	44	11	5
Female ( <i>n</i> = 1,591)	35	46	11	7
Formal education				
Less than high school ( <i>n</i> = 328)	31	43	16	10
High school diploma ( <i>n</i> = 881)	34	48	12	6
Some college ( <i>n</i> = 796)	42	41	12	6
Bachelor's degree ( <i>n</i> = 536)	43	46	6	5
Graduate or professional degree ( <i>n</i> = 318)	40	50	5	5
Science and mathematics education <sup>a</sup>				
Low ( <i>n</i> = 776)	32	47	14	7
Middle ( <i>n</i> = 262)	41	43	10	6
High ( <i>n</i> = 275)	47	44	5	4
Family income (quartile) <sup>b</sup>				
Bottom ( <i>n</i> = 705)	34	46	14	7
Third ( <i>n</i> = 586)	39	42	13	6
Second ( <i>n</i> = 677)	41	42	11	7
Top ( <i>n</i> = 628)	39	49	7	5
Age (years) <sup>b</sup>				
18–24 ( <i>n</i> = 228)	36	48	12	4
25–34 ( <i>n</i> = 510)	41	43	9	7
35–44 ( <i>n</i> = 481)	41	42	10	7
45–54 ( <i>n</i> = 489)	34	46	15	6

## CHAPTER 7 | Science and Technology: Public Attitudes and Understanding

Characteristic	Supporting scientific research			
	Too little	About right	Too much	Don't know
55–64 ( <i>n</i> = 533)	34	49	13	5
65 or older ( <i>n</i> = 617)	41	45	7	7
Trend factual knowledge of science scale (quartile) <sup>c</sup>				
Bottom ( <i>n</i> = 250)	31	39	17	12
Third ( <i>n</i> = 387)	28	52	11	8
Second ( <i>n</i> = 437)	39	47	11	4
Top ( <i>n</i> = 316)	51	39	7	2

<sup>a</sup> For science and mathematics education, "low" equates to five or fewer high school and college science or mathematics courses, "middle" is six through eight courses, and "high" means nine or more courses. Categories do not add to total *n* because "don't know" responses and refusals to respond are not shown.

<sup>b</sup> Categories do not add to total *n* because "don't know" responses and refusals to respond are not shown.

<sup>c</sup> See notes to Appendix Table 7-2 for an explanation of the trend factual knowledge of science scale.

### Note(s)

Responses to *We are faced with many problems in this country, none of which can be solved easily or inexpensively. I'm going to name some of these problems, and for each one, I'd like you to tell me if you think we're spending too little money on it, about the right amount, or too much.* Percentages may not add to 100% because of rounding.

### Source(s)

NORC at the University of Chicago, General Social Survey (2016).

*Science and Engineering Indicators 2018*

## CHAPTER 7 | Science and Technology: Public Attitudes and Understanding

APPENDIX TABLE 7-25

### Public assessment of spending on health, by respondent characteristic: 2016

(Percent)

Characteristic	Spending on health			
	Too little	About right	Too much	Don't know
All adults ( <i>n</i> = 2,867)	62	23	12	2
Sex				
Male ( <i>n</i> = 1,276)	58	26	14	2
Female ( <i>n</i> = 1,591)	66	21	11	2
Formal education				
Less than high school ( <i>n</i> = 328)	56	31	12	1
High school diploma ( <i>n</i> = 881)	64	23	11	2
Some college ( <i>n</i> = 796)	65	21	13	1
Bachelor's degree ( <i>n</i> = 536)	60	22	15	3
Graduate or professional degree ( <i>n</i> = 318)	62	23	12	3
Science and mathematics education <sup>a</sup>				
Low ( <i>n</i> = 776)	63	25	10	1
Middle ( <i>n</i> = 262)	64	21	13	2
High ( <i>n</i> = 275)	58	26	16	1
Family income (quartile) <sup>b</sup>				
Bottom ( <i>n</i> = 705)	65	25	8	2
Third ( <i>n</i> = 586)	66	22	11	1
Second ( <i>n</i> = 677)	62	22	14	1
Top ( <i>n</i> = 628)	58	22	17	2
Age (years) <sup>b</sup>				
18–24 ( <i>n</i> = 228)	67	23	8	2
25–34 ( <i>n</i> = 510)	61	26	11	2
35–44 ( <i>n</i> = 481)	66	20	13	1
45–54 ( <i>n</i> = 489)	59	24	14	3

## CHAPTER 7 | Science and Technology: Public Attitudes and Understanding

Characteristic	Spending on health			
	Too little	About right	Too much	Don't know
55–64 ( <i>n</i> = 533)	63	19	17	1
65 or older ( <i>n</i> = 617)	60	27	11	2
Trend factual knowledge of science scale (quartile) <sup>c</sup>				
Bottom ( <i>n</i> = 250)	57	29	12	2
Third ( <i>n</i> = 387)	67	26	6	1
Second ( <i>n</i> = 437)	65	20	14	2
Top ( <i>n</i> = 316)	57	26	15	2

<sup>a</sup> For science and mathematics education, "low" equates to five or fewer high school and college science or mathematics courses, "middle" is six through eight courses, and "high" means nine or more courses. Categories do not add to total *n* because "don't know" responses and refusals to respond are not shown.

<sup>b</sup> Categories do not add to total *n* because "don't know" responses and refusals to respond are not shown.

<sup>c</sup> See notes to Appendix Table 7-2 for an explanation of the trend factual knowledge of science scale.

### Note(s)

Responses to *We are faced with many problems in this country, none of which can be solved easily or inexpensively. I'm going to name some of these problems, and for each one, I'd like you to tell me if you think we're spending too little money on it, about the right amount, or too much.* Percentages may not add to 100% because of rounding.

### Source(s)

NORC at the University of Chicago, General Social Survey (2016).

*Science and Engineering Indicators 2018*



## CHAPTER 7 | Science and Technology: Public Attitudes and Understanding

APPENDIX TABLE 7-26

### Public assessment of spending on the environment, by respondent characteristic: 2016

(Percent)

Characteristic	Spending on environment			
	Too little	About right	Too much	Don't know
All adults ( <i>n</i> = 2,867)	63	27	8	2
Sex				
Male ( <i>n</i> = 1,276)	61	26	10	2
Female ( <i>n</i> = 1,591)	64	27	7	2
Formal education				
Less than high school ( <i>n</i> = 328)	52	34	10	5
High school diploma ( <i>n</i> = 881)	61	28	9	2
Some college ( <i>n</i> = 796)	66	24	8	2
Bachelor's degree ( <i>n</i> = 536)	63	27	8	2
Graduate or professional degree ( <i>n</i> = 318)	73	21	6	1
Science and mathematics education <sup>a</sup>				
Low ( <i>n</i> = 776)	59	31	8	2
Middle ( <i>n</i> = 262)	70	21	8	1
High ( <i>n</i> = 275)	67	25	7	1
Family income (quartile) <sup>b</sup>				
Bottom ( <i>n</i> = 705)	64	26	8	2
Third ( <i>n</i> = 586)	64	25	7	4
Second ( <i>n</i> = 677)	63	27	9	2
Top ( <i>n</i> = 628)	64	26	8	1
Age (years) <sup>b</sup>				
18–24 ( <i>n</i> = 228)	86	12	2	*
25–34 ( <i>n</i> = 510)	68	24	6	2
35–44 ( <i>n</i> = 481)	64	27	8	1
45–54 ( <i>n</i> = 489)	63	25	9	3

## CHAPTER 7 | Science and Technology: Public Attitudes and Understanding

Characteristic	Spending on environment			
	Too little	About right	Too much	Don't know
55–64 ( <i>n</i> = 533)	56	32	8	4
65 or older ( <i>n</i> = 617)	52	31	13	3
Trend factual knowledge of science scale (quartile) <sup>c</sup>				
Bottom ( <i>n</i> = 250)	54	35	7	3
Third ( <i>n</i> = 387)	63	28	6	2
Second ( <i>n</i> = 437)	66	24	8	2
Top ( <i>n</i> = 316)	63	27	9	1

\* = < 0.5% responded.

<sup>a</sup> For science and mathematics education, "low" equates to five or fewer high school and college science or mathematics courses, "middle" is six through eight courses, and "high" means nine or more courses. Categories do not add to total *n* because "don't know" responses and refusals to respond are not shown.

<sup>b</sup> Categories do not add to total *n* because "don't know" responses and refusals to respond are not shown.

<sup>c</sup> See notes to Appendix Table 7-2 for an explanation of the trend factual knowledge of science scale.

### Note(s)

Responses to *We are faced with many problems in this country, none of which can be solved easily or inexpensively. I'm going to name some of these problems, and for each one, I'd like you to tell me if you think we're spending too little money on it, about the right amount, or too much.* Percentages may not add to 100% because of rounding.

### Source(s)

NORC at the University of Chicago, General Social Survey (2016).

*Science and Engineering Indicators 2018*

## CHAPTER 7 | Science and Technology: Public Attitudes and Understanding

APPENDIX TABLE 7-27

### Public assessment of spending on space, by respondent characteristic: 2016

(Percent)

Characteristic	Spending on space			
	Too little	About right	Too much	Don't know
All adults ( <i>n</i> = 2,867)	21	45	25	9
Sex				
Male ( <i>n</i> = 1,276)	29	41	25	6
Female ( <i>n</i> = 1,591)	15	48	26	11
Formal education				
Less than high school ( <i>n</i> = 328)	12	40	38	11
High school diploma ( <i>n</i> = 881)	16	44	31	9
Some college ( <i>n</i> = 796)	23	43	24	9
Bachelor's degree ( <i>n</i> = 536)	29	46	17	8
Graduate or professional degree ( <i>n</i> = 318)	28	55	11	7
Science and mathematics education <sup>a</sup>				
Low ( <i>n</i> = 776)	16	46	28	9
Middle ( <i>n</i> = 262)	20	52	20	8
High ( <i>n</i> = 275)	34	43	15	7
Family income (quartile) <sup>b</sup>				
Bottom ( <i>n</i> = 705)	17	41	33	9
Third ( <i>n</i> = 586)	19	44	27	10
Second ( <i>n</i> = 677)	20	46	25	9
Top ( <i>n</i> = 628)	28	49	17	6
Age (years) <sup>b</sup>				
18–24 ( <i>n</i> = 228)	25	47	18	10
25–34 ( <i>n</i> = 510)	23	44	21	12
35–44 ( <i>n</i> = 481)	19	48	23	10
45–54 ( <i>n</i> = 489)	20	41	31	8

## CHAPTER 7 | Science and Technology: Public Attitudes and Understanding

Characteristic	Spending on space			
	Too little	About right	Too much	Don't know
55–64 ( <i>n</i> = 533)	21	44	30	6
65 or older ( <i>n</i> = 617)	20	46	27	7
Trend factual knowledge of science scale (quartile) <sup>c</sup>				
Bottom ( <i>n</i> = 250)	10	44	28	17
Third ( <i>n</i> = 387)	14	48	29	9
Second ( <i>n</i> = 437)	21	46	24	9
Top ( <i>n</i> = 316)	34	46	16	4

<sup>a</sup> For science and mathematics education, "low" equates to five or fewer high school and college science or mathematics courses, "middle" is six through eight courses, and "high" means nine or more courses. Categories do not add to total *n* because "don't know" responses and refusals to respond are not shown.

<sup>b</sup> Categories do not add to total *n* because "don't know" responses and refusals to respond are not shown.

<sup>c</sup> See notes to Appendix Table 7-2 for an explanation of the trend factual knowledge of science scale.

### Note(s)

Responses to *We are faced with many problems in this country, none of which can be solved easily or inexpensively. I'm going to name some of these problems, and for each one, I'd like you to tell me if you think we're spending too little money on it, about the right amount, or too much.* Percentages may not add to 100% because of rounding.

### Source(s)

NORC at the University of Chicago, General Social Survey (2016).

*Science and Engineering Indicators 2018*

## CHAPTER 7 | Science and Technology: Public Attitudes and Understanding

APPENDIX TABLE 7-28

## Public confidence in institutional leaders, by type of institution: 1973–2016

(Percent)

Year (number)	Military	Scientific community	Medicine	Education	U.S. Supreme Court	Organized religion	Major companies	Banks and financial institutions	Organized labor	Executive branch of the federal government	Television	Press	Congress	Mean <sup>a</sup>
2016 ( <i>n</i> = 1,956)	53	40	36	26	26	20	18	14	13	13	10	8	6	22.3
2014 ( <i>n</i> = 2,130)	49	41	37	23	20	17	16	13	11	10	9	7	5	20.3
2012 ( <i>n</i> = 3,258)	53	41	40	25	27	19	16	11	12	14	9	8	6	22.4
2010 ( <i>n</i> = 3,278)	52	40	41	26	30	18	12	10	11	16	11	9	10	23.0
2008 ( <i>n</i> = 2,390)	48	38	40	28	29	20	16	20	11	10	9	8	10	22.3
2006 ( <i>n</i> = 1,989)	47	41	40	28	33	24	18	30	12	16	9	10	12	24.1
2004 ( <i>n</i> = 876)	58	42	38	28	31	23	19	29	13	22	10	9	15	25.5
2002 ( <i>n</i> = 912)	56	37	37	26	36	19	17	22	12	27	9	10	14	25.0
2000 ( <i>n</i> = 1,896)	40	41	44	27	32	28	28	29	13	14	10	10	13	25.0

## CHAPTER 7 | Science and Technology: Public Attitudes and Understanding

Year (number)	Military	Scientific community	Medicine	Education	U.S. Supreme Court	Organized religion	Major companies	Banks and financial institutions	Organized labor	Executive branch of the federal government	Television	Press	Congress	Mean <sup>a</sup>
1998 ( <i>n</i> = 1,911)	36	40	45	27	31	27	26	26	11	13	10	9	10	23.8
1996 ( <i>n</i> = 1,925)	39	40	45	23	28	25	24	24	11	10	11	11	7	22.8
1994 ( <i>n</i> = 2,011)	37	39	42	26	31	25	26	18	11	11	10	10	8	23.0
1993 ( <i>n</i> = 1,057)	41	37	40	22	30	23	21	14	8	11	12	11	7	21.8
1991 ( <i>n</i> = 1,017)	61	40	48	30	37	25	20	12	11	27	15	16	18	28.8
1990 ( <i>n</i> = 899)	33	38	45	27	34	23	26	17	11	24	14	14	16	25.3
1989 ( <i>n</i> = 1,035)	33	41	47	30	35	22	25	19	9	20	14	17	18	25.8
1988 ( <i>n</i> = 997)	35	39	52	30	35	21	25	27	11	16	14	19	16	26.0
1987 ( <i>n</i> = 1,819)	35	41	51	36	35	30	28	27	12	17	12	19	16	27.5
1986 ( <i>n</i> = 1,470)	31	39	47	28	30	25	25	21	9	21	15	19	16	25.4
1984 ( <i>n</i> = 989)	36	44	51	28	33	30	30	30	8	19	13	17	13	26.9

## CHAPTER 7 | Science and Technology: Public Attitudes and Understanding

Year (number)	Military	Scientific community	Medicine	Education	U.S. Supreme Court	Organized religion	Major companies	Banks and financial institutions	Organized labor	Executive branch of the federal government	Television	Press	Congress	Mean <sup>a</sup>
1983 ( <i>n</i> = 1,599)	30	42	52	28	27	29	24	23	8	14	12	13	10	24.1
1982 ( <i>n</i> = 1,860)	29	35	45	35	30	33	21	26	13	17	15	18	13	25.3
1980 ( <i>n</i> = 1,468)	28	41	53	30	24	35	27	32	15	12	15	22	9	26.0
1978 ( <i>n</i> = 1,532)	30	36	46	28	29	31	21	32	11	12	14	20	13	24.1
1977 ( <i>n</i> = 1,530)	36	41	53	40	36	40	27	42	15	27	18	25	19	31.4
1976 ( <i>n</i> = 1,499)	40	42	54	37	34	30	21	39	12	13	18	28	13	28.6
1975 ( <i>n</i> = 1,490)	35	37	51	31	30	24	19	31	10	13	18	24	13	25.4
1974 ( <i>n</i> = 1,484)	39	45	61	49	33	45	31	NA	19	14	23	25	17	33.4
1973 ( <i>n</i> = 1,504)	32	37	54	37	31	34	29	NA	15	29	18	23	23	30.1

NA = not available; question was not asked.

<sup>a</sup> Excludes banks and financial institutions.

**Note(s)**



CHAPTER 7 | Science and Technology: Public Attitudes and Understanding

Respondents expressing "great deal of confidence" when asked *As far as the people running these institutions are concerned, would you say that you have a great deal of confidence, only some confidence, or hardly any confidence at all in them?* Sample size is not exact for all institutions. Table includes all years for which data were collected. Data in institution columns are rounded and may not work out to average shown in Mean column.

Source(s)

NORC at the University of Chicago, General Social Survey (1973–2016).  
*Science and Engineering Indicators 2018*



## CHAPTER 7 | Science and Technology: Public Attitudes and Understanding

APPENDIX TABLE 7-29

### Public confidence in science leaders, by respondent characteristic: 2016

(Percent)

Characteristic	Great deal of confidence	Only some confidence	Hardly any confidence	Don't know
All adults ( <i>n</i> = 1,956)	40	50	6	3
Sex				
Male ( <i>n</i> = 877)	45	48	4	3
Female ( <i>n</i> = 1,079)	36	52	7	4
Formal education				
Less than high school ( <i>n</i> = 216)	28	59	8	5
High school diploma ( <i>n</i> = 621)	32	54	8	5
Some college ( <i>n</i> = 538)	43	49	6	2
Bachelor's degree ( <i>n</i> = 361)	47	48	3	2
Graduate or professional degree ( <i>n</i> = 214)	61	38	1	1
Science and mathematics education <sup>a</sup>				
Low ( <i>n</i> = 276)	37	49	8	6
Middle ( <i>n</i> = 82)	38	55	7	*
High ( <i>n</i> = 96)	59	38	3	0
Family income (quartile) <sup>b</sup>				
Bottom ( <i>n</i> = 493)	39	51	8	3
Third ( <i>n</i> = 402)	37	51	9	3
Second ( <i>n</i> = 455)	39	53	5	3
Top ( <i>n</i> = 417)	49	46	3	1
Age (years) <sup>b</sup>				
18–24 ( <i>n</i> = 169)	47	46	4	3
25–34 ( <i>n</i> = 350)	47	44	7	2
35–44 ( <i>n</i> = 346)	41	50	6	3
45–54 ( <i>n</i> = 331)	36	55	4	4
55–64 ( <i>n</i> = 365)	37	52	8	3

## CHAPTER 7 | Science and Technology: Public Attitudes and Understanding

Characteristic	Great deal of confidence	Only some confidence	Hardly any confidence	Don't know
65 and older ( <i>n</i> = 389)	35	55	5	5
Trend factual knowledge of science scale (quartile) <sup>c</sup>				
Bottom ( <i>n</i> = 82)	24	59	10	7
Third ( <i>n</i> = 146)	30	53	11	7
Second ( <i>n</i> = 141)	47	47	6	1
Top ( <i>n</i> = 110)	61	39	0	0

\* = < 0.5% responded.

<sup>a</sup> For science and mathematics education, "low" equates to five or fewer high school and college science or mathematics courses, "middle" is six through eight courses, and "high" means nine or more courses. Categories do not add to total *n* because "don't know" responses and refusals to respond are not shown.

<sup>b</sup> Categories do not add to total *n* because "don't know" responses and refusals to respond are not shown.

<sup>c</sup> See notes to Appendix Table 7-2 for an explanation of the trend factual knowledge of science scale.

### Note(s)

Responses to *As far as the people running these institutions are concerned, would you say that you have a great deal of confidence, only some confidence, or hardly any confidence at all in them?* Percentages may not add to 100% because of rounding.

### Source(s)

NORC at the University of Chicago, General Social Survey (2016).

*Science and Engineering Indicators 2018*

## CHAPTER 7 | Science and Technology: Public Attitudes and Understanding

APPENDIX TABLE 7-30

### Public perception of scientists: 1983, 1985, 2001, 2012, 2016

(Percent and mean score)

Perception	1983 (n = 1,615)	1985 (n = 1,986)	2001 (n = 1,574)	2012 (n = 1,152)	2016 (n = 1,390)
Scientists work for the good of humanity					
Strongly agree	NA	4	11	19	26
Agree	NA	76	74	69	63
Disagree	NA	15	9	6	8
Strongly disagree	NA	1	1	1	1
Don't know	NA	4	4	5	2
Mean score	NA	2.87	3.00	3.11	3.16
Scientists help to solve problems					
Strongly agree	NA	NA	17	21	28
Agree	NA	NA	79	74	66
Disagree	NA	NA	2	1	4
Strongly disagree	NA	NA	*	1	1
Don't know	NA	NA	1	3	2
Mean score	NA	NA	3.15	3.19	3.23
Scientists want to make life better for the average person					
Strongly agree	NA	4	11	14	24
Agree	NA	76	78	72	64
Disagree	NA	15	8	8	9
Strongly disagree	NA	1	1	1	*
Don't know	NA	4	3	5	2
Mean score	NA	2.87	3.02	3.04	3.14
Scientists are odd and peculiar					
Strongly agree	1	NA	2	4	9
Agree	31	NA	22	32	43
Disagree	59	NA	63	51	37

## CHAPTER 7 | Science and Technology: Public Attitudes and Understanding

Perception	1983 (n = 1,615)	1985 (n = 1,986)	2001 (n = 1,574)	2012 (n = 1,152)	2016 (n = 1,390)
Strongly disagree	4	NA	8	6	7
Don't know	4	NA	4	8	4
Mean score	2.31	NA	2.20	2.36	2.57

\* = < 0.5% responded. NA = not available; question was not asked.

### Note(s)

Respondents who "strongly agree" with the statements *Scientific researchers are dedicated people who work for the good of humanity*, *Scientists are helping to solve challenging problems*, *Most scientists want to work on things that will make life better for the average person*, and *Scientists are apt to be odd and peculiar people*. Mean understanding score is based on a 5-point scale, where 5 equals strongly agree and 1 equals strongly disagree. Percentages may not add to 100% because of rounding.

### Source(s)

National Science Foundation, National Center for Science and Engineering Statistics, Survey of Public Attitudes Toward and Understanding of Science and Technology (1983, 1985, 2001); NORC at the University of Chicago, General Social Survey (2012, 2016).  
*Science and Engineering Indicators 2018*

## CHAPTER 7 | Science and Technology: Public Attitudes and Understanding

APPENDIX TABLE 7-31

### Public perception of scientists, by respondent characteristic: 2016

(Percent)

Characteristic	Scientists work for the good of humanity	Scientists help to solve problems	Scientists want to make life better for the average person	Scientists are odd and peculiar
All adults ( <i>n</i> = 1,390)	89	94	88	52
Sex				
Male ( <i>n</i> = 571)	89	95	87	57
Female ( <i>n</i> = 819)	88	93	89	48
Formal education				
Less than high school diploma ( <i>n</i> = 169)	86	87	87	58
High school diploma ( <i>n</i> = 415)	87	93	87	58
Some college ( <i>n</i> = 388)	90	95	89	53
Bachelor's degree ( <i>n</i> = 263)	89	97	88	44
Graduate or professional degree ( <i>n</i> = 151)	93	99	95	37
Science and mathematics education <sup>a</sup>				
Low ( <i>n</i> = 776)	88	92	88	56
Middle ( <i>n</i> = 262)	86	95	88	53
High ( <i>n</i> = 275)	94	99	92	39
Family income (quartile) <sup>b</sup>				
Bottom ( <i>n</i> = 336)	87	91	88	55
Third ( <i>n</i> = 281)	88	95	90	54
Second ( <i>n</i> = 324)	89	97	89	56
Top ( <i>n</i> = 318)	92	97	89	44
Age (years) <sup>b</sup>				
18–24 ( <i>n</i> = 115)	88	93	92	49

## CHAPTER 7 | Science and Technology: Public Attitudes and Understanding

Characteristic	Scientists work for the good of humanity	Scientists help to solve problems	Scientists want to make life better for the average person	Scientists are odd and peculiar
25–34 ( <i>n</i> = 269)	88	97	89	53
35–44 ( <i>n</i> = 206)	90	94	91	55
45–54 ( <i>n</i> = 223)	91	93	88	56
55–64 ( <i>n</i> = 264)	88	96	88	53
65 or older ( <i>n</i> = 310)	88	91	85	45
Trend factual knowledge of science scale (quartile) <sup>c</sup>				
Bottom ( <i>n</i> = 250)	83	86	83	55
Third ( <i>n</i> = 387)	90	93	90	58
Second ( <i>n</i> = 437)	90	96	90	54
Top ( <i>n</i> = 316)	88	98	88	39

<sup>a</sup> For science and mathematics education, "low" equates to five or fewer high school and college science or mathematics courses, "middle" is six through eight courses, and "high" means nine or more courses. Categories do not add to total *n* because "don't know" responses and refusals to respond are not shown.

<sup>b</sup> Categories do not add to total *n* because "don't know" responses and refusals to respond are not shown.

<sup>c</sup> See notes to Appendix Table 7-2 for an explanation of the trend factual knowledge of science scale.

### Note(s)

Respondents who "strongly agree" and "agree" with the statements *Scientific researchers are dedicated people who work for the good of humanity*; *Scientists are helping to solve challenging problems*; *Most scientists want to work on things that will make life better for the average person*; and *Scientists are apt to be odd and peculiar people*.

### Source(s)

NORC at the University of Chicago, General Social Survey (2016).

*Science and Engineering Indicators 2018*

CHAPTER 7 | Science and Technology: Public Attitudes and Understanding

APPENDIX TABLE 7-32

Public assessment of the danger of river, lake, and stream pollution to the environment, by respondent characteristic: 1993, 1994, 2000, 2010, 2016																				
Characteristic	1993				1994				2000				2010				2016			
	Extremely or very dangerous	Somewhat dangerous	Not very or not dangerous	Don't know	Extremely or very dangerous	Somewhat dangerous	Not very or not dangerous	Don't know	Extremely or very dangerous	Somewhat dangerous	Not very or not dangerous	Don't know	Extremely or very dangerous	Somewhat dangerous	Not very or not dangerous	Don't know	Extremely or very dangerous	Somewhat dangerous	Not very or not dangerous	Don't know
All adults ( <i>n</i> = 1,557; 1,386; 1,276; 1,430; 911)	66	27	4	3	61	29	5	5	66	23	5	7	69	24	4	2	79	17	3	1
Sex																				
Male ( <i>n</i> = 663; 617; 560; 607; 399)	64	28	5	3	58	31	6	4	67	22	5	6	68	25	5	1	78	18	3	1
Female ( <i>n</i> = 894; 769; 716; 823; 512)	68	25	3	4	63	27	4	6	65	24	4	7	70	23	4	3	79	16	3	2
Formal education <sup>a</sup>																				
Less than high school diploma ( <i>n</i> = 283; 225; 216; 220; 112)	57	29	5	9	50	30	9	10	61	21	7	11	62	24	9	5	65	25	7	3
High school diploma ( <i>n</i> = 496; 466; 397; 412; 260)	65	30	3	2	58	31	6	5	67	22	3	7	71	22	6	2	79	17	2	2

## CHAPTER 7 | Science and Technology: Public Attitudes and Understanding

Characteristic	1993				1994				2000				2010				2016			
	Extremely or very dangerous	Somewhat dangerous	Not very or not dangerous	Don't know	Extremely or very dangerous	Somewhat dangerous	Not very or not dangerous	Don't know	Extremely or very dangerous	Somewhat dangerous	Not very or not dangerous	Don't know	Extremely or very dangerous	Somewhat dangerous	Not very or not dangerous	Don't know	Extremely or very dangerous	Somewhat dangerous	Not very or not dangerous	Don't know
Some college ( <i>n</i> = 410; 346; 354; 390; 258)	70	22	5	2	66	28	3	4	65	23	5	7	70	25	3	3	81	16	3	*
Bachelor's degree ( <i>n</i> = 249; 242; 213; 266; 175)	69	25	3	3	63	30	3	4	70	27	2	2	70	26	3	1	79	17	2	1
Graduate or professional degree ( <i>n</i> = 114; 102; 89; 139; 104)	66	30	2	2	73	20	4	3	66	26	6	1	69	27	3	1	85	11	3	1
Science and mathematics education <sup>b</sup>																				
Low ( <i>n</i> = NA; NA; NA; 116; 500)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	67	24	8	1	77	18	3	2
Middle ( <i>n</i> = NA; NA; NA; 52; 180)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	65	29	2	5	84	14	2	1
High ( <i>n</i> = NA; NA; NA; 54; 179)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	67	28	5	0	82	14	4	0
Family income (quartile) <sup>a</sup>																				
Bottom ( <i>n</i> = NA; NA; NA; NA; 212)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	73	21	5	2



## CHAPTER 7 | Science and Technology: Public Attitudes and Understanding

Characteristic	1993				1994				2000				2010				2016			
	Extremely or very dangerous	Somewhat dangerous	Not very or not dangerous	Don't know	Extremely or very dangerous	Somewhat dangerous	Not very or not dangerous	Don't know	Extremely or very dangerous	Somewhat dangerous	Not very or not dangerous	Don't know	Extremely or very dangerous	Somewhat dangerous	Not very or not dangerous	Don't know	Extremely or very dangerous	Somewhat dangerous	Not very or not dangerous	Don't know
Third ( <i>n</i> = NA; NA; NA; NA; 184)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	79	18	2	1
Second ( <i>n</i> = NA; NA; NA; NA; 222)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	84	14	2	1
Top ( <i>n</i> = NA; NA; NA; NA; 211)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	80	16	4	*
Age (years) <sup>a</sup>																				
18–24 ( <i>n</i> = 132; 97; 113; 137; 59)	78	17	4	2	67	25	5	3	66	25	4	5	70	20	7	3	83	15	1	1
25–34 ( <i>n</i> = 325; 330; 256; 246; 160)	71	25	3	1	70	23	3	4	67	22	6	5	69	24	4	3	86	11	2	2
35–44 ( <i>n</i> = 383; 305; 297; 263; 135)	67	28	2	3	63	27	4	5	66	24	4	6	70	24	3	2	80	16	4	0
45–54 ( <i>n</i> = 251; 261; 245; 260; 158)	65	27	4	4	56	33	5	5	66	22	6	6	69	28	2	1	73	21	4	2
55–64 ( <i>n</i> = 171; 158; 144; 234; 168)	64	27	6	3	51	38	6	5	67	24	3	6	70	26	3	1	80	17	2	2
65 or older ( <i>n</i> = 291; 233; 220; 287; 228)	53	33	6	8	51	34	8	7	60	24	3	13	65	23	8	4	75	20	4	2

## CHAPTER 7 | Science and Technology: Public Attitudes and Understanding

Characteristic	1993				1994				2000				2010				2016			
	Extremely or very dangerous	Somewhat dangerous	Not very or not dangerous	Don't know	Extremely or very dangerous	Somewhat dangerous	Not very or not dangerous	Don't know	Extremely or very dangerous	Somewhat dangerous	Not very or not dangerous	Don't know	Extremely or very dangerous	Somewhat dangerous	Not very or not dangerous	Don't know	Extremely or very dangerous	Somewhat dangerous	Not very or not dangerous	Don't know
Trend factual knowledge of science scale (quartile) <sup>c</sup>																				
Bottom ( <i>n</i> = NA; NA; NA; 60; 168)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	61	23	8	7	67	22	5	
Third ( <i>n</i> = NA; NA; NA; 91; 241)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	74	18	8	1	79	18	3	
Second ( <i>n</i> = NA; NA; NA; 103; 296)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	66	28	5	1	82	16	2	
Top ( <i>n</i> = NA; NA; NA; 73; 206)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	67	27	4	1	84	14	3	

\* = < 0.5% responded. NA = not available; question was not asked.

<sup>a</sup> Categories do not add to total *n* because "don't know" responses and refusals to respond are not shown.

<sup>b</sup> For science and mathematics education, "low" equates to five or fewer high school and college science or mathematics courses, "middle" is six through eight courses, and "high" means nine or more courses. Categories do not add to total *n* because "don't know" responses and refusals to respond are not shown.

<sup>c</sup> See notes to Appendix Table 7-2 for an explanation of the trend factual knowledge of science scale.

**Note(s)**

Responses to the question *In general, do you think that pollution of America's rivers, lakes, and streams is...* [1 *Extremely dangerous*], [2 *Very dangerous*], [3 *Somewhat dangerous*], [4 *Not very dangerous*], [5 *Not dangerous*], [8 *Don't know*]. Percentages may not add to 100% because of rounding.

## Source(s)

National Science Foundation, National Center for Science and Engineering Statistics, Survey of Public Attitudes Toward and Understanding of Science and Technology (1993–94); NORC at the University of Chicago, General Social Survey (2000–16).

CHAPTER 7 | Science and Technology: Public Attitudes and Understanding

APPENDIX TABLE 7-33

Public assessment of the danger of air pollution from industry to the environment, by respondent characteristic: 1993, 1994, 2000, 2010, 2016																				
(Percent)																				
Characteristic	1993				1994				2000				2010				2016			
	Extremely dangerous or very dangerous	Somewhat dangerous	Not very dangerous or not dangerous	Don't know	Extremely dangerous or very dangerous	Somewhat dangerous	Not very dangerous or not dangerous	Don't know	Extremely dangerous or very dangerous	Somewhat dangerous	Not very dangerous or not dangerous	Don't know	Extremely dangerous or very dangerous	Somewhat dangerous	Not very dangerous or not dangerous	Don't know	Extremely dangerous or very dangerous	Somewhat dangerous	Not very dangerous or not dangerous	Don't know
All adults ( <i>n</i> = 1,557; 1,386; 1,276; 1,430; 911)	61	30	4	4	53	37	5	5	62	29	2	6	63	31	4	2	73	23	2	1
Sex																				
Male ( <i>n</i> = 663; 617; 560; 607; 399)	57	33	6	4	49	40	7	4	59	33	3	5	59	35	6	1	71	25	2	1
Female ( <i>n</i> = 894; 769; 716; 823; 512)	65	28	3	4	57	34	4	6	65	27	2	7	67	27	2	4	75	22	2	2
Formal education <sup>a</sup>																				
Less than high school diploma ( <i>n</i> = 283; 225; 216; 220; 112)	52	33	5	9	48	34	7	12	59	27	4	9	68	20	7	5	69	24	5	2

## CHAPTER 7 | Science and Technology: Public Attitudes and Understanding

Characteristic	1993				1994				2000				2010				2016			
	Extremely dangerous or very dangerous	Somewhat dangerous	Not very dangerous or not dangerous	Don't know	Extremely dangerous or very dangerous	Somewhat dangerous	Not very dangerous or not dangerous	Don't know	Extremely dangerous or very dangerous	Somewhat dangerous	Not very dangerous or not dangerous	Don't know	Extremely dangerous or very dangerous	Somewhat dangerous	Not very dangerous or not dangerous	Don't know	Extremely dangerous or very dangerous	Somewhat dangerous	Not very dangerous or not dangerous	Don't know
High school diploma ( <i>n</i> = 496; 466; 397; 412; 260)	60	32	4	3	51	39	6	4	61	30	2	7	59	33	5	2	69	27	2	2
Some college ( <i>n</i> = 410; 346; 354; 390; 258)	70	25	3	2	57	35	4	3	63	28	2	7	65	32	2	2	74	24	2	*
Bachelor's degree ( <i>n</i> = 249; 242; 213; 266; 175)	62	31	5	2	54	36	6	4	67	30	2	1	63	33	3	1	76	22	1	*
Graduate or professional degree ( <i>n</i> = 114; 102; 89; 139; 104)	56	37	6	0	57	37	4	3	57	38	2	3	62	34	3	2	83	13	2	1
Science and mathematics education <sup>b</sup>																				
Low ( <i>n</i> = NA; NA; NA; 116; 500)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	64	30	5	2	71	25	2	2
Middle ( <i>n</i> = NA; NA; NA; 52; 180)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	44	51	3	3	77	18	4	1

CHAPTER 7 | Science and Technology: Public Attitudes and Understanding

Characteristic	1993				1994				2000				2010				2016			
	Extremely dangerous or very dangerous	Somewhat dangerous	Not very dangerous or not dangerous	Don't know	Extremely dangerous or very dangerous	Somewhat dangerous	Not very dangerous or not dangerous	Don't know	Extremely dangerous or very dangerous	Somewhat dangerous	Not very dangerous or not dangerous	Don't know	Extremely dangerous or very dangerous	Somewhat dangerous	Not very dangerous or not dangerous	Don't know	Extremely dangerous or very dangerous	Somewhat dangerous	Not very dangerous or not dangerous	Don't know
High ( <i>n</i> = NA; NA; NA; 54; 179)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	57	35	6	3	77	22	1	0
Family income (quartile) <sup>a</sup>																				
Bottom ( <i>n</i> = NA; NA; NA; NA; 212)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	72	23	2	3
Third ( <i>n</i> = NA; NA; NA; NA; 184)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	74	23	2	1
Second ( <i>n</i> = NA; NA; NA; NA; 222)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	75	22	2	*
Top ( <i>n</i> = NA; NA; NA; NA; 211)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	73	24	2	*
Age (years) <sup>a</sup>																				
18–24 ( <i>n</i> = 132; 97; 113; 137; 59)	73	19	5	4	54	35	6	6	66	28	1	5	68	27	4	1	76	23	0	1
25–34 ( <i>n</i> = 325; 330; 256; 246; 160)	68	28	3	1	59	33	4	4	62	29	3	6	63	29	5	4	77	19	2	2
35–44 ( <i>n</i> = 383; 305; 297; 263; 135)	65	30	3	3	60	31	6	4	66	26	2	5	63	32	3	3	78	19	3	*

## CHAPTER 7 | Science and Technology: Public Attitudes and Understanding

Characteristic	1993				1994				2000				2010				2016			
	Extremely dangerous or very dangerous	Somewhat dangerous	Not very dangerous or not dangerous	Don't know	Extremely dangerous or very dangerous	Somewhat dangerous	Not very dangerous or not dangerous	Don't know	Extremely dangerous or very dangerous	Somewhat dangerous	Not very dangerous or not dangerous	Don't know	Extremely dangerous or very dangerous	Somewhat dangerous	Not very dangerous or not dangerous	Don't know	Extremely dangerous or very dangerous	Somewhat dangerous	Not very dangerous or not dangerous	Don't know
45–54 ( <i>n</i> = 251; 261; 245; 260; 158)	61	30	4	5	53	37	5	5	62	31	1	5	67	29	1	3	72	26	1	1
55–64 ( <i>n</i> = 171; 158; 144; 234; 168)	56	31	9	4	44	44	6	6	59	32	2	7	63	32	4	1	73	22	2	2
65 or older ( <i>n</i> = 291; 233; 220; 287; 228)	44	43	6	7	40	47	7	7	54	32	5	9	57	35	6	2	66	28	3	2
Trend factual knowledge of science scale (quartile) <sup>c</sup>																				
Bottom ( <i>n</i> = NA; NA; NA; 60; 168)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	55	36	1	8	67	23	4	7
Third ( <i>n</i> = NA; NA; NA; 91; 241)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	67	32	1	1	73	25	2	1
Second ( <i>n</i> = NA; NA; NA; 103; 296)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	50	42	6	1	75	22	3	*
Top ( <i>n</i> = NA; NA; NA; 73; 206)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	60	34	4	3	76	24	*	0

\* = < 0.5% responded. NA = not available; question was not asked.



CHAPTER 7 | Science and Technology: Public Attitudes and Understanding

<sup>a</sup> Categories do not add to total *n* because "don't know" responses and refusals to respond are not shown.

<sup>b</sup> For science and mathematics education, "low" equates to five or fewer high school and college science or mathematics courses, "middle" is six through eight courses, and "high" means nine or more courses. Categories do not add to total *n* because "don't know" responses and refusals to respond are not shown.

<sup>c</sup> See notes to Appendix Table 7-2 for an explanation of the trend factual knowledge of science scale.

**Note(s)**

Responses to the question *In general, do you think that air pollution caused by industry is...*[1 *Extremely dangerous*], [2 *Very dangerous*], [3 *Somewhat dangerous*], [4 *Not very dangerous*], [5 *Not dangerous*], [8 *Don't know*]. Percentages may not add to 100% because of rounding.

**Source(s)**

National Science Foundation, National Center for Science and Engineering Statistics, Survey of Public Attitudes Toward and Understanding of Science and Technology (1993–94); NORC at the University of Chicago, General Social Survey (2000–16).

*Science and Engineering Indicators 2018*

## CHAPTER 7 | Science and Technology: Public Attitudes and Understanding

APPENDIX TABLE 7-34

## Public assessment of the danger of climate change to the environment, by respondent characteristic: 1993, 1994, 2000, 2010, 2016

(Percent)

Characteristic	1993				1994				2000				2010				2016			
	Extremely dangerous or very dangerous	Somewhat dangerous	Not very dangerous or not dangerous	Don't know	Extremely dangerous or very dangerous	Somewhat dangerous	Not very dangerous or not dangerous	Don't know	Extremely dangerous or very dangerous	Somewhat dangerous	Not very dangerous or not dangerous	Don't know	Extremely dangerous or very dangerous	Somewhat dangerous	Not very dangerous or not dangerous	Don't know	Extremely dangerous or very dangerous	Somewhat dangerous	Not very dangerous or not dangerous	Don't know
All adults ( <i>n</i> = 1,557; 1,386; 1,276; 1,430; 911)	41	34	14	12	35	35	16	14	40	33	11	15	48	27	18	6	55	26	15	4
Sex																				
Male ( <i>n</i> = 663; 617; 560; 607; 399)	35	35	20	9	32	36	23	10	41	33	14	12	48	24	23	5	53	27	18	2
Female ( <i>n</i> = 894; 769; 716; 823; 512)	46	32	9	13	37	34	11	18	39	34	8	18	48	30	15	8	56	26	12	6
Formal education <sup>a</sup>																				
Less than high school diploma ( <i>n</i> = 283; 225; 216; 220; 112)	36	31	13	21	28	30	16	26	40	23	12	26	50	24	14	12	46	31	13	11



## CHAPTER 7 | Science and Technology: Public Attitudes and Understanding

Characteristic	1993				1994				2000				2010				2016			
	Extremely dangerous or very dangerous	Somewhat dangerous	Not very dangerous or not dangerous	Don't know	Extremely dangerous or very dangerous	Somewhat dangerous	Not very dangerous or not dangerous	Don't know	Extremely dangerous or very dangerous	Somewhat dangerous	Not very dangerous or not dangerous	Don't know	Extremely dangerous or very dangerous	Somewhat dangerous	Not very dangerous or not dangerous	Don't know	Extremely dangerous or very dangerous	Somewhat dangerous	Not very dangerous or not dangerous	Don't know
High school diploma ( $n = 496$ ; 466; 397; 412; 260)	38	35	15	11	31	36	19	14	39	35	9	16	40	35	17	8	46	35	14	4
Some college ( $n = 410$ ; 346; 354; 390; 258)	46	32	11	10	37	37	15	12	37	36	11	16	55	24	17	4	60	21	17	2
Bachelor's degree ( $n = 249$ ; 242; 213; 266; 175)	43	36	13	8	41	37	15	8	49	34	15	2	42	28	27	3	54	24	19	4
Graduate or professional degree ( $n = 114$ ; 102; 89; 139; 104)	44	30	21	5	43	34	14	8	39	38	12	11	54	21	16	10	73	18	8	1
Science and mathematics education <sup>b</sup>																				
Low ( $n = \text{NA}$ ; NA; NA; 116; 500)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	42	39	11	8	50	29	15	5
Middle ( $n = \text{NA}$ ; NA; NA; 52; 180)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	26	53	19	3	59	25	14	2

## CHAPTER 7 | Science and Technology: Public Attitudes and Understanding

Characteristic	1993				1994				2000				2010				2016			
	Extremely dangerous or very dangerous	Somewhat dangerous	Not very dangerous or not dangerous	Don't know	Extremely dangerous or very dangerous	Somewhat dangerous	Not very dangerous or not dangerous	Don't know	Extremely dangerous or very dangerous	Somewhat dangerous	Not very dangerous or not dangerous	Don't know	Extremely dangerous or very dangerous	Somewhat dangerous	Not very dangerous or not dangerous	Don't know	Extremely dangerous or very dangerous	Somewhat dangerous	Not very dangerous or not dangerous	Don't know
High ( <i>n</i> = NA; NA; NA; 54; 179)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	44	17	36	3	64	18	17	2
Family income (quartile) <sup>a</sup>																				
Bottom ( <i>n</i> = NA; NA; NA; NA; 212)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	52	27	14	6
Third ( <i>n</i> = NA; NA; NA; NA; 184)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	51	31	13	4
Second ( <i>n</i> = NA; NA; NA; NA; 222)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	61	23	11	4
Top ( <i>n</i> = NA; NA; NA; NA; 211)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	56	24	18	1
Age (years) <sup>a</sup>																				
18–24 ( <i>n</i> = 132; 97; 113; 137; 59)	55	32	8	5	51	30	13	6	48	31	5	16	62	19	15	4	68	21	9	2
25–34 ( <i>n</i> = 325; 330; 256; 246; 160)	48	29	13	10	37	36	13	14	47	30	12	11	51	27	17	5	61	28	6	6
35–44 ( <i>n</i> = 383; 305; 297; 263; 135)	42	36	14	8	38	37	13	12	43	31	9	17	49	28	16	7	59	22	16	3

## CHAPTER 7 | Science and Technology: Public Attitudes and Understanding

Characteristic	1993				1994				2000				2010				2016			
	Extremely dangerous or very dangerous	Somewhat dangerous	Not very dangerous or not dangerous	Don't know	Extremely dangerous or very dangerous	Somewhat dangerous	Not very dangerous or not dangerous	Don't know	Extremely dangerous or very dangerous	Somewhat dangerous	Not very dangerous or not dangerous	Don't know	Extremely dangerous or very dangerous	Somewhat dangerous	Not very dangerous or not dangerous	Don't know	Extremely dangerous or very dangerous	Somewhat dangerous	Not very dangerous or not dangerous	Don't know
45–54 ( <i>n</i> = 251; 261; 245; 260; 158)	40	33	13	14	33	34	20	14	41	35	12	11	46	28	20	6	53	26	18	4
55–64 ( <i>n</i> = 171; 158; 144; 234; 168)	32	34	18	16	25	37	19	19	28	43	13	17	40	34	19	7	52	29	16	3
65 or older ( <i>n</i> = 291; 233; 220; 287; 228)	28	37	17	18	25	33	22	20	29	33	14	23	38	29	24	9	45	29	20	6
Trend factual knowledge of science scale (quartile) <sup>c</sup>																				
Bottom ( <i>n</i> = NA; NA; NA; 60; 168)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	23	45	13	20	45	27	17	12
Third ( <i>n</i> = NA; NA; NA; 91; 241)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	53	32	11	5	50	31	15	3
Second ( <i>n</i> = NA; NA; NA; 103; 296)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	37	37	20	6	58	25	14	3
Top ( <i>n</i> = NA; NA; NA; 73; 206)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	42	28	25	5	63	22	15	1

NA = not available; question was not asked.



CHAPTER 7 | Science and Technology: Public Attitudes and Understanding

<sup>a</sup> Categories do not add to total *n* because "don't know" responses and refusals to respond are not shown.

<sup>b</sup> For science and mathematics education, "low" equates to five or fewer high school and college science or mathematics courses, "middle" is six through eight courses, and "high" means nine or more courses. Categories do not add to total *n* because "don't know" responses and refusals to respond are not shown.

<sup>c</sup> See notes to Appendix Table 7-2 for an explanation of the trend factual knowledge of science scale.

**Note(s)**

For 1993, 1994, 2000, and 2016, responses to the question *In general, do you think that a rise in the world's temperature caused by the 'greenhouse effect' is...*[1 *Extremely dangerous*], [2 *Very dangerous*], [3 *Somewhat dangerous*], [4 *Not very dangerous*], [5 *Not dangerous*], [8 *Don't know*]. For 2010, responses to the question *In general, do you think that a rise in the world's temperature caused by climate change is...*[1 *Extremely dangerous*], [2 *Very dangerous*], [3 *Somewhat dangerous*], [4 *Not very dangerous*], [5 *Not dangerous*], [8 *Don't know*]. Percentages may not add to 100% because of rounding.

**Source(s)**

National Science Foundation, National Center for Science and Engineering Statistics, Survey of Public Attitudes Toward and Understanding of Science and Technology (1993–94); NORC at the University of Chicago, General Social Survey (2000–16).

*Science and Engineering Indicators 2018*

CHAPTER 7 | Science and Technology: Public Attitudes and Understanding

APPENDIX TABLE 7-35

Public assessment of the danger of nuclear power stations to the environment, by respondent characteristic: 1993, 1994, 2010, 2016																
Characteristic	1993				1994				2010				2016			
	Extremely dangerous or very dangerous	Somewhat dangerous	Not very dangerous or not dangerous	Don't know	Extremely dangerous or very dangerous	Somewhat dangerous	Not very dangerous or not dangerous	Don't know	Extremely dangerous or very dangerous	Somewhat dangerous	Not very dangerous or not dangerous	Don't know	Extremely dangerous or very dangerous	Somewhat dangerous	Not very dangerous or not dangerous	Don't know
All adults (n = 1,557; 1,386; 1,430; 911)	40	34	16	9	41	35	15	9	45	30	19	7	55	30	13	2
Sex																
Male (n = 663; 617; 607; 399)	33	35	24	8	33	35	24	8	35	32	28	4	43	33	22	1
Female (n = 894; 769; 823; 512)	46	34	9	10	48	35	8	10	52	28	11	9	65	27	6	2
Formal education <sup>a</sup>																
Less than high school diploma (n = 283; 225; 220; 112)	48	29	8	15	45	28	11	16	53	20	10	16	67	23	8	2
High school diploma (n = 496; 466; 412; 260)	44	32	15	9	43	37	11	9	54	27	13	6	54	31	13	2

## CHAPTER 7 | Science and Technology: Public Attitudes and Understanding

Characteristic	1993				1994				2010				2016			
	Extremely dangerous or very dangerous	Somewhat dangerous	Not very dangerous or not dangerous	Don't know	Extremely dangerous or very dangerous	Somewhat dangerous	Not very dangerous or not dangerous	Don't know	Extremely dangerous or very dangerous	Somewhat dangerous	Not very dangerous or not dangerous	Don't know	Extremely dangerous or very dangerous	Somewhat dangerous	Not very dangerous or not dangerous	Don't know
Some college ( <i>n</i> = 410; 346; 390; 258)	41	35	16	8	38	37	16	9	43	35	17	6	58	28	13	*
Bachelor's degree ( <i>n</i> = 249; 242; 266; 175)	31	40	22	8	37	35	23	5	37	28	33	2	47	34	16	3
Graduate or professional degree ( <i>n</i> = 114; 102; 139; 104)	25	45	28	2	40	33	25	2	22	43	31	4	53	34	13	0
Science and mathematics education <sup>b</sup>																
Low ( <i>n</i> = NA; NA; 116; 500)	NA	NA	NA	NA	NA	NA	NA	NA	36	41	13	10	58	29	10	2
Middle ( <i>n</i> = NA; NA; 52; 180)	NA	NA	NA	NA	NA	NA	NA	NA	32	32	30	6	59	31	10	0
High ( <i>n</i> = NA; NA; 54; 179)	NA	NA	NA	NA	NA	NA	NA	NA	34	29	35	2	44	33	23	0
Family income (quartile) <sup>a</sup>																
Bottom ( <i>n</i> = NA; NA; NA; 212)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	60	26	12	2

## CHAPTER 7 | Science and Technology: Public Attitudes and Understanding

Characteristic	1993				1994				2010				2016			
	Extremely dangerous or very dangerous	Somewhat dangerous	Not very dangerous or not dangerous	Don't know	Extremely dangerous or very dangerous	Somewhat dangerous	Not very dangerous or not dangerous	Don't know	Extremely dangerous or very dangerous	Somewhat dangerous	Not very dangerous or not dangerous	Don't know	Extremely dangerous or very dangerous	Somewhat dangerous	Not very dangerous or not dangerous	Don't know
Third ( <i>n</i> = NA; NA; NA; 184)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	56	33	10	1
Second ( <i>n</i> = NA; NA; NA; 222)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	58	31	10	1
Top ( <i>n</i> = NA; NA; NA; 211)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	49	31	20	0
Age (years) <sup>a</sup>																
18–24 ( <i>n</i> = 132; 97; 137; 59)	55	32	7	6	53	36	7	5	52	31	7	9	69	16	15	0
25–34 ( <i>n</i> = 325; 330; 246; 160)	45	35	14	7	45	31	15	9	51	25	16	8	55	31	12	2
35–44 ( <i>n</i> = 383; 305; 263; 135)	40	38	15	8	44	33	17	6	47	31	15	7	63	28	8	0
45–54 ( <i>n</i> = 251; 261; 260; 158)	40	34	18	8	38	36	16	10	49	27	20	3	56	25	17	2
55–64 ( <i>n</i> = 171; 158; 234; 168)	31	30	24	15	30	44	17	9	39	35	23	3	52	39	8	1
65 or older ( <i>n</i> = 291; 233; 287; 228)	32	33	20	15	33	36	17	13	30	30	32	8	45	33	18	3

## CHAPTER 7 | Science and Technology: Public Attitudes and Understanding

Characteristic	1993				1994				2010				2016			
	Extremely dangerous or very dangerous	Somewhat dangerous	Not very dangerous or not dangerous	Don't know	Extremely dangerous or very dangerous	Somewhat dangerous	Not very dangerous or not dangerous	Don't know	Extremely dangerous or very dangerous	Somewhat dangerous	Not very dangerous or not dangerous	Don't know	Extremely dangerous or very dangerous	Somewhat dangerous	Not very dangerous or not dangerous	Don't know
Trend factual knowledge of science scale (quartile) <sup>c</sup>																
Bottom ( <i>n</i> = NA; NA; 60; 168)	NA	NA	NA	NA	NA	NA	NA	NA	44	30	15	10	58	28	7	6
Third ( <i>n</i> = NA; NA; 91; 241)	NA	NA	NA	NA	NA	NA	NA	NA	48	32	11	10	61	27	11	1
Second ( <i>n</i> = NA; NA; 103; 296)	NA	NA	NA	NA	NA	NA	NA	NA	38	37	19	5	58	28	13	1
Top ( <i>n</i> = NA; NA; 73; 206)	NA	NA	NA	NA	NA	NA	NA	NA	28	39	30	3	42	38	20	0

\* = < 0.5% responded. NA = not available; question was not asked.

<sup>a</sup> Categories do not add to total *n* because "don't know" responses and refusals to respond are not shown.

<sup>b</sup> For science and mathematics education, "low" equates to five or fewer high school and college science or mathematics courses, "middle" is six through eight courses, and "high" means nine or more courses. Categories do not add to total *n* because "don't know" responses and refusals to respond are not shown.

<sup>c</sup> See notes to Appendix Table 7-2 for an explanation of the trend factual knowledge of science scale.

### Note(s)

Responses to the question *In general, do you think that nuclear power stations are...* [1 Extremely dangerous], [2 Very dangerous], [3 Somewhat dangerous], [4 Not very dangerous], [5 Not dangerous], [8 Don't know]. Percentages may not add to 100% because of rounding.

### Source(s)





CHAPTER 7 | **Science and Technology: Public Attitudes and Understanding**

National Science Foundation, National Center for Science and Engineering Statistics, Survey of Public Attitudes Toward and Understanding of Science and Technology (1993–94); NORC at the University of Chicago, General Social Survey (2010–16).

*Science and Engineering Indicators 2018*

## CHAPTER 7 | Science and Technology: Public Attitudes and Understanding

APPENDIX TABLE 7-36

### Public assessment of the danger of modifying genes of crops to the environment, by respondent characteristic: 2000, 2010, 2016

(Percent)

Characteristic	2000				2010				2016			
	Extremely dangerous or very dangerous	Somewhat dangerous	Not very dangerous or not dangerous	Don't know	Extremely dangerous or very dangerous	Somewhat dangerous	Not very dangerous or not dangerous	Don't know	Extremely dangerous or very dangerous	Somewhat dangerous	Not very dangerous or not dangerous	Don't know
All adults ( <i>n</i> = 1,276; 1,430; 911)	21	32	25	22	25	33	26	16	43	36	18	4
Sex												
Male ( <i>n</i> = 560; 607; 399)	16	34	33	16	22	33	34	11	30	41	26	3
Female ( <i>n</i> = 716; 823; 512)	25	31	18	26	27	33	19	21	53	31	12	4
Formal education <sup>a</sup>												
Less than high school diploma ( <i>n</i> = 216; 220; 112)	21	33	16	30	25	30	23	21	47	32	13	8
High school diploma ( <i>n</i> = 397; 412; 260)	25	26	25	24	24	35	24	18	41	37	19	4

## CHAPTER 7 | Science and Technology: Public Attitudes and Understanding

Characteristic	2000				2010				2016			
	Extremely dangerous or very dangerous	Somewhat dangerous	Not very dangerous or not dangerous	Don't know	Extremely dangerous or very dangerous	Somewhat dangerous	Not very dangerous or not dangerous	Don't know	Extremely dangerous or very dangerous	Somewhat dangerous	Not very dangerous or not dangerous	Don't know
Some college ( <i>n</i> = 354; 390; 258)	19	38	22	21	29	36	21	14	48	31	19	2
Bachelor's degree ( <i>n</i> = 213; 266; 175)	20	37	33	10	21	31	34	14	39	40	18	3
Graduate or professional degree ( <i>n</i> = 89; 139; 104)	11	27	46	16	20	26	38	16	36	42	19	3
Science and mathematics education <sup>b</sup>												
Low ( <i>n</i> = NA; 116; 500)	NA	NA	NA	NA	32	32	25	11	43	35	17	5
Middle ( <i>n</i> = NA; 52; 180)	NA	NA	NA	NA	13	25	46	17	49	36	13	1
High ( <i>n</i> = NA; 54; 179)	NA	NA	NA	NA	19	31	40	10	37	37	26	*
Family income (quartile) <sup>a</sup>												
Bottom ( <i>n</i> = NA; NA; 212)	NA	NA	NA	NA	NA	NA	NA	NA	42	34	17	8

## CHAPTER 7 | Science and Technology: Public Attitudes and Understanding

Characteristic	2000				2010				2016			
	Extremely dangerous or very dangerous	Somewhat dangerous	Not very dangerous or not dangerous	Don't know	Extremely dangerous or very dangerous	Somewhat dangerous	Not very dangerous or not dangerous	Don't know	Extremely dangerous or very dangerous	Somewhat dangerous	Not very dangerous or not dangerous	Don't know
Third ( <i>n</i> = NA; NA; 184)	NA	NA	NA	NA	NA	NA	NA	NA	43	40	15	2
Second ( <i>n</i> = NA; NA; 222)	NA	NA	NA	NA	NA	NA	NA	NA	48	30	20	2
Top ( <i>n</i> = NA; NA; 211)	NA	NA	NA	NA	NA	NA	NA	NA	38	41	21	1
Age (years) <sup>a</sup>												
18–24 ( <i>n</i> = 113; 137; 59)	24	31	27	17	24	37	24	16	44	33	19	4
25–34 ( <i>n</i> = 256; 246; 160)	25	34	22	19	26	33	29	12	42	35	19	4
35–44 ( <i>n</i> = 297; 263; 135)	19	38	24	19	31	30	25	14	52	34	11	2
45–54 ( <i>n</i> = 245; 260; 158)	22	31	26	21	28	35	23	15	43	39	15	3
55–64 ( <i>n</i> = 144; 234; 168)	16	32	31	21	20	38	25	17	42	36	20	2
65 or older ( <i>n</i> = 220; 287; 228)	21	24	21	34	17	28	30	25	37	34	23	6

## CHAPTER 7 | Science and Technology: Public Attitudes and Understanding

Characteristic	2000				2010				2016			
	Extremely dangerous or very dangerous	Somewhat dangerous	Not very dangerous or not dangerous	Don't know	Extremely dangerous or very dangerous	Somewhat dangerous	Not very dangerous or not dangerous	Don't know	Extremely dangerous or very dangerous	Somewhat dangerous	Not very dangerous or not dangerous	Don't know
Trend factual knowledge of science scale (quartile) <sup>c</sup>												
Bottom ( <i>n</i> = NA; 60; 168)	NA	NA	NA	NA	16	33	21	30	45	32	11	11
Third ( <i>n</i> = NA; 91; 241)	NA	NA	NA	NA	36	33	19	12	44	32	20	3
Second ( <i>n</i> = NA; 103; 296)	NA	NA	NA	NA	23	27	45	4	47	35	16	1
Top ( <i>n</i> = NA; 73; 206)	NA	NA	NA	NA	18	39	31	13	31	44	23	1

\* = < 0.5% responded. NA = not available; question was not asked.

<sup>a</sup> Categories do not add to total *n* because "don't know" responses and refusals to respond are not shown.

<sup>b</sup> For science and mathematics education, "low" equates to five or fewer high school and college science or mathematics courses, "middle" is six through eight courses, and "high" means nine or more courses. Categories do not add to total *n* because "don't know" responses and refusals to respond are not shown.

<sup>c</sup> See notes to Appendix Table 7-2 for an explanation of the trend factual knowledge of science scale.

### Note(s)

Responses to the question *Do you think that modifying the genes of certain crops is:* [1 Extremely dangerous for environment], [2 Very dangerous], [3 Somewhat dangerous], [4 Not very dangerous], [5 Not dangerous at all for environment], [8 Can't choose]. Percentages may not add to 100% because of rounding.

### Source(s)

NORC at the University of Chicago, General Social Survey (2000–16).



## CHAPTER 7 | Science and Technology: Public Attitudes and Understanding

*Science and Engineering Indicators 2018*

## CHAPTER 7 | Science and Technology: Public Attitudes and Understanding

APPENDIX TABLE 7-37 

### Public assessment of the benefits and harms of nanotechnology, by respondent characteristic: 2006, 2008, 2010, 2016

(Percent and mean score)

Characteristic	2006				2008				2010				2016			
	Benefits greater	Benefits and harms about equal	Harmful results greater	Don't know	Benefits greater	Benefits and harms about equal	Harmful results greater	Don't know	Benefits greater	Benefits and harms about equal	Harmful results greater	Don't know	Benefits greater	Benefits and harms about equal	Harmful results greater	Don't know
All adults ( <i>n</i> = 1,864; 2,021; 963; 911)	40	19	9	32	39	13	9	40	37	9	11	43	50	10	18	21
Sex																
Male ( <i>n</i> = 804; 918; 397; 399)	49	18	8	24	46	12	10	32	45	10	9	36	61	10	16	12
Female ( <i>n</i> = 1,060; 1,103; 566; 512)	33	20	9	39	32	14	8	46	30	9	11	50	41	11	19	29
Formal education <sup>a</sup>																
Less than high school diploma ( <i>n</i> = 227; 283; 119; 112)	14	28	15	43	18	16	18	47	22	13	9	56	33	18	27	22
High school diploma ( <i>n</i> = 507; 632; 296; 260)	34	19	11	37	36	13	9	42	26	14	19	41	44	15	18	22
Some college ( <i>n</i> = 607; 550; 243; 258)	41	19	9	32	41	13	8	38	41	8	7	44	52	7	22	19

## CHAPTER 7 | Science and Technology: Public Attitudes and Understanding

Characteristic	2006				2008				2010				2016			
	Benefits greater	Benefits and harms about equal	Harmful results greater	Don't know	Benefits greater	Benefits and harms about equal	Harmful results greater	Don't know	Benefits greater	Benefits and harms about equal	Harmful results greater	Don't know	Benefits greater	Benefits and harms about equal	Harmful results greater	Don't know
Bachelor's degree ( <i>n</i> = 346; 356; 205; 175)	52	17	4	27	49	10	5	36	49	4	4	43	60	7	12	22
Graduate or professional degree ( <i>n</i> = 176; 200; 100; 104)	63	14	2	22	53	13	1	32	53	6	7	34	65	6	7	22
Science and mathematics education <sup>b</sup>																
Low ( <i>n</i> = 1,050; 1,199; 236; 500)	29	22	11	39	31	14	11	45	30	14	11	46	43	12	20	25
Middle ( <i>n</i> = 354; 340; 130; 180)	49	19	8	24	47	14	8	31	43	8	7	42	55	9	16	20
High ( <i>n</i> = 390; 395; 103; 179)	63	13	3	21	60	11	3	27	55	5	2	38	71	9	8	12
Family income (quartile) <sup>a</sup>																
Bottom ( <i>n</i> = NA; NA; NA; 212)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	42	11	26	21
Third ( <i>n</i> = NA; NA; NA; 184)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	47	13	19	21
Second ( <i>n</i> = NA; NA; NA; 222)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	53	10	16	21



## CHAPTER 7 | Science and Technology: Public Attitudes and Understanding

Characteristic	2006				2008				2010				2016			
	Benefits greater	Benefits and harms about equal	Harmful results greater	Don't know	Benefits greater	Benefits and harms about equal	Harmful results greater	Don't know	Benefits greater	Benefits and harms about equal	Harmful results greater	Don't know	Benefits greater	Benefits and harms about equal	Harmful results greater	Don't know
Top ( <i>n</i> = NA; NA; NA; 211)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	62	8	13	17
Age (years) <sup>a</sup>																
18–24 ( <i>n</i> = 157; 173; 53; 59)	45	22	13	20	44	20	14	23	32	18	18	32	67	12	18	4
25–34 ( <i>n</i> = 341; 346; 179; 160)	41	20	9	30	41	15	9	35	41	14	7	38	60	10	12	19
35–44 ( <i>n</i> = 382; 377; 165; 135)	38	23	5	34	38	14	9	39	40	7	15	38	41	12	24	23
45–54 ( <i>n</i> = 386; 421; 183; 158)	44	16	10	30	38	14	7	41	43	8	6	43	49	10	21	20
55–64 ( <i>n</i> = 272; 335; 173; 168)	41	17	9	33	44	10	7	39	35	6	13	46	50	14	19	17
65 or older ( <i>n</i> = 321; 354; 204; 228)	30	16	7	47	29	6	7	58	28	7	7	58	44	7	15	34
Trend factual knowledge of science scale (quartile) <sup>c</sup>																
Bottom ( <i>n</i> = 351; 375; 202; 168)	13	24	13	50	20	8	12	60	14	8	20	58	29	16	24	31
Third ( <i>n</i> = 489; 521; 223; 241)	26	19	13	41	28	14	12	46	30	11	8	51	45	12	22	21

## CHAPTER 7 | Science and Technology: Public Attitudes and Understanding

Characteristic	2006				2008				2010				2016			
	Benefits greater	Benefits and harms about equal	Harmful results greater	Don't know	Benefits greater	Benefits and harms about equal	Harmful results greater	Don't know	Benefits greater	Benefits and harms about equal	Harmful results greater	Don't know	Benefits greater	Benefits and harms about equal	Harmful results greater	Don't know
Second ( <i>n</i> = 545; 566; 290; 296)	45	22	7	26	38	16	8	39	42	9	10	38	52	8	18	22
Top ( <i>n</i> = 479; 559; 248; 206)	64	13	2	21	61	12	5	22	54	9	5	31	72	8	8	13

NA = not available; question was not asked.

<sup>a</sup> For science and mathematics education, "low" equates to five or fewer high school and college science or mathematics courses, "middle" is six through eight courses, and "high" means nine or more courses. Categories do not add to total *n* because "don't know" responses and refusals to respond are not shown.

<sup>b</sup> Categories do not add to total *n* because "don't know" responses and refusals to respond are not shown.

<sup>c</sup> See notes to Appendix Table 7-2 for an explanation of the trend factual knowledge of science scale.

### Note(s)

Data represent responses to the question *Nanotechnology works at the molecular level atom by atom to build new structures, materials, and machines. People have frequently noted that new technologies have produced both benefits and harmful results. Do you think the benefits of nanotechnology will outweigh the harmful results or the harmful results will outweigh the benefits?* Percentages may not add to 100% because of rounding.

### Source(s)

NORC at the University of Chicago, General Social Survey (2006–16).

*Science and Engineering Indicators 2018*

## CHAPTER 8

# Invention, Knowledge Transfer, and Innovation

## List of Appendix Tables

Appendix Table 8-1	USPTO patents granted, by sector: 2002–16 .....	8-3
Appendix Table 8-2	U.S. university patent awards, by technology area: 1996–2016.....	8-5
Appendix Table 8-3	Regions, countries, or economies in USPTO patent data .....	8-8
Appendix Table 8-4	USPTO patents granted, by region, country, or economy: 2000–16.....	8-11
Appendix Table 8-5	USPTO patents granted in computer technology, by region, country, or economy: 2000–16.....	8-15
Appendix Table 8-6	USPTO patents granted in semiconductors, by region, country, or economy: 2000–16.....	8-19
Appendix Table 8-7	USPTO patents granted in telecommunications, by region, country, or economy: 2000–16.....	8-23
Appendix Table 8-8	USPTO patents granted in digital communication, by region, country, or economy: 2000–16.....	8-27
Appendix Table 8-9	USPTO patents granted in basic communication processes, by region, country, or economy: 2000–16.....	8-31
Appendix Table 8-10	USPTO patents granted in IT methods for management, by region, country, or economy: 2000–16.....	8-35
Appendix Table 8-11	USPTO patents granted in medical technology, by region, country, or economy: 2000–16.....	8-39
Appendix Table 8-12	USPTO patents granted in biotechnology, by region, country, or economy: 2000–16.....	8-43
Appendix Table 8-13	USPTO patents granted in pharmaceuticals, by region, country, or economy: 2000–16.....	8-47
Appendix Table 8-14	USPTO patents granted in basic material chemistry, by region, country, or economy: 2000–16.....	8-51
Appendix Table 8-15	USPTO patents granted in organic chemistry, by region, country, or economy: 2000–16.....	8-55
Appendix Table 8-16	USPTO patents granted in macromolecular chemistry, by region, country, or economy: 2000–16.....	8-59
Appendix Table 8-17	USPTO patents granted in chemical engineering, by region, country, or economy: 2000–16.....	8-63
Appendix Table 8-18	USPTO patents granted in measurement, by region, country, or economy: 2000–16.....	8-67
Appendix Table 8-19	USPTO patents granted in optics, by region, country, or economy: 2000–16.....	8-71
Appendix Table 8-20	USPTO patents granted in analysis of biological materials, by region, country, or economy: 2000–16.....	8-75
Appendix Table 8-21	USPTO patents granted in control, by region, country, or economy: 2000–16.....	8-79
Appendix Table 8-22	USPTO patents granted in materials and metallurgy, by region, country, or economy: 2000–16.....	8-83

Appendix Table 8-23	USPTO patents granted in microstructural and nanotechnology, by region, country, or economy: 2000–16.....	8-87
Appendix Table 8-24	USPTO patents granted in surface technology and coating, by region, country, or economy: 2000–16.....	8-91
Appendix Table 8-25	Patent activity indexes for selected technologies for selected economies: 2014–16.....	8-95
Appendix Table 8-26	Academic patenting and licensing activities: 2001–15 .....	8-97
Appendix Table 8-27	Federal technology transfer activity indicators for U.S. agencies with federal laboratories: FYs 2001–14 .....	8-99
Appendix Table 8-28	Citation of S&E articles in USPTO patents, by cited field and cited country and sector: 2013–16.....	8-108
Appendix Table 8-29	Exports and imports of charges for the use of intellectual property, by selected region, country, or economy: 2008–16 .....	8-114
Appendix Table 8-30	Global venture capital investment, by financing stage and selected region, country, or economy: 2006–16.....	8-116
Appendix Table 8-31	Definitions of industry or technologies of venture capital data .....	8-119
Appendix Table 8-32	U.S. seed-stage venture capital investment, by industry: 2011–16 .....	8-122
Appendix Table 8-33	U.S. early and later-stage venture capital investment, by industry: 2011–16.....	8-124
Appendix Table 8-34	China early and later-stage venture capital investment, by industry: 2011–16.....	8-126
Appendix Table 8-35	SBIR and STTR awards, by type of award: FYs 1983–2015 .....	8-128
Appendix Table 8-36	SBIR award funding, by type of award and federal agency: FYs 1983–2015 .....	8-130
Appendix Table 8-37	STTR award funding, by type of award and federal agency: FYs 1995–2015 .....	8-133
Appendix Table 8-38	Federal policies and programs supporting early stage technology development and innovation .....	8-135

## CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

APPENDIX TABLE 8-1

### USPTO patents granted, by sector: 2002–16

(Number)

Owner and sector	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Total	167,400	169,077	164,384	143,891	173,822	157,331	157,788	167,463	219,848	224,871	253,624	278,517	301,643	299,382	304,126
Assigned to foreign owner	77,890	79,095	78,148	67,374	81,979	75,922	77,887	82,730	108,663	112,672	128,226	138,872	149,765	150,716	152,371
Assigned to owner from unknown location	49	37	23	202	247	268	273	282	426	317	310	393	430	420	482
Assigned to U.S. owner	89,462	89,946	86,213	76,315	91,596	81,141	79,628	84,451	110,759	111,882	125,089	139,251	151,448	148,246	151,272
Government	1,117	1,082	1,019	846	1,009	948	907	933	1,260	1,197	1,355	1,452	1,436	1,380	1,303
Private	70,299	71,418	69,401	61,921	74,810	66,762	66,395	70,993	92,481	94,503	106,000	118,228	129,247	126,112	129,024
Academic	3,461	3,473	3,219	2,883	3,525	3,221	3,030	3,282	4,543	4,433	5,057	5,636	6,107	6,191	6,639
Individual	14,104	13,529	12,165	10,342	11,840	9,879	9,006	8,911	11,994	11,264	12,138	13,332	13,859	13,668	13,578
Other	406	375	356	289	368	298	261	298	444	438	483	558	554	514	471
Unclassified	75	69	53	33	44	33	29	34	36	47	54	46	244	382	258

USPTO = U.S. Patent and Trademark Office.

#### Note(s)

Patents are allocated according to patent ownership information. Patents are credited on a fractional-count basis (i.e., for articles with collaborating institutions, each institution receives fractional credit on the basis of its proportion among participating institutions). Private covers the for-profit business sector. Government includes federal, state, local, and municipal and federally funded research and development centers. Other includes private nonprofits, including foundations, associations, nonacademic hospitals, and research-performing institutions.

#### Source(s)

National Science Foundation, National Center for Science and Engineering Statistics; SRI International; Science-Metrix; PatentsView and USPTO patent data, accessed April 2017.



CHAPTER 8 | **Invention, Knowledge Transfer, and Innovation**

*Science and Engineering Indicators 2018*

CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

APPENDIX TABLE 8-2

U.S. university patent awards, by technology area: 1996–2016

(Number)

Technology area	1996–2016	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
All university patents	83,443	2,279	2,658	3,432	3,628	3,307	3,438	3,461	3,473	3,219	2,883	3,525	3,221	3,030	3,282	4,543	4,433	5,057	5,636	6,107	6,191	6,639
Biotechnology	14,728	401	605	822	891	722	791	710	622	567	485	671	607	555	602	746	690	760	792	888	850	953
Pharmaceuticals	12,043	359	481	599	656	602	571	575	512	430	369	455	395	366	379	562	524	655	727	876	941	1,008
Medical technology	6,809	171	178	236	273	225	225	236	311	228	200	223	187	210	216	345	375	451	561	622	651	683
Measurement	6,070	177	176	188	223	214	225	216	252	288	246	279	262	282	282	345	375	393	401	391	415	438
Organic fine chemistry	5,829	194	206	242	232	245	250	295	250	201	202	251	215	190	221	309	254	358	379	423	432	480
Computer technology	4,217	79	83	120	99	92	118	119	119	136	122	180	169	167	185	284	285	338	356	393	365	406
Analysis of biological materials	3,999	84	105	181	160	129	163	143	141	138	124	148	155	182	176	274	257	247	300	308	288	296
Optics	2,856	64	83	101	105	127	102	140	135	152	145	149	140	137	138	155	126	168	157	177	181	175
Semiconductors	2,676	50	65	70	77	81	99	106	137	99	98	101	95	79	112	162	165	171	206	229	229	244
Electrical machinery, apparatus, energy	2,652	76	73	88	99	80	80	87	99	113	98	124	100	90	99	165	133	155	179	220	231	264
Microstructural and nanotechnology	2,166	24	30	40	37	47	50	65	83	93	91	115	115	109	111	146	161	149	191	183	184	143
Chemical engineering	2,079	63	58	79	85	77	76	70	99	88	82	82	74	73	71	121	107	123	147	152	172	178
Macromolecular chemistry, polymers	1,631	74	52	59	77	69	74	77	88	57	52	68	59	40	57	93	81	81	117	109	116	131
Basic materials chemistry	1,589	55	68	55	67	61	71	51	70	59	54	60	44	47	53	73	85	96	138	118	124	139
Materials, metallurgy	1,416	58	52	67	60	58	59	62	61	51	49	55	53	40	62	74	76	82	99	86	103	111

CHAPTER 8

|

Invention, Knowledge Transfer, and Innovation

Technology area	1996–2016	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Other special machines	1,346	33	47	62	61	64	70	78	73	53	54	51	56	43	52	70	67	71	83	78	84	94
Digital communication	1,228	14	9	14	11	25	27	25	22	32	35	63	61	55	61	87	115	120	92	128	120	113
Surface technology, coating	1,181	37	38	38	51	61	57	56	58	49	44	40	47	43	37	67	60	73	79	78	82	87
Telecommunications	1,104	23	19	33	29	24	37	50	41	59	43	56	54	49	56	62	63	86	70	78	86	85
Audio-visual technology	962	19	26	51	42	31	44	37	41	38	35	52	40	37	36	46	40	67	71	55	75	79
Environmental technology	886	36	33	41	37	40	36	43	35	37	25	43	34	26	42	42	46	44	58	73	57	56
Basic communication processes	837	21	6	23	20	20	14	20	24	44	48	44	48	51	55	48	65	50	61	57	55	62
Engines, pumps, turbines	680	14	23	20	26	23	27	25	31	24	24	30	27	31	35	42	37	45	41	50	43	63
Food chemistry	646	43	35	44	49	43	33	28	26	19	17	26	18	11	19	27	21	35	35	35	41	41
Control	579	15	13	24	18	20	20	22	24	20	19	33	25	14	21	33	32	37	48	46	40	54
Transport	418	11	8	7	22	16	18	16	14	21	19	20	17	14	11	25	28	25	34	33	33	29
Machine tools	408	19	17	21	24	13	16	17	20	21	14	18	19	14	20	18	23	21	24	30	20	17
Civil engineering	400	9	16	17	20	22	14	18	14	20	18	9	15	11	12	16	23	19	29	28	32	36
Textile and paper machines	391	11	10	20	15	14	14	20	14	21	13	19	19	14	12	20	21	21	33	25	23	32
Mechanical elements	388	12	10	15	16	19	18	19	17	19	14	18	18	11	9	17	20	23	31	29	27	27
IT methods for management	271	2	1	8	6	7	6	3	6	3	10	14	12	15	13	21	26	23	26	35	16	19
Thermal processes and apparatus	253	11	12	13	11	7	11	10	16	15	10	11	9	8	8	12	10	8	17	19	16	19
Other consumer goods	241	9	10	12	13	11	6	9	7	8	5	5	13	4	6	13	15	16	18	17	18	25
Handling	181	5	5	9	7	3	5	7	5	5	5	4	6	4	1	9	8	14	17	18	21	21



CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

Technology area	1996–2016	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Furniture, games	156	5	4	6	5	7	6	4	6	7	5	5	7	4	6	6	7	15	12	14	11	17
Unclassified	128	1	3	4	5	5	4	1	2	5	7	3	4	5	8	9	11	14	9	7	9	13

IT = information technology.

Note(s)

Patents are allocated according to patent inventorship information. Data include institutions affiliated with academic institutions, such as university and alumni organizations, foundations, university associations, and affiliated hospitals. Universities vary in how patents are assigned (e.g., to boards of regents, individual campuses, or entities with or without affiliation with university). Patents are classified under the World Intellectual Property Organization (WIPO) classification of patents, which classifies International Patent Classification (IPC) codes under 35 technical fields. IPC reformed codes take into account changes that were made to the WIPO classification in 2006 under the eighth version of the classification and were used to prepare these data. However, because PatentsView only provides the original IPC codes as they appeared on patents and not the IPC reformed codes, current Cooperative Patent Classification codes on patents were converted back to the most recent IPC classification to prepare these statistics. Fractional counts of patents were assigned to each technological field on patents to assign the proper weight of a patent to the corresponding technological fields under the classification. For instance, a patent that is classified under five different technological fields will see each of its technological fields receive a 0.2 count of the patent, so that the patent accounts for a count of 1.0 across all technological fields. Patents were also fractionally allocated among regions, countries, or economies based on the proportion of residences of all assignees. As such, data across technical fields sum up to the total number of granted academic patents in the United States. Data across technical fields also sum up to the total number of U.S. Patent and Trademark Office (USPTO)-granted patents.

Source(s)

National Science Foundation, National Center for Science and Engineering Statistics; SRI International; Science-Metrix; USPTO patent data, accessed April 2017.

Science and Engineering Indicators 2018

## CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

APPENDIX TABLE 8-3

### Regions, countries, or economies in USPTO patent data

(List of regions, countries, or economies in USPTO patent data)

North America	Central and South America	Europe	Middle East	Africa	Asia	Australia and Oceania
Canada	Argentina	EU	Israel	South Africa	China	Australia
Mexico	Brazil	Austria	All others	Algeria	Mainland China	New Zealand
Puerto Rico	All others	Belgium	Armenia	Angola	Hong Kong	All others
United States	Antigua and Barbuda	Denmark	Azerbaijan	Benin	Macau	Cook Islands
All others	Bahamas, The	Finland	Bahrain	Burkina Faso	India	Fiji
Greenland	Barbados	France	Iran	Cameroon	Japan	Kiribati
	Belize	Germany	Iraq	Chad	Malaysia	Marshall Islands
	Bolivia	Hungary	Jordan	Congo, Democratic Republic of the	Singapore	Nauru
	Chile	Ireland	Kuwait	Congo, Republic of the	South Korea	Palau
	Colombia	Italy	Lebanon	Côte d'Ivoire	Taiwan	Samoa
	Costa Rica	Netherlands	Oman	Djibouti	All others	Solomon Islands
	Cuba	Spain	Qatar	Egypt	Afghanistan	Vanuatu
	Dominica	Sweden	Saudi Arabia	Eritrea	Bangladesh	
	Dominican Republic	United Kingdom	Syria	Ethiopia	Brunei	

## CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

North America	Central and South America	Europe	Middle East	Africa	Asia	Australia and Oceania
	Ecuador	All others	United Arab Emirates	Gabon	Burma	
	El Salvador	Bulgaria	Yemen	Gambia, The	Cambodia	
	Grenada	Croatia		Ghana	Georgia	
	Guatemala	Cyprus		Guinea	Indonesia	
	Guyana	Czech Republic		Kenya	Kazakhstan	
	Haiti	Estonia		Liberia	Kyrgyzstan	
	Honduras	Greece		Libya	Laos	
	Jamaica	Latvia		Madagascar	Nepal	
	Nicaragua	Lithuania		Mali	North Korea	
	Panama	Luxembourg		Mauritius	Pakistan	
	Paraguay	Malta		Morocco	Papua New Guinea	
	Peru	Poland		Namibia	Philippines	
	Saint Kitts and Nevis	Portugal		Niger	Sri Lanka	
	Saint Lucia	Romania		Nigeria	Tajikistan	
	Saint Vincent and the Grenadines	Slovakia		Rwanda	Thailand	
	Suriname	Slovenia		Senegal	Uzbekistan	
	Trinidad and Tobago	Other Europe		Seychelles	Vietnam	
	Uruguay	Former Soviet Union		Sierra Leone		
	Venezuela	Belarus		Swaziland		

## CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

North America	Central and South America	Europe	Middle East	Africa	Asia	Australia and Oceania
		Moldova		Tanzania		
		Ukraine		Togo		
		Norway		Tunisia		
		Russia		Uganda		
		Switzerland		Zambia		
		All others		Zimbabwe		
		Albania				
		Andorra				
		Bosnia and Herzegovina				
		Iceland				
		Liechtenstein				
		Macedonia				
		Monaco				
		Montenegro				
		San Marino				
		Serbia				
		Turkey				
		Vatican City				

EU = European Union; USPTO = U.S. Patent and Trademark Office.

### Source(s)

Science-Metrix; PatentsView and USPTO patent data.

*Science and Engineering Indicators 2018*

## CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

APPENDIX TABLE 8-4

## USPTO patents granted, by region, country, or economy: 2000–16

(Number)

Region, country, or economy	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
World	157,595	166,158	167,400	169,077	164,384	143,891	173,822	157,331	157,788	167,463	219,848	224,871	253,624	278,517	301,643	299,382	304,126
North America	88,258	91,063	90,215	91,145	87,456	77,360	93,103	82,622	80,646	85,731	112,190	113,273	126,380	139,855	151,267	147,448	149,977
Canada	3,401	3,594	3,448	3,448	3,395	2,918	3,598	3,341	3,370	3,667	4,856	5,052	5,758	6,533	7,032	6,735	6,503
Mexico	79	90	108	91	91	82	72	59	64	64	101	103	135	164	185	182	238
Puerto Rico	26	12	13	27	18	25	27	30	17	15	26	26	37	22	41	33	46
United States	84,751	87,367	86,646	87,579	83,953	74,334	89,406	79,192	77,195	81,986	107,206	108,092	120,451	133,135	144,008	140,498	143,190
All others	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0
Central and South America	238	255	240	277	222	157	236	200	208	239	319	390	407	498	613	602	569
Argentina	55	50	54	61	47	27	42	40	35	47	47	60	68	83	77	75	90
Brazil	102	116	99	132	106	75	129	92	101	111	181	223	201	261	352	337	318
All others	80	90	87	84	69	54	65	68	72	81	91	106	138	154	183	190	162
Europe	27,097	29,379	29,165	28,878	26,854	22,727	26,307	23,686	23,683	24,115	33,128	33,465	39,083	44,392	48,732	48,580	49,105
EU	25,224	27,332	27,234	26,964	25,062	21,278	24,560	22,125	21,999	22,356	30,735	30,917	36,225	40,970	44,982	44,584	44,983
Austria	520	584	532	595	546	453	561	453	455	509	740	763	871	1,014	1,213	1,180	1,367
Belgium	707	738	725	636	630	528	621	531	517	600	831	810	882	1,064	1,205	1,155	1,238
Denmark	436	489	450	537	426	370	442	395	397	393	612	737	857	923	1,065	1,012	1,084

## CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

Region, country, or economy	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Finland	618	743	824	868	924	726	954	856	824	864	1,143	960	1,060	1,227	1,363	1,386	1,513
France	3,839	4,067	4,039	3,879	3,406	2,901	3,461	3,151	3,182	3,165	4,479	4,558	5,394	6,148	6,723	6,597	6,465
Germany	10,255	11,276	11,309	11,462	10,784	9,028	10,040	9,067	8,941	9,012	12,387	11,931	13,889	15,572	16,589	16,588	15,975
Hungary	39	59	49	74	51	47	54	49	66	50	93	104	110	137	159	159	178
Ireland	129	142	126	163	185	156	186	151	174	192	278	328	356	432	506	508	590
Italy	1,703	1,728	1,760	1,723	1,605	1,315	1,493	1,317	1,369	1,377	1,842	1,922	2,167	2,531	2,653	2,687	2,712
Netherlands	1,269	1,329	1,392	1,330	1,286	1,004	1,340	1,272	1,324	1,318	1,660	1,766	1,954	2,277	2,530	2,424	2,600
Spain	275	276	323	325	273	273	312	281	317	339	436	492	673	738	805	850	795
Sweden	1,584	1,746	1,668	1,511	1,286	1,131	1,249	1,066	1,063	1,009	1,436	1,715	2,090	2,301	2,775	2,664	2,863
United Kingdom	3,696	3,989	3,859	3,661	3,478	3,166	3,625	3,309	3,115	3,233	4,394	4,375	5,343	5,927	6,604	6,506	6,603
All others	154	166	178	200	182	180	223	226	254	296	405	457	577	679	792	867	998
Other Europe	1,873	2,047	1,932	1,915	1,791	1,449	1,747	1,561	1,685	1,759	2,393	2,548	2,859	3,422	3,749	3,997	4,122
Former Soviet Union	22	33	33	30	25	24	33	30	31	26	29	35	58	53	66	78	92
Norway	247	266	249	258	247	223	238	243	263	266	391	369	445	479	549	616	609
Russia	201	255	220	223	188	168	198	199	199	216	307	331	365	439	474	498	557
Switzerland	1,343	1,428	1,366	1,335	1,267	990	1,209	1,031	1,121	1,193	1,584	1,713	1,882	2,303	2,464	2,577	2,631
All others	60	66	64	70	64	44	69	59	70	58	82	99	110	148	197	228	233
Asia	40,187	43,278	45,538	46,350	47,544	41,502	51,299	48,181	50,490	54,415	70,172	73,329	83,048	88,232	94,777	96,387	98,019
China	331	467	570	622	747	750	1,066	1,203	1,617	2,054	3,222	3,730	5,373	6,695	8,137	9,026	11,449

## CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

Region, country, or economy	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
India	141	187	265	354	369	401	511	566	651	709	1,144	1,277	1,756	2,456	3,073	3,456	3,767
Japan	31,362	33,279	34,913	35,567	35,441	30,376	36,854	33,399	33,710	35,548	44,978	46,337	50,897	52,271	54,318	52,809	50,169
Malaysia	44	34	58	48	85	94	123	171	159	156	200	177	213	222	268	267	275
Singapore	226	307	420	438	457	345	412	390	404	435	616	650	804	793	933	961	989
South Korea	3,332	3,548	3,792	3,952	4,429	4,365	5,901	6,298	7,542	8,776	11,669	12,254	13,234	14,556	16,529	17,963	19,576
Taiwan	4,705	5,397	5,444	5,299	5,951	5,113	6,348	6,103	6,345	6,666	8,235	8,794	10,637	11,077	11,342	11,688	11,576
All others	46	57	76	69	64	59	83	50	61	71	108	111	134	162	176	216	220
Middle East	841	1,022	1,094	1,236	1,089	980	1,274	1,163	1,250	1,476	1,937	2,123	2,752	3,406	3,988	4,183	4,357
Israel	789	983	1,046	1,189	1,053	935	1,217	1,111	1,183	1,410	1,839	1,976	2,482	3,008	3,486	3,632	3,713
All others	52	39	48	47	35	44	57	52	67	66	98	147	269	398	502	551	644
Africa	130	137	129	136	124	114	128	99	109	112	151	155	188	223	235	228	254
South Africa	112	119	112	111	102	90	108	78	90	90	121	120	140	163	154	161	181
All others	19	18	17	25	22	24	21	21	19	22	30	35	49	60	82	68	73
Australia and Oceania	819	1,012	1,010	1,048	1,094	1,050	1,470	1,377	1,399	1,373	1,944	2,129	1,754	1,893	2,014	1,935	1,832
Australia	710	882	861	909	957	927	1,332	1,267	1,294	1,241	1,770	1,943	1,530	1,643	1,753	1,667	1,561
New Zealand	109	129	147	137	135	122	137	110	104	132	171	185	223	250	260	267	270
All others	0	1	1	2	2	1	1	0	0	0	3	0	0	0	1	1	2
Unclassified	25	12	9	6	1	2	4	3	3	3	7	8	12	18	16	19	12



CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

EU = European Union; USPTO = U.S. Patent and Trademark Office.

**Note(s)**

Patents are allocated according to patent inventorship information. Patents are fractionally allocated among regions, countries, or economies based on the proportion of residences of all named inventors. The EU includes 28 member countries. China includes Hong Kong.

**Source(s)**

Science-Metrix; PatentsView and USPTO patent data, accessed April 2017.

*Science and Engineering Indicators 2018*



## CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

APPENDIX TABLE 8-5

## USPTO patents granted in computer technology, by region, country, or economy: 2000–16

(Number)

Region, country, or economy	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
World	11,891	12,719	12,890	13,655	14,646	13,635	19,092	17,583	19,107	20,881	26,714	27,309	32,611	36,778	41,080	41,530	43,210
North America	7,603	8,110	8,136	8,711	9,234	8,536	11,975	10,634	11,399	12,628	16,102	16,018	18,503	20,790	23,600	23,277	24,271
Canada	145	163	184	194	210	179	319	327	378	460	706	740	886	1,027	1,120	1,037	1,021
Mexico	2	2	0	1	3	5	3	1	0	2	2	4	6	3	5	7	15
Puerto Rico	0	0	0	0	0	0	1	0	1	0	1	1	2	1	4	3	3
United States	7,456	7,944	7,953	8,515	9,020	8,352	11,652	10,305	11,020	12,165	15,393	15,273	17,610	19,758	22,471	22,229	23,232
All others	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Central and South America	2	3	3	4	5	5	8	8	7	9	16	17	17	23	35	54	53
Argentina	0	0	0	0	1	0	2	1	0	2	1	3	4	6	5	10	10
Brazil	1	2	1	2	1	1	3	4	5	6	12	12	10	15	23	34	32
All others	1	2	2	2	2	4	2	2	3	1	3	2	4	3	7	10	12
Europe	864	1,027	1,089	1,092	1,328	1,239	1,701	1,725	1,855	2,063	2,697	2,610	3,225	3,675	4,198	4,419	4,646
EU	832	973	1,031	1,026	1,250	1,176	1,612	1,633	1,753	1,943	2,535	2,416	2,958	3,351	3,803	3,940	4,154
Austria	12	19	8	25	25	18	26	22	20	25	41	33	40	43	57	62	68
Belgium	21	22	14	14	24	14	32	28	24	30	45	43	52	62	69	58	65
Denmark	8	12	15	15	13	11	16	17	18	21	29	37	42	40	35	49	48

## CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

Region, country, or economy	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Finland	17	22	25	32	45	37	72	78	70	93	103	97	102	131	167	191	200
France	168	174	213	211	244	192	306	241	286	294	420	357	475	557	607	588	598
Germany	223	258	310	290	390	375	478	561	636	658	908	792	911	1,003	1,115	1,193	1,197
Hungary	1	1	0	2	1	2	2	2	1	1	4	11	6	7	7	15	14
Ireland	11	20	10	15	20	18	21	18	15	30	40	43	64	76	76	104	102
Italy	82	101	89	81	78	95	96	99	110	106	118	135	170	197	207	209	225
Netherlands	44	54	52	42	59	41	71	84	76	102	111	111	112	132	168	145	149
Spain	5	4	3	7	9	12	19	12	23	27	31	38	56	55	53	57	74
Sweden	43	61	53	46	45	45	66	73	61	60	89	114	156	174	191	236	277
United Kingdom	194	224	235	242	290	308	397	389	391	456	534	544	696	788	911	879	952
All others	2	2	4	3	8	8	11	11	22	41	61	62	76	86	141	154	187
Other Europe	32	55	58	66	78	63	88	92	102	120	162	194	266	324	394	479	492
Former Soviet Union	1	1	0	0	0	1	2	1	2	3	3	5	9	12	27	31	32
Norway	6	6	7	5	11	9	10	20	21	19	18	31	42	41	35	59	55
Russia	9	17	15	30	18	12	30	23	27	39	57	73	85	93	117	131	142
Switzerland	15	27	33	29	45	41	44	43	47	57	78	80	112	163	201	241	241
All others	0	3	3	2	4	1	3	5	5	3	6	5	17	15	15	18	22
Asia	3,271	3,404	3,482	3,606	3,825	3,616	5,036	4,867	5,469	5,781	7,372	7,990	9,996	11,252	11,979	12,377	12,779
China	13	26	32	34	49	56	119	158	249	346	442	517	833	1,097	1,121	1,305	1,763

## CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

Region, country, or economy	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
India	10	17	15	40	42	57	100	123	172	214	373	442	564	851	1,100	1,278	1,303
Japan	2,508	2,610	2,676	2,773	2,805	2,574	3,493	3,183	3,390	3,358	4,140	4,469	5,342	5,707	5,772	5,396	4,964
Malaysia	2	1	2	4	3	10	12	20	22	27	30	20	35	34	35	35	47
Singapore	14	18	29	27	30	22	43	27	44	45	48	54	76	82	96	102	121
South Korea	469	441	376	350	387	435	640	716	826	997	1,427	1,464	1,683	1,856	2,170	2,466	2,931
Taiwan	253	291	350	376	508	461	627	637	762	787	907	1,009	1,450	1,607	1,667	1,778	1,625
All others	2	0	1	1	1	1	1	2	4	7	5	15	12	17	17	17	25
Middle East	111	119	128	175	175	160	220	199	237	256	336	440	653	823	1,024	1,153	1,174
Israel	109	118	125	174	173	159	214	196	234	253	328	434	628	787	991	1,115	1,112
All others	1	2	3	1	2	1	6	3	3	4	9	7	25	36	33	38	62
Africa	3	4	6	3	5	7	6	6	6	6	8	10	18	20	34	33	39
South Africa	3	3	4	2	3	7	4	3	4	3	5	4	5	6	12	15	21
All others	0	1	2	0	2	0	3	3	2	3	3	6	13	15	22	18	18
Australia and Oceania	36	51	46	64	75	72	146	145	134	137	182	224	196	193	208	215	247
Australia	32	48	44	57	71	68	137	137	123	124	167	212	174	174	191	194	223
New Zealand	4	3	1	7	4	4	9	9	11	13	15	13	22	19	17	21	24
All others	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0
Unclassified	2	0	0	1	0	0	0	0	0	0	1	0	3	2	2	1	1

CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

EU = European Union; USPTO = U.S. Patent and Trademark Office.

**Note(s)**

Patents are allocated according to patent inventorship information. Patents are fractionally allocated among regions, countries, or economies based on the proportion of residences of all named inventors. The EU includes 28 member countries. China includes Hong Kong. Patents are classified under the World Intellectual Property Organization (WIPO) classification of patents, which classifies International Patent Classification (IPC) codes under 35 technical fields. IPC reformed codes take into account changes that were made to the WIPO classification in 2006 under the eighth version of the classification and were used to prepare these data. However, because PatentsView only provides the original IPC codes as they appeared on patents and not the IPC reformed codes, current CPC codes on patents were converted back to the most recent IPC classification to prepare these statistics. Fractional counts of patents were assigned to each technological field on patents to assign the proper weight of a patent to the corresponding technological fields under the classification.

**Source(s)**

Science-Metrix; PatentsView and USPTO patent data, accessed April 2017.

*Science and Engineering Indicators 2018*

## CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

APPENDIX TABLE 8-6

## USPTO patents granted in semiconductors, by region, country, or economy: 2000–16

(Number)

Region, country, or economy	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
World	8,557	10,174	10,564	10,653	10,778	9,330	10,043	9,570	9,205	10,354	14,136	14,400	13,858	15,812	17,929	18,402	19,006
North America	3,808	4,469	4,603	4,623	4,492	3,901	3,996	3,728	3,379	3,472	4,642	4,491	4,308	4,887	5,620	5,570	5,816
Canada	25	25	25	35	40	29	32	31	31	40	54	64	57	67	80	73	76
Mexico	0	1	1	0	0	2	0	1	2	0	0	1	2	0	1	1	0
Puerto Rico	1	0	0	0	0	0	1	0	0	0	1	0	0	1	1	0	0
United States	3,782	4,443	4,576	4,587	4,452	3,871	3,962	3,696	3,346	3,433	4,588	4,426	4,249	4,820	5,539	5,495	5,739
All others	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Central and South America	0	1	0	0	0	0	0	0	0	0	1	1	0	3	2	2	2
Argentina	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Brazil	0	1	0	0	0	0	0	0	0	0	1	1	0	1	1	1	1
All others	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1
Europe	473	647	708	780	801	725	761	719	675	780	1,152	1,181	1,220	1,427	1,607	1,676	1,712
EU	453	615	673	755	776	701	735	696	657	749	1,120	1,144	1,181	1,367	1,544	1,616	1,646
Austria	12	13	9	16	14	11	13	23	18	29	42	57	65	79	105	127	164
Belgium	11	18	19	37	35	22	29	23	31	39	62	56	64	70	69	84	110
Denmark	0	2	2	3	4	2	5	1	2	3	7	4	3	5	5	1	2

## CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

Region, country, or economy	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Finland	5	5	6	4	10	12	10	9	7	11	14	14	14	12	16	17	25
France	64	96	93	101	112	99	123	116	95	129	169	185	193	241	256	267	253
Germany	196	253	302	347	403	396	386	379	352	366	613	592	603	668	787	773	741
Hungary	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	1
Ireland	1	7	3	4	4	3	6	4	8	6	6	11	10	14	14	7	17
Italy	64	97	87	80	54	37	39	29	34	38	40	51	47	74	96	107	94
Netherlands	26	42	55	65	44	35	42	36	33	32	60	68	70	75	68	73	98
Spain	2	1	3	2	0	2	2	1	3	1	1	2	4	5	5	6	5
Sweden	35	33	28	20	8	14	14	7	9	13	12	16	17	15	22	25	24
United Kingdom	36	47	62	76	85	67	61	65	62	78	86	83	82	103	93	118	97
All others	1	2	3	1	2	0	4	1	3	3	6	4	9	7	8	11	17
Other Europe	20	31	35	25	25	24	26	24	18	31	32	37	39	60	63	60	66
Former Soviet Union	1	0	1	1	0	0	0	0	0	0	0	0	1	0	1	1	0
Norway	0	0	2	0	4	2	2	2	1	1	1	2	1	3	8	4	5
Russia	6	10	6	3	2	3	3	2	3	2	3	4	3	3	6	3	4
Switzerland	12	20	26	20	20	18	20	19	14	27	27	30	32	53	47	49	53
All others	0	1	0	0	0	0	1	0	0	0	0	2	1	1	2	3	4
Asia	4,254	5,026	5,224	5,212	5,446	4,669	5,258	5,092	5,122	6,068	8,294	8,678	8,278	9,449	10,631	11,093	11,402
China	5	12	26	32	48	57	69	105	109	121	177	188	237	364	499	628	817

## CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

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CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

EU = European Union; USPTO = U.S. Patent and Trademark Office.

**Note(s)**

Patents are allocated according to patent inventorship information. Patents are fractionally allocated among regions, countries, or economies based on the proportion of residences of all named inventors. The EU includes 28 member countries. China includes Hong Kong. Patents are classified under the World Intellectual Property Organization (WIPO) classification of patents, which classifies International Patent Classification (IPC) codes under 35 technical fields. IPC reformed codes take into account changes that were made to the WIPO classification in 2006 under the eighth version of the classification and were used to prepare these data. However, because PatentsView only provides the original IPC codes as they appeared on patents and not the IPC reformed codes, current Cooperative Patent Classification codes on patents were converted back to the most recent IPC classification to prepare these statistics. Fractional counts of patents were assigned to each technological field on patents to assign the proper weight of a patent to the corresponding technological fields under the classification.

**Source(s)**

Science-Metrix; PatentsView and USPTO patent data, accessed April 2017.

*Science and Engineering Indicators 2018*



## CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

APPENDIX TABLE 8-7

## USPTO patents granted in telecommunications, by region, country, or economy: 2000–16

(Number)

Region, country, or economy	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
World	5,502	5,748	5,886	6,047	6,516	5,998	8,317	6,928	7,076	7,225	8,571	9,200	11,357	12,107	12,513	11,732	11,106
North America	3,006	3,163	3,196	3,186	3,533	3,202	4,402	3,593	3,463	3,564	4,143	4,496	5,293	5,776	5,981	5,523	5,164
Canada	161	168	147	158	183	174	246	207	195	226	252	306	393	441	455	390	349
Mexico	1	1	1	3	5	3	2	1	0	0	1	0	1	2	3	2	9
Puerto Rico	1	0	0	0	1	0	1	0	0	0	0	0	2	1	1	1	1
United States	2,843	2,994	3,047	3,026	3,345	3,025	4,153	3,385	3,268	3,338	3,890	4,190	4,897	5,332	5,522	5,130	4,805
All others	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Central and South America	2	0	2	0	1	0	2	1	4	6	5	7	8	5	18	14	11
Argentina	1	0	0	0	0	0	0	0	0	3	0	2	2	2	3	3	3
Brazil	1	0	1	0	0	0	1	1	3	2	2	4	4	2	13	8	6
All others	0	0	1	0	0	0	0	0	1	2	3	1	2	2	3	3	3
Europe	767	856	892	926	929	819	1,089	877	875	824	1,023	989	1,242	1,362	1,497	1,471	1,485
EU	744	828	863	897	886	783	1,043	847	842	794	976	945	1,191	1,311	1,441	1,403	1,400
Austria	8	3	6	13	10	17	13	7	16	12	18	20	30	19	35	27	28
Belgium	12	14	8	15	19	19	24	18	21	17	17	14	13	24	27	30	32
Denmark	13	13	16	17	12	14	19	15	15	11	13	12	26	34	44	27	37

## CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

Region, country, or economy	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Finland	95	96	109	132	119	100	138	130	111	116	123	112	97	120	109	103	114
France	117	139	137	129	134	108	163	108	112	111	142	132	180	195	183	215	203
Germany	150	198	205	241	263	234	296	257	218	217	256	210	273	281	360	305	302
Hungary	1	1	0	6	1	1	2	2	1	2	3	0	4	2	6	2	6
Ireland	3	4	4	5	11	6	9	5	9	10	17	14	22	20	24	36	31
Italy	16	20	19	26	30	28	37	31	44	29	48	47	55	75	79	65	65
Netherlands	33	27	27	21	34	19	30	27	46	26	33	41	60	68	62	66	65
Spain	5	6	3	10	7	9	23	18	26	18	16	27	45	41	37	47	35
Sweden	130	131	146	125	70	77	85	56	65	68	127	126	152	175	214	213	233
United Kingdom	161	174	179	156	173	145	198	167	152	146	150	169	211	232	242	241	216
All others	1	2	2	2	4	6	5	5	6	11	14	19	23	25	21	27	33
Other Europe	23	28	30	29	43	36	46	30	32	30	46	44	52	51	56	68	85
Former Soviet Union	0	1	0	0	0	0	0	1	0	0	0	4	4	0	0	2	2
Norway	2	3	6	7	6	5	8	6	6	3	7	7	5	5	7	8	9
Russia	3	7	4	2	8	6	7	8	6	10	10	11	12	13	18	28	32
Switzerland	16	15	17	18	22	23	27	13	19	17	27	20	29	32	28	26	36
All others	2	2	3	2	7	2	4	2	1	1	1	2	2	1	3	4	6
Asia	1,668	1,663	1,717	1,839	1,935	1,875	2,643	2,322	2,596	2,684	3,218	3,500	4,602	4,743	4,753	4,480	4,216
China	8	7	3	12	20	23	41	40	59	94	165	243	386	395	539	504	529

## CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

Region, country, or economy	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
India	1	2	3	2	6	7	10	18	21	16	24	34	62	83	100	123	122
Japan	1,401	1,373	1,415	1,453	1,546	1,475	2,008	1,617	1,756	1,790	2,102	2,167	2,809	2,784	2,713	2,462	2,105
Malaysia	1	3	1	0	3	1	1	4	4	6	3	5	6	5	5	11	14
Singapore	5	10	13	10	12	10	15	12	10	13	12	15	32	24	23	20	23
South Korea	158	156	157	201	180	210	317	341	412	442	565	626	821	973	917	926	980
Taiwan	91	111	124	161	168	149	250	290	332	324	345	410	480	474	452	431	438
All others	2	0	0	0	1	0	0	0	1	0	1	1	5	4	4	3	5
Middle East	38	43	43	66	77	58	96	78	78	82	101	109	157	182	211	198	179
Israel	38	42	43	65	77	58	94	77	77	82	99	107	151	177	196	182	167
All others	0	1	1	0	0	1	1	1	0	0	2	3	6	5	16	15	11
Africa	2	2	3	1	3	3	3	3	2	2	3	2	5	3	6	8	4
South Africa	1	2	3	1	3	1	2	2	2	2	3	1	1	1	3	5	2
All others	1	1	0	0	0	2	1	1	0	0	0	1	4	1	3	3	2
Australia and Oceania	19	19	32	30	37	41	84	55	60	61	77	94	48	36	47	38	45
Australia	15	14	28	21	36	38	79	54	57	59	74	88	43	32	40	35	44
New Zealand	3	5	4	9	1	3	5	1	3	2	3	6	6	4	6	3	1
All others	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Unclassified	2	2	0	0	0	0	0	0	0	0	0	1	1	0	0	1	1

CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

EU = European Union; USPTO = U.S. Patent and Trademark Office.

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**Source(s)**

Science-Metrix; PatentsView and USPTO patent data, accessed April 2017.

*Science and Engineering Indicators 2018*

## CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

APPENDIX TABLE 8-8

## USPTO patents granted in digital communication, by region, country, or economy: 2000–16

(Number)

Region, country, or economy	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
World	4,233	4,426	4,823	5,292	6,436	6,318	9,818	9,003	10,354	12,000	16,182	17,645	21,048	23,942	28,395	27,932	28,932
North America	2,743	2,819	2,999	3,298	4,142	4,054	6,304	5,656	6,385	7,478	9,851	10,359	11,973	13,384	16,024	16,070	15,892
Canada	147	149	146	169	212	193	303	290	380	423	583	653	825	981	1,138	1,024	878
Mexico	1	2	3	3	2	3	2	0	1	0	1	1	2	1	1	2	5
Puerto Rico	0	0	0	0	1	0	0	1	0	1	0	0	1	0	1	1	0
United States	2,595	2,668	2,850	3,126	3,927	3,858	5,999	5,366	6,004	7,054	9,267	9,705	11,145	12,402	14,882	15,044	15,009
All others	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Central and South America	1	0	2	0	2	2	4	4	5	7	9	9	15	26	30	30	31
Argentina	0	0	0	0	0	0	0	3	0	1	3	1	4	8	6	6	7
Brazil	0	0	2	0	1	1	1	1	3	3	2	6	7	12	17	20	17
All others	1	0	0	0	0	0	3	1	2	3	4	2	4	6	6	4	6
Europe	592	631	743	848	969	937	1,359	1,221	1,405	1,476	2,037	2,293	2,774	3,254	3,998	3,751	4,042
EU	577	609	719	818	935	900	1,308	1,170	1,339	1,405	1,937	2,182	2,647	3,125	3,821	3,551	3,803
Austria	3	3	7	7	7	6	13	5	10	18	23	23	29	32	38	36	41
Belgium	7	9	11	13	23	26	29	19	28	39	44	51	55	56	68	65	79
Denmark	2	2	5	12	8	16	26	21	16	22	26	33	37	44	37	57	37

## CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

Region, country, or economy	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Finland	86	99	134	159	221	152	258	255	270	260	333	285	326	373	433	389	410
France	95	99	109	120	135	128	194	187	236	194	303	341	384	440	504	431	435
Germany	106	114	132	176	170	195	313	259	292	351	461	503	522	617	748	690	693
Hungary	1	0	0	6	3	5	5	9	7	11	14	23	26	39	54	45	52
Ireland	3	12	11	12	24	11	15	12	18	14	33	40	38	45	66	70	100
Italy	8	5	11	13	15	11	32	27	38	49	64	103	120	137	124	110	105
Netherlands	29	22	28	27	34	46	58	38	54	63	79	97	107	131	161	138	160
Spain	2	4	5	3	8	6	9	18	17	18	22	27	60	82	84	76	69
Sweden	126	123	146	133	124	119	116	81	86	98	157	241	402	483	692	657	772
United Kingdom	107	117	119	133	161	174	236	228	255	247	349	384	477	583	726	705	734
All others	1	0	1	4	2	4	6	11	10	21	29	31	64	62	87	82	115
Other Europe	15	22	24	30	35	38	51	50	66	72	100	111	127	129	177	201	239
Former Soviet Union	0	1	0	0	0	1	0	2	1	0	2	1	3	4	4	5	6
Norway	1	5	6	7	6	8	5	9	10	13	15	8	13	9	22	27	36
Russia	2	2	2	1	4	2	6	7	16	14	21	31	41	35	45	56	59
Switzerland	9	8	12	20	21	23	38	30	37	44	59	66	67	74	95	98	124
All others	3	5	4	3	4	4	2	3	2	1	2	4	4	7	11	15	14
Asia	848	905	992	1,035	1,200	1,176	1,955	1,945	2,350	2,761	3,898	4,589	5,816	6,726	7,671	7,401	8,214
China	5	3	3	6	10	18	58	48	84	150	332	481	752	1,115	1,576	1,533	2,043

## CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

Region, country, or economy	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
India	1	4	6	12	18	22	38	55	83	83	172	184	269	370	550	654	795
Japan	693	722	772	822	884	864	1,375	1,248	1,365	1,553	1,995	2,205	2,592	2,753	2,776	2,424	2,260
Malaysia	0	0	1	1	2	1	2	3	4	5	7	7	7	8	15	9	28
Singapore	5	3	15	10	10	6	15	19	14	35	35	38	41	31	42	40	45
South Korea	117	150	160	153	214	205	351	418	623	749	1,093	1,359	1,682	1,953	2,171	2,223	2,534
Taiwan	25	21	35	30	61	57	113	153	176	182	260	314	465	484	526	511	501
All others	3	2	0	0	2	1	3	1	2	3	3	2	7	11	15	7	8
Middle East	38	59	76	95	103	117	147	126	142	213	303	296	360	431	529	560	598
Israel	38	58	75	93	102	116	146	125	141	210	297	287	343	406	505	530	568
All others	0	1	1	1	1	1	2	1	1	3	6	9	17	25	24	29	30
Africa	2	1	1	1	3	3	2	2	3	1	6	4	6	9	11	12	31
South Africa	2	0	1	0	2	2	1	1	2	0	3	2	3	4	6	9	20
All others	0	1	0	1	1	1	1	1	1	1	3	2	4	5	5	3	11
Australia and Oceania	9	12	9	15	17	29	46	49	65	63	77	96	104	113	131	106	123
Australia	9	11	8	13	17	26	43	48	64	59	71	87	95	105	122	97	116
New Zealand	0	1	1	2	1	3	3	1	2	4	6	8	9	8	9	9	6
All others	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Unclassified	1	0	0	0	0	0	0	0	1	0	0	0	1	1	1	2	0



CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

EU = European Union; USPTO = U.S. Patent and Trademark Office.

**Note(s)**

Patents are allocated according to patent inventorship information. Patents are fractionally allocated among regions, countries, or economies based on the proportion of residences of all named inventors. The EU includes 28 member countries. China includes Hong Kong. Patents are classified under the World Intellectual Property Organization (WIPO) classification of patents, which classifies International Patent Classification (IPC) codes under 35 technical fields. IPC reformed codes take into account changes that were made to the WIPO classification in 2006 under the eighth version of the classification and were used to prepare these data. However, because PatentsView only provides the original IPC codes as they appeared on patents and not the IPC reformed codes, current Cooperative Patent Classification codes on patents were converted back to the most recent IPC classification to prepare these statistics. Fractional counts of patents were assigned to each technological field on patents to assign the proper weight of a patent to the corresponding technological fields under the classification.

**Source(s)**

Science-Metrix; PatentsView and USPTO patent data, accessed April 2017.

*Science and Engineering Indicators 2018*



## CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

APPENDIX TABLE 8-9

## USPTO patents granted in basic communication processes, by region, country, or economy: 2000–16

(Number)

Region, country, or economy	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
World	3,063	3,340	3,489	3,587	3,668	3,303	4,322	4,142	4,032	4,256	4,897	4,628	4,557	5,060	5,124	4,678	4,675
North America	1,628	1,816	1,890	1,971	1,920	1,720	2,141	2,074	1,869	1,935	2,184	1,993	1,960	2,218	2,215	2,065	1,998
Canada	61	63	60	62	74	67	62	77	67	58	89	84	96	130	130	120	97
Mexico	0	0	0	0	0	0	0	0	0	0	1	1	1	2	1	2	2
Puerto Rico	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0
United States	1,567	1,753	1,829	1,908	1,845	1,652	2,080	1,997	1,802	1,877	2,093	1,907	1,863	2,086	2,084	1,943	1,898
All others	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Central and South America	0	0	0	1	0	0	2	0	1	1	4	3	4	2	7	6	6
Argentina	0	0	0	0	0	0	2	0	0	1	1	1	1	1	1	1	0
Brazil	0	0	0	0	0	0	0	0	1	0	3	2	3	0	6	4	4
All others	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2
Europe	426	460	490	578	527	491	701	591	579	606	693	654	674	749	811	737	773
EU	409	441	476	560	509	468	662	566	551	579	654	597	622	689	752	670	705
Austria	6	6	5	17	26	24	42	26	41	42	57	43	32	32	48	42	46
Belgium	6	7	7	6	8	10	9	6	8	9	15	10	17	11	10	13	13
Denmark	3	4	8	8	11	5	15	7	16	10	10	12	13	8	14	11	7

## CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

Region, country, or economy	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Finland	12	27	35	41	25	28	29	26	13	12	30	20	13	21	20	18	21
France	81	65	72	74	86	68	88	87	84	91	96	92	134	150	119	127	113
Germany	115	108	120	177	148	149	216	186	199	197	213	165	158	179	193	197	206
Hungary	0	0	0	1	1	1	0	1	0	1	1	0	0	1	2	1	0
Ireland	5	6	5	14	12	14	18	20	18	8	13	18	16	19	29	26	21
Italy	48	57	50	39	33	24	42	33	34	41	43	30	33	39	60	46	53
Netherlands	34	38	49	54	45	29	59	58	45	42	48	61	57	77	71	54	57
Spain	2	3	0	1	1	1	1	2	3	7	5	2	4	7	6	5	5
Sweden	35	47	41	36	35	32	36	24	24	30	29	45	38	42	46	28	41
United Kingdom	62	72	82	90	76	78	99	81	61	77	83	84	89	88	107	90	106
All others	1	1	1	3	2	3	6	8	6	14	10	17	18	15	25	12	15
Other Europe	17	20	14	17	18	23	39	25	28	27	40	57	52	59	59	67	68
Former Soviet Union	0	1	0	0	0	0	1	0	0	0	0	1	5	5	2	2	4
Norway	1	4	3	2	1	1	6	6	1	1	8	5	7	10	8	11	12
Russia	4	6	2	3	2	4	3	3	6	4	6	7	16	7	6	9	9
Switzerland	12	10	9	12	15	18	28	15	21	22	26	40	21	35	42	40	40
All others	0	0	0	1	1	0	1	0	1	0	0	3	2	2	1	4	3
Asia	981	1,036	1,078	991	1,184	1,044	1,425	1,424	1,529	1,666	1,956	1,916	1,860	1,996	1,991	1,779	1,816
China	4	5	7	9	8	10	20	20	42	43	69	75	113	123	156	157	196

## CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

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CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

EU = European Union; USPTO = U.S. Patent and Trademark Office.

**Note(s)**

Patents are allocated according to patent inventorship information. Patents are fractionally allocated among regions, countries, or economies based on the proportion of residences of all named inventors. The EU includes 28 member countries. China includes Hong Kong. Patents are classified under the World Intellectual Property Organization (WIPO) classification of patents, which classifies International Patent Classification (IPC) codes under 35 technical fields. IPC reformed codes take into account changes that were made to the WIPO classification in 2006 under the eighth version of the classification and were used to prepare these data. However, because PatentsView only provides the original IPC codes as they appeared on patents and not the IPC reformed codes, current Cooperative Patent Classification codes on patents were converted back to the most recent IPC classification to prepare these statistics. Fractional counts of patents were assigned to each technological field on patents to assign the proper weight of a patent to the corresponding technological fields under the classification.

**Source(s)**

Science-Metrix; PatentsView and USPTO patent data, accessed April 2017.

*Science and Engineering Indicators 2018*

## CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

APPENDIX TABLE 8-10

## USPTO patents granted in IT methods for management, by region, country, or economy: 2000–16

(Number)

Region, country, or economy	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
World	962	868	970	1,112	1,201	1,544	2,386	2,371	2,948	3,515	6,056	6,165	7,265	8,111	7,550	4,684	4,359
North America	777	700	776	872	931	1,184	1,821	1,832	2,296	2,820	4,951	5,052	5,958	6,716	6,120	3,666	3,374
Canada	17	14	17	12	21	29	35	42	66	76	123	139	171	191	185	139	117
Mexico	1	0	0	0	1	1	1	2	1	1	3	3	4	2	4	2	1
Puerto Rico	0	0	0	0	0	0	0	1	0	1	1	1	1	0	0	2	0
United States	759	686	759	860	909	1,154	1,785	1,788	2,229	2,742	4,824	4,908	5,782	6,522	5,931	3,522	3,256
All others	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Central and South America	1	0	2	2	2	1	1	3	2	7	8	10	7	10	14	9	12
Argentina	0	0	1	0	0	1	0	0	1	0	1	2	2	2	2	2	3
Brazil	0	0	0	1	1	1	1	2	1	4	6	7	3	6	10	5	9
All others	0	0	1	1	1	0	1	1	1	3	2	1	2	2	3	2	1
Europe	61	54	66	67	78	111	165	176	241	289	517	488	592	658	655	422	382
EU	58	52	61	64	76	105	153	158	221	268	484	455	556	612	599	394	351
Austria	1	1	0	2	2	1	1	2	2	3	6	4	4	6	6	5	3
Belgium	1	2	1	1	1	2	1	3	5	5	5	8	9	11	12	11	6
Denmark	1	1	1	1	1	2	2	5	0	4	15	4	7	9	4	2	4

## CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

Region, country, or economy	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Finland	2	1	4	5	6	10	14	9	11	10	18	18	20	27	29	28	24
France	8	10	12	6	15	18	18	23	29	25	50	55	72	61	65	48	45
Germany	15	11	10	12	20	25	43	51	79	98	192	171	205	225	190	115	91
Hungary	0	0	0	0	1	0	0	0	0	0	0	0	1	1	3	2	1
Ireland	0	1	0	1	2	2	3	4	8	8	13	17	17	16	34	25	26
Italy	3	1	2	3	2	2	4	4	4	7	13	19	20	26	22	14	14
Netherlands	8	2	5	1	2	5	9	5	7	8	19	13	16	12	9	11	6
Spain	0	0	1	0	1	0	1	2	2	2	4	10	12	6	16	7	11
Sweden	3	5	3	9	2	7	10	7	11	10	18	17	17	16	24	18	17
United Kingdom	14	18	21	26	23	29	46	40	59	81	121	107	136	168	155	91	87
All others	2	1	0	0	0	4	2	4	3	6	9	12	20	29	29	16	15
Other Europe	2	2	5	3	2	6	12	18	20	22	32	33	36	46	56	28	31
Former Soviet Union	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	1
Norway	0	0	2	0	0	0	1	2	3	1	2	2	3	7	6	2	2
Russia	0	1	1	1	0	1	2	3	2	3	3	2	4	4	12	6	8
Switzerland	2	1	2	3	2	5	7	13	15	17	25	28	26	29	37	19	20
All others	0	0	0	0	0	0	1	0	1	1	1	0	2	4	2	1	1
Asia	107	98	112	149	168	216	358	311	350	326	457	470	570	584	615	474	487
China	0	1	0	1	1	3	5	5	5	10	23	36	49	65	83	56	70

## CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

Region, country, or economy	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
India	0	0	0	2	4	9	10	9	17	24	46	61	92	140	153	112	129
Japan	102	88	102	126	137	175	294	259	287	248	316	278	319	261	253	190	182
Malaysia	0	0	0	0	0	0	2	1	1	2	4	3	1	2	2	0	1
Singapore	0	0	2	1	3	2	2	3	4	4	3	9	5	10	16	10	9
South Korea	4	6	2	9	10	4	11	10	18	18	41	57	66	69	74	82	75
Taiwan	0	3	6	11	13	23	33	24	18	19	21	25	34	32	32	20	17
All others	0	0	0	0	0	0	2	1	1	2	3	1	4	6	3	3	3
Middle East	8	7	8	10	7	12	18	14	24	32	47	58	72	79	82	75	68
Israel	8	7	8	10	7	12	18	14	22	31	41	52	68	73	75	69	66
All others	1	0	0	0	0	0	1	0	2	1	6	6	4	6	8	6	2
Africa	1	3	1	2	1	0	1	0	3	2	5	8	13	7	9	5	6
South Africa	1	3	1	2	1	0	1	0	2	2	4	8	11	5	7	4	3
All others	0	0	0	0	0	0	0	0	1	0	1	0	2	2	3	0	3
Australia and Oceania	8	5	5	10	15	19	21	35	33	38	72	80	54	55	54	33	29
Australia	8	3	3	8	14	16	21	33	33	35	66	74	50	49	47	26	26
New Zealand	0	1	2	2	0	3	1	1	0	3	5	6	4	6	7	7	3
All others	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Unclassified	0	1	0	1	0	0	0	0	0	0	0	0	0	2	0	0	0

CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

EU = European Union; IT = information technology; USPTO = U.S. Patent and Trademark Office.

**Note(s)**

Patents are allocated according to patent inventorship information. Patents are fractionally allocated among regions, countries, or economies based on the proportion of residences of all named inventors. The EU includes 28 member countries. China includes Hong Kong. Patents are classified under the World Intellectual Property Organization (WIPO) classification of patents, which classifies International Patent Classification (IPC) codes under 35 technical fields. IPC reformed codes take into account changes that were made to the WIPO classification in 2006 under the eighth version of the classification and were used to prepare these data. However, because PatentsView only provides the original IPC codes as they appeared on patents and not the IPC reformed codes, current Cooperative Patent Classification codes on patents were converted back to the most recent IPC classification to prepare these statistics. Fractional counts of patents were assigned to each technological field on patents to assign the proper weight of a patent to the corresponding technological fields under the classification.

**Source(s)**

Science-Metrix; PatentsView and USPTO patent data, accessed April 2017.

*Science and Engineering Indicators 2018*



## CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

APPENDIX TABLE 8-11

## USPTO patents granted in medical technology, by region, country, or economy: 2000–16

(Number)

Region, country, or economy	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
World	7,964	8,147	8,052	9,034	7,336	6,125	7,153	6,527	5,949	6,877	11,015	12,182	14,595	16,836	17,675	16,798	17,136
North America	5,908	5,939	5,668	6,453	5,212	4,401	5,103	4,611	4,083	4,800	7,772	8,747	10,205	11,618	12,039	11,290	11,605
Canada	125	162	141	182	122	106	109	99	95	102	161	175	190	245	246	267	262
Mexico	3	3	3	4	7	5	4	2	6	1	4	6	7	12	9	9	9
Puerto Rico	3	0	0	3	4	0	1	5	2	1	5	6	4	4	7	3	5
United States	5,777	5,773	5,523	6,264	5,079	4,290	4,988	4,504	3,980	4,696	7,602	8,559	10,004	11,357	11,776	11,011	11,329
All others	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Central and South America	30	30	35	38	16	23	12	9	9	21	18	36	42	55	52	49	34
Argentina	11	12	14	16	9	10	3	4	1	11	5	10	13	16	13	10	12
Brazil	8	8	8	12	2	6	6	1	4	2	8	15	17	17	22	21	7
All others	10	10	12	10	6	7	3	4	4	7	5	11	11	22	16	17	16
Europe	1,288	1,354	1,346	1,427	1,203	941	1,039	1,026	943	1,098	1,807	1,807	2,350	2,800	3,076	2,911	2,958
EU	1,157	1,219	1,212	1,295	1,081	840	930	921	827	970	1,609	1,573	2,068	2,477	2,709	2,504	2,607
Austria	19	20	20	29	26	19	23	12	18	26	30	39	50	58	74	64	74
Belgium	22	18	23	20	13	9	19	15	16	24	28	39	33	63	66	41	58
Denmark	34	33	36	56	35	28	33	23	27	35	52	63	77	95	122	91	88

CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

Region, country, or economy	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Finland	26	28	27	34	32	25	27	23	21	20	41	34	33	49	55	42	52
France	163	175	159	171	131	105	103	105	114	113	188	185	249	249	312	283	262
Germany	394	427	468	443	400	278	327	377	330	434	704	625	846	1,009	987	945	962
Hungary	1	4	2	3	0	3	3	2	4	0	5	6	4	5	8	5	6
Ireland	19	10	8	21	19	27	22	22	9	25	46	56	51	59	75	61	96
Italy	71	79	84	93	78	56	59	62	55	60	90	83	104	141	150	136	136
Netherlands	73	83	76	64	59	39	46	47	42	49	81	81	113	135	172	137	146
Spain	15	7	14	16	10	8	10	17	7	4	11	14	25	33	37	35	31
Sweden	141	167	137	159	118	110	117	81	78	69	100	134	174	177	198	178	165
United Kingdom	171	158	151	177	151	126	131	125	100	108	211	194	283	377	427	450	500
All others	8	10	8	9	10	8	9	10	7	3	21	20	27	26	25	37	31
Other Europe	131	135	135	133	122	101	109	105	115	128	198	234	282	324	367	407	351
Former Soviet Union	2	0	1	3	2	0	1	3	2	2	3	2	4	0	1	2	5
Norway	12	18	16	18	16	7	13	12	6	8	25	20	25	25	24	20	13
Russia	22	15	14	14	10	13	9	12	13	15	12	18	25	26	26	25	23
Switzerland	90	96	97	92	91	72	77	68	81	92	143	175	216	254	293	324	269
All others	6	5	6	6	3	8	8	10	12	11	16	19	13	19	24	37	42
Asia	564	616	753	849	693	585	748	695	732	711	1,069	1,159	1,549	1,747	1,824	1,903	1,893
China	9	5	18	23	19	19	22	20	27	43	78	73	103	114	103	121	181

## CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

Region, country, or economy	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
India	3	4	1	5	7	4	12	7	11	10	10	15	22	37	48	49	57
Japan	443	501	577	664	523	423	549	542	563	545	818	876	1,127	1,265	1,289	1,297	1,186
Malaysia	2	1	5	4	3	2	2	1	3	1	3	2	3	4	5	8	6
Singapore	2	4	4	6	5	3	6	3	9	8	10	10	22	19	32	32	25
South Korea	29	34	43	68	37	38	44	39	48	45	70	85	113	149	196	220	258
Taiwan	76	67	100	77	97	93	113	81	72	56	78	96	154	155	144	169	171
All others	1	1	5	1	0	2	1	2	1	2	2	2	6	3	7	8	8
Middle East	95	146	162	166	135	99	141	113	115	165	232	261	293	404	453	410	454
Israel	94	142	160	164	133	99	139	111	110	162	230	253	283	370	425	379	420
All others	1	4	1	3	2	0	2	1	5	2	2	9	9	34	28	31	33
Africa	11	4	7	10	5	7	12	5	3	6	9	11	17	10	17	15	15
South Africa	11	3	4	6	4	5	9	4	2	5	7	8	13	9	12	11	12
All others	0	1	3	4	1	2	3	0	1	1	2	3	4	2	5	4	3
Australia and Oceania	67	58	82	90	73	68	98	69	64	77	109	160	139	202	213	219	177
Australia	60	53	67	76	56	55	83	65	60	69	94	148	115	183	193	186	148
New Zealand	8	5	15	13	17	12	15	5	4	7	14	13	25	19	21	34	29
All others	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0
Unclassified	1	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1	0



CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

EU = European Union; USPTO = U.S. Patent and Trademark Office.

**Note(s)**

Patents are allocated according to patent inventorship information. Patents are fractionally allocated among regions, countries, or economies based on the proportion of residences of all named inventors. The EU includes 28 member countries. China includes Hong Kong. Patents are classified under the World Intellectual Property Organization (WIPO) classification of patents, which classifies International Patent Classification (IPC) codes under 35 technical fields. IPC reformed codes take into account changes that were made to the WIPO classification in 2006 under the eighth version of the classification and were used to prepare these data. However, because PatentsView only provides the original IPC codes as they appeared on patents and not the IPC reformed codes, current Cooperative Patent Classification codes on patents were converted back to the most recent IPC classification to prepare these statistics. Fractional counts of patents were assigned to each technological field on patents to assign the proper weight of a patent to the corresponding technological fields under the classification.

**Source(s)**

Science-Metrix; PatentsView and USPTO patent data, accessed April 2017.

*Science and Engineering Indicators 2018*

## CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

APPENDIX TABLE 8-12

## USPTO patents granted in biotechnology, by region, country, or economy: 2000–16

(Number)

Region, country, or economy	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
World	3,713	4,215	3,830	3,473	3,039	2,654	3,685	3,696	3,377	3,525	4,524	4,659	4,803	5,044	5,595	5,601	5,747
North America	2,522	2,791	2,614	2,304	1,985	1,709	2,345	2,377	2,109	2,248	2,784	2,771	2,885	2,982	3,229	3,230	3,301
Canada	130	142	139	102	98	69	119	125	100	110	124	132	145	135	115	131	120
Mexico	3	4	2	2	2	1	1	0	1	3	4	2	5	5	4	2	4
Puerto Rico	0	1	0	0	0	0	1	1	0	0	1	0	1	0	0	1	2
United States	2,389	2,645	2,473	2,200	1,885	1,639	2,225	2,251	2,007	2,134	2,654	2,637	2,734	2,842	3,110	3,096	3,175
All others	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Central and South America	4	7	7	8	8	4	15	12	9	13	16	14	18	19	20	32	23
Argentina	0	1	0	0	3	0	5	2	1	4	5	3	1	2	3	4	4
Brazil	2	4	3	4	4	2	7	6	3	4	6	5	9	9	7	18	11
All others	2	2	4	3	2	2	3	4	4	4	6	6	7	9	11	10	9
Europe	747	876	736	717	622	535	674	713	670	684	914	971	1,011	1,067	1,262	1,290	1,326
EU	687	813	678	669	581	492	623	653	612	626	831	884	931	984	1,146	1,190	1,213
Austria	18	17	16	14	10	13	9	16	11	18	21	27	22	36	46	39	41
Belgium	42	39	41	32	35	23	29	42	32	37	46	46	44	49	51	50	57
Denmark	59	68	47	58	30	30	44	39	38	38	63	83	77	98	112	94	108

## CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

Region, country, or economy	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Finland	10	14	10	9	11	10	12	10	16	13	21	16	13	12	17	17	27
France	116	141	107	127	85	87	105	104	94	91	114	130	145	157	175	186	200
Germany	158	212	174	195	188	142	193	187	190	177	251	243	265	259	312	334	293
Hungary	1	5	4	5	7	3	3	3	1	1	3	2	4	1	3	5	7
Ireland	2	4	2	3	4	2	4	3	2	5	7	8	5	8	6	9	10
Italy	22	21	26	20	13	17	27	22	25	24	45	41	45	52	48	56	58
Netherlands	66	56	52	39	40	43	43	47	46	54	58	70	67	79	110	102	117
Spain	9	10	8	7	8	8	10	12	14	15	15	19	28	22	38	35	27
Sweden	27	40	40	37	36	24	28	35	34	25	32	38	45	37	53	48	44
United Kingdom	149	179	145	120	109	86	108	124	102	119	138	148	162	154	158	193	184
All others	8	9	6	2	5	5	8	9	7	10	17	13	10	21	17	21	39
Other Europe	60	63	57	48	41	43	51	60	58	58	83	87	80	83	116	99	113
Former Soviet Union	0	1	1	1	2	0	1	2	1	0	1	1	1	2	1	1	2
Norway	8	6	3	7	8	5	4	7	6	10	9	10	11	13	16	17	18
Russia	9	7	12	6	7	10	9	17	16	15	20	25	14	15	17	12	18
Switzerland	42	47	38	31	23	27	35	31	29	28	50	50	52	50	74	66	73
All others	1	2	3	3	1	2	2	3	5	4	4	1	3	3	8	3	2
Asia	361	439	377	369	360	354	548	511	507	471	683	750	731	787	899	867	908
China	6	9	13	12	13	17	26	36	29	27	46	45	59	81	100	99	129

## CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

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CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

EU = European Union; USPTO = U.S. Patent and Trademark Office.

**Note(s)**

Patents are allocated according to patent inventorship information. Patents are fractionally allocated among regions, countries, or economies based on the proportion of residences of all named inventors. The EU includes 28 member countries. China includes Hong Kong. Patents are classified under the World Intellectual Property Organization (WIPO) classification of patents, which classifies International Patent Classification (IPC) codes under 35 technical fields. IPC reformed codes take into account changes that were made to the WIPO classification in 2006 under the eighth version of the classification and were used to prepare these data. However, because PatentsView only provides the original IPC codes as they appeared on patents and not the IPC reformed codes, current Cooperative Patent Classification codes on patents were converted back to the most recent IPC classification to prepare these statistics. Fractional counts of patents were assigned to each technological field on patents to assign the proper weight of a patent to the corresponding technological fields under the classification.

**Source(s)**

Science-Metrix; PatentsView and USPTO patent data, accessed April 2017.

*Science and Engineering Indicators 2018*



## CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

APPENDIX TABLE 8-13

## USPTO patents granted in pharmaceuticals, by region, country, or economy: 2000–16

(Number)

Region, country, or economy	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
World	3,931	4,240	4,293	3,960	2,925	2,580	3,241	2,697	2,688	2,724	3,976	4,009	4,726	5,753	6,579	6,703	6,551
North America	2,645	2,805	2,882	2,591	1,910	1,666	2,088	1,722	1,676	1,695	2,480	2,445	2,883	3,431	3,887	3,916	3,880
Canada	134	133	148	136	109	84	104	91	97	95	127	133	112	145	159	165	139
Mexico	4	2	0	5	2	2	2	1	3	4	4	6	9	13	11	8	10
Puerto Rico	0	1	2	1	0	0	1	1	1	0	3	2	2	4	2	2	4
United States	2,507	2,669	2,733	2,450	1,799	1,580	1,981	1,630	1,575	1,596	2,345	2,305	2,760	3,270	3,715	3,742	3,728
All others	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Central and South America	10	11	20	16	8	6	16	10	12	10	22	21	26	34	51	38	41
Argentina	4	7	8	9	4	1	6	4	3	4	1	6	5	9	5	5	10
Brazil	3	1	2	5	1	2	7	2	2	4	9	6	9	13	17	10	16
All others	3	3	10	2	3	2	3	4	8	3	12	10	11	13	29	24	15
Europe	875	913	873	873	637	550	665	564	594	578	885	882	1,024	1,258	1,478	1,532	1,448
EU	806	838	806	807	588	501	613	521	548	528	810	788	922	1,120	1,309	1,383	1,279
Austria	13	13	15	11	8	11	9	12	10	13	24	25	20	32	43	25	33
Belgium	36	29	42	31	33	22	31	27	27	26	43	28	34	47	52	66	66
Denmark	22	34	24	33	25	21	24	22	25	19	36	34	43	59	79	62	59

## CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

Region, country, or economy	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Finland	15	16	15	14	12	10	11	8	8	8	14	11	14	9	17	12	15
France	133	143	124	150	87	83	98	77	92	89	138	128	169	202	232	248	225
Germany	212	221	206	221	162	132	156	143	141	131	208	201	239	281	328	343	308
Hungary	4	4	8	7	5	3	4	3	5	5	7	4	6	6	3	9	7
Ireland	9	5	7	7	7	7	5	3	4	6	8	10	9	10	14	15	13
Italy	65	79	67	60	49	42	51	43	45	50	74	84	99	113	140	137	132
Netherlands	30	32	33	31	28	28	27	28	28	36	42	53	46	55	59	66	64
Spain	8	8	17	14	10	7	13	11	12	15	21	19	24	41	48	76	46
Sweden	62	55	66	62	37	35	37	28	34	26	41	41	46	46	64	65	59
United Kingdom	190	186	176	151	115	95	134	108	111	90	139	136	158	198	197	231	224
All others	8	13	7	16	10	4	13	8	6	16	13	14	14	22	33	29	30
Other Europe	69	74	68	65	49	48	53	43	46	50	75	94	102	137	169	150	169
Former Soviet Union	0	1	2	1	0	0	0	0	0	0	0	1	0	2	2	1	2
Norway	16	15	7	9	7	8	6	11	7	9	13	15	17	20	27	23	22
Russia	8	9	11	8	5	7	5	6	6	8	12	10	11	21	20	22	23
Switzerland	40	47	44	40	36	32	39	24	32	29	47	61	69	84	105	93	115
All others	5	3	4	7	2	2	3	2	1	4	2	6	5	10	15	10	6
Asia	304	402	390	363	285	282	388	318	308	332	467	501	615	805	906	959	951
China	10	17	17	18	22	25	32	37	38	32	38	44	73	103	126	147	171

## CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

Region, country, or economy	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
India	15	29	30	46	25	31	39	30	29	22	34	41	63	86	96	121	135
Japan	239	312	287	244	180	176	250	187	170	205	279	286	305	397	429	420	339
Malaysia	0	0	2	2	1	0	1	1	2	0	3	2	4	2	9	4	5
Singapore	4	1	1	3	2	2	4	4	7	4	5	9	11	14	15	18	21
South Korea	23	28	30	32	33	25	32	35	28	32	57	58	80	99	128	138	171
Taiwan	11	13	21	17	20	22	27	22	33	35	49	58	75	99	99	102	104
All others	2	2	2	1	2	1	4	2	2	2	2	3	4	5	4	9	6
Middle East	47	41	61	62	42	40	42	43	51	57	69	84	97	127	150	148	134
Israel	45	40	59	61	41	36	41	42	51	55	67	80	91	124	134	132	114
All others	2	1	2	1	1	4	1	1	0	2	2	4	7	3	16	16	20
Africa	6	7	6	7	3	2	4	5	2	5	10	7	9	15	9	10	9
South Africa	1	4	4	5	2	1	2	2	1	2	3	3	5	9	3	7	6
All others	5	3	3	2	1	1	2	4	1	3	7	4	4	6	6	4	3
Australia and Oceania	42	60	58	48	40	34	38	36	44	47	45	70	71	81	99	96	87
Australia	34	54	44	37	30	27	34	29	38	37	36	53	58	67	89	89	76
New Zealand	7	6	14	11	9	7	5	7	7	10	8	16	13	14	10	7	10
All others	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Unclassified	1	1	3	0	0	0	0	0	0	0	0	0	1	1	0	2	0

CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

EU = European Union; USPTO = U.S. Patent and Trademark Office.

**Note(s)**

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**Source(s)**

Science-Metrix; PatentsView and USPTO patent data, accessed April 2017.

*Science and Engineering Indicators 2018*

## CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

APPENDIX TABLE 8-14

## USPTO patents granted in basic material chemistry, by region, country, or economy: 2000–16

(Number)

Region, country, or economy	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
World	3,421	3,573	3,426	3,371	2,940	2,167	2,411	2,231	2,140	2,341	3,341	3,476	3,886	4,390	4,797	4,536	4,477
North America	1,869	1,839	1,744	1,702	1,457	1,088	1,230	1,107	1,064	1,189	1,696	1,789	2,005	2,238	2,466	2,193	2,135
Canada	71	71	71	61	57	38	43	39	43	74	81	99	99	118	140	123	107
Mexico	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Puerto Rico	4	2	4	3	2	1	0	4	1	2	4	5	5	7	13	10	9
United States	1	0	0	0	0	0	0	1	0	1	0	1	1	0	1	2	2
All others	1,794	1,766	1,669	1,638	1,397	1,049	1,187	1,064	1,020	1,112	1,611	1,684	1,901	2,113	2,312	2,058	2,017
Central and South America	16	11	15	16	13	9	16	11	9	13	28	25	32	21	24	27	28
Argentina	1	1	0	2	1	2	1	0	0	0	1	1	2	1	1	2	1
Brazil	7	4	4	7	5	7	10	4	6	8	15	14	9	12	14	10	20
All others	8	6	10	7	8	0	5	7	3	5	12	10	22	8	9	15	6
Europe	907	1,020	972	940	769	580	618	534	471	496	752	726	824	932	1,066	1,018	949
EU	843	944	898	882	711	539	571	494	436	447	690	673	760	852	978	930	849
Austria	4	7	8	6	5	5	6	4	2	2	5	6	9	4	13	13	11
Belgium	70	66	85	72	45	39	38	28	20	33	39	35	43	54	63	42	39
Denmark	11	21	14	18	9	7	8	13	6	8	12	19	16	19	14	17	25

## CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

Region, country, or economy	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Finland	7	11	9	8	6	4	3	8	5	5	3	11	15	10	14	17	14
France	109	101	108	101	74	59	56	69	63	58	98	96	103	124	138	126	148
Germany	382	450	425	402	337	249	279	219	204	203	297	282	347	378	456	418	346
Hungary	1	3	1	1	1	2	1	0	1	0	1	1	1	3	2	1	3
Ireland	1	2	1	3	4	3	2	3	2	2	2	3	4	5	3	5	2
Italy	38	27	41	44	20	16	20	14	19	13	23	29	23	29	24	31	30
Netherlands	56	53	49	54	44	32	41	32	15	31	49	39	41	59	65	67	65
Spain	6	10	6	7	7	7	3	3	5	4	7	9	11	11	12	16	15
Sweden	9	14	10	12	12	6	8	10	7	6	7	12	13	12	14	13	16
United Kingdom	148	179	140	153	143	106	105	89	82	79	143	129	126	134	150	152	125
All others	2	1	4	1	4	3	2	3	3	3	4	3	7	10	11	13	11
Other Europe	63	76	74	59	58	41	47	40	35	48	62	53	64	80	87	87	100
Former Soviet Union	0	2	1	0	1	0	0	1	1	0	0	1	1	2	2	1	3
Norway	5	6	4	3	7	3	3	3	5	3	7	3	7	10	10	10	10
Russia	6	5	7	6	6	4	6	8	4	5	11	5	5	10	11	10	10
Switzerland	52	63	62	50	42	33	36	28	24	37	43	42	50	58	64	64	75
All others	0	0	0	1	1	1	1	1	0	2	0	2	2	1	1	1	3
Asia	592	677	659	672	667	451	521	551	561	611	808	868	961	1,109	1,147	1,179	1,248
China	6	5	14	9	16	10	14	8	15	17	27	32	43	65	80	115	149

## CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

[illegible]



CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

EU = European Union; USPTO = U.S. Patent and Trademark Office.

**Note(s)**

Patents are allocated according to patent inventorship information. Patents are fractionally allocated among regions, countries, or economies based on the proportion of residences of all named inventors. The EU includes 28 member countries. China includes Hong Kong. Patents are classified under the World Intellectual Property Organization (WIPO) classification of patents, which classifies International Patent Classification (IPC) codes under 35 technical fields. IPC reformed codes take into account changes that were made to the WIPO classification in 2006 under the eighth version of the classification and were used to prepare these data. However, because PatentsView only provides the original IPC codes as they appeared on patents and not the IPC reformed codes, current Cooperative Patent Classification codes on patents were converted back to the most recent IPC classification to prepare these statistics. Fractional counts of patents were assigned to each technological field on patents to assign the proper weight of a patent to the corresponding technological fields under the classification.

**Source(s)**

Science-Metrix; PatentsView and USPTO patent data, accessed April 2017.

*Science and Engineering Indicators 2018*



## CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

APPENDIX TABLE 8-15

## USPTO patents granted in organic chemistry, by region, country, or economy: 2000–16

(Number)

Region, country, or economy	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
World	5,415	5,721	6,213	5,246	4,335	3,758	4,666	4,500	4,355	4,694	5,749	5,632	6,482	7,116	7,089	6,828	6,000
North America	2,618	2,677	2,974	2,563	2,078	1,881	2,339	2,148	2,103	2,252	2,744	2,581	3,006	3,323	3,320	3,189	2,896
Canada	75	75	89	76	71	49	80	76	84	99	105	109	102	110	113	101	95
Mexico	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Puerto Rico	1	1	4	2	0	0	0	4	1	2	2	2	1	3	6	6	5
United States	1	0	0	1	0	0	2	1	1	1	1	1	2	0	0	1	0
All others	2,542	2,600	2,881	2,484	2,006	1,831	2,257	2,067	2,016	2,150	2,636	2,468	2,901	3,209	3,201	3,080	2,795
Central and South America	9	6	11	8	5	4	11	3	9	10	8	12	16	20	25	22	18
Argentina	3	0	3	1	0	0	3	1	2	2	1	2	2	3	3	2	2
Brazil	4	2	6	4	4	2	4	1	4	7	7	9	9	14	16	17	12
All others	2	4	2	3	1	2	4	1	2	2	0	2	4	3	7	4	4
Europe	1,865	1,985	2,091	1,733	1,429	1,182	1,477	1,508	1,464	1,487	1,867	1,785	2,000	2,224	2,136	1,939	1,612
EU	1,731	1,842	1,945	1,618	1,304	1,100	1,358	1,413	1,341	1,354	1,691	1,601	1,817	1,997	1,955	1,768	1,428
Austria	15	17	19	12	20	10	7	15	13	12	23	10	22	24	29	26	20
Belgium	34	44	48	32	34	35	43	37	37	54	49	69	62	89	92	87	69
Denmark	40	50	47	51	37	32	31	30	25	33	57	55	52	50	31	36	32

## CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

Region, country, or economy	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Finland	9	12	20	10	13	11	7	8	7	9	12	10	9	11	13	13	8
France	387	430	469	367	247	223	259	302	279	254	310	344	332	412	362	342	283
Germany	682	710	772	623	543	406	535	507	467	483	595	491	649	746	779	647	487
Hungary	11	16	11	18	10	11	12	12	20	8	19	16	13	13	14	19	12
Ireland	1	5	5	5	3	2	2	2	1	3	5	4	4	8	6	4	6
Italy	112	102	113	85	77	79	80	85	105	88	134	115	132	142	141	131	108
Netherlands	51	59	51	47	51	43	45	54	56	55	57	61	47	58	70	79	56
Spain	18	19	33	36	19	23	35	36	40	47	55	53	78	63	56	48	50
Sweden	27	40	43	41	24	24	41	32	43	43	57	48	54	43	42	34	26
United Kingdom	332	323	294	273	211	192	235	266	235	229	290	275	327	287	283	258	224
All others	11	17	19	17	15	10	25	25	11	33	28	49	36	51	37	44	46
Other Europe	134	143	145	115	126	82	119	95	123	133	176	184	183	227	181	171	184
Former Soviet Union	0	3	2	1	2	1	1	0	2	1	0	1	4	2	3	2	2
Norway	8	5	8	6	8	4	5	2	4	7	7	10	10	14	13	14	17
Russia	12	10	9	7	7	7	9	8	6	9	11	15	7	21	17	16	13
Switzerland	111	121	122	98	105	68	99	83	106	114	153	152	159	186	145	135	149
All others	2	5	4	3	4	3	4	2	4	1	4	6	3	4	4	4	3
Asia	879	997	1,067	871	763	640	764	774	704	856	1,039	1,170	1,373	1,425	1,493	1,563	1,377
China	14	12	14	16	23	20	21	31	33	51	77	84	128	178	232	248	280

## CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

Region, country, or economy	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
India	45	50	84	91	78	75	95	89	95	99	122	131	154	195	190	241	208
Japan	728	838	857	659	562	469	555	542	469	576	684	768	863	786	770	772	622
Malaysia	0	0	0	2	0	0	3	1	0	2	0	2	4	3	3	3	1
Singapore	1	1	1	1	3	2	3	3	2	6	4	8	16	11	20	20	15
South Korea	68	64	82	77	66	52	57	82	73	82	102	122	143	165	187	184	189
Taiwan	19	30	28	24	28	21	30	25	27	39	49	53	62	83	89	87	58
All others	3	3	2	1	3	1	2	1	4	1	1	1	4	3	2	7	3
Middle East	24	31	44	46	35	32	51	47	59	60	60	42	45	64	74	64	56
Israel	19	28	40	42	35	31	47	42	56	59	57	38	40	52	55	42	35
All others	5	3	4	3	1	1	4	5	3	1	3	5	5	12	19	23	22
Africa	4	3	5	5	5	3	2	2	4	6	4	8	3	11	3	7	9
South Africa	3	3	5	5	5	3	1	2	2	5	3	6	2	8	1	5	7
All others	1	0	0	0	0	0	1	1	2	1	1	2	0	2	1	2	2
Australia and Oceania	14	20	19	20	19	15	23	18	13	23	27	33	38	48	36	44	33
Australia	8	14	17	17	15	14	16	14	11	18	19	26	32	43	31	36	28
New Zealand	6	5	2	3	4	1	7	4	2	5	8	7	5	5	5	7	5
All others	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Unclassified	2	1	2	0	0	0	0	0	0	0	0	0	1	2	1	0	0

CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

EU = European Union; USPTO = U.S. Patent and Trademark Office.

**Note(s)**

Patents are allocated according to patent inventorship information. Patents are fractionally allocated among regions, countries, or economies based on the proportion of residences of all named inventors. The EU includes 28 member countries. China includes Hong Kong. Patents are classified under the World Intellectual Property Organization (WIPO) classification of patents, which classifies International Patent Classification (IPC) codes under 35 technical fields. IPC reformed codes take into account changes that were made to the WIPO classification in 2006 under the eighth version of the classification and were used to prepare these data. However, because PatentsView only provides the original IPC codes as they appeared on patents and not the IPC reformed codes, current Cooperative Patent Classification codes on patents were converted back to the most recent IPC classification to prepare these statistics. Fractional counts of patents were assigned to each technological field on patents to assign the proper weight of a patent to the corresponding technological fields under the classification.

**Source(s)**

Science-Metrix; PatentsView and USPTO patent data, accessed April 2017.

*Science and Engineering Indicators 2018*

## CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

APPENDIX TABLE 8-16

## USPTO patents granted in macromolecular chemistry, by region, country, or economy: 2000–16

(Number)

Region, country, or economy	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
World	2,939	3,200	3,267	3,112	2,798	2,028	2,189	1,856	1,562	1,740	2,677	2,637	2,764	3,187	3,423	3,361	3,371
North America	1,410	1,501	1,553	1,414	1,199	947	994	864	738	802	1,177	1,148	1,152	1,292	1,371	1,324	1,320
Canada	38	50	62	39	43	29	31	32	29	27	47	31	37	42	49	61	55
Mexico	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Puerto Rico	1	0	1	2	1	1	0	0	2	3	1	4	2	6	3	3	3
United States	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
All others	1,371	1,450	1,490	1,373	1,155	917	963	831	707	772	1,129	1,114	1,113	1,244	1,320	1,260	1,262
Central and South America	4	2	3	2	3	2	3	1	2	3	4	5	4	3	12	8	9
Argentina	1	0	0	0	0	1	0	0	0	0	0	2	1	0	0	0	0
Brazil	3	1	2	1	2	1	1	0	1	3	3	2	3	2	9	5	8
All others	0	1	0	1	1	0	1	1	1	0	1	0	1	0	3	2	1
Europe	745	824	814	852	774	505	562	466	362	382	654	604	686	819	865	814	785
EU	701	771	767	802	737	476	538	432	337	354	611	556	630	749	811	764	717
Austria	12	13	13	9	7	5	8	5	6	7	12	7	18	18	29	21	30
Belgium	52	73	63	54	39	33	35	29	23	23	57	39	49	70	61	58	48
Denmark	3	2	5	2	3	3	2	2	2	2	3	5	3	5	10	8	10

## CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

Region, country, or economy	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Finland	12	18	17	17	12	9	5	7	9	7	13	8	9	19	16	18	17
France	84	92	88	94	89	66	69	62	43	48	74	77	86	112	119	107	106
Germany	353	385	371	419	403	246	288	203	169	154	270	272	294	328	379	332	287
Hungary	1	1	0	1	0	0	0	0	0	0	1	1	0	1	1	1	1
Ireland	1	1	0	2	1	4	1	1	3	1	4	4	6	4	6	2	2
Italy	59	68	71	59	60	32	53	39	34	48	54	45	53	56	55	56	63
Netherlands	45	53	63	68	54	23	27	36	16	26	50	37	44	48	56	63	56
Spain	5	3	4	5	4	4	4	3	1	3	5	6	5	6	8	14	7
Sweden	7	9	9	11	4	6	7	6	6	5	10	5	13	23	17	19	23
United Kingdom	60	49	56	47	56	38	34	34	19	23	48	43	42	51	45	54	57
All others	8	4	8	15	5	6	5	6	7	4	8	7	8	8	9	11	10
Other Europe	45	52	47	50	37	30	24	34	25	29	44	49	56	70	54	50	67
Former Soviet Union	0	0	0	0	0	0	0	0	0	1	1	0	0	1	1	1	2
Norway	2	4	4	10	6	5	5	2	2	4	3	6	4	7	4	3	5
Russia	6	6	2	3	2	1	1	5	3	5	5	2	3	4	5	4	6
Switzerland	34	41	38	35	28	23	15	23	16	17	32	37	45	57	42	42	52
All others	3	1	2	2	1	0	3	4	4	2	3	3	4	1	3	1	3
Asia	764	848	869	817	801	559	611	515	451	533	823	861	895	1,043	1,127	1,166	1,214
China	8	5	10	13	10	3	8	14	13	16	22	24	40	56	64	82	93

## CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

Region, country, or economy	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
India	7	9	9	8	12	10	11	14	10	14	21	14	16	15	32	25	24
Japan	679	768	773	704	673	468	511	421	361	431	644	666	667	764	800	760	796
Malaysia	1	0	0	1	2	1	0	0	0	1	1	3	2	3	6	1	3
Singapore	1	1	3	1	2	3	4	4	1	1	4	3	5	7	9	14	10
South Korea	47	43	53	67	77	56	61	47	53	54	96	108	120	145	162	212	230
Taiwan	21	22	21	23	23	17	15	15	12	15	32	43	44	50	52	65	56
All others	1	0	0	1	2	1	1	0	0	1	2	1	1	2	3	7	1
Middle East	7	8	10	14	8	8	10	5	2	11	6	11	14	18	34	33	31
Israel	6	7	5	10	4	6	4	3	2	10	4	9	8	10	16	16	15
All others	2	1	5	4	4	2	5	1	0	1	2	3	6	8	18	17	16
Africa	1	3	5	2	1	1	0	2	1	2	1	1	1	2	1	1	1
South Africa	1	3	5	1	1	0	0	2	0	2	1	1	1	1	0	0	0
All others	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	1	1
Australia and Oceania	6	14	11	12	12	5	9	4	6	6	11	6	11	10	12	16	10
Australia	6	12	11	11	12	5	8	3	4	5	10	5	7	10	11	15	8
New Zealand	0	1	0	0	0	0	1	1	1	0	1	1	4	0	1	1	3
All others	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Unclassified	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0



CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

EU = European Union; USPTO = U.S. Patent and Trademark Office.

**Note(s)**

Patents are allocated according to patent inventorship information. Patents are fractionally allocated among regions, countries, or economies based on the proportion of residences of all named inventors. The EU includes 28 member countries. China includes Hong Kong. Patents are classified under the World Intellectual Property Organization (WIPO) classification of patents, which classifies International Patent Classification (IPC) codes under 35 technical fields. IPC reformed codes take into account changes that were made to the WIPO classification in 2006 under the eighth version of the classification and were used to prepare these data. However, because PatentsView only provides the original IPC codes as they appeared on patents and not the IPC reformed codes, current Cooperative Patent Classification codes on patents were converted back to the most recent IPC classification to prepare these statistics. Fractional counts of patents were assigned to each technological field on patents to assign the proper weight of a patent to the corresponding technological fields under the classification.

**Source(s)**

Science-Metrix; PatentsView and USPTO patent data, accessed April 2017.

*Science and Engineering Indicators 2018*



## CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

APPENDIX TABLE 8-17

## USPTO patents granted in chemical engineering, by region, country, or economy: 2000–16

(Number)

Region, country, or economy	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
World	3,425	3,452	3,322	3,309	2,977	2,572	2,722	2,459	2,461	2,468	3,416	3,462	3,682	4,008	4,354	4,594	4,741
North America	2,018	1,948	1,843	1,895	1,737	1,493	1,573	1,404	1,366	1,380	1,814	1,863	1,965	2,065	2,206	2,326	2,348
Canada	94	102	87	82	74	58	73	55	52	58	68	80	96	82	109	118	124
Mexico	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Puerto Rico	2	2	4	3	3	1	1	1	0	1	2	3	3	5	4	5	4
United States	1	0	1	0	0	1	0	1	0	1	2	0	1	0	1	1	2
All others	1,921	1,844	1,751	1,811	1,660	1,433	1,499	1,347	1,314	1,321	1,743	1,779	1,864	1,978	2,093	2,203	2,219
Central and South America	13	12	8	6	11	7	7	7	11	7	6	12	14	14	24	17	17
Argentina	3	1	1	2	1	0	1	1	0	1	1	0	1	2	1	1	0
Brazil	6	5	4	3	7	3	3	4	4	4	5	7	9	6	13	9	11
All others	5	6	3	1	3	4	3	3	6	2	1	5	4	6	10	7	5
Europe	852	896	883	833	709	610	681	570	587	558	830	843	903	1,020	1,133	1,136	1,194
EU	779	823	803	768	655	572	632	527	542	505	773	769	816	926	1,023	1,038	1,093
Austria	11	15	14	11	8	9	9	11	7	8	10	10	12	15	22	22	24
Belgium	18	24	16	16	16	15	15	11	15	15	23	26	30	35	33	35	34
Denmark	24	14	14	11	6	9	12	11	6	12	15	18	26	19	17	20	23

## CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

Region, country, or economy	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Finland	27	31	26	35	25	17	21	10	16	11	19	25	16	16	23	28	33
France	137	165	164	147	112	99	95	97	79	80	120	117	116	140	162	155	173
Germany	322	330	339	331	270	242	275	210	226	220	316	331	329	394	413	416	429
Hungary	2	0	2	1	1	1	1	1	1	0	2	1	0	3	3	3	2
Ireland	3	1	1	3	4	4	3	1	5	2	3	5	3	9	6	8	10
Italy	49	46	46	33	44	38	43	33	27	30	61	53	49	54	64	53	77
Netherlands	37	37	44	41	41	36	34	27	39	37	42	40	58	60	65	75	69
Spain	11	10	11	10	6	5	9	5	10	5	10	9	15	8	14	18	13
Sweden	38	52	40	42	29	27	37	26	35	23	45	44	49	54	61	53	60
United Kingdom	92	96	83	84	87	67	72	81	72	59	101	83	104	112	129	136	132
All others	9	3	2	3	6	4	4	3	5	2	6	7	9	7	12	16	14
Other Europe	73	73	80	64	55	39	50	44	45	52	57	74	86	94	110	98	101
Former Soviet Union	2	3	2	1	1	1	2	0	2	1	1	0	3	2	1	2	1
Norway	10	14	18	10	13	9	7	12	9	12	11	14	18	17	19	20	20
Russia	11	9	15	12	8	5	10	7	6	7	10	9	14	18	21	13	13
Switzerland	48	45	43	41	32	24	29	23	28	30	32	49	49	54	65	61	62
All others	3	1	2	1	1	0	1	2	1	1	2	2	3	3	3	2	5
Asia	482	547	528	523	471	412	416	434	461	492	708	682	715	805	874	992	1,061
China	14	14	17	11	18	13	24	19	20	28	46	61	73	81	94	123	147

## CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

[illegible]

CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

EU = European Union; USPTO = U.S. Patent and Trademark Office.

**Note(s)**

Patents are allocated according to patent inventorship information. Patents are fractionally allocated among regions, countries, or economies based on the proportion of residences of all named inventors. The EU includes 28 member countries. China includes Hong Kong. Patents are classified under the World Intellectual Property Organization (WIPO) classification of patents, which classifies International Patent Classification (IPC) codes under 35 technical fields. IPC reformed codes take into account changes that were made to the WIPO classification in 2006 under the eighth version of the classification and were used to prepare these data. However, because PatentsView only provides the original IPC codes as they appeared on patents and not the IPC reformed codes, current Cooperative Patent Classification codes on patents were converted back to the most recent IPC classification to prepare these statistics. Fractional counts of patents were assigned to each technological field on patents to assign the proper weight of a patent to the corresponding technological fields under the classification.

**Source(s)**

Science-Metrix; PatentsView and USPTO patent data, accessed April 2017.

*Science and Engineering Indicators 2018*

## CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

APPENDIX TABLE 8-18

## USPTO patents granted in measurement, by region, country, or economy: 2000–16

(Number)

Region, country, or economy	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
World	6,838	7,283	7,934	8,580	8,352	7,497	8,958	8,701	8,838	8,851	10,248	9,823	10,694	11,496	12,146	12,393	13,124
North America	4,035	4,193	4,439	4,852	4,704	4,215	5,060	4,740	4,729	4,639	5,125	4,983	5,240	5,541	5,739	5,831	6,168
Canada	124	138	139	162	172	135	150	161	158	164	186	188	205	239	245	230	269
Mexico	0	2	3	8	8	8	9	6	3	3	3	2	2	3	4	6	7
Puerto Rico	0	1	0	2	1	1	1	0	1	0	1	1	2	1	1	0	2
United States	3,910	4,053	4,297	4,680	4,522	4,071	4,901	4,573	4,566	4,472	4,936	4,792	5,031	5,299	5,490	5,593	5,889
All others	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Central and South America	4	7	3	7	5	4	10	11	10	8	14	11	15	16	18	18	15
Argentina	1	1	0	3	2	0	1	2	2	2	5	5	3	2	6	2	3
Brazil	2	3	2	3	1	2	4	6	7	3	7	4	8	8	9	10	8
All others	1	3	2	1	3	1	6	2	1	3	2	2	4	6	3	6	3
Europe	1,287	1,419	1,590	1,700	1,607	1,445	1,678	1,670	1,699	1,660	2,114	2,038	2,317	2,650	2,919	2,902	3,129
EU	1,161	1,284	1,423	1,517	1,435	1,287	1,496	1,479	1,467	1,433	1,826	1,798	2,025	2,329	2,575	2,508	2,687
Austria	16	17	28	25	30	23	35	31	29	31	46	50	46	67	71	84	112
Belgium	11	16	18	15	14	16	17	24	20	13	18	28	31	32	52	41	41
Denmark	12	11	12	16	20	20	26	21	13	16	24	30	24	26	38	36	37

## CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

Region, country, or economy	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Finland	39	26	43	50	47	34	43	43	48	50	65	43	55	53	67	61	76
France	175	177	165	191	155	160	184	197	213	185	251	263	307	383	409	416	427
Germany	539	621	707	788	728	654	732	729	717	669	836	799	895	993	1,079	1,040	1,089
Hungary	1	3	1	2	2	2	1	1	2	2	1	1	2	3	5	4	4
Ireland	8	2	6	13	10	3	10	13	8	13	17	11	10	17	21	15	26
Italy	44	62	58	62	63	46	55	62	59	53	74	85	83	119	119	125	119
Netherlands	52	51	66	66	57	46	56	57	73	72	77	92	107	117	149	143	150
Spain	6	4	9	3	3	9	10	7	15	17	13	23	25	24	29	27	30
Sweden	68	76	77	66	54	56	74	65	59	56	74	75	86	94	118	96	116
United Kingdom	182	213	219	208	240	209	234	215	197	235	304	274	327	360	386	379	417
All others	8	6	15	12	11	9	19	14	15	22	25	22	28	38	32	41	42
Other Europe	127	135	167	182	172	157	182	191	231	227	288	241	292	321	344	394	442
Former Soviet Union	1	1	2	3	2	2	4	5	5	3	2	4	6	5	3	2	9
Norway	15	15	20	31	28	31	32	33	54	42	60	60	57	66	70	83	68
Russia	10	21	20	22	13	9	17	19	14	19	23	16	23	30	38	27	35
Switzerland	95	95	120	123	129	114	125	132	152	161	200	158	199	214	223	273	322
All others	4	2	4	4	0	1	5	3	6	3	4	3	7	6	9	9	8
Asia	1,415	1,555	1,787	1,908	1,908	1,721	2,072	2,130	2,246	2,381	2,803	2,610	2,909	3,050	3,225	3,363	3,530
China	9	10	17	16	30	30	41	59	93	131	175	154	205	216	265	297	344

## CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

[illegible]

CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

EU = European Union; USPTO = U.S. Patent and Trademark Office.

**Note(s)**

Patents are allocated according to patent inventorship information. Patents are fractionally allocated among regions, countries, or economies based on the proportion of residences of all named inventors. The EU includes 28 member countries. China includes Hong Kong. Patents are classified under the World Intellectual Property Organization (WIPO) classification of patents, which classifies International Patent Classification (IPC) codes under 35 technical fields. IPC reformed codes take into account changes that were made to the WIPO classification in 2006 under the eighth version of the classification and were used to prepare these data. However, because PatentsView only provides the original IPC codes as they appeared on patents and not the IPC reformed codes, current Cooperative Patent Classification codes on patents were converted back to the most recent IPC classification to prepare these statistics. Fractional counts of patents were assigned to each technological field on patents to assign the proper weight of a patent to the corresponding technological fields under the classification.

**Source(s)**

Science-Metrix; PatentsView and USPTO patent data, accessed April 2017.

*Science and Engineering Indicators 2018*



## CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

APPENDIX TABLE 8-19

## USPTO patents granted in optics, by region, country, or economy: 2000–16

(Number)

Region, country, or economy	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
World	7,596	7,898	8,165	9,018	9,633	8,459	9,695	8,787	9,007	9,357	11,188	11,048	11,137	11,611	12,422	12,354	12,088
North America	2,768	3,018	3,167	3,509	3,555	3,138	3,324	2,890	2,725	2,590	2,953	2,620	2,673	2,773	2,926	2,884	2,954
Canada	93	90	107	136	125	104	112	100	104	110	132	126	129	121	144	128	140
Mexico	0	1	4	2	1	2	1	2	1	1	0	1	4	3	5	5	6
Puerto Rico	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
United States	2,674	2,926	3,056	3,371	3,429	3,032	3,211	2,787	2,620	2,479	2,821	2,493	2,540	2,648	2,777	2,751	2,808
All others	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Central and South America	2	3	2	1	2	1	2	0	1	1	1	1	2	4	3	5	4
Argentina	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Brazil	2	2	1	1	0	0	2	0	1	1	1	0	0	3	2	2	3
All others	0	0	1	1	1	1	0	0	0	0	0	1	1	1	1	3	1
Europe	798	861	822	938	1,004	817	971	835	919	827	946	866	898	1,044	1,113	1,110	1,099
EU	753	806	769	881	927	753	913	793	869	785	888	820	857	978	1,049	1,040	1,030
Austria	13	13	10	10	12	9	14	8	8	6	14	16	13	13	16	17	18
Belgium	83	62	43	43	32	20	30	20	20	13	24	18	18	23	31	30	39
Denmark	4	8	6	12	16	11	6	13	9	13	10	9	6	10	10	15	11

## CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

Region, country, or economy	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Finland	3	8	3	5	9	11	7	15	9	13	21	9	11	12	12	18	20
France	111	121	92	128	115	81	81	66	58	77	95	93	112	123	130	125	119
Germany	260	304	325	363	393	342	353	293	339	294	331	314	343	395	417	425	406
Hungary	0	2	0	1	2	1	4	3	3	0	3	3	0	2	2	3	3
Ireland	1	1	2	4	4	7	4	2	6	4	4	5	2	4	5	5	4
Italy	25	38	24	47	43	32	34	31	22	35	24	27	31	32	22	30	35
Netherlands	48	49	66	74	104	86	210	211	254	212	218	191	174	204	236	214	209
Spain	2	5	1	2	2	2	4	5	4	4	3	4	8	9	6	8	10
Sweden	41	34	31	29	37	26	32	29	26	26	29	29	22	26	30	30	21
United Kingdom	163	157	162	160	152	118	123	89	97	83	105	94	107	113	121	101	123
All others	1	4	3	2	4	6	10	8	14	4	6	7	9	11	12	15	12
Other Europe	45	54	53	58	78	64	58	41	50	41	57	46	40	66	64	71	70
Former Soviet Union	0	2	1	2	3	1	3	1	1	0	3	2	0	0	2	3	3
Norway	1	0	4	4	6	8	5	4	4	1	3	2	5	4	8	2	3
Russia	5	10	8	8	15	17	15	7	10	6	13	7	7	13	10	12	12
Switzerland	37	41	40	43	53	38	34	28	32	33	36	35	28	47	45	51	47
All others	1	0	0	1	0	0	1	0	2	1	2	1	0	1	0	2	4
Asia	3,984	3,953	4,108	4,484	4,994	4,443	5,309	4,989	5,286	5,858	7,189	7,472	7,483	7,697	8,276	8,243	7,914
China	11	15	22	30	36	27	28	40	48	51	92	126	141	210	388	538	688



CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

EU = European Union; USPTO = U.S. Patent and Trademark Office.

**Note(s)**

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**Source(s)**

Science-Metrix; PatentsView and USPTO patent data, accessed April 2017.

*Science and Engineering Indicators 2018*

## CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

APPENDIX TABLE 8-20

## USPTO patents granted in analysis of biological materials, by region, country, or economy: 2000–16

(Number)

Region, country, or economy	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
World	852	958	880	874	866	707	954	980	1,010	1,029	1,519	1,519	1,522	1,697	1,722	1,747	1,757
North America	572	658	593	606	597	498	639	663	656	668	965	951	939	1,021	989	1,022	1,019
Canada	33	36	31	38	34	19	34	35	33	28	47	44	48	47	39	51	45
Mexico	0	0	0	0	2	0	0	0	0	1	1	1	0	1	2	2	1
Puerto Rico	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
United States	539	622	562	568	562	478	605	628	623	639	917	905	891	973	948	969	972
All others	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Central and South America	2	3	2	3	4	2	4	1	1	1	1	3	3	6	6	5	3
Argentina	1	0	0	0	1	0	1	0	0	0	0	1	0	0	2	1	1
Brazil	0	1	0	2	2	1	2	0	1	1	0	2	2	2	3	1	1
All others	1	2	2	0	0	2	1	1	0	0	0	0	1	3	1	4	1
Europe	192	190	183	177	165	125	179	184	177	189	300	298	295	353	401	363	366
EU	181	176	173	166	150	118	170	172	164	176	284	280	269	329	374	334	330
Austria	3	4	4	3	3	1	1	4	3	3	8	5	11	9	11	9	7
Belgium	4	4	3	10	6	3	10	8	9	9	11	14	9	10	19	14	14
Denmark	8	6	10	9	6	6	4	5	4	1	8	10	8	11	11	11	9

## CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

Region, country, or economy	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Finland	6	10	10	5	4	5	5	2	5	6	9	6	10	5	6	11	9
France	30	23	25	22	18	22	33	25	29	26	41	38	38	54	64	55	58
Germany	58	67	57	54	53	31	52	54	47	66	109	102	90	114	109	98	97
Hungary	0	1	0	0	0	0	1	0	1	0	1	0	1	1	2	1	1
Ireland	2	2	2	1	1	0	3	1	0	0	1	2	2	5	2	3	2
Italy	5	3	4	6	4	3	4	4	7	6	10	12	11	13	17	13	15
Netherlands	9	6	4	8	8	5	3	8	9	11	13	14	12	12	22	24	15
Spain	1	1	2	3	1	1	1	3	6	6	3	3	4	4	7	9	11
Sweden	16	11	14	11	13	10	11	17	11	11	16	21	20	17	26	17	25
United Kingdom	37	37	37	33	31	31	41	40	33	29	51	49	49	67	73	66	60
All others	1	1	0	0	1	1	1	1	1	2	4	4	2	7	6	3	7
Other Europe	12	13	11	10	15	7	9	13	13	13	16	19	26	23	27	30	36
Former Soviet Union	0	0	0	1	0	0	0	0	1	0	0	0	1	1	0	0	0
Norway	2	4	1	2	3	2	0	4	4	4	1	4	8	5	5	5	6
Russia	1	1	1	4	1	0	0	2	2	1	3	1	1	4	3	3	4
Switzerland	6	7	8	4	11	4	7	6	6	7	11	14	15	14	17	20	24
All others	2	1	0	0	0	0	1	0	1	1	1	0	1	0	2	2	2
Asia	68	87	82	72	84	70	107	112	154	144	223	237	252	272	285	304	313
China	0	2	2	2	2	0	2	4	9	6	18	12	25	18	27	26	30

## CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

[illegible]



CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

EU = European Union; USPTO = U.S. Patent and Trademark Office.

**Note(s)**

Patents are allocated according to patent inventorship information. Patents are fractionally allocated among regions, countries, or economies based on the proportion of residences of all named inventors. The EU includes 28 member countries. China includes Hong Kong. Patents are classified under the World Intellectual Property Organization (WIPO) classification of patents, which classifies International Patent Classification (IPC) codes under 35 technical fields. IPC reformed codes take into account changes that were made to the WIPO classification in 2006 under the eighth version of the classification and were used to prepare these data. However, because PatentsView only provides the original IPC codes as they appeared on patents and not the IPC reformed codes, current Cooperative Patent Classification codes on patents were converted back to the most recent IPC classification to prepare these statistics. Fractional counts of patents were assigned to each technological field on patents to assign the proper weight of a patent to the corresponding technological fields under the classification.

**Source(s)**

Science-Metrix; PatentsView and USPTO patent data, accessed April 2017.

*Science and Engineering Indicators 2018*



## CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

APPENDIX TABLE 8-21

## USPTO patents granted in control, by region, country, or economy: 2000–16

(Number)

Region, country, or economy	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
World	2,662	2,645	2,654	2,842	2,987	2,667	3,370	2,825	2,834	2,897	3,793	3,931	4,807	5,302	5,665	5,428	5,849
North America	1,623	1,595	1,589	1,760	1,858	1,630	2,101	1,735	1,796	1,826	2,387	2,495	2,932	3,339	3,495	3,263	3,525
Canada	56	54	63	44	61	49	66	45	58	56	79	82	85	133	137	113	120
Mexico	1	0	2	1	1	2	2	0	0	3	2	3	3	1	2	2	3
Puerto Rico	1	0	0	1	0	1	1	1	1	1	1	0	1	0	1	1	3
United States	1,565	1,541	1,524	1,714	1,796	1,579	2,033	1,689	1,737	1,767	2,305	2,410	2,843	3,205	3,355	3,147	3,399
All others	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Central and South America	4	3	1	5	6	3	9	3	2	4	6	9	10	8	8	13	13
Argentina	1	1	1	1	1	0	2	0	0	1	1	0	1	1	3	3	1
Brazil	3	1	0	2	3	2	5	1	0	2	3	6	8	4	4	9	9
All others	0	1	0	2	2	1	2	3	2	1	2	3	2	3	1	1	2
Europe	397	409	440	425	425	421	473	377	412	382	511	528	698	741	830	774	858
EU	376	378	414	404	404	398	445	353	387	362	476	493	656	690	774	722	801
Austria	13	10	3	10	10	6	10	5	11	11	12	15	25	29	32	29	37
Belgium	7	8	5	2	3	3	3	4	5	3	6	4	8	6	9	7	13
Denmark	5	1	5	6	4	4	6	1	2	4	4	7	4	8	11	6	10

## CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

Region, country, or economy	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Finland	5	8	7	3	8	5	12	10	5	7	7	10	5	16	19	12	23
France	51	45	64	58	55	55	48	48	61	55	93	94	139	147	148	118	123
Germany	150	164	174	189	195	194	217	145	166	155	198	181	250	244	278	274	276
Hungary	0	0	0	0	0	1	2	0	1	0	0	0	0	0	1	1	2
Ireland	2	2	3	2	2	4	8	6	4	11	7	6	4	4	11	10	13
Italy	26	29	22	23	19	19	23	16	20	15	17	21	38	34	46	42	46
Netherlands	17	15	13	12	13	11	16	11	15	11	11	13	18	25	21	24	32
Spain	6	5	8	4	5	4	2	2	5	5	7	5	8	15	18	20	13
Sweden	22	19	16	18	19	18	25	23	16	14	21	27	33	33	35	39	44
United Kingdom	71	70	87	74	68	73	73	76	69	68	90	101	104	107	122	109	140
All others	1	3	7	3	2	3	3	6	7	3	3	9	19	21	23	31	28
Other Europe	21	32	26	21	22	23	28	25	24	20	36	35	42	51	56	52	56
Former Soviet Union	3	2	1	0	0	1	1	0	0	0	0	0	1	1	1	1	0
Norway	4	4	5	2	4	2	7	7	5	3	7	8	9	9	9	9	8
Russia	2	3	2	3	1	4	3	2	2	2	3	2	3	5	6	5	8
Switzerland	12	23	18	16	16	15	17	15	17	14	25	24	27	33	38	34	36
All others	1	0	1	0	0	0	1	0	1	0	2	1	2	3	2	3	3
Asia	597	591	583	600	638	566	726	641	570	621	794	794	1,016	1,042	1,150	1,204	1,290
China	2	4	10	5	6	7	11	21	20	16	38	39	50	55	96	103	111

## CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

Region, country, or economy	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
India	1	2	4	1	6	6	7	7	7	13	17	26	20	48	64	56	82
Japan	485	491	487	484	510	438	565	483	419	441	560	540	703	706	682	702	732
Malaysia	1	0	0	0	0	0	0	2	0	1	1	1	1	3	3	2	2
Singapore	5	3	3	4	5	7	3	3	5	8	9	10	7	7	8	17	19
South Korea	53	55	32	50	43	43	49	59	48	67	75	94	95	107	150	183	201
Taiwan	50	37	47	54	67	65	88	66	70	74	89	82	138	115	140	140	136
All others	0	0	0	1	1	1	4	0	0	1	6	1	2	1	7	3	7
Middle East	20	20	17	23	25	16	25	26	18	24	29	37	32	42	62	70	63
Israel	17	19	16	23	23	15	22	23	17	23	25	30	26	31	48	56	51
All others	3	1	1	1	2	1	3	3	1	1	4	7	7	11	14	14	12
Africa	1	7	5	3	3	2	3	3	2	3	4	3	7	9	7	8	8
South Africa	1	6	5	3	3	2	3	3	2	3	4	3	6	8	4	6	5
All others	0	1	0	0	0	0	0	0	0	0	0	1	1	1	3	1	3
Australia and Oceania	21	18	20	26	32	29	33	40	34	37	61	63	112	118	111	96	93
Australia	20	16	17	25	29	26	30	35	32	34	58	61	107	114	107	88	88
New Zealand	1	2	3	1	3	3	2	5	2	3	3	2	4	4	4	8	5
All others	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Unclassified	1	1	0	0	0	0	0	0	1	0	1	2	0	3	1	1	1

CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

EU = European Union; USPTO = U.S. Patent and Trademark Office.

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**Source(s)**

Science-Metrix; PatentsView and USPTO patent data, accessed April 2017.

*Science and Engineering Indicators 2018*

## CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

APPENDIX TABLE 8-22

## USPTO patents granted in materials and metallurgy, by region, country, or economy: 2000–16

(Number)

Region, country, or economy	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
World	2,093	2,373	2,401	2,315	2,043	1,584	1,607	1,458	1,364	1,682	2,341	2,333	2,524	2,654	2,778	2,805	2,752
North America	938	1,031	1,017	1,008	886	697	735	663	608	744	1,012	965	997	1,081	1,109	1,045	1,010
Canada	52	57	70	62	50	39	44	33	33	39	52	49	50	55	57	48	52
Mexico	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Puerto Rico	10	2	6	4	2	0	4	3	2	5	6	7	6	8	8	4	5
United States	0	0	0	1	1	0	0	1	0	0	1	0	0	0	0	0	1
All others	877	972	941	941	833	657	687	626	573	700	953	909	941	1,019	1,043	993	952
Central and South America	9	10	9	10	6	2	6	7	6	9	9	15	13	10	21	18	16
Argentina	0	1	0	1	0	0	0	0	0	0	0	1	2	0	3	2	1
Brazil	2	3	2	4	2	0	3	3	2	5	5	8	5	6	11	13	11
All others	7	5	7	4	4	2	3	4	4	4	5	7	5	3	6	4	4
Europe	553	626	616	547	488	384	359	322	301	347	499	491	550	569	605	627	610
EU	507	583	564	498	445	359	331	300	277	322	466	454	501	528	559	579	552
Austria	19	34	30	29	19	17	16	17	8	14	21	20	23	22	26	25	29
Belgium	15	17	23	13	20	12	14	8	10	15	23	15	16	18	28	26	26
Denmark	11	12	14	8	12	10	10	4	4	7	8	7	7	7	9	8	6

## CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

Region, country, or economy	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Finland	5	11	8	9	15	9	6	5	4	10	17	6	8	12	9	16	13
France	110	120	96	85	66	65	52	56	55	63	90	87	127	110	116	126	111
Germany	226	235	228	208	199	158	136	122	102	132	182	190	203	223	224	205	204
Hungary	1	1	1	1	1	0	0	1	1	0	1	1	0	2	1	1	1
Ireland	0	0	1	1	1	0	0	1	1	2	1	2	1	3	1	3	1
Italy	29	30	35	28	20	19	21	14	16	10	26	24	19	22	29	33	34
Netherlands	15	15	16	16	19	15	11	10	17	18	17	23	15	21	23	17	16
Spain	6	4	8	9	4	4	6	2	4	4	4	7	7	7	10	7	10
Sweden	24	45	48	33	26	19	20	29	26	21	29	25	24	27	25	36	26
United Kingdom	42	47	45	53	39	25	34	27	24	22	36	41	40	42	45	60	58
All others	4	11	11	6	3	7	3	6	6	3	10	7	10	11	13	16	16
Other Europe	46	43	52	48	43	25	27	22	24	25	33	37	49	41	45	48	58
Former Soviet Union	1	2	3	4	0	3	1	0	0	1	1	2	1	0	2	2	2
Norway	8	5	6	6	10	5	4	4	7	2	7	5	8	8	9	9	9
Russia	6	9	11	9	12	7	7	5	4	7	9	6	3	8	8	7	10
Switzerland	29	26	31	26	20	10	14	12	10	14	14	21	33	23	26	27	30
All others	1	1	1	3	0	0	2	1	3	1	1	3	3	2	1	3	6
Asia	558	664	721	712	624	475	468	438	422	541	761	805	909	933	975	1,043	1,053
China	5	4	7	2	8	3	6	11	9	20	32	32	57	63	87	91	96

## CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

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CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

EU = European Union; USPTO = U.S. Patent and Trademark Office.

**Note(s)**

Patents are allocated according to patent inventorship information. Patents are fractionally allocated among regions, countries, or economies based on the proportion of residences of all named inventors. The EU includes 28 member countries. China includes Hong Kong. Patents are classified under the World Intellectual Property Organization (WIPO) classification of patents, which classifies International Patent Classification (IPC) codes under 35 technical fields. IPC reformed codes take into account changes that were made to the WIPO classification in 2006 under the eighth version of the classification and were used to prepare these data. However, because PatentsView only provides the original IPC codes as they appeared on patents and not the IPC reformed codes, current Cooperative Patent Classification codes on patents were converted back to the most recent IPC classification to prepare these statistics. Fractional counts of patents were assigned to each technological field on patents to assign the proper weight of a patent to the corresponding technological fields under the classification.

**Source(s)**

Science-Metrix; PatentsView and USPTO patent data, accessed April 2017.

*Science and Engineering Indicators 2018*



## CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

APPENDIX TABLE 8-23

## USPTO patents granted in microstructural and nanotechnology, by region, country, or economy: 2000–16

(Number)

Region, country, or economy	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
World	484	595	696	905	1,032	966	1,134	1,039	1,060	1,145	1,493	1,458	1,410	1,551	1,668	1,457	1,245
North America	246	321	378	516	580	558	626	572	583	582	713	678	663	741	794	694	588
Canada	5	5	2	15	15	14	16	12	17	11	22	22	22	20	24	22	19
Mexico	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Puerto Rico	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1	1	0
United States	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1	0	0
All others	240	316	376	501	565	545	610	559	565	570	689	656	641	719	769	671	568
Central and South America	0	0	0	0	0	1	0	0	0	0	1	1	2	1	2	1	1
Argentina	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Brazil	0	0	0	0	0	1	0	0	0	0	1	1	1	1	2	1	0
All others	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Europe	52	61	76	89	103	103	118	114	112	128	205	210	210	239	248	242	211
EU	45	54	69	78	91	94	105	106	98	120	187	189	195	222	227	224	191
Austria	1	0	0	0	1	2	2	2	3	2	6	5	6	5	2	7	4
Belgium	0	1	2	1	4	1	3	2	3	5	8	10	10	12	8	9	6
Denmark	0	0	1	2	1	2	1	2	3	2	1	1	1	2	2	3	3

## CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

Region, country, or economy	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Finland	0	0	1	1	2	2	1	1	0	2	2	4	5	4	2	4	5
France	10	10	12	13	14	15	13	14	13	18	46	42	40	38	46	44	35
Germany	17	21	27	39	37	41	47	48	41	45	64	63	74	82	87	85	68
Hungary	0	0	0	0	0	0	0	0	0	1	0	2	1	0	0	1	1
Ireland	0	1	1	1	1	0	2	0	1	1	2	1	2	4	3	1	1
Italy	1	3	4	2	5	3	7	8	8	5	10	14	7	13	13	16	14
Netherlands	1	6	6	5	5	6	9	11	10	14	20	16	22	25	24	15	20
Spain	1	2	2	1	1	0	0	0	1	1	2	2	1	4	5	5	4
Sweden	5	2	3	4	5	4	2	4	4	5	7	8	10	7	7	9	6
United Kingdom	8	6	10	10	14	16	15	12	10	17	17	15	14	21	25	22	19
All others	0	0	1	0	1	2	2	2	1	1	2	5	2	5	2	4	7
Other Europe	6	7	7	10	12	9	13	8	14	9	18	21	15	17	21	18	20
Former Soviet Union	0	0	0	1	0	0	0	1	0	0	0	1	1	1	1	1	0
Norway	1	1	1	0	2	0	2	0	1	1	1	1	1	0	1	1	0
Russia	2	2	2	2	2	2	2	2	3	2	2	2	2	4	4	3	4
Switzerland	4	4	3	6	7	7	8	5	9	6	14	15	11	11	15	13	14
All others	0	0	0	1	1	0	1	0	1	0	0	1	1	1	1	1	2
Asia	180	195	233	289	337	290	370	334	352	415	557	547	519	545	595	495	423
China	0	0	1	1	3	3	8	7	7	17	23	22	29	47	65	59	58

## CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

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CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

EU = European Union; USPTO = U.S. Patent and Trademark Office.

**Note(s)**

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**Source(s)**

Science-Metrix; PatentsView and USPTO patent data, accessed April 2017.

*Science and Engineering Indicators 2018*

## CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

APPENDIX TABLE 8-24

## USPTO patents granted in surface technology and coating, by region, country, or economy: 2000–16

(Number)

Region, country, or economy	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
World	2,502	2,651	2,676	2,617	2,470	1,913	1,760	1,656	1,576	1,564	2,222	2,299	2,596	2,753	2,913	3,019	3,153
North America	1,326	1,421	1,394	1,410	1,269	1,043	905	863	802	813	1,066	1,074	1,217	1,266	1,258	1,319	1,359
Canada	35	41	42	39	34	30	29	28	21	18	21	35	52	39	40	40	52
Mexico	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Puerto Rico	0	1	0	0	3	0	1	1	1	1	0	0	1	2	1	2	3
United States	0	1	0	2	0	0	1	0	0	0	0	0	0	2	0	0	0
All others	1,291	1,378	1,352	1,369	1,232	1,013	875	833	781	795	1,045	1,039	1,164	1,223	1,216	1,277	1,304
Central and South America	3	3	7	7	8	1	2	4	3	2	3	4	5	11	4	8	5
Argentina	0	0	0	0	2	0	0	0	0	0	0	1	1	1	0	0	0
Brazil	0	1	0	1	0	0	1	2	2	0	1	1	1	4	2	5	3
All others	3	2	7	6	5	1	1	2	1	2	2	3	3	6	2	3	2
Europe	391	480	462	444	402	303	309	253	252	219	394	416	446	470	499	574	588
EU	359	436	424	406	361	279	278	230	226	205	364	381	409	427	463	529	531
Austria	11	14	14	11	8	6	6	6	6	5	10	12	12	12	14	12	20
Belgium	11	17	17	13	8	12	8	10	8	11	17	20	17	16	20	24	25
Denmark	4	1	5	4	2	2	1	1	3	3	3	5	4	4	8	4	7

## CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

Region, country, or economy	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Finland	5	13	11	15	19	11	17	9	10	15	12	10	7	15	11	15	19
France	52	60	51	57	50	30	35	33	26	36	52	43	57	63	73	78	79
Germany	169	210	201	204	182	140	130	97	96	81	159	159	165	184	212	234	224
Hungary	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Ireland	0	0	2	2	2	0	2	0	4	2	2	3	5	2	5	4	4
Italy	28	27	22	24	20	13	16	16	10	13	20	19	26	20	17	26	26
Netherlands	15	11	17	15	15	14	10	13	14	9	16	19	20	20	22	24	30
Spain	2	0	4	1	3	3	2	2	0	1	4	4	7	3	5	8	11
Sweden	23	31	27	21	24	21	25	15	21	11	22	36	37	28	23	22	21
United Kingdom	36	49	50	36	27	25	25	24	21	15	39	46	48	53	48	69	52
All others	2	4	4	5	2	3	3	3	7	3	7	4	5	7	4	8	12
Other Europe	32	44	38	38	41	23	31	23	27	13	30	35	37	43	37	45	57
Former Soviet Union	1	1	1	1	1	3	0	1	2	0	0	0	1	1	2	3	2
Norway	2	1	2	1	3	3	4	2	7	2	1	4	2	4	2	4	7
Russia	7	12	7	8	6	3	4	4	2	3	3	4	5	1	1	3	5
Switzerland	19	29	27	25	28	15	21	14	14	7	24	24	26	36	30	32	41
All others	2	1	1	3	3	0	2	2	1	1	2	2	2	2	2	2	2
Asia	766	726	791	738	767	554	532	518	506	515	738	781	906	983	1,122	1,092	1,166
China	2	4	4	3	4	6	6	6	4	7	25	20	34	50	62	60	91

## CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

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CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

EU = European Union; USPTO = U.S. Patent and Trademark Office.

**Note(s)**

Patents are allocated according to patent inventorship information. Patents are fractionally allocated among regions, countries, or economies based on the proportion of residences of all named inventors. The EU includes 28 member countries. China includes Hong Kong. Patents are classified under the World Intellectual Property Organization (WIPO) classification of patents, which classifies International Patent Classification (IPC) codes under 35 technical fields. IPC reformed codes take into account changes that were made to the WIPO classification in 2006 under the eighth version of the classification and were used to prepare these data. However, because PatentsView only provides the original IPC codes as they appeared on patents and not the IPC reformed codes, current Cooperative Patent Classification codes on patents were converted back to the most recent IPC classification to prepare these statistics. Fractional counts of patents were assigned to each technological field on patents to assign the proper weight of a patent to the corresponding technological fields under the classification.

**Source(s)**

Science-Metrix; PatentsView and USPTO patent data, accessed April 2017.

*Science and Engineering Indicators 2018*



## CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

APPENDIX TABLE 8-25



### Patent activity indexes for selected technologies for selected economies: 2014–16

(Patent activity index)

Technology	United States	EU	Japan	South Korea	Taiwan	China
ICT						
Basic communication processes	0.87	0.99	1.07	1.14	1.70	1.11
Computer	1.14	0.64	0.74	1.01	1.05	1.05
Digital communications	1.12	0.88	0.50	1.36	0.47	1.91
IT management	1.62	0.54	0.22	0.23	0.11	0.40
Semiconductors	0.64	0.58	1.51	2.46	3.52	1.11
Telecommunications	0.93	0.81	1.19	1.34	0.98	1.41
Testing, measuring, and control						
Analysis of biological materials	1.17	1.34	0.58	0.48	0.43	0.50
Control	1.24	0.91	0.72	0.53	0.64	0.58
Measurement	0.95	1.39	0.97	0.58	0.74	0.76
Optics	0.48	0.57	2.69	1.43	1.66	1.38
Chemistry and health						
Pharmaceuticals	1.19	1.35	0.34	0.37	0.40	0.71
Biotechnology	1.17	1.41	0.48	0.48	0.33	0.61
Basic material chemistry	0.98	1.34	1.01	0.50	0.30	0.79
Organic chemistry	0.96	1.74	0.63	0.47	0.31	1.21
Macromolecular chemistry	0.80	1.52	1.34	1.00	0.44	0.74
Chemical engineering	1.01	1.55	0.68	0.64	0.52	0.84
Medical technology	1.40	1.02	0.42	0.22	0.25	0.25
Materials and nanotechnology						
Materials and metallurgy	0.76	1.36	1.47	0.91	0.39	1.04
Microstructural and nanotechnology	0.97	0.99	0.90	1.18	1.62	1.32
Surface technology and coating	0.88	1.13	1.43	0.98	0.89	0.74

## CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

EU = European Union; ICT = information and communications technologies; IT = information technology.

### Note(s)

Patents are allocated according to patent inventorship information. A patent activity index is the ratio of a country's share of a technology to its share of all patents. A patent activity index greater than 1.00 indicates that the country is relatively more concentrated in the technology area. An index less than 1.00 indicates that the economy is relatively less concentrated in the technology area. The EU includes 28 member countries. China includes Mainland China, Hong Kong, and Macau. Patents are classified under the World Intellectual Property Organization (WIPO) classification of patents, which classifies International Patent Classification (IPC) codes under 35 technical fields. IPC reformed codes take into account changes that were made to the WIPO classification in 2006 under the eighth version of the classification and were used to prepare these data. However, because PatentsView only provides the original IPC codes as they appeared on patents and not the IPC reformed codes, current Cooperative Patent Classification codes on patents were converted back to the most recent IPC classification to prepare these statistics. Fractional counts of patents were assigned to each technological field on patents to assign the proper weight of a patent to the corresponding technological fields under the classification. For instance, a patent that is classified under five different technological fields will see each of its technological fields receive a 0.2 count of the patent so that the patent accounts for a count of 1.0 across all technological fields. Patents are also fractionally allocated among regions, countries, or economies based on the proportion of residences of all named inventors. As such, data across regions, countries, or economies add up to the world total.

### Source(s)

Science-Metrix; PatentsView and U.S. Patent and Trademark Office patent data, accessed April 2017.

*Science and Engineering Indicators 2018*

## CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

APPENDIX TABLE 8-26

### Academic patenting and licensing activities: 2001–15

(Millions of current dollars and number)

Activity indicator	2001 (139)	2002 (156)	2003 (165)	2004 (164)	2005 (159)	2006 (161)	2007 (161)	2008 (159)	2009 (153)	2010 (155)	2011 (157)	2012 (155)	2013 (162)	2014 (155)	2015 (165)
Current \$millions															
Net royalties <sup>a</sup>	753.8	868.9	866.8	924.9	1,588.1	1,322.3	1,898.8	2,127.1	1,474.6	1,480.5	1,486.0	1,708.4	1,816.1	2,038.4	1,760.0
Gross royalties <sup>a</sup>	868.3	997.8	1,033.6	1,088.5	1,775.0	1,511.6	2,098.8	2,397.2	1,782.1	1,790.1	1,814.0	1,955.3	2,089.9	2,223.4	1,946.0
Royalties paid to others	41.0	38.8	65.5	54.4	67.8	67.8	63.7	114.8	153.2	164.4	175.5	87.6	92.2	103.0	143.5
Unreimbursed legal fees expended	73.5	90.1	101.3	109.2	119.1	121.5	136.3	155.3	154.3	145.2	152.5	159.3	181.6	185.0	186.0
Number															
Invention disclosures received	11,259	12,638	13,718	15,002	15,371	16,855	17,677	17,694	18,163	18,635	19,732	21,353	21,596	21,717	22,507
New U.S. patent applications filed	5,784	6,509	7,203	9,462	9,306	10,748	10,899	11,197	11,222	11,075	12,090	13,034	13,573	12,696	13,389
U.S. patents granted	3,179	3,109	3,450	3,268	2,944	2,895	3,291	2,933	3,088	4,018	4,296	4,635	5,220	5,898	6,164
Startup companies formed	402	364	348	425	418	500	510	549	555	613	617	655	759	853	950
Operational startups	1,904	2,070	2,090	2,451	2,652	2,960	3,148	3,076	3,175	3,339	3,573	3,747	3,948	4,419	4,757
Active licenses	18,845	20,927	22,091	23,269	23,896	26,070	26,094	26,816	28,763	33,309	33,284	34,417	37,445	37,956	40,402
Revenue-generating licenses/ options	7,715	8,490	8,976	9,543	10,251	10,733	12,467	13,231	13,927	13,995	14,754	15,797	15,925	15,678	17,758
New licenses/ options executed <sup>b</sup>	3,300	3,739	3,855	4,087	4,201	4,192	4,419	4,416	4,624	4,735	5,398	5,567	5,865	6,190	7,157
Equity licenses/ options	328	373	316	318	278	357	377	382	354	357	387	445	428	495	603

<sup>a</sup> One-year spikes in royalty data reflect extraordinary one-time payments.



CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

<sup>b</sup> Data before 2004 may not be comparable with data for 2004 and beyond due to changes in survey wording.

**Note(s)**

The number of institutions reporting is given in parentheses. Data from nonuniversity hospitals and medical institutes are not included. Responding institutions may report for any 12-month period ending in the identified year.

**Source(s)**

Association of University Technology Managers (AUTM), AUTM Licensing Survey (various years).

*Science and Engineering Indicators 2018*

## CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

APPENDIX TABLE 8-27

### Federal technology transfer activity indicators for U.S. agencies with federal laboratories: FYs 2001–14

(Number)

Agency	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Invention disclosures and patenting														
All 11 agencies														
Inventions disclosed	3,962	4,149	5,106	5,454	4,771	5,193	4,732	4,572	4,452	4,755	5,251	5,350	5,321	5,103
Patent applications filed	2,175	2,130	2,318	1,768	1,745	1,912	1,847	1,952	1,957	2,002	2,308	2,361	2,494	2,609
Patents issued	1,610	1,511	1,631	1,391	1,012	1,284	1,380	1,253	1,319	1,468	1,449	2,228	1,855	1,931
USDA														
Inventions disclosed	118	151	121	142	125	105	126	100	143	149	158	160	191	117
Patent applications filed	83	90	60	81	88	83	114	123	123	113	124	122	157	119
Patents issued	64	53	64	50	27	39	37	30	24	45	49	69	65	83
DOC														
Inventions disclosed	26	17	21	25	21	14	32	40	41	31	26	52	41	47
Patent applications filed	12	12	5	12	12	5	8	21	20	20	17	21	26	25
Patents issued	21	20	9	12	10	7	3	3	7	12	16	13	16	18
DOD														
Inventions disclosed	1,005	1,122	1,332	1,369	534	1,056	838	1,018	831	698	929	1,078	1,032	963
Patent applications filed	809	829	810	517	354	691	597	590	690	436	844	1,013	942	916

## CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

Agency	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Patents issued	619	617	619	426	191	472	425	462	404	304	523	1,048	648	670
DOE														
Inventions disclosed	1,527	1,498	1,469	1,617	1,776	1,694	1,575	1,460	1,439	1,616	1,820	1,661	1,796	1,588
Patent applications filed	792	711	866	661	812	726	693	904	775	965	868	780	944	1,144
Patents issued	605	551	627	520	467	438	441	370	363	480	460	483	554	693
EPA														
Inventions disclosed	17	16	14	18	12	12	16	9	8	5	8	18	8	5
Patent applications filed	14	14	23	12	13	13	15	6	3	3	8	10	7	9
Patents issued	12	9	8	11	9	10	10	4	9	9	12	17	16	5
HHS														
Inventions disclosed	434	431	472	461	452	442	447	437	389	337	351	352	320	351
Patent applications filed	255	262	279	216	230	166	261	164	156	291	272	233	230	216
Patents issued	119	116	136	167	154	164	379	278	397	470	270	453	428	335
DHS														
Inventions disclosed	na	na	na	NA	NA	NA	NA	10	32	7	38	40	20	36
Patent applications filed	na	na	na	NA	NA	NA	NA	0	2	2	12	10	4	5
Patents issued	na	na	na	NA	NA	NA	NA	1	2	1	0	0	4	3
DOI														
Inventions disclosed	6	14	9	6	4	5	7	7	4	5	5	10	9	6

## CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

Agency	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Patent applications filed	17	12	8	6	3	2	5	7	8	7	2	3	8	4
Patents issued	7	13	5	9	9	5	6	1	4	5	1	3	4	2
NASA														
Inventions disclosed	696	775	1,485	1,612	1,678	1,749	1,514	1,324	1,412	1,735	1,723	1,642	1,618	1,683
Patent applications filed	152	166	231	207	202	142	127	122	141	150	130	131	146	146
Patents issued	159	128	155	189	133	85	68	90	93	130	111	129	116	117
DOT														
Inventions disclosed	2	0	0	0	4	3	2	3	3	1	2	2	13	3
Patent applications filed	3	0	0	2	5	3	2	2	2	2	2	1	5	0
Patents issued	0	0	0	0	2	0	3	4	1	4	0	4	1	1
VA														
Inventions disclosed	131	125	183	204	165	157	175	164	150	171	191	335	273	304
Patent applications filed	38	34	36	54	26	27	25	13	37	13	29	37	25	25
Patents issued	4	4	8	7	10	5	8	10	15	8	7	9	3	4
Licensing														
All 11 agencies														
All licenses, total active in the fiscal year	4,391	6,063	6,497	7,567	9,577	10,186	12,024	12,732	12,598	15,166	12,077	11,542	11,672	20,822
Invention licenses	3,140	3,588	3,747	3,804	4,236	4,163	3,790	4,046	3,854	4,081	3,211	3,882	3,768	3,956
Other intellectual property licenses	1,254	2,475	2,771	3,775	5,341	6,023	8,234	8,686	8,744	11,085	8,866	7,660	7,904	16,866

## CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

Agency	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
USDA														
All licenses, total active in the fiscal year	255	267	270	296	320	332	339	328	330	344	358	384	400	414
Invention licenses	255	267	270	296	320	332	339	304	302	313	322	341	351	363
Other intellectual property licenses	0	0	0	0	0	0	0	24	28	31	36	43	49	51
DOC														
All licenses, total active in the fiscal year	40	41	101	125	133	111	222	29	40	46	40	41	40	41
Invention licenses	40	41	101	125	133	111	222	29	40	46	40	41	39	41
Other intellectual property licenses	0	0	0	0	0	0	0	0	0	0	0	0	1	0
DOD														
All licenses, total active in the fiscal year	285	471	364	369	412	444	495	365	432	397	633	520	527	NA
Invention licenses	283	350	361	364	406	438	460	351	386	341	431	432	425	297
Other intellectual property licenses	5	121	3	5	6	6	35	14	46	56	202	88	102	NA
DOE														
All licenses, total active in the fiscal year	2,005	3,459	3,687	4,345	5,677	5,916	5,842	6,196	5,742	6,228	5,310	5,328	5,217	5,861
Invention licenses	1,162	1,327	1,223	1,362	1,535	1,420	1,354	1,418	1,452	1,453	1,432	1,428	1,353	1,560
Other intellectual property licenses	843	2,132	2,464	2,983	4,142	4,496	4,488	4,748	4,290	4,775	3,878	3,900	3,864	4,301
EPA														
All licenses, total active in the fiscal year	16	23	32	38	39	35	38	37	40	37	45	42	42	41
Invention licenses	16	23	32	38	39	35	38	37	40	37	45	42	42	41



## CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

Agency	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Other intellectual property licenses	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HHS														
All licenses, total active in the fiscal year	1,367	1,356	1,423	1,424	1,532	1,535	1,418	1,675	1,584	1,941	1,613	1,465	1,426	1,555
Invention licenses	1,007	1,213	1,350	1,173	1,237	1,213	915	1,376	1,304	1,240	414	1,090	1,069	1,186
Other intellectual property licenses	360	143	82	251	295	322	460	299	280	701	1,199	375	357	369
DHS														
All licenses, total active in the fiscal year	na	na	na	NA	NA	NA	NA	18	63	458	495	523	1,265	10,313
Invention licenses	na	na	na	NA	NA	NA	NA	NA	45	0	0	0	0	2
Other intellectual property licenses	na	na	na	NA	NA	NA	NA	NA	18	458	495	523	1,265	10,311
DOI														
All licenses, total active in the fiscal year	8	8	11	13	20	21	15	19	21	28	25	26	20	18
Invention licenses	8	8	10	12	19	20	15	18	18	23	23	24	20	16
Other intellectual property licenses	0	0	1	1	1	1	0	1	3	5	2	2	0	2
NASA														
All licenses, total active in the fiscal year	328	357	521	861	1,338	2,856	3,520	3,912	4,181	5,515	3,363	3,013	2,538	2,381
Invention licenses	292	290	312	338	441	308	316	330	146	456	309	284	266	253
Other intellectual property licenses	36	67	209	523	897	2,548	3,204	3,582	4,035	5,059	3,054	2,729	2,272	2,128
DOT														
All licenses, total active in the fiscal year	1	0	0	1	5	5	5	5	2	3	3	3	3	1

## CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

Agency	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Invention licenses	1	0	0	1	5	5	1	5	3	3	3	3	0	0
Other intellectual property licenses	0	0	0	0	0	0	0	0	0	0	0	0	3	1
VA														
All licenses, total active in the fiscal year	86	81	88	95	101	112	130	153	163	169	192	197	194	197
Invention licenses	76	69	88	95	101	112	130	153	163	169	192	197	194	197
Other intellectual property licenses	10	12	12	12	0	0	0	0	0	0	0	0	0	0
Collaborative R&D relationships														
All 11 agencies														
CRADAs, total active in the fiscal year	3,676	5,377	5,603	6,015	5,947	7,268	7,333	6,954	7,756	8,374	8,240	8,307	8,830	9,180
Traditional CRADAs	2,837	2,858	2,316	3,546	3,962	3,666	3,845	3,712	4,296	4,772	4,569	4,292	5,258	4,891
Other collaborative R&D relationships	NA	NA	8,162	7,454	11,767	9,738	10,568	12,719	17,649	20,538	25,367	24,717	27,051	27,182
USDA														
CRADAs, total active in the fiscal year	219	225	229	205	199	195	230	254	259	273	292	274	259	267
Traditional CRADAs	217	222	212	185	171	163	207	223	207	219	207	211	211	193
Other collaborative R&D relationships	NA	NA	2,769	1,166	5,028	3,477	4,084	5,821	10,306	12,943	15,837	15,878	17,344	17,005
DOC														
CRADAs, total active in the fiscal year	247	1,883	1,903	1,969	1,904	3,008	2,778	2,390	2,397	2,253	2,245	2,410	2,428	2,359
Traditional CRADAs	188	139	92	67	80	149	154	131	101	100	98	153	196	206
Other collaborative R&D relationships	1,575	1,694	1,814	2,301	2,714	2,114	2,672	2,816	2,828	2,897	2,899	2,782	2,977	3,031

## CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

Agency	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
DOD														
CRADAs, total active in the fiscal year	1,965	1,913	2,134	2,833	2,736	2,999	2,971	2,596	2,870	3,248	2,554	2,400	2,682	2,762
Traditional CRADAs	1,418	1,376	1,523	2,425	2,736	2,424	2,383	1,993	2,247	2,516	1,685	1,328	2,076	2,281
Other collaborative R&D relationships	0	0	0	0	0	0	0	3	1	287	988	0	606	581
DOE														
CRADAs, total active in the fiscal year	558	680	661	610	644	631	697	711	744	697	720	742	742	704
Traditional CRADAs	558	680	661	610	644	631	697	711	744	697	720	742	742	NA
Other collaborative R&D relationships	0	0	0	0	0	0	0	0	0	0	0	0	0	0
EPA														
CRADAs, total active in the fiscal year	48	59	91	104	107	94	84	112	112	67	84	92	112	129
Traditional CRADAs	45	55	77	82	95	83	67	74	51	50	54	63	55	52
Other collaborative R&D relationships	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HHS														
CRADAs, total active in fiscal year	498	470	427	220	215	164	284	453	457	447	430	377	427	532
Traditional CRADAs	289	261	254	119	117	92	206	295	284	300	284	245	313	378
Other collaborative R&D relationships	0	0	0	0	0	0	0	0	0	0	0	0	114	154
DHS														
CRADAs, total active in the fiscal year	na	na	na	NA	NA	NA	NA	23	23	36	62	94	114	158
Traditional CRADAs	na	na	na	NA	NA	NA	NA	21	22	32	55	89	91	121

## CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

Agency	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Other collaborative R&D relationships	na	na	na	NA	NA	NA	NA	3	5	3	11	11	6	31
DOI														
CRADAs, total active in fiscal year	56	52	51	61	70	82	170	170	248	436	351	379	476	601
Traditional CRADAs	41	42	51	45	49	31	20	33	36	29	22	28	21	35
Other collaborative R&D relationships	0	0	0	0	0	0	0	0	0	0	209	283	322	292
NASA														
CRADAs, total active in the fiscal year	1	1	0	0	1	1	1	1	1	0	0	0	0	0
Traditional CRADAs	1	1	0	0	1	1	1	1	1	0	0	0	0	0
Other collaborative R&D relationships	1,053	2,659	3,579	3,987	4,025	4,275	3,812	4,076	4,507	4,379	5,384	5,749	5,656	6,058
DOT														
CRADAs, total active in fiscal year	82	92	96	0	57	59	36	23	22	22	25	29	40	50
Traditional CRADAs	78	80	96	0	55	59	36	23	22	0	0	3	3	7
Other collaborative R&D relationships	0	0	0	0	0	0	0	0	2	29	39	14	26	30
VA														
CRADAs, total active in the fiscal year	2	2	11	13	14	37	82	221	623	895	1,477	1,510	1,550	1,618
Traditional CRADAs	2	2	11	13	14	33	74	207	581	829	1,444	1,430	1,550	1,618
Other collaborative R&D relationships	0	0	0	0	0	0	0	0	0	0	0	0	0	0

na = not applicable; NA = not available.

## CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

CRADA = Cooperative R&D Agreement; DHS = Department of Homeland Security; DOC = Department of Commerce; DOD = Department of Defense; DOE = Department of Energy; DOI = Department of the Interior; DOT = Department of Transportation; EPA = Environmental Protection Agency; HHS = Department of Health and Human Services; NASA = National Aeronautics and Space Administration; USDA = Department of Agriculture; VA = Department of Veterans Affairs.

### Note(s)

DHS started to operate in early 2003; it did not start to provide technology transfer statistics until FY 2008. Invention licenses refer to inventions that are patented or could be patented. Other intellectual property refers to intellectual property protected through mechanisms other than a patent (e.g., copyright). Total CRADAs refers to all agreements executed under CRADA authority (15 USC 3710a). Traditional CRADAs are collaborative R&D partnerships between a federal laboratory and one or more nonfederal organizations. (Nontraditional CRADAs are established for special purposes, such as material transfer or technical assistance that may result in protected information.) Federal agencies have varying authorities for other kinds of collaborative R&D relationships.

### Source(s)

National Institute of Standards and Technology, U.S. Department of Commerce, *Federal Laboratory Technology Transfer, Fiscal Year 2014: Summary Report to the President and the Congress* (2016), [https://www.nist.gov/sites/default/files/documents/2016/10/26/fy2014\\_federal\\_tech\\_transfer\\_report.pdf](https://www.nist.gov/sites/default/files/documents/2016/10/26/fy2014_federal_tech_transfer_report.pdf).

*Science and Engineering Indicators 2018*

## CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

APPENDIX TABLE 8-28



### Citation of S&E articles in USPTO patents, by cited field and cited country and sector: 2013–16

(Number)

Field and sector	2013	2014	2015	2016
All fields, all sectors	582,179	640,922	633,407	615,028
Foreign	301,659	336,684	337,309	329,291
Unknown country	3,098	3,232	2,913	2,744
United States	277,423	301,006	293,185	282,993
Federal government	11,738	12,428	12,114	11,396
Industry	51,465	56,946	52,842	49,392
Academic	181,090	195,796	193,748	189,995
FFRDCs	5,476	6,011	5,644	5,562
Nonprofit	14,893	16,213	16,367	15,195
State and local government	296	309	269	333
Joint and unknown sectors	12,466	13,304	12,199	11,119
Engineering	76,400	86,803	85,372	84,644
Foreign	45,567	52,782	53,182	53,440
Unknown country	472	535	439	426
United States	30,362	33,485	31,752	30,778
Federal government	863	882	891	802
Industry	7,491	7,742	7,067	6,616
Academic	18,817	21,478	20,635	20,291
FFRDCs	877	1071	981	1,098
Nonprofit	1049	1091	935	859
State and local government	8	8	10	19
Joint and unknown sectors	1,256	1,212	1,231	1,093
Astronomy	127	154	118	183
Foreign	83	98	78	116
Unknown country	0	0	0	0

## CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

Field and sector	2013	2014	2015	2016
United States	44	56	39	67
Federal government	4	4	6	8
Industry	9	10	8	10
Academic	22	27	18	40
FFRDCs	8	13	5	7
Nonprofit	1	1	0	0
State and local government	0	0	0	0
Joint and unknown sectors	1	0	2	3
Chemistry	58,913	62,812	64,151	62,141
Foreign	34,934	37,721	39,236	38,039
Unknown country	84	69	47	42
United States	23,895	25,022	24,868	24,060
Federal government	772	796	769	745
Industry	4,233	4,644	4,729	4,175
Academic	16,815	17,357	17,186	17,135
FFRDCs	991	1,088	1,015	981
Nonprofit	603	633	701	589
State and local government	3	2	3	11
Joint and unknown sectors	478	503	465	425
Physics	55,656	65,772	63,730	60,958
Foreign	31,703	38,739	39,037	37,653
Unknown country	125	150	99	92
United States	23,828	26,883	24,594	23,213
Federal government	731	771	709	657
Industry	6,466	7,476	6,244	5,334
Academic	13,894	15,502	14,761	14,577
FFRDCs	1,720	1,976	1,905	1,756

## CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

Field and sector	2013	2014	2015	2016
Nonprofit	269	307	290	278
State and local government	1	4	3	4
Joint and unknown sectors	747	848	682	607
Geosciences	3,757	4,480	4,092	3,894
Foreign	2,237	2,673	2,537	2,481
Unknown country	38	44	43	41
United States	1,482	1,763	1,512	1,372
Federal government	117	137	97	113
Industry	305	392	319	263
Academic	858	964	887	794
FFRDCs	85	96	59	70
Nonprofit	18	23	29	12
State and local government	9	9	7	6
Joint and unknown sectors	91	142	114	115
Mathematics	1,143	1,252	1,206	1,153
Foreign	580	680	617	631
Unknown country	3	2	3	2
United States	560	570	586	520
Federal government	7	14	11	8
Industry	59	49	49	28
Academic	441	447	472	437
FFRDCs	25	28	15	19
Nonprofit	10	11	10	9
State and local government	0	1	0	0
Joint and unknown sectors	18	20	28	20
Computer sciences	59,078	66,851	65,084	67,353
Foreign	26,703	30,161	30,373	32,046



## CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

Field and sector	2013	2014	2015	2016
Unknown country	426	489	420	411
United States	31,950	36,201	34,291	34,896
Federal government	188	191	175	211
Industry	9,207	10,370	9,423	9,510
Academic	20,676	23,775	23,046	23,611
FFRDCs	383	345	363	384
Nonprofit	535	552	412	349
State and local government	1	2	1	0
Joint and unknown sectors	960	967	870	832
Agricultural sciences	4,190	4,576	4,305	4,023
Foreign	2,627	2,982	2,913	2,811
Unknown country	8	8	6	4
United States	1,555	1,586	1,385	1,207
Federal government	256	241	216	211
Industry	173	165	141	120
Academic	1046	1098	966	813
FFRDCs	2	4	3	8
Nonprofit	3	4	7	4
State and local government	1	0	2	0
Joint and unknown sectors	73	73	51	51
Biological sciences	187,154	201,708	200,568	188,592
Foreign	89,416	97,835	97,006	90,565
Unknown country	446	446	403	393
United States	97,292	103,428	103,158	97,634
Federal government	5,525	5,894	5,879	5,359
Industry	16,734	18,323	17,523	16,341
Academic	64,309	67,669	68,108	65,163

## CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

Field and sector	2013	2014	2015	2016
FFRDCs	1,148	1,172	1,067	1,003
Nonprofit	6,011	6,646	7,087	6,505
State and local government	144	153	125	158
Joint and unknown sectors	3,420	3,571	3,369	3,107
Medical sciences	131,580	142,320	140,547	137,371
Foreign	66,049	71,236	70,522	69,312
Unknown country	1,458	1,459	1,418	1,304
United States	64,073	69,625	68,606	66,755
Federal government	3,187	3,414	3,303	3,227
Industry	6,478	7,447	6,981	6,593
Academic	42,673	45,930	46,085	45,458
FFRDCs	234	214	217	224
Nonprofit	6,156	6,740	6,713	6,440
State and local government	126	131	113	132
Joint and unknown sectors	5,219	5,750	5,195	4,680
Other life sciences	1,887	1,981	1,996	2,185
Foreign	726	766	825	983
Unknown country	16	14	23	17
United States	1,145	1,201	1,148	1,185
Federal government	43	43	31	27
Industry	249	259	280	340
Academic	532	619	583	595
FFRDCs	2	1	2	7
Nonprofit	193	155	151	116
State and local government	0	0	5	1
Joint and unknown sectors	126	123	96	99
Psychology	1,305	1,244	1,282	1,518

## CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

Field and sector	2013	2014	2015	2016
Foreign	547	508	512	688
Unknown country	12	7	5	7
United States	747	729	764	823
Federal government	24	20	20	22
Industry	41	40	43	25
Academic	606	574	621	702
FFRDCs	1	0	2	0
Nonprofit	30	40	22	24
State and local government	2	0	0	0
Joint and unknown sectors	43	55	57	49
Social sciences	989	969	956	1,013
Foreign	486	503	468	526
Unknown country	12	9	7	5
United States	491	457	481	482
Federal government	21	20	7	8
Industry	20	30	36	38
Academic	400	356	379	380
FFRDCs	2	2	8	6
Nonprofit	15	9	11	10
State and local government	0	0	0	2
Joint and unknown sectors	33	40	40	38

FFRDC = federally funded research and development center; USPTO = U.S. Patent and Trademark Office.

### Source(s)

National Science Foundation, National Center for Science and Engineering Statistics; SRI International; Science-Metrix; PatentsView and USPTO patent data; Elsevier, Scopus abstract and citation database (<https://www.scopus.com/>), accessed April 2017 (patent data) and July 2017.

*Science and Engineering Indicators 2018*



## CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

Region, country, or economy	2008	2009	2010	2011	2012	2013	2014	2015	2016
Australia	2,953	2,794	3,412	4,107	4,186	3,978	3,991	3,493	3,340
Canada	8,931	8,892	9,731	10,409	10,902	11,805	11,630	9,855	9,684
EU	81,493	69,219	52,971	58,186	56,532	60,800	92,262	108,648	109,353
Hong Kong	1,610	1,700	1,978	2,009	2,018	2,027	1,938	1,861	NA
Japan	18,292	16,831	18,774	19,158	19,897	17,820	20,866	17,034	19,672
Norway	460	318	634	779	588	668	654	570	589
Singapore	13,483	13,227	16,610	19,621	22,046	22,566	20,547	18,698	19,276
South Korea	5,823	7,356	9,183	7,415	8,617	9,837	10,546	10,056	9,292
Switzerland	4,978	6,996	8,025	10,650	11,111	11,769	14,143	12,932	12,075
Taiwan	3,015	3,424	4,943	5,788	4,513	3,795	3,746	3,474	3,401
United States	29,623	31,297	32,551	36,087	38,661	38,860	42,208	39,495	42,743
Selected developing countries or economies									
Brazil	10,320	11,065	13,040	14,706	17,749	21,033	22,610	22,033	23,977
China	2,697	2,512	3,226	3,748	4,198	4,567	5,923	5,250	5,141
India	1,529	1,860	2,438	2,819	3,990	3,904	4,849	5,009	5,470
Malaysia	1,268	1,133	1,318	1,634	1,543	1,395	1,424	1,257	1,319
Philippines	387	412	446	442	471	529	547	613	546
Russian Federation	4,481	3,987	4,842	5,830	7,629	8,371	8,021	5,634	4,997

NA = not available.

EU = European Union.

### Note(s)

EU exports do not include intra-EU exports.

### Source(s)

World Trade Organization, International trade and tariff data, [https://www.wto.org/english/res\\_e/statis\\_e/statis\\_e.htm](https://www.wto.org/english/res_e/statis_e/statis_e.htm), accessed 15 August 2017.

*Science and Engineering Indicators 2018*

## CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

APPENDIX TABLE 8-30



### Global venture capital investment, by financing stage and selected region, country, or economy: 2006–16

(Millions of U.S. dollars)

Financing stage and industry or technology	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
All stages											
Global	35,534	45,068	48,117	33,585	43,486	61,558	56,549	61,818	103,459	135,093	130,534
United States	28,719	34,627	35,956	25,386	29,385	42,478	38,806	42,399	65,157	73,918	68,549
China	1,066	1,100	1,767	980	2,683	5,894	3,204	2,686	12,099	27,428	34,149
EU	3,333	6,244	6,448	4,117	6,544	6,457	7,174	8,150	11,705	15,230	11,902
France	674	873	862	708	941	841	1,056	976	1,137	1,640	1,672
Germany	310	619	1,050	514	737	1,440	1,485	1,558	3,249	3,210	1,943
United Kingdom	1,149	1,881	2,168	1,236	3,173	1,636	2,780	3,014	4,089	6,168	4,854
All others	1,198	2,873	2,368	1,660	1,692	2,540	1,854	2,601	3,231	4,212	3,434
Canada	739	916	982	630	863	1,403	1,270	1,436	1,599	1,687	3,177
India	512	437	633	358	638	1,254	1,147	1,453	5,051	8,155	3,473
Israel	623	509	786	474	935	988	976	778	1,080	1,228	2,415
ROW	546	1,232	1,547	1,642	2,439	3,084	3,973	4,917	6,768	7,447	6,869
Seed stage											
Global	313	426	568	477	938	1,413	2,409	3,492	4,035	5,239	5,810
United States	184	213	291	311	435	977	1,727	2,387	2,616	3,111	3,342
China	2	1	1	8	14	15	11	31	139	146	71
EU	66	100	147	109	364	218	331	520	673	814	924
France	20	15	12	19	9	26	18	32	59	94	66
Germany	8	15	25	10	12	33	28	42	57	66	73
United Kingdom	25	38	75	33	256	77	138	227	294	303	476
All others	13	33	35	47	86	83	147	219	264	351	309
Canada	20	32	50	12	24	68	102	107	178	156	194

## CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

Financing stage and industry or technology	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
India	17	7	4	6	5	9	36	87	69	456	184
Israel	5	29	30	8	10	18	44	66	63	100	737
ROW	20	43	46	24	86	108	158	294	298	456	359
Early stage											
Global	16,401	19,768	20,828	13,603	18,499	21,571	21,403	22,336	33,459	45,396	52,042
United States	12,805	14,536	14,464	9,275	10,712	13,558	12,653	14,526	19,923	23,709	23,178
China	555	718	1,108	532	1,288	2,243	1,415	1,058	4,221	10,721	16,523
EU	1,878	2,754	2,872	2,209	3,699	2,460	3,737	2,830	3,980	5,293	5,581
France	493	555	376	428	464	359	377	426	460	612	747
Germany	158	136	560	213	251	469	988	461	704	662	799
United Kingdom	593	1,007	1,053	612	1,955	610	1,458	1,074	1,633	2,296	1,964
All others	633	1,057	883	957	1,029	1,022	914	868	1,183	1,723	2,072
Canada	250	546	377	323	280	598	401	626	475	536	1,979
India	346	188	391	194	379	826	542	374	702	1,581	1,043
Israel	280	357	477	291	649	331	278	321	465	483	818
ROW	289	668	1,140	779	1,492	1,555	2,377	2,602	3,692	3,073	2,920
Later stage											
Global	18,820	24,874	26,721	19,505	24,049	38,574	32,737	35,990	65,965	84,458	72,682
United States	15,730	19,878	21,201	15,800	18,238	27,943	24,426	25,486	42,618	47,098	42,029
China	509	381	658	440	1,381	3,636	1,778	1,597	7,739	16,561	17,555
EU	1,389	3,390	3,429	1,799	2,481	3,779	3,106	4,800	7,052	9,123	5,397
France	161	303	474	261	468	456	661	518	618	934	859
Germany	144	468	465	291	474	938	469	1,055	2,488	2,482	1,071
United Kingdom	531	836	1,040	591	962	949	1,184	1,713	2,162	3,569	2,414
All others	552	1,783	1,450	656	577	1,435	793	1,514	1,784	2,138	1,053
Canada	469	338	555	295	559	737	767	703	946	995	1,004
India	149	242	238	158	254	419	569	992	4,280	6,118	2,246

## CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

Financing stage and industry or technology	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Israel	338	123	279	175	276	639	654	391	552	645	860
ROW	237	521	361	839	861	1,421	1,438	2,021	2,778	3,918	3,590

EU = European Union; ROW = rest of world.

### Note(s)

Seed financing supports proof-of-concept development and initial product development and marketing. Early stage financing supports product development and marketing, the initiation of commercial manufacturing, and sales; it also supports company expansion and provides financing to prepare for an initial public offering. Later-stage financing includes acquisition financing and management and leveraged buyouts.

### Source(s)

PitchBook, Venture capital and private equity database, <https://my.pitchbook.com/>.

*Science and Engineering Indicators 2018*



## CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

APPENDIX TABLE 8-31



### Definitions of industry or technologies of venture capital data

(List of industries or technologies and definitions)

Industry or technology	Definition
3-D printing	Refers to the manufacturing process and all technology related to printing a three-dimensional object; 3-D printing encompasses the actual printer as well as software, including 3-D versions of computer-aided design, which utilizes multiple data points to create cross-sectional patterns of the object to be formed.
Advertising technology	All technologies, software, and services used for delivering, controlling, and targeting online advertising.
Agriculture technology	Companies that develop software and hardware systems to automate and manage farming processes and promote environmentally conscious agriculture. These include wireless sensors to monitor soil, air, and animal health; hydroponic and aquaponic systems; remote-controlled irrigation systems; aerial photo technology to analyze field conditions; biotech platforms for crop yields; data-analysis software to augment planting, herd, poultry, and livestock management; automation software to manage farm-task workflows; and accounting software to track and manage facility and task expenses.
Artificial intelligence and machine learning	Companies developing technologies that enable computers to learn, deduce, and act autonomously, through utilization of large data sets. The technology enables development of systems that collect and store massive amounts of data and that analyze such content to make decisions based on probability and statistical analysis. Applications for artificial intelligence and machine learning include speech recognition, computer vision, robotic control, and accelerating processes in the empirical sciences, where large data sets are essential, such as gene sequencing in life sciences.
Audio technology	Developers of software and hardware technology for the music industry. Includes providers of on-demand music services that connect products from music artists with the public. Also includes developers of audio technology for the professional and consumer sound markets, including earphones, transmitters, automobile sound systems, and home and studio systems.
Autonomous cars	Companies that develop street-legal vehicles that can sense their environments and navigate without human interaction. Includes related technology, which is based on radar, light detection and ranging, GPS, odometry, software, and computer vision.
Big data	Companies providing a product or service where the core technology handles data that are too large for traditional database systems, usually due to data volume, data velocity, or data variety.
Clean technology	Developers of technology that seeks to reduce the environmental impact of human activities or to reduce significantly the amount of natural resources consumed through such activities.
Cybersecurity	Information technology companies that provide a solution specifically oriented toward providing user and network security.
E-commerce	This includes online retailers, online marketplaces, social commerce, and logistics and shipping for online retailers and for providers of software and hosting services for online retail.

## CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

Industry or technology	Definition
Education technology	Software or hardware created to enhance teaching practices and improve learning outcomes.
Ephemeral content	Companies that provide online platforms for the sharing and temporary display of photos, videos, messages, documents, and other content. The key aspect is that the content vanishes from the Web after a certain time frame.
Finance technology	Companies engaged in providing software and hardware to enable automated financial transactions.
Health technology	Companies that provide mobility and other information technologies to improve health care delivery while decreasing costs. It entails the use of technology and services—including cloud computing, Internet services, and social mobility—to optimize patient-centric health care.
Infrastructure	Companies owning physical assets necessary for the movement of goods, multimodal commerce, or power generation.
Internet of Things	A company that provides a product that is enabled with sensors and actuators embedded in physical objects or software that uses these sensor data to improve the user experience or allows for sharing these data with a network of other devices, often using the same Internet Protocol that connects the Internet.
Life sciences	Companies involved in sciences dealing with living organisms and life processes, including biology, pharmaceuticals, biomedical technology, and nutraceuticals.
Lifestyles of health and sustainability	Companies that provide consumer products or services focused on health, the environment, green technology, social justice, personal development, and sustainable living.
Manufacturing	Companies that produce products that require the heavy use of capital equipment and raw materials.
Marketing technology	Marketing technology consists of digital technology to automate and simplify the marketing process. This includes tools for search-engine optimization, customer analytics, customer-relationship management, loyalty programs, and applications that leverage social media for connecting brands with consumers.
Mobile	Companies whose primary revenue source comes from providing services for mobile devices or enabling mobile communications.
Nanotechnology	Companies engaged in creating products that are dependent on the ability to manipulate materials at an atomic level, usually due to the materials exhibiting novel properties at the subatomic level.
Oncology	Companies involved in the diagnosis or treatment of cancer without regard to whether they do so through the production of pharmaceuticals, devices, or service-based models.
Robotics and drones	Automated or remote-controlled mechanical devices and technology. These include machinery programmed to perform repetitive tasks, such as manufacturing and loading; precision tasks, such as surgery or semiconductor production; and remote-operated movement or travel, such as that provided by unmanned aerial vehicles, subsea vehicles, and land vehicles.
Software as a service	Information technology companies that provide their software using client-server architectures that host the application in a centralized, off-site location.

## CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

Industry or technology	Definition
Virtual reality	Technology, including hardware and software, providing an immersive, 3-D user experience in a virtual world. Virtual-reality environments are provided through a computer screen augmented with wearable devices, such as head-mounted stereoptical displays or sensor-embedded gloves. Virtual reality also includes remote communication environments, where users interact with each other through computer-generated avatars.
Wearables and quantified self	A consumer health care sector entailing sensor-based tracking of aspects of a user's life, including moods, nutrition, and activities. This category entails use of wireless sensors that can be attached to a person through clothing, attached to the body, or ingested into the body. The data can be used for self-tracking for better understanding of individual health and behavioral capacities. Common uses for this technology include fitness assessment, stress analysis, sleep monitoring, biofeedback applications, and monitoring of behavioral changes.

GPS = global positioning system.

### Source(s)

PitchBook, Venture capital and private equity database, <https://my.pitchbook.com/>.

*Science and Engineering Indicators 2018*

## CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

APPENDIX TABLE 8-32

### U.S. seed-stage venture capital investment, by industry: 2011–16

(Millions of dollars)

Industry	2011	2012	2013	2014	2015	2016
3-D printing	0.8	5.8	2.4	22.4	13.6	13.6
Advertising technology	17.8	53.5	50.6	79.4	53.8	38.6
Agriculture technology	1.1	6.6	5.6	12.1	14.8	19.0
Artificial intelligence and machine learning	9.9	42.7	66.0	97.3	189.4	347.3
Audio technology	2.3	10.7	14.0	19.2	10.8	13.1
Autonomous cars	0.0	0.3	0.0	11.0	5.5	73.9
Big data	32.9	93.3	151.9	168.3	303.1	294.5
Clean technology	17.8	28.8	37.6	34.8	40.9	46.2
Cybersecurity	8.8	32.8	66.6	94.8	103.9	100.0
E-commerce	78.2	148.5	182.8	228.6	176.3	230.3
Education technology	31.0	65.4	72.4	73.5	81.7	85.8
Ephemeral content	0.0	0.5	0.6	1.5	0.0	0.5
Finance technology	37.1	71.9	144.5	208.1	331.8	263.9
Health technology	18.7	51.9	80.9	111.7	157.3	151.8
Infrastructure	0.0	2.0	3.3	4.4	4.6	4.3
Insurance technology	1.9	5.8	19.5	17.8	39.1	34.7
Internet of Things	8.5	18.5	36.8	71.1	104.5	140.6
Life sciences	39.7	54.4	52.2	68.0	128.6	141.3
LOHAS	23.5	18.6	36.0	75.1	91.0	102.2
Manufacturing	15.9	42.3	65.3	80.1	86.5	135.8
Marketing technology	46.7	77.9	99.4	111.2	98.1	87.5
Mobile	206.1	400.5	622.5	753.6	756.1	746.0
Nanotechnology	0.5	14.3	8.3	5.2	22.3	12.5
Oncology	12.1	26.2	15.2	21.8	44.2	26.1
Robotics and drones	1.3	2.7	12.8	23.6	47.6	174.8

## CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

Industry	2011	2012	2013	2014	2015	2016
Software as a service	250.4	439.4	648.0	796.1	805.0	827.2
Virtual reality	2.5	26.6	10.3	26.3	30.9	72.0
Wearables and quantified self	4.3	29.2	22.0	50.3	64.3	50.5

LOHAS = lifestyles of health and sustainability.

### Note(s)

Seed financing supports proof-of-concept development and initial product development and marketing.

### Source(s)

PitchBook, Venture capital and private equity database, <https://my.pitchbook.com/>.

*Science and Engineering Indicators 2018*

## CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

APPENDIX TABLE 8-33



### U.S. early and later-stage venture capital investment, by industry: 2011–16

(Millions of dollars)

Industry or technology	2011	2012	2013	2014	2015	2016
3-D printing	52.2	28.4	85.9	97.1	176.8	611.7
Advertising technology	3,379.2	1,207.3	1,193.8	1,401.8	1,515.9	634.6
Agriculture technology	225.2	200.5	184.5	458.7	371.8	621.8
Artificial intelligence and machine learning	728.8	717.5	1,234.9	2,790.2	2,090.0	3,899.3
Audio technology	218.2	272.6	171.8	290.7	222.9	58.0
Autonomous cars	0.1	0.3	55.5	59.2	128.9	458.9
Big data	1,226.8	1,204.6	2,323.0	4,446.5	4,710.3	4,273.8
Clean technology	4,787.0	3,960.2	2,675.8	3,061.6	2,457.7	2,958.5
Cybersecurity	1,099.0	1,680.6	1,817.1	2,310.0	3,483.7	2,694.9
E-commerce	3,437.4	2,433.8	2,638.7	6,783.6	10,048.2	10,021.4
Education technology	440.7	544.6	851.5	1,041.0	1,410.6	894.0
Ephemeral content	7.0	50.0	73.5	545.3	214.0	1,860.6
Financial technology	1,145.1	1,522.4	1,792.6	4,490.8	6,964.2	5,004.0
Health technology	832.7	785.6	1,488.6	2,137.6	3,190.1	2,760.8
Infrastructure	379.3	774.8	259.8	196.0	233.7	602.5
Insurance technology	3.2	60.0	189.3	390.4	1,265.0	1,208.4
Internet of Things	578.3	557.0	593.5	996.9	805.0	1,179.4
Life sciences	4,647.3	5,221.3	5,715.0	8,316.0	10,101.9	8,837.3
LOHAS	1,520.2	2,167.9	1,510.7	3,805.2	5,020.2	8,678.5
Manufacturing	4,607.3	3,906.5	3,385.6	3,904.9	3,424.7	2,185.5
Marketing technology	1,479.5	1,139.1	1,489.7	1,969.3	2,375.3	1,677.3
Mobile	8,673.7	4,896.9	6,755.8	13,572.5	17,025.1	17,540.5
Nanotechnology	570.0	345.5	378.1	423.2	473.5	388.8
Oncology	1,963.3	1,942.5	1,967.2	3,429.0	4,459.8	4,343.0
Robotics and drones	112.9	182.3	264.9	313.2	608.0	641.2

## CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

Industry or technology	2011	2012	2013	2014	2015	2016
Software as a service	9,230.5	9,016.4	10,607.2	17,221.5	18,719.5	16,066.2
Virtual reality	22.8	46.0	164.0	737.0	371.5	1,392.8
Wearables and quantified self	230.7	228.7	331.4	1,359.2	413.4	1,598.3

LOHAS = lifestyles of health and sustainability.

### Note(s)

Early stage financing supports product development and marketing, the initiation of commercial manufacturing, and sales; it also supports company expansion and provides financing to prepare for an initial public offering. Later-stage financing includes acquisition financing, management buyouts, and leveraged buyouts.

### Source(s)

PitchBook, venture capital and private equity database, <https://my.pitchbook.com/>.

*Science and Engineering Indicators 2018*

## CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

APPENDIX TABLE 8-34



### China early and later-stage venture capital investment, by industry: 2011–16

(Millions of dollars)

Industry	2011	2012	2013	2014	2015	2016
3-D printing	0.0	0.0	0.0	0.0	3.0	0.0
Advertising technology	191.0	72.0	153.8	363.0	792.0	0.0
Agricultural technology	0.0	0.0	0.0	30.0	85.0	0.0
Artificial intelligence and machine learning	0.0	1.6	37.3	108.0	1,061.9	258.2
Audio technology	0.0	0.0	0.0	1.6	33.0	46.0
Autonomous cars	0.0	0.0	0.0	0.0	507.9	15.0
Big data	26.0	7.0	39.1	240.3	307.4	824.9
Clean technology	52.0	12.7	26.0	88.0	597.0	78.7
Cybersecurity	37.8	6.5	73.8	61.7	43.3	151.9
E-commerce	2,889.9	785.1	883.4	2,486.5	5,673.9	6,632.4
Educational technology	42.9	44.2	58.5	326.2	1,112.1	384.2
Financial technology	14.8	94.4	153.0	616.0	4,047.7	7,656.1
Health technology	25.2	222.0	13.0	83.5	298.8	260.6
Infrastructure	10.0	9.5	0.0	3.3	1.6	232.1
Insurance technology	0.0	0.0	0.0	0.0	31.0	97.3
Internet of Things	92.6	223.7	100.2	1,214.6	261.5	107.8
Life sciences	223.7	733.0	168.0	108.7	297.1	907.2
LOHAS	12.5	0.0	0.0	3.2	567.6	120.0
Manufacturing	162.5	438.4	85.6	478.3	503.5	438.0
Marketing technology	34.0	32.0	30.5	64.5	122.6	15.0
Mobile	1,202.6	591.1	729.6	5,442.0	11,909.6	16,664.8
Nanotechnology	0.0	0.0	0.0	0.0	2.0	0.0
Oncology	139.1	25.0	135.0	65.0	242.5	639.7
Robotics and drones	0.0	0.0	9.0	103.0	307.1	141.7
Software as a service	333.3	308.7	313.8	1,721.2	5,967.6	6,079.2



## CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

Industry	2011	2012	2013	2014	2015	2016
Virtual reality	0.0	0.0	0.0	16.7	61.2	3.3
Wearables and quantified self	3.1	1.6	0.0	119.8	158.1	50.0

LOHAS = lifestyles of health and sustainability.

### Note(s)

China includes Hong Kong. Early stage financing supports product development and marketing, the initiation of commercial manufacturing, and sales; it also supports company expansion and provides financing to prepare for an initial public offering. Later-stage financing includes acquisition financing and management and leveraged buyouts.

### Source(s)

PitchBook, Venture capital and private equity database, <https://my.pitchbook.com/>.

*Science and Engineering Indicators 2018*

## CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

APPENDIX TABLE 8-35



### SBIR and STTR awards, by type of award: FYs 1983–2015

(Number)

Fiscal year	SBIR			STTR		
	Total	Phase I	Phase II	Total	Phase I	Phase II
1983	789	789	0	na	na	na
1984	1,292	1,015	277	na	na	na
1985	1,838	1,483	355	na	na	na
1986	2,172	1,599	573	na	na	na
1987	2,766	2,065	701	na	na	na
1988	2,664	1,955	709	na	na	na
1989	2,813	2,045	768	na	na	na
1990	3,220	2,374	846	na	na	na
1991	3,397	2,642	755	na	na	na
1992	3,598	2,677	921	na	na	na
1993	4,010	2,964	1,046	na	na	na
1994	4,028	3,129	899	na	na	na
1995	4,367	3,092	1,275	1	1	0
1996	4,051	2,845	1,206	0	0	0
1997	4,786	3,369	1,417	0	0	0
1998	4,289	3,021	1,268	209	208	1
1999	4,637	3,381	1,256	375	301	74
2000	5,286	3,941	1,345	410	315	95
2001	5,825	4,281	1,544	409	318	91
2002	6,750	5,148	1,602	468	369	99
2003	6,844	5,100	1,744	572	459	113
2004	6,381	4,392	1,989	903	719	184
2005	6,085	4,216	1,869	801	579	222
2006	5,658	3,746	1,912	858	630	228

## CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

Fiscal year	SBIR			STTR		
	Total	Phase I	Phase II	Total	Phase I	Phase II
2007	5,399	3,814	1,585	848	637	211
2008	5,555	3,698	1,857	734	482	252
2009	5,816	4,016	1,800	831	593	238
2010	6,258	4,301	1,957	903	625	278
2011	5,403	3,628	1,775	709	468	241
2012	5,015	3,417	1,598	637	467	170
2013	4,520	3,017	1,503	642	456	186
2014	4,598	3,092	1,506	703	493	210
2015	4,508	2,939	1,569	725	553	172

na = not applicable.

SBIR = Small Business Innovation Research; STTR = Small Business Technology Transfer.

### Source(s)

U.S. Small Business Administration, SBIR/STTR official website, <https://www.sbir.gov/awards/annual-reports>, accessed 1 March 2017.

*Science and Engineering Indicators 2018*

## CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

APPENDIX TABLE 8-36

## SBIR award funding, by type of award and federal agency: FYs 1983–2015

(Millions of dollars)

Fiscal year	Type			Agency										
	All	Phase I	Phase II	USDA	DOC	DOD	ED	DOE	HHS	DHS <sup>a</sup>	DOT	EPA	NASA	NSF
1983	38.1	38.1	0.0	0.6	0.0	15.6	0.3	5.0	7.2	na	0.3	0.2	4.9	3.5
1984	149.9	49.3	100.6	2.0	0.0	49.8	1.0	26.2	32.4	na	1.7	0.9	29.9	4.2
1985	195.3	74.5	120.8	3.1	0.2	95.8	1.2	27.0	44.1	na	3.2	1.9	7.8	9.8
1986	305.7	82.0	223.7	3.5	0.9	159.5	1.7	25.0	66.4	na	3.7	2.7	32.5	8.6
1987	271.8	103.8	168.0	3.5	1.7	142.3	1.5	23.3	48.3	na	2.7	3.0	28.4	16.2
1988	392.3	99.1	293.2	3.8	1.4	198.9	2.2	36.3	75.4	na	3.4	3.0	49.2	18.1
1989	400.8	102.8	298.0	3.9	1.1	194.7	1.9	36.2	79.5	na	3.7	3.1	57.6	18.0
1990	453.3	120.9	332.4	4.1	0.7	219.6	2.5	41.5	89.1	na	4.1	3.2	68.5	19.4
1991	453.4	133.0	320.4	4.9	1.2	201.4	2.6	41.6	95.7	na	5.4	3.5	74.2	22.4
1992	531.6	134.6	397.0	5.7	2.0	257.4	1.7	43.1	104.7	na	3.5	4.0	85.5	22.4
1993	630.5	161.7	468.7	7.1	2.3	330.2	2.9	49.5	146.0	na	5.1	4.5	59.1	22.1
1994	601.6	222.4	379.2	7.5	3.7	268.5	2.9	52.0	118.5	na	8.5	5.0	106.4	27.0
1995	962.2	236.5	725.8	11.3	7.6	448.0	3.4	70.8	218.0	na	10.2	7.0	145.7	38.9
1996	925.7	228.6	697.1	9.5	6.1	496.9	3.5	66.9	176.2	na	7.9	4.8	113.1	40.1
1997	1,132.5	281.1	851.4	9.7	7.3	558.6	3.9	73.9	283.4	na	6.8	5.6	130.5	52.6

## CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

Fiscal year	Type			Agency										
	All	Phase I	Phase II	USDA	DOC	DOD	ED	DOE	HHS	DHS <sup>a</sup>	DOT	EPA	NASA	NSF
1998	1,050.4	261.8	788.6	12.7	6.8	568.5	6.5	77.2	233.1	na	5.9	4.8	83.2	51.6
1999	1,123.3	294.3	829.1	12.3	7.0	520.3	4.5	79.1	331.1	na	7.3	5.1	98.8	57.9
2000	1,058.9	293.7	765.1	18.1	6.2	544.7	0.0	85.6	231.2	na	3.6	7.9	99.7	61.8
2001	1,181.8	307.7	874.1	15.7	6.8	605.2	7.1	88.4	283.1	na	4.5	6.1	102.8	62.1
2002	1,504.9	423.2	1,081.8	17.2	6.9	661.5	6.7	94.5	458.5	na	4.6	7.6	187.3	60.2
2003	1,742.5	467.2	1,275.3	16.7	7.9	955.7	9.0	94.9	549.4	na	3.3	6.2	22.9	76.4
2004	1,970.6	493.6	1,476.9	18.7	8.3	1,033.1	7.4	107.3	574.3	10.7	3.7	3.0	114.2	89.8
2005	1,862.5	452.5	1,410.0	18.4	9.0	948.5	8.9	100.6	554.9	30.7	2.5	6.2	103.2	79.6
2006	1,914.8	424.8	1,490.0	16.5	7.0	1,007.9	9.7	114.3	566.6	13.9	3.3	8.0	106.2	61.4
2007	1,705.0	447.5	1,257.5	18.1	2.3	865.1	10.0	108.5	491.3	36.4	1.9	6.6	96.8	67.9
2008	1,884.3	449.5	1,434.9	18.7	5.8	967.7	9.9	129.7	560.3	22.2	5.3	3.4	99.3	62.2
2009	1,964.8	503.4	1,461.5	16.1	12.5	906.8	9.9	151.0	615.5	19.9	3.8	4.7	133.0	91.6
2010	2,300.1	564.9	1,735.2	22.9	7.3	1,169.2	10.1	198.0	606.1	27.5	7.5	9.4	137.0	106.0
2011	2,052.4	507.6	1,544.8	22.4	6.1	942.7	12.2	140.9	628.2	20.7	10.1	4.7	175.7	88.6
2012	2,037.8	561.7	1,476.1	16.8	4.5	960.4	12.0	132.6	684.2	17.6	9.1	4.1	100.5	96.0
2013	1,927.0	489.9	1,437.1	18.2	5.3	865.0	9.3	144.0	651.8	18.8	7.8	4.2	96.3	106.3
2014	1,983.8	502.6	1,481.2	19.0	6.9	762.1	8.4	174.0	726.4	15.0	11.2	4.8	146.0	109.2
2015	1,922.8	462.0	1,460.8	22.0	9.0	947.0	7.5	191.3	415.8	21.4	11.0	4.5	149.1	140.3



CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

na = not applicable.

DHS = Department of Homeland Security; DOC = Department of Commerce; DOD = Department of Defense; DOE = Department of Energy; DOT = Department of Transportation; ED = Department of Education; EPA = Environmental Protection Agency; HHS = Department of Health and Human Services; NASA = National Aeronautics and Space Administration; NSF = National Science Foundation; SBIR = Small Business Innovation Research; USDA = Department of Agriculture.

<sup>a</sup> DHS, established by the Homeland Security Act of 2002 and formed in January 2003, held its first SBIR competition in FY 2004.

**Note(s)**

Detail may not add to total because of rounding.

**Source(s)**

U.S. Small Business Administration, SBIR/Small Business Technology Transfer official website, <https://www.sbir.gov/awards/annual-reports>, accessed 1 March 2017.

*Science and Engineering Indicators 2018*

## CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

APPENDIX TABLE 8-37

### STTR award funding, by type of award and federal agency: FYs 1995–2015

(Millions of dollars)

Fiscal year	Type			Agency										
	All	Phase I	Phase II	USDA	DOC	DOD	ED	DOE	HHS	DHS <sup>a</sup>	DOT	EPA	NASA	NSF
1995	0.1	0.1	0.0	na	na	na	na	na	0.1	na	na	na	na	na
1996	0.0	0.0	0.0	na	na	na	na	na	0.0	na	na	na	na	na
1997	0.0	0.0	0.0	na	na	na	na	na	0.0	na	na	na	na	na
1998	20.0	19.5	0.5	na	na	8.1	na	1.4	9.3	na	na	na	na	1.2
1999	56.3	24.4	31.9	na	na	25.0	na	4.4	13.2	na	na	na	9.7	4.0
2000	64.0	23.7	40.3	na	na	32.2	na	5.2	17.0	na	na	na	5.5	4.1
2001	62.6	24.9	37.7	na	na	25.7	na	4.3	19.0	na	na	na	5.4	8.2
2002	85.4	31.0	54.4	na	na	36.1	na	7.2	32.2	na	na	na	4.5	5.4
2003	109.2	41.5	67.7	na	na	55.3	na	7.3	33.8	na	na	na	7.0	5.9
2004	205.6	82.4	123.2	na	na	105.2	na	7.5	74.1	na	na	na	12.9	5.9
2005	226.4	66.1	160.3	na	na	118.5	na	12.2	69.3	na	na	na	19.5	7.0
2006	242.2	78.4	163.8	na	na	131.6	na	14.1	70.3	0.4	na	na	13.1	12.7
2007	243.1	83.8	159.3	na	na	119.2	na	15.1	74.7	0.8	na	na	10.5	22.8
2008	252.8	61.1	191.7	na	na	121.2	na	18.2	73.9	0.5	na	na	11.7	27.3
2009	241.0	72.2	168.8	na	na	129.3	na	14.2	58.0	NA	na	na	15.2	24.2
2010	298.7	78.9	219.8	na	na	165.9	na	22.5	80.4	NA	na	na	16.8	13.2
2011	266.6	67.7	198.9	na	na	128.9	na	18.8	88.2	NA	na	na	21.5	9.2
2012	222.5	73.1	149.4	na	na	109.0	na	16.3	79.5	NA	na	na	12.5	5.2
2013	218.9	74.1	144.7	na	na	108.4	na	20.2	67.8	NA	na	na	13.9	8.6
2014	284.2	95.1	189.1	na	na	112.7	na	25.3	103.7	NA	na	na	21.4	21.1
2015	257.6	98.5	159.1	na	na	125.5	na	26.4	62.9	NA	na	na	22.1	20.3

na = not applicable; NA = not available.

## CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

DHS = Department of Homeland Security; DOC = Department of Commerce; DOD = Department of Defense; DOE = Department of Energy; DOT = Department of Transportation; ED = Department of Education; EPA = Environmental Protection Agency; HHS = Department of Health and Human Services; NASA = National Aeronautics and Space Administration; NSF = National Science Foundation; STTR = Small Business Technology Transfer; USDA = Department of Agriculture.

<sup>a</sup> DHS, established by the Homeland Security Act of 2002 and formed in January 2003, held its first STTR competition in FY 2006.

### Note(s)

Detail may not add to total because of rounding.

### Source(s)

U.S. Small Business Administration, Small Business Innovation Research/STTR official website, <https://www.sbir.gov/awards/annual-reports>, accessed 1 March 2017.

*Science and Engineering Indicators 2018*



CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

APPENDIX TABLE 8-38

Federal policies and programs supporting early stage technology development and innovation

(Summary of programs and policies for selected federal agencies)

Agency	Office	Program	Science and technology development							Enterprise development						
			Tech. devt.	Tech. scouting	Govt. need	Financial support	Talent devt.	Standard setting	IP mgmt./ tech. transfer	Business training	Business networks	Business mentors and peers	Business services	Talent devt.	Liability protn.	Financial support
Department of Agriculture																
Under Secretary for Natural Resources and Environment	U.S. Forest Service	Forest Products Laboratory (FPL) Business Incubator	X						X							
		Consortium for Research on Renewable Industrial Materials (CORRIM)		X												
Under Secretary for Research, Education, and Economics	Agricultural Research Service (ARS)	ARS Innovation Corps (I-Corps ARS)								X		X		X		
		Agricultural Research Partnerships (ARP) Network	X	X					X		X	X	X			

## CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

Agency	Office	Program	Science and technology development							Enterprise development						
			Tech. devt.	Tech. scouting	Govt. need	Financial support	Talent devt.	Standard setting	IP mgmt./ tech. transfer	Business training	Business networks	Business mentors and peers	Business services	Talent devt.	Liability protn.	Financial support
		Agricultural Technology Innovation Partnership (ATIP)		X					X		X					
	National Institute of Food and Agriculture (NIFA)	Innovations in Food and Agricultural Science and Technology (I-FAST) Prize Competition								X	X	X		X		
Program descriptions	FPL Business Incubator	Program goals: To expedite the discovery and application of new science, the FPL is in the initial stages of developing a business incubator for emerging or fledgling advanced wood technology business ventures.														
		Program activities: Private startups or other entities needing expanded production resources can rent space and equipment at the FPL to pilot test new products or process innovations. By developing product prototypes without excessive overhead costs, business incubator associates can sell these products in limited quantities. These companies will conduct research in partnership with FPL scientists and technical staff in existing FPL laboratories. When appropriate, companies can also enter into joint-venture agreements for collaborative research.														
		Website: <a href="https://www.fpl.fs.fed.us/partners/businessincubator/index.shtml">https://www.fpl.fs.fed.us/partners/businessincubator/index.shtml</a>														

## CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

Agency	Office	Program	Science and technology development							Enterprise development						
			Tech. devt.	Tech. scouting	Govt. need	Financial support	Talent devt.	Standard setting	IP mgmt./ tech. transfer	Business training	Business networks	Business mentors and peers	Business services	Talent devt.	Liability protn.	Financial support
	CORRIM	Program goals: The CORRIM research plan develops a scientific base of information relating to the environmental performance of wood-based building products. The research plan provides (1) a consistent life-cycle inventory database for evaluating the environmental performance of wood and alternative materials from resource regeneration or extraction to end use and disposal; (2) a framework for evaluating life-cycle environmental and economic impacts; (3) source data for many users, including resource managers, manufacturers, architects, engineers, environmental protection and energy analysts, and policy specialists; and (4) continuously updated wood products life-cycle assessment (LCA) underlying data for making LCA-based environmental product declaration (EPD) eco-labels renewals easy and cost-effective, and providing valuable environmental performance feedback to industry.														
		Program activities: CORRIM research provides a transparent and credible database of information for quantifying environmental impacts and economic costs of wood building materials through the stages of tree planting, growing, product manufacturing, building construction, and its operational use and demolition. Current research provides a component-by-component assessment of environmental impacts to assist in making building design changes that can improve performance along with development of North American-wide EPDs. CORRIM's geographic, product, and building design coverage was expanded in order to identify more opportunities for improved performance. As part of the any wood product LCA and EPD updates, CORRIM addresses pressing research issues including carbon sequestration, temporal and spatial aspects of forest harvesting, land use and land use changes (direct and indirect), and the impact of changes in forest carbon inventories.														
		Website: <a href="https://www.fpl.fs.fed.us/partners/corrim/corrim.shtml">https://www.fpl.fs.fed.us/partners/corrim/corrim.shtml</a>														
	I-Corps ARS	Program goals: The I-Corps ARS pilot was a set of activities and programs that prepared ARS scientists to extend their focus beyond the laboratory and broadened the impact of select ARS research projects.														
		Program activities: The I-Corps ARS curriculum, based on the National Science Foundation (NSF) I-Corps, taught research teams to identify the problems facing stakeholders and develop valuable products and/ or technologies that can emerge from their own research. In addition, I-Corps ARS offered entrepreneurship training, which helped the participants to be more innovative in their research programs. I-Corps ARS was the first program in a government-owned, government-operated environment (GOGO) that has an intramural focus with the goal of creating an entrepreneurial scientific enterprise.														
		Website: NA														
	ARP Network	Program goals: The ARS founded the ARP Network to expand the impact of ARS research and provide resources to help ARS commercial partners grow.														

## CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

Agency	Office	Program	Science and technology development							Enterprise development						
			Tech. devt.	Tech. scouting	Govt. need	Financial support	Talent devt.	Standard setting	IP mgmt./ tech. transfer	Business training	Business networks	Business mentors and peers	Business services	Talent devt.	Liability protn.	Financial support
		Program activities: The ARP Network matches business needs with ARS innovations and research capabilities and provides business assistance services to help companies and startups solve agricultural problems, develop products, and create new jobs. The ARP Network assists ARS in creating new partnerships and in supporting existing partnerships to advance ARS R&D efforts and subsequent utilization, including commercialization. Some of the ARP Network activities include matching industry needs with ARS patents and researchers for partnering; providing access to ARS research expertise, facilities, and equipment; and assisting in identifying sources of funding. The ARP Network is composed of organizations interested in agriculture-based economic development.														
		Website: <a href="https://www.ars.usda.gov/office-of-technology-transfer/administration-partnership/">https://www.ars.usda.gov/office-of-technology-transfer/administration-partnership/</a>														
	ATIP	Program goals: ATIP is a national network of Department of Agriculture (USDA) federal partnership intermediaries that facilitate the transfer of USDA technologies to U.S. businesses for their research, development, and production needs to meet agriculture requirements, as well as to foster commercial applications and support U.S. economic competitiveness.														
		Program activities: ATIP leverages the skills, knowledge, and capabilities of USDA's 10 partnership intermediaries to enhance USDA's ability to transfer technology. ATIP helps USDA labs and research institutions successfully partner with the private sector for the purpose of collaborating on technology innovation and maturation. The program markets USDA technologies and capabilities and facilitates communications with the private sector. ATIP makes companies aware of both USDA-developed technologies available for commercial licensing, use, and manufacturing, and USDA's research capabilities for solving problems of the agriculture sector. ATIP also conducts market research to establish the value of licensable technologies and help ensure the license applications and commercialization plans received contain appropriate information for a decision on licensing or partnering regarding further development of a technology.														
	Website: <a href="http://atipfoundation.com/">http://atipfoundation.com/</a>															
	I-FAST Prize Competition	Program goals: The I-FAST Prize Competition pilot program provides entrepreneurship training to USDA NIFA grantees. The competition aims to identify valuable product opportunities that can emerge from NIFA-supported academic research, to spur translation of that research to the market place, to encourage collaboration between academia and industry, and to train NIFA-funded faculty, students, and other researchers to understand innovation and entrepreneurship.														

## CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

Agency	Office	Program	Science and technology development							Enterprise development						
			Tech. devt.	Tech. scouting	Govt. need	Financial support	Talent devt.	Standard setting	IP mgmt./ tech. transfer	Business training	Business networks	Business mentors and peers	Business services	Talent devt.	Liability protn.	Financial support
		Program activities: The I-FAST Prize Competition identifies promising NIFA-funded research teams and provides them with support, in the form of mentoring, training, and funding, to accelerate the translation of fundamental research into emerging products and services that can attract subsequent third-party funding. I-FAST teams participate in a 6-month entrepreneurial immersion course provided by the NSF I-Corps program. Leveraging experience and guidance from established entrepreneurs and the NSF I-Corps curriculum, I-FAST teams learn to identify valuable product opportunities that can emerge from USDA NIFA supported academic research. The final goal of the I-FAST Prize Competition is to facilitate technology transfer of innovations that can make an impact in the marketplace and the global economy.														
		Website: <a href="https://nifa.usda.gov/program/innovations-food-and-agricultural-science-and-technology-i-fast-prize-competition">https://nifa.usda.gov/program/innovations-food-and-agricultural-science-and-technology-i-fast-prize-competition</a>														
Department of Commerce																
National Institute of Standards and Technology (NIST)	Associate Director for Innovation and Industry Services	Manufacturing USA	X			X	X				X		X	X		X
		Designated User Facilities	X		X											
		Domestic Guest Researcher (DGR) Program	X		X		X									
		Hollings Manufacturing Extension Partnership (MEP)	X	X						X	X	X	X	X		
		NIST Entrepreneurs-in-Residence (EIRs)								X		X	X			

## CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

Agency	Office	Program	Science and technology development							Enterprise development						
			Tech. devt.	Tech. scouting	Govt. need	Financial support	Talent devt.	Standard setting	IP mgmt./ tech. transfer	Business training	Business networks	Business mentors and peers	Business services	Talent devt.	Liability protn.	Financial support
		NIST Science and Technology Entrepreneurship Program (N-STEP)	X						X	X		X	X	X		
Economic Development Administration (EDA)	Office of Innovation and Entrepreneurship	i6 Challenge	X			X				X	X	X	X	X		X
		Seed Fund Support (SFS) Grant									X			X		X
Program descriptions	Manufacturing USA	Program goals: Manufacturing USA aims to (1) increase the competitiveness of U.S. manufacturing; (2) facilitate the transition of innovative technologies into scalable, cost-effective, and high-performing domestic manufacturing capabilities; (3) accelerate the development of an advanced manufacturing workforce; and (4) support business models that help institutes become stable and sustainable.														
		Program activities: The program currently consists of 14 public-private partnership institutes, which are established through competed proposals requiring matching funds from the proposing partner organizations. Manufacturing USA institutes focus on moving promising, early stage research into proven capabilities ready for adoption by U.S. manufacturers. The institutes provide members with access to state-of-the-art facilities and equipment, as well as workforce training and skills development customized to support new technology areas. Each institute focuses on a specific technology area; examples include advanced fabrics, biopharmaceuticals, and integrated photonics.														
		Website: <a href="https://www.manufacturingusa.com/">https://www.manufacturingusa.com/</a>														
	Designated User Facilities	Program goals: Designated User Facilities aim to support U.S. industry, academic institutions, the National Institute of Standards and Technology (NIST), and other government laboratories in specific areas of research.														

## CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

Agency	Office	Program	Science and technology development							Enterprise development						
			Tech. devt.	Tech. scouting	Govt. need	Financial support	Talent devt.	Standard setting	IP mgmt./ tech. transfer	Business training	Business networks	Business mentors and peers	Business services	Talent devt.	Liability protn.	Financial support
		Program activities: NIST operates two unique laboratory facilities available for use by approved users from industry, academic institutions, NIST, and other government laboratories: (1) NIST Center for Neutron Research (NCNR); and (2) Center for Nanoscale Science and Technology (CNST). NCNR is a national user facility that provides cold and thermal neutron measurement capabilities. CNST supports the development of nanotechnology from discovery to production.														
		Website: https://www.nist.gov/labs-major-programs/user-facilities														
	DGR Program	Program goals: The DGR Program provides access to NIST facilities and equipment to nongovernment scientists to work with NIST staff on projects of mutual interest.														
		Program activities: The program provides access for technically qualified U.S. citizens to NIST facilities and equipment while working with NIST staff on projects of mutual interest. Research results are available to the public because the DGR Agreement does not provide for confidentiality of research results.														
		Website: https://www.nist.gov/tpo/guest-researchers														
	MEP	Program goals: The MEP Program's overarching mission is to strengthen and empower U.S. manufacturers. The program works primarily with small- and medium-sized U.S. manufacturers to help them create and retain jobs, increase profits, and increase and retain sales.														
		Program activities: The program consists of 51 MEP centers, one in every state and Puerto Rico, that work directly with manufacturers and their local manufacturing communities to strengthen the competitiveness of the nation's domestic manufacturing base. The public-private partnership that is the MEP National Network™ is composed of nonprofit, university-based and state economic development-based organizations, in partnership with the federal government. Each MEP center provides a variety of services to their local manufacturers, including product design and prototyping, design for manufacture/assembly, machine and equipment design, lean process improvement, and other services. Center services are fee-based and designed to be flexible and responsive.														
		Website: https://www.nist.gov/mep														
	NIST EIRs	Program goals: In partnership with the Maryland Technology Development Corporation (TEDCO), NIST EIRs are selected to provide advice and consulting to NIST scientists and tech transfer staff regarding commercialization and entrepreneurship.														

## CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

Agency	Office	Program	Science and technology development							Enterprise development						
			Tech. devt.	Tech. scouting	Govt. need	Financial support	Talent devt.	Standard setting	IP mgmt./ tech. transfer	Business training	Business networks	Business mentors and peers	Business services	Talent devt.	Liability protn.	Financial support
		Program activities: NIST EIRs hold public seminars about entrepreneurship and commercialization, and meet one-on-one with individual NIST scientists and postdocs about career opportunities in business and entrepreneurship, developing spinoffs and startup companies, and other commercialization topics. They also provide information about the potential commercial viability of new NIST inventions to assist in the patenting and licensing process.														
		Website: NA														
	N-STEP	Program goals: N-STEP aims to provide opportunities for motivated researchers to build upon the experience gained while working at NIST as they explore entrepreneurial careers.														
		Program activities: Maryland TEDCO administers the N-STEP program, which will offer grants to current and former NIST researchers for technology development and commercialization of NIST technologies. The NIST Technology Partnerships Office (TPO) identifies inventions available for licensing that are most appropriate for commercialization, especially by startup and early-stage firms. TEDCO and local economic development organizations help the researchers create startup companies to license and commercialize NIST's inventions. In addition to the funding, NIST and TEDCO will make available a variety of resources, including entrepreneurship training, mentoring, and other resources.														
		Website: <a href="http://tedco.md/program/n-step/">http://tedco.md/program/n-step/</a>														
	i6 Challenge	Program goals: The i6 program supports innovation, entrepreneurship, innovative regional economic development, and commercialization of research. Supported projects must focus on one or more of these aims.														
		Program activities: The i6 Challenge is one of the two competitions supported by the Regional Innovation Strategies (RIS) Program. The i6 Challenge provides grants to support the creation of centers for innovation and entrepreneurship that increase the rate at which innovations, ideas, intellectual property, and research are translated into products, services, viable companies, and, ultimately, jobs. The i6 grantees offer a range of services to client companies, including events, networking, and referrals; mentoring, coaching, and technical assistance; access to facilities and equipment; technology development support; and financing support.														
Website: <a href="https://www.eda.gov/oie/ris/i6/">https://www.eda.gov/oie/ris/i6/</a>																





## CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

Agency	Office	Program	Science and technology development							Enterprise development						
			Tech. devt.	Tech. scouting	Govt. need	Financial support	Talent devt.	Standard setting	IP mgmt./ tech. transfer	Business training	Business networks	Business mentors and peers	Business services	Talent devt.	Liability protn.	Financial support
Department of the Navy		Navy Small Business Innovation Research (SBIR)/ Small Business Technology Transfer (STTR) Transition Program (STP)								X	X	X	X			
	Naval Surface Warfare Center, Crane Division (NSWC Crane)	Innovation Discovery Process							X		X	X				
Department of the Air Force		New York Furnace Technology Transfer Accelerator (NY Furnace)							X	X	X	X				
Office of the Secretary of Defense	Office of the Under Secretary of Defense for Acquisition, Technology and Logistics	Joint Capability Technology Demonstration (JCTD)	X		X						X					

## CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

Agency	Office	Program	Science and technology development							Enterprise development						
			Tech. devt.	Tech. scouting	Govt. need	Financial support	Talent devt.	Standard setting	IP mgmt./ tech. transfer	Business training	Business networks	Business mentors and peers	Business services	Talent devt.	Liability protn.	Financial support
		Rapid Reaction Fund	X		X	X										
	Office of the Assistant Secretary of Defense for Research & Engineering	I-Corps @ DoD								X	X	X		X		
	Defense Advanced Research Projects Agency (DARPA)	SBIR/STTR Transition & Commercialization Support Program (TCSP)								X	X	X	X			
		Defense Innovation Unit Experimental (DIUx)		X	X											X
		MD5 National Security Technology Accelerator (MD5)	X	X	X	X			X	X	X	X	X	X		

## CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

Agency	Office	Program	Science and technology development							Enterprise development						
			Tech. devt.	Tech. scouting	Govt. need	Financial support	Talent devt.	Standard setting	IP mgmt./ tech. transfer	Business training	Business networks	Business mentors and peers	Business services	Talent devt.	Liability protn.	Financial support
Program descriptions	ManTech Program	Program goals: The Defense-Wide Manufacturing Science & Technology (DMS&T) ManTech Program was established to address cross-cutting, game-changing initiatives that are beyond the scope of any one Military Department or Defense Agency.														
		Program activities: ManTech seeks to address defense manufacturing needs, transition manufacturing R&D processes into production applications, attack manufacturing issues, and explore new opportunities.														
		Website: https://www.dodmantech.com/														
	CRP	Program goals: Part of the Department of Defense's (DoD) SBIR/STTR program, the purpose of the CRP is to accelerate the transition of SBIR and STTR funded technologies to Phase III, especially those that lead to programs of record and fielded systems.														
		Program activities: The CRP enhances the connectivity among SBIR and STTR firms, prime contractors, and DoD science & technology and acquisition communities. It also improves an SBIR or STTR firm's capability to provide the identified technology to the Department, directly or as a subcontractor.														
		Website: http://www.acq.osd.mil/osbp/sbir/sb/crp.shtml														
	AVCI	Program goals: AVCI aims to accelerate product development and efficiently deliver breakthrough, war-winning capabilities through investments in venture-funded companies developing innovative technologies of significant interest to the warfighter that are traditionally beyond the reach of the DoD.														
		Program activities: AVCI is the venture activity of the U.S. Army and DoD that strategically invests in cutting-edge technologies. The model helps build sustainable solutions and is powered by investing along with venture capital firms. AVCI focuses on technologies addressing the needs of the commercial market that will also meet priority warfighter needs. For each dollar AVCI invests in a company, the venture community, on average, invests more than \$22. AVCI's model offers a complement to traditional acquisition and uses a proven commercial investment methodology that results in faster solution identification, product development, continuous enhancements, and is often accompanied by lower costs to the DoD.														
		Website: http://armyvci.org/														
ARL Open Campus Iniative	Program goals: ARL's Open Campus Initiative is a collaborative endeavor, with the goal of building a science and technology ecosystem that will encourage groundbreaking advances in basic and applied research areas of relevance to the Army.															

## CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

Agency	Office	Program	Science and technology development							Enterprise development						
			Tech. devt.	Tech. scouting	Govt. need	Financial support	Talent devt.	Standard setting	IP mgmt./ tech. transfer	Business training	Business networks	Business mentors and peers	Business services	Talent devt.	Liability protn.	Financial support
		Program activities: Through the Open Campus framework, ARL scientists and engineers work collaboratively and side-by-side with visiting scientists in ARL's facilities, and as visiting researchers at collaborators' institutions. Central to the research collaborations is mutual scientific interest and investment by all partners – ARL's Open Campus is not a funding opportunity.														
		Website: <a href="http://www.arl.army.mil/www/default.cfm?page=2357">www.arl.army.mil/www/default.cfm?page=2357</a>														
	Navy STP	Program goals: The Navy STP provides commercialization, transition, and professional business assistance through a structured program so that participating small businesses are in the best position to obtain Phase III funding.														
		Program activities: The program takes a holistic approach to assisting selected small businesses to identify and plan a path to obtain Phase III funding for commercialization of their SBIR/STTR-developed technology(s) and transition their technology(s) through business mentoring, training, marketing material creation, and business development activities and promotion. STP provides a range of support for selected companies, including providing relevant market research appropriate to the Small Business's technology and transition targets, identifying leads for potential transition opportunities, promoting their technology(s) on the Virtual Transition Marketplace (VTM—an online, searchable showcase accessible to Government and private sector), and others.														
		Website: <a href="https://navystp.com/">https://navystp.com/</a>														
	NSWC Crane Innovation Discovery Process	Program goals: The primary goal of the NSWC Crane Innovation Discovery Process is to help researchers identify potential intellectual property.														
		Program activities: The NSWC Crane Innovation Discovery Process involves "Innovation Mining" events where inventors discuss their research projects in front of business and engineering faculty, entrepreneurs, and industry and technology transfer experts who help identify potential invention disclosures and commercialization ideas concurrently.														
		Website: NA														
	NY Furnace	Program goals: The aim of NY Furnace is to form, fund, and launch startups that will license and successfully commercialize one or more Air Force technologies.														

## CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

Agency	Office	Program	Science and technology development							Enterprise development						
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		Program activities: DoD made Air Force inventions available to entrepreneurs through state-wide competitions; those entrepreneurial teams selected then participated in a follow-on startup acceleration program called NY Furnace. DoD partnered with Arizona State University's (ASU) Pracademic Center of Excellence in Technology Transfer (PACE/T2), the developers of the furnace system, to support the transfer and commercialization of discoveries from the country's top research laboratories.														
		Website: <a href="http://www.azte.com/for-startups/acceleration">http://www.azte.com/for-startups/acceleration</a>														
	JCTD	Program goals: The mission of the JCTD Program is to execute pre-engineering and manufacturing development (pre-EMD) and fieldable prototypes through operational demonstrations of game-changing technologies to meet DoD strategic needs while addressing Joint Force and Combatant Commands capability gaps.														
		Program activities: JCTD has four main activities: (1) stimulating innovation by providing a collaborative environment between government, industry and academia and providing a bridge from science and technology to operational use and acquisition; (2) reducing technical risk through the use of experimentation and prototyping and reducing operational risk by conducting operational demonstrations with the warfighter; (3) enabling affordability by providing open architecture to enhance interoperability and minimizing design changes and surprises during the EMD phase of acquisition; and (4) accelerating the acquisition process.														
		Website: <a href="http://www.acq.osd.mil/ecp/PROGRAMS/JCTD.html">http://www.acq.osd.mil/ecp/PROGRAMS/JCTD.html</a>														
	Rapid Reaction Fund	Program goals: The Rapid Reaction Technology Office (RRTO) uses the Rapid Reaction Fund to develop and demonstrate less mature, high-reward technologies that produce game-changing capabilities by leveraging nontraditional sources of innovation, interagency partnerships, and rapid prototyping.														
		Program activities: RRTO uses the fund to develop prototypes and host technology demonstrations to counter emerging and anticipated threats in order to accelerate the delivery of resilient solutions leading to affordable warfighter capabilities. RRTO achieves its mission through partnerships with combatant commands, Service labs, Defense Department offices, other government agencies, the commercial sector, and academia.														
		Website: <a href="http://www.acq.osd.mil/ecp/PROGRAMS/RRTO.html">www.acq.osd.mil/ecp/PROGRAMS/RRTO.html</a>														
	I-Corps @ DoD	Program goals: I-Corps @ DoD aims to commercialize the outputs of basic research funded by the DoD, develop a more entrepreneurial mindset among DoD-funded researchers, and better align DoD basic research efforts with the needs of the defense community and commercial markets.														

## CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

Agency	Office	Program	Science and technology development							Enterprise development						
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		Program activities: The I-Corps @ DoD Pilot Program partners with NSF's I-Corps program to provide entrepreneurial education to DoD-funded researchers. Funded researchers conduct 100 interviews with potential customers using lean startup methods in order to learn more about problems that commercial stakeholders want to have solved. The training is directed by experienced entrepreneurs who teach researchers about value propositions, business plans, and other concepts essential to commercialization.														
		Website: <a href="http://basicresearch.defense.gov/">http://basicresearch.defense.gov/</a>														
	SBIR/STTR TCSP	Program goals: The DARPA SBIR/STTR TCSP aims to maximize the potential for SBIR/STTR companies to move their technology beyond Phase II, and into other R&D programs for further maturity, or into solutions or products for DoD acquisition programs, other federal programs, and/or the commercial market.														
		Program activities: For SBIR/STTR Phase I awardees, the program provides information on how to continue transition and plan for commercialization. For Phase II awardees, the program reviews and provides feedback to the company on their transition and commercialization plan; identifies potential sources of funding and collaborators, experiment and demonstration opportunities, thought leadership opportunities, and media and publication sources; facilitates introductions to potential funders, collaborators, and partners; and provides business planning and assessment tools, in addition to providing other resources.														
		Website: <a href="https://www.darpa.mil/work-with-us/for-small-businesses/commercialization-continued">https://www.darpa.mil/work-with-us/for-small-businesses/commercialization-continued</a>														
	DIUx	Program goals: DIUx aims to accelerate commercial innovation for national defense by building relationships between the high-technology commercial sector and DoD customers.														
		Program activities: DIUx provides non-dilutive capital to companies to work on new technologies to solve DoD problems. DIUx operates nationwide, with headquarters in Silicon Valley and offices in Boston, Austin, and the Pentagon.														
		Website: <a href="https://diux.mil/">https://diux.mil/</a>														
	MD5	Program goals: MD5 seeks to (1) accelerate capability development leveraging non-traditional collaborators and "bottom-up" approaches, (2) augment the defense industry through the creation of startup businesses responsive to national security problems, and (3) enhance the DOD workforce through critical innovation skills development.														

## CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

Agency	Office	Program	Science and technology development							Enterprise development						
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		Program activities: MD5 executes three portfolios of effort: Education promotes workforce development cultivating innovators and intrapreneurs inside DoD (Hacking for Defense, JPME, innovation boot camps, and industry fellowships); Collaboration connects communities of innovators around problems and technologies relevant to national security to enable formation of new ventures (Hackathons, Innovation Challenges, Startup Showcases, and Fed Tech); and Acceleration grows and matures civil-military technology ventures by ensuring that innovators can access critical resources, including DoD R&D infrastructure, to build, test, and enhance venture concepts (Proof-of-Concept Centers, Fulcrum, Hard Tech Studio/Innovator-in-Residence, and Defense Innovation Proving Ground).														
		Website: <a href="http://www.md5.net/">www.md5.net/</a>														
Department of Energy																
Advanced Research Projects Agency-Energy (ARPA-E)		Tech-to-Market (T2M) Program							X	X	X	X	X			
Office of the Under Secretary for Science and Energy	Office of Energy Efficiency and Renewable Energy (EERE)	Small Business Vouchers (SBV)	X			X							X			
		Cleantech University Prize (Cleantech UP)	X				X			X		X		X		X
		National Incubator Initiative for Clean Energy (NIICE)	X							X	X	X	X			



## CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

Agency	Office	Program	Science and technology development							Enterprise development						
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		Build4Scale Manufacturing Training for Cleantech Entrepreneurs (Build4Scale)	X							X			X			
		Energy I-Corps (Lab-Corps)								X	X	X		X		
		Incubatenergy Network									X		X			
		Lab-Embedded Entrepreneurship Program	X							X	X					
		Technologist in Residence (TIR) Program	X	X	X				X		X					
		SunShot Incubator	X			X				X	X	X	X			
		SunShot Technology-to-Market (T2M) Initiative	X			X				X	X	X	X			X

## CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

Agency	Office	Program	Science and technology development							Enterprise development						
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	Office of Science	Argonne National Laboratory Nano Design Works (ADW)	X													
		Argonne Collaborative Center for Energy Storage Science (ACCESS)	X													
		Argonne National Laboratory Chain Reaction Innovations (CRI)	X				X				X	X	X			X
		Innovation Crossroads	X			X				X	X	X	X			X
		Lawrence Berkeley National Laboratory Cyclotron Road	X						X							X

## CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

Agency	Office	Program	Science and technology development							Enterprise development						
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		Oak Ridge National Laboratory (ORNL) SPARK!			X						X					
		ORNL Bridging the Gap							X		X					
		ORNL Institute for Advanced Composites Manufacturing Innovation (IACMI)	X								X		X			
		Pacific Northwest National Laboratory Mentor-Protégé Program (MPP)								X		X				
		Pacific Northwest National Laboratory Entrepreneur Support Catalog									X					

## CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

Agency	Office	Program	Science and technology development							Enterprise development						
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	Office of Nuclear Energy	Gateway for Accelerated Innovation in Nuclear (GAIN)	X									X				
	Office of Technology Transitions	Energy Investment Center (EIC)										X		X		X
		Technology Commercialization Fund (TCF)	X				X			X		X				
Office of the Under Secretary for Nuclear Security and National Nuclear Security Administration	National Nuclear Security Administration	Center for Collaboration and Commercialization (C3)	X						X	X	X	X	X			
		Livermore Valley Open Campus (LVOC)	X					X			X					
Program descriptions	T2M Program	Program goals: The ARPA-E T2M Program aids ARPA-E in transitioning energy technologies from the laboratory towards real-world application. The T2M Program team helps create impact opportunities for funded projects across all ARPA-E program areas.														

## CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

Agency	Office	Program	Science and technology development							Enterprise development						
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		Program activities: Once a project team has crafted a tech-to-market plan, the ARPA-E T2M team works to align their resources and efforts towards the wants and need of potential technology transition partners. They do this through a range of activities, including providing awardees with market knowledge; providing resources on commercialization best practices; identifying and connecting awardees to strategic opportunities and resources; maintaining and cultivating a strong network across the market/industry; presenting and highlighting ARPA-E projects and technologies to stakeholders across the ecosystem; and identifying and working to mitigate shared obstacles for fielding new energy technologies (regulatory, ecosystem, standards, etc.).														
		Website: https://arpa-e.energy.gov/?q=site-page/tech-market-t2m														
	SBV	Program goals: SBVs help small businesses overcome challenges with prototyping, materials characterization, high-performance computations, modeling and simulations, and validation of technology performance by providing them access to national labs. At the same time, the program increases national lab awareness of the challenges small businesses face in the energy sector.														
		Program activities: Through the SBV program, eligible small businesses can tap into the reserve of national laboratory intellectual and technical assets to overcome critical technology challenges, including prototyping, materials characterization, high performance computations, modeling and simulations, intermediate scaling to generate samples for potential customers, validation of technology performance, and designing new ways to satisfy regulatory compliance. The SunShot Initiative funds vouchers for solar projects under the SBV program, which are valued between \$50,000 and \$300,000 each.														
		Website: https://energy.gov/eere/technology-to-market/small-business-vouchers														
	Cleantech UP	Program goals: Cleantech UP inspires and equips the next generation of clean energy entrepreneurs and innovators by providing them with competitive funding for business development and commercialization training and other educational opportunities.														
Program activities: Eight institutions across the country host annual Cleantech UP Collegiate Competitions, where students receive entrepreneurial support and compete for cash prizes and services to further support the commercialization of their clean energy technologies. The Collegiate Competitions establish team development and training that will aid students in developing the skills to move clean energy technologies from the discovery phase to the marketplace. Winners of the Collegiate Competitions are eligible to compete in the Cleantech UP National Competition run by the Hub. The National Competition, which is the culmination of the Collegiate Competitions, awards an additional \$100,000 in prizes.																

## CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

Agency	Office	Program	Science and technology development							Enterprise development						
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		Website: <a href="https://energy.gov/eere/technology-to-market/cleantech-university-prize-cleantech">https://energy.gov/eere/technology-to-market/cleantech-university-prize-cleantech</a>														
	NIICE	Program goals: NIICE aims to increase coordination and collaboration among incubators across the country and develop best practices to raise incubator performance standards. This effort enables incubators to provide more efficient and effective services to early-stage U.S. companies.														
		Program activities: Through NIICE, EERE funds the first nationwide support organization to connect and build a community of cleantech-focused startup incubators. This network is a community of U.S. clean energy-focused business incubators nationwide that have supported almost 500 companies to date. NIICE also funds several regional cleantech incubators to run programs with commercialization services for startups including mentorship, business development, capital access, and testing and demonstration. These incubators work with the national organization to develop best practices for clean energy incubators that can be replicated nationwide.														
		Website: <a href="https://energy.gov/eere/technology-to-market/national-incubator-initiative-clean-energy-niice-0">https://energy.gov/eere/technology-to-market/national-incubator-initiative-clean-energy-niice-0</a>														
	Build4Scale	Program goals: Build4Scale provides entrepreneurs with the tools they need to identify and address manufacturing challenges early in the process. The development of the Build4Scale training was informed by the "Manufacturing 101: An Education and Training Curriculum for Hardware Entrepreneurs" report developed by MFOresight.														
		Program activities: Build4Scale trains cleantech entrepreneurs on the fundamentals of manufacturing, providing them with the tools and information they need to bring their promising energy solutions to market. The Build4Scale training "tool-kit" includes training for making and evaluating manufacturing-related decisions, understanding product design and development, self-assessment for manufacturing readiness, and basics of manufacturing processes. Lawrence Livermore National Laboratory (LLNL) led the development of the Build4Scale training. LLNL collaborated with more than a dozen partners to develop the training, leveraging their strengths in key areas, including technical knowledge, training module development, and resource networks.														
		Website: <a href="https://energy.gov/eere/technology-to-market/build4scale-manufacturing-training-cleantech-entrepreneurs">https://energy.gov/eere/technology-to-market/build4scale-manufacturing-training-cleantech-entrepreneurs</a>														
	Energy I-Corps	Program goals: Energy I-Corps aims to accelerate the commercialization of clean energy technologies from the Department of Energy (DOE) national laboratories by utilizing the NSF's I-Corps model. I-Corps is an intensive, structured, and curriculum-based program designed to educate early stage technology developers on business model development and the value of customer discovery.														

## CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

Agency	Office	Program	Science and technology development							Enterprise development						
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		Program activities: Energy I-Corps pairs teams of researchers with industry mentors for an intensive two-month training where the researchers define technology value propositions, conduct customer discovery interviews, and develop viable market pathways for their technologies. Researchers return to the lab with a framework for industry engagement to guide future research and inform a culture of market awareness within the labs. Energy I-Corps is managed by DOE's National Renewable Energy Laboratory (NREL), which leads curriculum development and execution, recruits program instructors and industry mentors, and assembles teams from 10 national labs.														
		Website: https://energy.gov/eere/technology-to-market/energy-i-corps														
	Lab-Embedded Entrepreneurship Program	Program goals: The Lab-Embedded Entrepreneurship Program provides an institutional home for researchers to build their research into products and train to be entrepreneurs.														
		Program activities: The Lab-Embedded Entrepreneurship Program takes top entrepreneurial scientists and engineers and embeds them within the U.S. national laboratories to perform applied R&D with the express goal of launching a clean energy business. In addition to technological access and support, the program trains innovators to develop entrepreneurial acumen and skills, while introducing them to the ecosystem partners needed to facilitate commercial and investment opportunities. This dual focus on R&D and entrepreneurial development provides innovators with the platform they need to take their ideas from the lab and onto the commercialization pathway.														
		Website: https://energy.gov/eere/technology-to-market/lab-embedded-entrepreneurship-program														
	TIR Program	Program goals: The goals of the TIR program are to (1) increase collaborative R&D between national laboratories and private sector companies; and (2) develop a streamlined method for companies to establish long-term relationships with national laboratories that result in collaborative R&D.														
Program activities: The TIR program is designed to streamline engagement and increase collaborative R&D between national labs and private sector companies. The program competitively selects "technologist pairs" – a senior technical staff member from a national lab and a counterpart senior technical staff member from a manufacturing company or consortium of companies – that focus on building strong new R&D relationships between the respective companies and national labs. These partnerships focus on identifying the challenges of interest, and applicable resources and capabilities within the national labs; proposing collaborative R&D solutions; and developing an agreement and scope of work that would address one or more identified challenges.																

## CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

Agency	Office	Program	Science and technology development							Enterprise development						
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		Website: <a href="https://energy.gov/eere/cemi/technologist-residence-program">https://energy.gov/eere/cemi/technologist-residence-program</a>														
	SunShot Incubator	Program goals: The SunShot Incubator aims to shorten the time it takes for a young business or company to develop an innovative product concept and make it commercially available, which includes product prototyping, deployment, and, potentially, manufacturing. Most projects are cooperative agreements that last from 12 to 18 months with payment made upon completion and verification of aggressive project deliverables.														
		Program activities: The SunShot Incubator program provides early-stage assistance to help startup companies cross technological barriers to commercialization while encouraging private sector investment. By taking innovations and putting them through a rigorous de-risking process, the Incubator program allows entrepreneurs to focus on rapid commercialization. Early-stage Incubator assistance enables startup businesses to cross critical technological barriers that the investment community is unable to address. Once these key risks are addressed, the startup businesses are ideally suited for private follow-on funding and success.														
		Website: <a href="https://energy.gov/eere/sunshot/sunshot-incubator-program">https://energy.gov/eere/sunshot/sunshot-incubator-program</a>														
	SunShot T2M Initiative	Program goals: The projects funded by the SunShot T2M subprogram aim to catalyze the continued development of the U.S. solar market and the continued expansion of U.S. manufacturing of solar products in order to achieve the 2020 SunShot goals. The T2M Initiative targets two funding gaps for energy technologies: those that occur at the prototype commercialization stage and those at the commercial scale-up stage.														
		Program activities: There are four main funding programs under the SunShot T2M Initiative, each of which addresses innovations in technology development, supply chain, and/or manufacturing. The four main T2M funding programs are: (1) SunShot's Incubator program, which provides early-stage assistance to companies; (2) SBIR and STTR programs which encourage U.S.-based small businesses to engage in R&D; (3) the Solar Manufacturing Technology (SolarMaT) program, which funds the development of manufacturing technologies; and (4) the SunShot Photovoltaic Manufacturing Initiative (PVMI), which focuses on manufacturing R&D projects.														
		Website: <a href="https://energy.gov/eere/sunshot/technology-market">https://energy.gov/eere/sunshot/technology-market</a>														
	ADW	Program goals: ADW provides services to strengthen the impact and support the acceleration of discoveries to market, helping the U.S. remain a leader in global nanotechnology.														



## CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

Agency	Office	Program	Science and technology development							Enterprise development						
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		Program activities: ADW provides a central point of contact for companies—ranging from large industrial entities to smaller businesses and startups, as well as government agencies—to benefit from Argonne National Lab's world-class expertise, scientific tools and facilities in the field of nanotechnology. Argonne National Lab has the capacity to fully comprehend the function of materials in three key areas: (1) fabrication and synthesis, (2) characterization of nanoscale materials, and (3) predictive understanding through modeling and simulation.														
		Website: <a href="https://argonnedesignworks.anl.gov/">https://argonnedesignworks.anl.gov/</a>														
	ACCESS	Program goals: ACCESS helps public and private-sector customers solve energy storage problems through multidisciplinary research.														
		Program activities: ACCESS provides a central point of contact for companies to benefit from Argonne National Lab's world-class expertise, scientific tools, and facilities in the field of energy storage. ACCESS assembles collaborative teams drawn from Argonne National Lab's 1,400 scientists and engineers, who represent dozens of disciplines, to help clients in several key areas related to energy storage, including discovery of new materials and properties, materials characterization, process scale-up, process and systems modeling, cell fabrication, and performance testing.														
		Website: <a href="https://access.anl.gov/">https://access.anl.gov/</a>														
	Argonne National Laboratory CRI	Program goals: Argonne National Laboratory CRI identifies innovators with ideas for energy- and science-based technologies that can have a significant impact on the lives of billions of people.														
		Program activities: CRI is a two-year program for innovators focusing on energy and science technologies. Program participants receive the financial and technical support needed to mature nascent technologies that face long development cycles to the proof-of-concept level. CRI gives teams of innovators a two-year runway to develop and scale their technologies while being supported through fellowship funding that covers salary, benefits, and use of laboratory equipment and office space. Through partnerships with mentor organizations, CRI participants get assistance developing business strategies, conducting market research, and finding long-term financing and potential commercial partners. CRI is one of the Lab-Embedded Entrepreneurship Programs.														
		Website: <a href="https://chainreaction.anl.gov/">https://chainreaction.anl.gov/</a>														
	Innovation Crossroads	Program goals: Through Innovation Crossroads, ORNL matches aspiring energy entrepreneurs with technology leaders, experienced mentors, and business and investment networks in technology-related fields that can help accelerate the transition of their world-changing ideas to the marketplace.														

## CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

Agency	Office	Program	Science and technology development							Enterprise development						
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		Program activities: Through an annual call, the Innovation Crossroads program selects up to five entrepreneurs to help transform their ideas into energy and advanced manufacturing companies with financial support from the DOE's EERE. Innovators receive a fellowship that covers living costs, benefits and a travel stipend for up to two years, plus up to \$350,000 to use on collaborative research and development at ORNL. Each innovator is also paired with a doctoral student from the University of Tennessee's Bredesen Center for Interdisciplinary Research and Graduate Education for assistance with market research and customer discovery.														
		Website: https://innovationcrossroads.ornl.gov/														
	Lawrence Berkeley National Laboratory Cyclotron Road	Program goals: Cyclotron Road aims to empower scientists to advance hard technologies from concept to viable first product, positioning them for broad societal impact in the long term.														
		Program activities: Cyclotron Road's Cohort Program is a two-year fellowship that supports scientists developing energy technologies that have potential for broad impact on the national, economic, and energy security of the U.S. Cohort innovators spend two years embedded at Lawrence Berkeley National Laboratory with an explicit mandate to bring their ideas to the point of commercial viability. Cyclotron Road participants receive access to facilities, equipment, and expertise at Lawrence Berkeley National Laboratory, as well as a small amount of initial research funding to facilitate access and collaboration with the Lab's staff scientists. Innovators fully own or jointly own all intellectual property developed during the program. Cyclotron Road is one of the Lab-Embedded Entrepreneurship Programs.														
		Website: http://www.cyclotronroad.org/														
	ORNL SPARK!	Program goals: SPARK! events aim to showcase ORNL's most promising technologies and get industry feedback on those technologies.														
		Program activities: SPARK! is an annual event at which some of ORNL's most promising technologies for commercialization are presented to a small group of entrepreneurs, investors, and industry experts, who provide valuable feedback about potential market applications and collaborators.														
		Website: https://www.ornl.gov/partnerships/entrepreneurial-development-programs														
	ORNL Bridging the Gap	Program goals: Bridging the Gap events showcase ORNL's most promising technologies that are available to licensing or other types of agreements.														
		Program activities: Bridging the Gap events showcase ORNL's most promising technologies to a wide range of people from various industries. During the events, participants can also meet with ORNL researchers, and tour labs and other facilities.														

## CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

Agency	Office	Program	Science and technology development							Enterprise development						
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		Website: <a href="https://www.ornl.gov/partnerships/entrepreneurial-development-programs">https://www.ornl.gov/partnerships/entrepreneurial-development-programs</a>														
	ORNL IACMI	Program goals: IACMI aims to increase domestic production capacity, grow manufacturing, and create jobs across the U.S. composite industry.														
		Program activities: IACMI, managed by the Collaborative Composite Solutions Corporation (CCS), is a partnership of industry, universities, national laboratories, and federal, state, and local governments working together to benefit the nation’s energy and economic security by sharing existing resources and co-investing to accelerate development and commercial deployment of advanced composites. CCS is a not-for-profit organization established by The University of Tennessee Research Foundation. IACMI partners focus on accelerating development and adoption of cutting-edge manufacturing technologies for low-cost, energy-efficient manufacturing of advanced polymer composites for vehicles, wind turbines, and compressed gas storage.														
		Website: <a href="https://www.ornl.gov/partnerships/iacmi">https://www.ornl.gov/partnerships/iacmi</a>														
	Pacific Northwest National Laboratory MPP	Program goals: MPP assists in the creation, stabilization, and growth of regional technology-based businesses by providing a network of individuals experienced in business (mentors) able and willing to provide guidance to regional companies/individuals (protégés).														
		Program activities: Potential protégés initiate the process by requesting a mentor for a specific business challenge. Through the MPP, protégés are introduced to one or more qualified mentors, who will assist them for an agreed upon period (typically 6–24 months). Mentors and protégés may continue their relationship independent of the MPP following completion of the formal mentoring engagement. In general, protégés receive the obvious benefit of learning from a mentor's experience. They may also receive specific assistance in things like writing business and sales plans, uncovering new market opportunities for products and services, preparing financial projections, and others.														
		Website: <a href="http://www.pnnl.gov/edo/mentor/">http://www.pnnl.gov/edo/mentor/</a>														
	Pacific Northwest National Laboratory Entrepreneur Support Catalog	Program goals: The Entrepreneur Support Catalog provides an online database to help small businesses and entrepreneurs in the Tri-Cities, Washington area find support to prosper and grow. It is also intended to help the economic development organizations listed make referrals to other organizations.														
		Program activities: The Entrepreneur Support Catalog is an online database of economic development and entrepreneurial support organizations. All of the information in the Entrepreneur Support Catalog is added and maintained by the organizations listed. The database contains information about not-for-profit organizations only, although some of the organizations listed will make referrals to for-profit organizations (e.g., accountants) as appropriate.														

## CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

Agency	Office	Program	Science and technology development							Enterprise development						
			Tech. devt.	Tech. scouting	Govt. need	Financial support	Talent devt.	Standard setting	IP mgmt./ tech. transfer	Business training	Business networks	Business mentors and peers	Business services	Talent devt.	Liability protn.	Financial support
		Website: <a href="http://www.pnnl.gov/edo/Default.aspx?topic=Entrepreneur_Support_Catalog">http://www.pnnl.gov/edo/Default.aspx?topic=Entrepreneur_Support_Catalog</a>														
	GAIN	Program goals: GAIN provides the nuclear energy community with access to the technical, regulatory, and financial support necessary to move new or advanced nuclear reactor designs toward commercialization while ensuring the continued safe, reliable, and economic operation of the existing nuclear fleet.														
		Program activities: GAIN provides the nuclear community with a single point of access to the broad range of capabilities – people, facilities, materials, and data – across the DOE complex and its National Lab capabilities. Focused research opportunities and dedicated industry engagement are also important components of GAIN, ensuring that DOE-sponsored activities are impactful to companies working to realize the full potential of nuclear energy. The capabilities accessible through GAIN include experimental capabilities, with primary emphasis on nuclear and radiological facilities; computational capabilities; information and data; and land use and site information for demonstration facilities.														
		Website: <a href="https://gain.inl.gov/SitePages/Home.aspx">https://gain.inl.gov/SitePages/Home.aspx</a>														
	EIC	Program goals: The EIC builds bridges to the private sector to facilitate the public-private partnerships needed to unshackle domestic innovation and assert U.S. leadership in the global energy technology race and marketplace that is fast-developing around the world.														
		Program activities: EIC assists and supports investors and businesses by providing a one-stop-shop to get connected with world-leading energy experts, acquire the latest research studies and reports, and identify promising funding opportunities and promising energy products. EIC offers: (1) Laboratory-Investor Knowledge Series (LINKS), which coordinate meetings across the country between DOE labs and with investors to discuss partnership opportunities; (2) Laboratory Partnering Service (LPS), an online platform that enables access to energy experts within the DOE national laboratory network; (3) Innovation Interface (I2), a forum for information exchange between investors and DOE program managers; and (4) Technical Assistance.														
		Website: <a href="https://energy.gov/technologytransitions/us-department-energys-energy-investor-center">https://energy.gov/technologytransitions/us-department-energys-energy-investor-center</a>														
	TCF	Program goals: TCF aims to (1) increase the number of energy technologies developed at DOE’s national labs that graduate to commercial development and achieve commercial impact, and (2) enhance DOE's technology transitions system with a forward-looking and competitive approach to lab-industry partnerships.														

## CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

Agency	Office	Program	Science and technology development							Enterprise development						
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Department of Health and Human Services		Program activities: The TCF is a nearly \$20 million funding opportunity that leverages the R&D funding in applied energy programs to mature promising energy technologies with the potential for high impact. These funds are matched with funds from private partners to promote promising energy technologies for commercial purposes. There are three key areas within DOE where the TCF enhances technology transitions efforts: (1) national lab technology maturation; (2) strategic CRADA (Cooperative Research and Development Agreement) approach to increase commercial impact; and (3) focused industry engagement to identify high-quality partners.														
		Website: <a href="https://energy.gov/technologytransitions/services/technology-commercialization-fund">https://energy.gov/technologytransitions/services/technology-commercialization-fund</a>														
	C3	Program goals: The proposed C3 will serve as a public face for Sandia National Laboratories, facilitating access to the Labs and building linkages with the community.														
		Program activities: Located in the Sandia Science & Technology Park (SS&TP), C3 will be a multi-tenant facility dedicated to increasing Sandia's collaboration and commercialization activities. C3 will offer spaces for lease along with programs and services for tenants and partners, all designed to facilitate successful partnerships. C3 will offer many programs and services, including: Entrepreneur Training, Small Business Assistance, Interactive Intellectual Property Library, Tech Maturation, Investor Access, Scientific and Technical Consulting, Technology Showcase, and Mentors.														
		Website: <a href="https://sstp.org/c3">https://sstp.org/c3</a>														
	LVOC	Program goals: LVOC creates a novel venue for collaborations between experts from Lawrence Livermore National Laboratory and Sandia National Laboratories and experts outside the labs.														
		Program activities: LVOC is an innovation hub along the boundaries of Lawrence Livermore National Laboratory and Sandia National Laboratories. LVOC is an open, unclassified R&D space intended to foster research on current and future national security challenges in areas such as high performance computing, energy and environmental security, cybersecurity, economic security, and non-proliferation. Modeled in part after research and development campuses found at major industrial research parks and other DOE laboratories, LVOC has a set of business and operating rules devised to enhance and accelerate international scientific collaboration and partnerships with U.S. government agencies, industry, and academia.														
		Website: <a href="https://lvoc.org/">https://lvoc.org/</a>														

## CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

Agency	Office	Program	Science and technology development							Enterprise development						
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National Institutes of Health (NIH)	Office of the Director	Commercialization Accelerator Program (CAP)								X	X	X	X			
		I-Corps at NIH								X	X	X		X		
		Niche Assessment Program											X			
		Neuro Startup Challenge		X					X					X		X
	National Heart Lung and Blood Institute (NHLBI)	NIH Centers for Accelerated Innovations (NCAI)	X			X				X	X	X	X	X		
		Research Evaluation and Commercialization Hubs (REACH)	X			X				X	X	X	X	X		
		SBIR Phase IIB Bridge Award	X			X					X					
		SBIR Phase IIB Small Market Award	X			X					X					

## CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

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## CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

Agency	Office	Program	Science and technology development							Enterprise development						
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		Bridging Interventional Development Gaps (BrIDGs)	X													
Centers for Disease Control and Prevention (CDC)	Office of the Director	Innovation Fund (iFund)	X			X				X						
		Ideation Catalyst (I-Catalyst)								X		X		X		
Program descriptions	CAP	Program goals: The NIH CAP mentors and assists the agency's most promising small life science and healthcare SBIR/STTR Phase II awardees in developing commercial businesses and transitioning SBIR/STTR-funded technologies into the marketplace.														
		Program activities: Offered annually, CAP provides selected participants with individualized assistance toward accomplishing key commercialization goals. The program assists participants in evaluating commercialization options based on their specific technologies (including the need and prospect for investment, strategic partnerships, or licensing) and in developing an 18-month market-entry plan. This is achieved through individual mentoring and consulting sessions, training workshops, access to domain experts, and focus on outcomes that will enhance the commercialization profile and readiness of participating awardees. The program is customized to meet the needs of participating companies in three distinct tracks: (1) Commercialization Transition Track (CTT) for emerging companies, (2) Advanced Commercialization Track (ACT), and (3) Regulatory/Reimbursement Training Track (RTT) for "seasoned" companies.														
		Website: <a href="https://sbir.nih.gov/cap">https://sbir.nih.gov/cap</a>														
	I-Corps at NIH	Program goals: Based on the NSF I-Corps program, I-Corps at NIH provides participants with real-world, hands-on entrepreneurship training in the life science and biotechnology sectors in order to accelerate the translation of innovations from the lab to clinical practice.														



## CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

Agency	Office	Program	Science and technology development							Enterprise development						
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			Program activities: I-Corps at NIH is offered to SBIR/STTR funded academic researchers and small businesses from across 17 NIH and CDC Institutes/Centers. Project teams include: (1) a C-Level Corporate Officer with decision-making authority; (2) an individual with a business development background in the target industry; and (3) the assigned PD/PI on the SBIR/STTR Phase I award. Selected teams receive funding through grant supplement awards to support entrepreneurial training, mentorship, and collaboration opportunities that assist them in translating their research ideas into viable products and overcoming key obstacles along the path of innovation and commercialization. At the beginning of the training program, the project teams attend an evening reception and intensive, 3-day "Entrepreneurial Immersion" course. Project teams then participate in an 8-week I-Corps training curriculum administered via online instruction. At the end of the course, each team attends a 2-day report-out session.													
			Website: <a href="https://sbir.cancer.gov/programseducation/icorps">https://sbir.cancer.gov/programseducation/icorps</a>													
	Niche Assessment Program		Program goals: The Niche Assessment Program provides small businesses with market insight and data to help them strategically position their technology in the marketplace.													
			Program activities: Technology Niche Analyses assess potential applications for a technology and then for one viable application, it provides an assessment of the: (1) needs and concerns of end-users; (2) competing technologies and competing products; (3) competitive advantage of the SBIR/STTR-developed technology; (4) market size and potential market share (may include national and/or global markets); (5) barriers to market entry (may include but is not limited to pricing, competition, government regulations, manufacturing challenges, capital requirements, etc.); (6) market drivers; (7) status of market and industry trends; (8) potential customers, licensees, investors, or other commercialization partners; and (9) the price customers are likely to pay.													
			Website: <a href="https://sbir.nih.gov/nap">https://sbir.nih.gov/nap</a>													
	Neuro Startup Challenge			Program goals: The Neuro Startup Challenge was a multi-phase business plan competition that leveraged NIH's significant portfolio of inventions available for licensing.												

## CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

Agency	Office	Program	Science and technology development							Enterprise development						
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		Program activities: The Center for Advancing Innovation (CAI) evaluated NIH's portfolio to identify those inventions with the strongest commercial viability. These inventions were eligible for use in the Neuro Startup Challenge. The Neuro Startup Challenge involved four phases. In Phase 0, teams outlined their intent to participate in the Neuro Startup Challenge by providing information regarding the invention they would develop their business plan around, details and backgrounds of the members of their team, and how team members met eligibility requirements. In Phase 1: Elevator Speech, teams developed a two-minute elevator speech via recorded video; a 350-word executive summary outlining potential commercial product(s); and a company vision. Winners of the phase moved on to Phase 2: Business Plan, in which the teams developed a 10-page business plan with a detailed financial plan and presented a 20 minute "live" pitch to the challenge judges. Winners of this phase received a \$2500 award as well as moved on to Phase 3: Startup. In Phase 3, teams launched their startups, including incorporation, applying for licenses, and executing other regulatory/developmental needs.														
		Website: <a href="http://www.neurostartupchallenge.org/">http://www.neurostartupchallenge.org/</a>														
	NCAI	Program goals: The NCAIs address the gap in the commercialization pipeline between scientific discovery and company formation in order to more rapidly and effectively move breakthrough innovations to available products with health, economic, and societal impact.														
		Program activities: NCAIs are unique public-private partnerships featuring expertise and resources from the federal government, academia, and the private-sector that change the way discoveries with scientific and commercial potential are identified and developed. NCAIs support proof-of-concept studies, educate academics on the technology development process, and provide early access to the scientific and business expertise needed for commercialization. NCAIs provide early mentoring to innovators to develop key business elements (legal, business development, regulatory, reimbursement, access to partners and capital). NCAIs address the knowledge and funding gaps for the early steps needed to translate novel discoveries and technologies into new diagnostics, devices, therapeutics, and tools for patient care by providing pilot funding, based upon a review process for scientific merit and commercial potential; resources and expertise, including business plan development, market research, and IP protection; and educational and networking activities and linkages to local ecosystem resources														
		Website: <a href="https://ncai.nhlbi.nih.gov/ncai/">https://ncai.nhlbi.nih.gov/ncai/</a>														
	REACH	Program goals: The REACHs accelerate the translation of scientific discovery into commercial products that improve health for patients.														

## CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

Agency	Office	Program	Science and technology development							Enterprise development						
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			Program activities: REACHs are unique public-private partnerships featuring expertise and resources from the federal government, academia, and the private-sector that change the way discoveries with scientific and commercial potential are identified and developed. The program gives upstream consideration to commercial and business issues and uses industry-style project management with go/no-go milestones to develop de-risked technologies with well-designed business cases primed for licensing or startup company formation. The program enables the development of self-sustaining biomedical technology development ecosystems that encourage the conversion of laboratory discoveries into products and services and disseminates best practices for translating academic innovations into new drugs, devices, and diagnostics to other agencies, institutions, and regions across the nation.													
			Website: <a href="https://ncai.nhlbi.nih.gov/ncai/">https://ncai.nhlbi.nih.gov/ncai/</a>													
	NHLBI SBIR Phase IIB Bridge Award		Program goals: NHLBI SBIR Phase IIB Bridge Awards facilitate and accelerate the capital-intensive steps that are required to transition SBIR/STTR Phase II projects to the commercialization stage by promoting partnerships between SBIR/STTR Phase II awardees and third-party investors and/or strategic partners.													
			Program activities: The Bridge Award encourages business relationships between applicant small business concerns and third-party investors/strategic partners who can provide substantial financing to help accelerate the commercialization of promising new products and technologies that were initiated with SBIR/STTR funding. Applicants are expected to leverage their previous SBIR/STTR support in conjunction with the NHLBI Bridge Award funds to attract and negotiate third-party financing needed to advance a product or technology toward commercialization. The applicant's ability to secure independent third-party investor funds that equal or exceed the total amount of the NHLBI funds being requested over the entire Bridge Award project period helps validate the commercial potential that is essential for the projects solicited under the Bridge Award program.													
			Website: <a href="http://www.nhlbi.nih.gov/research/funding/sbir/funding-opportunities/targeted-funding/bridge-award">www.nhlbi.nih.gov/research/funding/sbir/funding-opportunities/targeted-funding/bridge-award</a>													
	NHLBI SBIR Phase IIB Small Market Award		Program goals: The NHLBI SBIR Phase IIB Small Market Award provides support to Phase II SBIR or STTR awardees developing NHLBI mission-related technologies that address a rare disease or young pediatric populations.													

## CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

Agency	Office	Program	Science and technology development							Enterprise development						
			Tech. dev.	Tech. scouting	Govt. need	Financial support	Talent devt.	Standard setting	IP mgmt./ tech. transfer	Business training	Business networks	Business mentors and peers	Business services	Talent devt.	Liability protn.	Financial support
			Program activities: The Small Market Award encourages business relationships between applicants and third-party investors/strategic partners who can provide substantial financing to help accelerate the commercialization of promising new products and technologies that were initiated with SBIR/STTR funding. Applicants are expected to leverage their previous SBIR/STTR support, in conjunction with the NHLBI Small Market Award funds to attract and negotiate third-party financing needed to advance a technology toward commercialization. The applicant's ability to secure independent third-party investor funds that equal or exceed one-third of the NHLBI funds being requested over the entire project period helps validate the commercial potential that is essential for the projects solicited under this program. Projects supported by this award must require eventual Federal regulatory approval/clearance and be focused on commercializing biomedical technologies for rare diseases and/or young pediatric populations, and may address preclinical and/or clinical stages of technology development.													
			Website: <a href="http://www.nhlbi.nih.gov/research/funding/sbir/small-market-awards">www.nhlbi.nih.gov/research/funding/sbir/small-market-awards</a>													
	NCI SBIR Phase IIB Bridge Award		Program goals: NCI SBIR Phase IIB Bridge Awards support the next stage of development for federally funded SBIR Phase II projects in the areas of cancer therapeutics, imaging technologies, interventional devices, diagnostics, and prognostics.													
			Program activities: This award addresses the "Valley of Death" funding gap between the end of the SBIR Phase II award and the subsequent round of financing needed to advance a product or service toward commercialization for projects in the technical/scientific areas of cancer therapeutics; cancer imaging technologies, interventional devices, and in vivo diagnostics; and/or in vitro and ex vivo cancer diagnostics and prognostics. To achieve this goal, the funding opportunity incentivized partnerships between federally-funded SBIR Phase II awardees and third-party investors and/or strategic partners. Preference is given to applications deemed likely to result in a commercial product, as indicated by the applicant's ability to secure substantial independent third-party investor funds. Applicants must provide a commercialization plan that describes the long-term commercialization strategy and details on any independent third-party investor funding that has already been secured or will be provided during the Bridge Award project period.													
	SBIR FRAC Workshop		Website: <a href="https://sbir.cancer.gov/bridge">https://sbir.cancer.gov/bridge</a>													
		Program goals: The SBIR FRAC Workshop provides awardees an opportunity to learn how to utilize federal and local resources in order to advance commercialization.														
			Program activities: The NCI SBIR Development Center FRAC Workshop is a two-day event open to current NCI SBIR/STTR awardees. The workshop brings together representatives from federal agencies including the FDA, CMS, and BARDA, as well as experts from local and private organizations to share their expertise with attending companies. Attendees also have a chance to engage in one-on-one meetings with their respective Program Directors, as well as with speakers at the event.													

## CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

Agency	Office	Program	Science and technology development							Enterprise development						
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		Website: <a href="https://sbir.cancer.gov/node/277">https://sbir.cancer.gov/node/277</a>														
	Breast Cancer Startup Challenge	Program goals: The Breast Cancer Startup Challenge was a business plan and startup competition to accelerate the commercialization of inventions conceived and developed by NCI scientists and Avon Foundation grantees.														
		Program activities: The Breast Cancer Startup Challenge leveraged 10 research technologies that were judged to show great promise to advance breast cancer research. These inventions included therapeutics, diagnostics, prognostics, one device, one vaccine, one delivery system, and one health IT invention. Teams of business, legal, medical/scientific, engineering, computer science students and seasoned entrepreneurs evaluated these technologies to create business plans and start new companies to develop and commercialize them. Winners and finalists in the Breast Cancer Startup Challenge were not only recognized for creating a business plan and pitch, but were also invited to launch a startup, negotiate licensing agreements, and raise seed funding to further develop the inventions.														
		Website: <a href="http://www.breastcancerstartupchallenge.com/">http://www.breastcancerstartupchallenge.com/</a>														
	Nanotechnology Startup Challenge in Cancer	Program goals: The Nanotechnology Startup Challenge in Cancer is a business plan and startup competition that leverages inventions available for licensing from NCI to accelerate the translation and development of nanotechnology solutions for the early detection, diagnosis, and treatment of cancer.														
		Program activities: CAI evaluated NCI's portfolio to identify those inventions with the strongest commercial viability. These inventions were eligible for use in the Nanotechnology Startup Challenge in Cancer. The Nanotechnology Startup Challenge in Cancer involves four phases. In Phase 0, teams outline their intent to participate in the Nanotechnology Startup Challenge in Cancer by providing information regarding the invention they will develop their business plan around, details and backgrounds of the members of their team, and how team members meet eligibility requirements. In Phase 1: Elevator Speech, teams develop a two-minute elevator speech via recorded video; a 350-word executive summary outlining potential commercial product(s); and a company vision. Winners of Phase 1 move on to Phase 2: Business Plan, in which the teams develop a 10-page business plan with a detailed financial plan and present a 20 minute "live" pitch to the challenge judges. Winners of this phase receive a \$2000 award as well as move on to Phase 3: Startup. In Phase 3, teams launch their startups, including incorporation, applying for licenses, and executing other regulatory/developmental needs.														
		Website: <a href="http://www.nscsquared.org/">http://www.nscsquared.org/</a>														

## CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

Agency	Office	Program	Science and technology development							Enterprise development						
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	Invention Development Program	Program goals: The Invention Development Program accelerates the development of selected technologies through the early stages of validation to inform critical decision points in the patenting process.														
		Program activities: The Invention Development Program accelerates development of NCI's inventions by providing funding for studies conducted by Leidos Biomedical Research to demonstrate proof-of-principle. NCI identified 21 inventions from its portfolio that were in need of specific data to attract commercial interest. The inventions were evaluated based on uniqueness, patent status, public health benefit, stage of research, patent filing date, and cost. A review committee composed of NCI scientists with experience in drug development and preclinical validation reviewed the 21 inventions and selected eight inventions as top candidates for the program. The eight technologies that moved forward in the pilot program are in various phases of in vivo studies. Five inventions in the program have yielded actionable data so far.														
		Website: NA														
	TRND	Program goals: The TRND program supports pre-clinical development of therapeutic candidates intended to treat rare or neglected disorders, with the goal of enabling an Investigational New Drug (IND) application to the Food and Drug Administration (FDA).														
		Program activities: The TRND program encourages and speeds the development of new treatments for diseases with high unmet medical needs. The program advances the entire field of therapeutic development by encouraging scientific and technological innovations to improve success rates in the crucial pre-clinical stage of development. TRND stimulates therapeutic development research collaborations among NIH and academic scientists, nonprofit organizations, and pharmaceutical and biotechnology companies working on rare and neglected illnesses. The program provides NIH's rare and neglected disease drug development capabilities, expertise, clinical resources, and regulatory expertise to research partners to optimize promising therapeutics and move them through pre-clinical testing, with the goal to generate sufficient-quality data to support successful IND applications and first-in-human studies in limited circumstances.														
		Website: <a href="https://ncats.nih.gov/trnd">https://ncats.nih.gov/trnd</a>														
	BrIDGs	Program goals: The BrIDGs program enables research collaborations to advance candidate therapeutics for both common and rare diseases through late-stage pre-clinical development toward an IND application and clinical testing.														

## CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

Agency	Office	Program	Science and technology development							Enterprise development						
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Department of Homeland Security		Program activities: Investigators do not receive grant funds through this program. Instead, selected researchers partner with NCATS experts to generate pre-clinical data and clinical-grade material through government contracts for use in IND applications to a regulatory authority such as the FDA. BrIDGs provides synthesis, formulation, pharmacokinetic and toxicology expertise and resources to its collaborators.														
		Website: <a href="https://ncats.nih.gov/bridgs">https://ncats.nih.gov/bridgs</a>														
	iFund	Program goals: The iFund supports the design and development of innovations that show promise for making a substantial impact on public health and how the CDC accomplishes its mission.														
		Program activities: The iFund seeks to promote the inventiveness and creativity of the CDC community in the design and development of new innovations which show promise for making a substantial impact on public health and how we accomplish our mission. The iFund provides intramural funding and support to CDC staff to develop initial proof of concept "prototypes" and pilot projects, or scale up more mature projects that have been proven effective through pilot or replication studies.														
		Website: <a href="https://www.cdc.gov/od/science/technology/innovation/innovationfund.htm">https://www.cdc.gov/od/science/technology/innovation/innovationfund.htm</a>														
	I-Catalyst	Program goals: I-Catalyst program trains CDC scientists to transform ideas into solutions.														
		Program activities: I-Catalyst is an internal innovation training program intended to help CDC teams transform ideas into solutions. I-Catalyst is designed to help teams get their ideas out of the starting blocks and down the track through a discovery, ideation, and prototyping process. I-Catalyst is based on the NSF's successful I-Corps program.														
		Website: NA														

## CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

Agency	Office	Program	Science and technology development							Enterprise development						
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Science and Technology Directorate (S&T)	Office of Research and Development Partnerships (RDP)	Support Anti-Terrorism by Fostering Effective Technologies Act (SAFETY Act)													X	
		Technology Scouting and Horizon Scanning		X	X											
		Centers of Excellence (COEs)	X		X	X	X									
	Homeland Security Advanced Research Projects Agency (HSARPA)	HSARPA	X		X	X										
		Transition to Practice Program (TPP)	X						X			X	X	X		
		Homeland Security Innovation Program (HSIP)	X		X	X			X		X	X				
		Silicon Valley Office (SVO)	X		X	X					X					



## CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

Agency	Office	Program	Science and technology development							Enterprise development						
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	Support to the Homeland Security Enterprise and First Responders Group (FRG)	EMERGE Accelerator			X					X		X				
Program descriptions	SAFETY Act	Program goals: The SAFETY Act aims to designate anti-terrorism technologies that qualify for protection under the system of risk management. The program incentivizes the private sector to commit additional resources to significantly improve anti-terrorism preparedness and resiliency by reducing private sector risk and liability for developing anti-terrorism technologies.														
		Program activities: This program provides liability protections for claims resulting from an act of terrorism and provides legal liability protection for providers of qualified anti-terrorism technologies. The SAFETY Act provides two levels of liability protections: (1) designation, where the seller's liability for products or services is limited to the amount of liability insurance that the Department of Homeland Security (DHS) determines the seller must maintain; and (2) certification, which allows a seller of anti-terrorism technology to assert the Government Contractor Defense for claims arising from acts of terrorism.														
		Website: https://www.safetyact.gov/pages/homepages/Home.do														
	Technology Scouting and Horizon Scanning	Program goals: Technology Scouting aims to provide DHS S&T with a foundation for program decisions and help shape program priorities. Technology scouting shapes the way DHS S&T discovers, monitors, and assesses new and emerging technologies critical to homeland security. The program goals are to improve the availability of technology alternatives, increase the speed of project execution, and reduce costs for projects.														
		Program activities: The technology scouting program provides program managers with a better understanding of the state of technology, including new and emerging technology, market analysis, and private sector innovation landscapes. The program does this in two ways: (1) technology scouting, which maps patent landscapes, finds federal laboratory technology, analyzes venture capital firms, and looks across relevant markets for a technology that will meet S&T needs; and (2) horizon scanning, which maintains constant awareness of the technology space to inform project managers of impactful breakthroughs or alternatives.														
Website: https://www.dhs.gov/publication/technology-scouting-and-horizon-scanning																

## CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

Agency	Office	Program	Science and technology development							Enterprise development						
			Tech. devt.	Tech. scouting	Govt. need	Financial support	Talent devt.	Standard setting	IP mgmt./ tech. transfer	Business training	Business networks	Business mentors and peers	Business services	Talent devt.	Liability protn.	Financial support
	COEs	Program goals: COEs establish a coordinated, university-based system to enhance the nation's homeland security.														
		Program activities: COEs develop multidisciplinary, customer-driven, innovative tools and technologies to solve real-world homeland security challenges and help train the next generation of homeland security experts. The COEs assist the homeland security community with specialized research, expertise, and facilities. Each COE focuses on a specific set of DHS-relevant challenges and addresses these challenges with multidisciplinary, customer-driven research and technology development. The COEs also provide their knowledge and technology to assist in rapid response and emergency operations.														
		Website: <a href="https://www.dhs.gov/science-and-technology/centers-excellence">https://www.dhs.gov/science-and-technology/centers-excellence</a>														
	HSARPA	Program goals: HSARPA awards competitive, merit-reviewed grants, cooperative agreements, or contracts to public or private entities, including businesses, federally funded research and development centers, and universities that support basic and applied homeland security research that promotes revolutionary changes in technologies.														
		Program activities: HSARPA conducts analysis to understand current missions, systems and processes and helps identify operational gaps where new technologies can have the most impact. HSARPA develops, tests and evaluates these new homeland security technologies and capabilities. HSARPA delivers usable, scalable, cost-effective, mission-focused capabilities to DHS components and other homeland security enterprise partners. The team also advises partners on science, technology, and industry developments with respect to mission, threats, and opportunities.														
		Website: <a href="https://www.dhs.gov/science-and-technology/hsarpa">https://www.dhs.gov/science-and-technology/hsarpa</a>														
	TPP	Program goals: TPP aims to (1) identify mature technologies that address an existing or imminent cybersecurity gap in public or private systems that impacts national security; (2) increase use through partnerships, product development efforts, and marketing strategies; and (3) improve the long-term ability for federal government research labs to transition technology more efficiently.														
Program activities: TTP conducts tech foraging to identify promising cybersecurity technologies from several sources of federally funded R&D. Approximately eight new technologies are selected by TTP every year. The TTP transition process includes training, market validation, testing and evaluation, pilot deployment, and outreach. Technologies are introduced to potential partners, investors, and integrators, and showcased at a national series of Technology Demonstration Days. TTP supports multiple paths to transition, including open source, licensing, startups, adoption by cyber operators, and government use.																

## CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

Agency	Office	Program	Science and technology development							Enterprise development						
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		Website: <a href="https://www.dhs.gov/science-and-technology/csd-ttp">https://www.dhs.gov/science-and-technology/csd-ttp</a>														
	HSIP	Program goals: HSIP generates innovation in hubs around the nation and the world to solve DHS’s most difficult challenges. The program aims to use existing procurement authorities to mirror the process and pace of Silicon Valley and other innovative investment communities.														
		Program activities: HSIP uses Innovation Other Transaction Solicitations (OTs) to work with non-traditional performers. These Innovation OTs are open to all innovation ecosystems and offer up to \$800k in funding over 24 months. The Innovation OTS program offers several advantages to performers, including the government as an early adopter, no dilution of ownership, and pilots and operator feedback. The HSIP regional programs help companies better understand DHS, S&T, DHS components, the homeland security mission, and how innovation corridors can help the government solve problems across the Homeland Security Enterprise.														
		Website: <a href="https://www.dhs.gov/science-and-technology/hsip">https://www.dhs.gov/science-and-technology/hsip</a>														
	SVO	Program gals: The DHS SVO cultivates a pipeline for non-traditional partners who have typically never done business with the government to develop solutions for the toughest homeland security challenges.														
		Program activities: The SVO helps DHS keep pace with the innovation community in order to tackle the hardest problems faced by the DHS. SVO cultivates relationships with technology companies from small startups to larger firms, incubators and accelerators, to help them better understand DHS's operational mission. SVO also co-invests in promising technologies to accelerate transition to market, demonstrate, and pilot near-term technologies that could better protect the homeland, fund new research and development using forward-leaning acquisition methods (such as accelerators and prize competitions), and transition emerging innovative technology into DHS programs and the Homeland Security Enterprise.														
		Website: <a href="https://www.dhs.gov/publication/silicon-valley-office">https://www.dhs.gov/publication/silicon-valley-office</a>														
	EMERGE Accelerator	Program goals: EMERGE is a pilot for entrepreneurs designed to accelerate the development of technologies that address the unique needs of first responders by providing early market validation, test and evaluation opportunities, and paths to introduce those technologies to a variety of markets, including partners in the public sector.														

## CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

Agency	Office	Program	Science and technology development							Enterprise development						
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		Program activities: EMERGE participants are provided with business development education and connected with mentors to produce next generation innovative wearable technology. The EMERGE Accelerator program works with the Center for Innovation Technology and business accelerators TechNexus and Tech Wildcatters, to educate the investment, entrepreneurial, and startup communities on these specific homeland security needs. In 2015, the program selected around twenty startups and second-stage companies from roughly a hundred candidates. In 2016, the program selected 10 startups from over 260 candidates and worked with over 200 accelerators, incubators, and university partners across 149 cities.														
		Website: <a href="https://www.dhs.gov/publication/emerger-accelerator-program">https://www.dhs.gov/publication/emerger-accelerator-program</a>														
Department of Transportation																
Federal Highway Administration (FHWA)	Office of Innovative Program Delivery	State Transportation Innovation Council (STIC) Incentive Program		X	X	X						X				
		Every Day Counts (EDC) Program		X	X							X			X	
		Accelerated Innovation Deployment (AID) Demonstration Program		X	X											X
Program descriptions	STIC Incentive Program	Program goals: The STIC Incentive Program offers technical assistance and resources to support the standardization of innovative practices among state transportation agencies and other public sector stakeholders.														

## CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

Agency	Office	Program	Science and technology development							Enterprise development						
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		Program activities: The STIC Incentive Program provides up to \$100,000 per State per Federal fiscal year to STICs to support or offset the costs of standardizing innovative practices in a State transportation agency (STA) or other public sector STIC stakeholder. STIC Incentive Program funding may be used to conduct internal assessments; build capacity; develop guidance, standards, and specifications; implement system process changes; organize peer exchanges; offset implementation costs; or conduct other activities the STIC identifies to address Technology and Innovation Deployment Program (TIDP) goals.														
		Website: <a href="https://www.fhwa.dot.gov/innovation/stic/">https://www.fhwa.dot.gov/innovation/stic/</a>														
	EDC Program	Program goals: The EDC Program is a state-based model for the identification and rapid deployment of proven but underutilized innovations to shorten the project delivery process, enhance roadway safety, reduce congestion, and improve environmental sustainability.														
		Program activities: Every two years FHWA works with state and local transportation agencies and industry stakeholders to select a new collection of innovations to champion based on market readiness, impacts, benefits, and ease of adoption. Transportation leaders from across the country gather at regional summits to discuss the EDC technologies for deployment, identify the innovations that make the most sense for their unique program needs, establish performance goals, and commit to finding opportunities to get those innovations into practice over the next two years. Throughout the two-year deployment cycle, specifications, best practices, lessons learned, and relevant data are shared among stakeholders through case studies, webinars, and demonstration projects.														
		Website: <a href="https://www.fhwa.dot.gov/innovation/everydaycounts/">https://www.fhwa.dot.gov/innovation/everydaycounts/</a>														
	AID Demonstration Program	Program goals: The AID Demonstration program provides incentive funding for eligible entities to accelerate the implementation and adoption of innovations in highway transportation.														
		Program activities: The AID Demonstration program provides funding to state departments of transportation (DOTs), federal land management agencies, and tribal governments that covers the cost of implementation and adoption of an innovation being deployed in a highway transportation project. AID Demonstration projects may involve any phase of a highway transportation project between project planning and project delivery including planning, financing, operation, structures, materials, pavements, environment, and construction and must include an innovation proven as a real-world highway transportation application but not routinely used by the applicant.														
		Website: <a href="https://www.fhwa.dot.gov/innovation/grants/">https://www.fhwa.dot.gov/innovation/grants/</a>														

## CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

Agency	Office	Program	Science and technology development							Enterprise development						
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Environmental Protection Agency																
Agency Wide		Environmental Technology Innovation Clusters	X	X							X					
Office of Water		WaterSense	X					X								
Office of Air and Radiation		SmartWay	X					X			X		X			
		ENERGY STAR®	X					X								
		Continuous Emissions Monitoring Performance Specifications	X					X								
Office of Research and Development		Roadmap for Next Generation Air Monitoring	X	X	X		X		X		X					
Program descriptions	Environmental Technology Innovation Clusters	Program goals: The Environmental Protection Agency's (EPA) Environmental Technology Innovation Clusters program supports community-based business clusters that seek to solve water problems and create jobs at the same time through the development and deployment of innovative water technologies.														

## CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

Agency	Office	Program	Science and technology development							Enterprise development						
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		Program activities: Environmental Technology Innovation Clusters are regional groupings of businesses, government, research institutions, and other organizations focused on innovative technologies for clean water. The program serves cluster organizations in an advisory role by disseminating best practices in cluster development, communicating EPA environmental priorities such as the Blueprint for Integrating Technology Innovation into the National Water Program, and convening cluster organization leaders. The program maintains a national inventory of water technology SBIR awards across eight agencies. The U.S. Small Business Administration and the U.S. Department of Commerce are full partners in this effort.														
		Website: https://www.epa.gov/clusters-program														
	WaterSense	Program goals: WaterSense aims to transform the marketplace for products and services that use water, and promote a nationwide ethic of water efficiency to conserve water resources for future generations and reduce water and wastewater infrastructure costs. The program encourages water efficiency in the United States through the use of a special label on consumer products.														
		Program activities: The EPA provides and maintains the WaterSense brand and develops national specifications for water-efficient products and programs through agreement and partnerships with interested stakeholders, such as product manufacturers, retailers, and water utilities. EPA requires all products bearing the WaterSense label to be assessed for conformance to the relevant WaterSense product specification by an accredited third-party product certifying body. Accredited product certifying bodies are licensed by EPA to certify that products conform to applicable specifications and to authorize the use of the WaterSense label in conjunction with the certified product.														
		Website: https://www.epa.gov/watersense														
	SmartWay	Program goals: SmartWay is a partnership with the private sector to achieve better environmental outcomes, save money, and drive technical innovation through improved efficiency in moving goods across commercial supply chains.														
Program activities: SmartWay helps U.S. businesses (freight shippers, carriers, logistics companies) innovate and lean their goods movement with tools, methods and technical advice that businesses rely upon to measure, benchmark and improve efficiency across freight supply chains. SmartWay technology verification and branding works with manufacturers and suppliers to accelerate the availability, adoption and market penetration of cleaner, fuel-saving technologies and operational practices. SmartWay also advances technical capacity for U.S. companies with overseas supply chains, by working to harmonize global sustainability accounting methods. More than 3,600 companies and over 400 trade associations and other organizations participate in SmartWay, along with dozens of manufacturers and suppliers.																

## CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

Agency	Office	Program	Science and technology development							Enterprise development						
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		Website: <a href="https://www.epa.gov/smartway">https://www.epa.gov/smartway</a>														
	ENERGY STAR®	Program goals: ENERGY STAR® is the government-backed symbol for energy efficiency, providing simple, credible, and unbiased information that consumers and businesses rely on to make well-informed decisions. It is a voluntary program that aims to identify and promote energy-efficient products and buildings in order to reduce energy consumption, improve energy security, and reduce emissions through voluntary labeling or other forms of communication about products and buildings that meet the highest energy efficiency standards.														
		Program activities: ENERGY STAR boosts the adoption of energy efficient products, practices, and services through valuable partnerships, objective measurement tools, and consumer education. For products, ENERGY STAR ensures that each product that earns the label is independently certified to deliver the quality, performance, and savings that consumers have come to expect. ENERGY STAR has also developed energy performance rating systems for several commercial and institutional building types and manufacturing facilities, which provide a means for benchmarking the energy efficiency of specific buildings and industrial plants against the energy performance of similar facilities. For buildings and plants, ENERGY STAR tools and resources help businesses determine cost-effective approaches to managing energy use in their buildings and plants—enabling the private sector to save energy, increase profits, and strengthen their competitiveness. The program includes an online tool, ENERGY STAR Portfolio Manager®, that calculates an ENERGY STAR score for commercial buildings, which has become the industry standard for rating a facility's energy performance.														
		Website: <a href="https://www.energystar.gov/">https://www.energystar.gov/</a>														
	Continuous Emissions Monitoring Performance Specifications	Program goals: These specifications set continuous emissions monitoring performance specifications and quality assurance procedures for governing the installation, performance, and continued operation of continuous emissions monitoring systems (CEMS) used to determine continuous compliance with air emissions standards for stationary sources of air pollution. These CEMS performance specifications and quality assurance procedures are designed to be as performance-based as possible to allow for the introduction of new and innovative monitoring technologies into the marketplace.														



## CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

Agency	Office	Program	Science and technology development							Enterprise development						
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		Program activities: EPA's CEMS Performance Specifications and QA Procedures currently address: (1) Clean Air Act criteria pollutants including particulate matter, sulfur dioxide, nitrogen oxides, carbon monoxide, and total volatile organic compounds, (2) hazardous air pollutants (HAP) including mercury, hydrogen chloride, hydrogen sulfide, and speciated gaseous HAP organics, and (3) the diluent gases. Future projects will aim to refine performance specifications for Fourier-Transform Infrared technology for monitoring of multiple HAP simultaneously and expand the current gaseous hydrogen chloride (HCl) performance specifications to cover additional inorganic gases.														
		Website: <a href="https://www.epa.gov/emc/performance-specifications-and-other-monitoring-information">https://www.epa.gov/emc/performance-specifications-and-other-monitoring-information</a>														
	Roadmap for Next Generation Air Monitoring	Program goals: The Roadmap for Next Generation Air Monitoring summarizes major findings about the Next Generation of Air Monitoring (NGAM), particularly sensor technology. It focuses on three near-term goals: (1) promoting the development of affordable, near source, fenceline monitoring technologies and sensor network-based leak detection systems; (2) supplementing air quality monitoring networks through development of low cost, reliable air quality monitoring technology; and (3) supporting environmental justice communities and citizen science efforts to measure air pollution in local areas.														
		Program activities: The Roadmap proposes research and other activities in each of these three areas: (1) Technology Development, Testing, and Integration; (2) Technology Demonstration, Outreach and Communication Strategies; and (3) IT infrastructure and New Data Streams.														
Website: <a href="https://www.epa.gov/sites/production/files/2014-09/documents/roadmap-20130308.pdf">https://www.epa.gov/sites/production/files/2014-09/documents/roadmap-20130308.pdf</a>																
National Aeronautics and Space Administration																
Private Business - From Multi Federal Agency Initiative, including the National Aeronautics and Space Administration (NASA)		LAUNCH	X				X				X	X				
NASA-Initiated Public/Private Partnership		Space Race		X					X	X		X		X		X

## CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

Agency	Office	Program	Science and technology development							Enterprise development						
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Human Exploration and Operations Mission Directorate	Advanced Exploration Systems Division	Next Space Technologies for Exploration Partnerships (NextSTEP)	X		X	X					X					
Space Technology Mission Directorate	Technology Demonstration Missions	X	X	X												
	Flight Opportunities	X	X	X												
	Centennial Challenges	X	X	X											X	
	Regional Economic Development (RED)	X	X	X						X			X			
	Technology Transfer Program	QuickLaunch							X							
		Startup NASA	X	X					X							X
		NASA Software Catalog		X					X							

## CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

Agency	Office	Program	Science and technology development							Enterprise development						
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		Technology Transfer University (T2U)								X				X		
Program descriptions	LAUNCH	Program goals: LAUNCH aims to build and nurture a community of innovators, thought leaders and decision makers across value chains to collectively understand, articulate, and scale solutions for positive systems change leading to a more sustainable society.														
		Program activities: LAUNCH is a network-centered innovation platform that convenes and curates networks of individuals and organizations. LAUNCH coordinates system-wide collaborations to address complex challenges through its curated network of innovators and thought leaders. LAUNCH Network members help shape LAUNCH's challenge statements, recruit and select innovators, provide pro-bono innovator support and mentorship, and join a coalition of the committed to actively shepherd change.														
		Website: <a href="http://www.launch.org/">http://www.launch.org/</a>														
	Space Race	Program goals: Space Race fostered new startup companies and encouraged adoption of NASA technologies, by teaming with CAI to run a multi-phase business plan competition in 2016. The competition leveraged NASA's new prgoram – "Startup NASA" – to create space technology spin-offs.														
		Program activities: CAI reviewed NASA's portfolio of technologies and identified those that have near-term commercialization potential. CAI held a challenge for teams to explore the market potential of the technologies and write business plans. The winners of the competition were awarded a cash prize, provided by third-party venture capital investors, and encouraged to incorporate and pursue licensing the technologies from NASA, using their winnings as seed funding for the new business. The challenge was supported by a startup accelerator designed to provide training and expert mentorship to all participants.														
		Website: <a href="https://www.space-race.org/">https://www.space-race.org/</a>														
	NextSTEP	Program goals: The NextSTEP program is a public-private partnership model that encourages commercial development of deep space exploration capabilities to support more extensive human spaceflight missions in the Proving Ground around and beyond cislunar space—the space near Earth that extends just beyond the moon.														

## CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

Agency	Office	Program	Science and technology development							Enterprise development						
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		Program activities: NextSTEP stimulates the commercial space industry to help NASA achieve its strategic goals and objectives for expanding the frontiers of knowledge, capability, and opportunities in space. The NextSTEP partnership model provides an opportunity for NASA and industry to partner to develop capabilities that meet NASA human space exploration objectives while also supporting industry commercialization plans. Through these public-private partnerships, NextSTEP partners provide advance concept studies and technology development projects in the areas of advanced propulsion, habitation systems, and small satellites.														
		Website: <a href="https://www.nasa.gov/nextstep">https://www.nasa.gov/nextstep</a>														
	Technology Demonstration Missions	Program goals: Technology Demonstration Missions seek to mature crosscutting, laboratory-proven technologies—ones that could radically advance NASA's mission in space and reap untold benefits for science and industry here on Earth—to flight-ready status.														
		Program activities: The Technology Demonstration Mission program focuses on crosscutting technologies with strong customer interest that meet the needs of NASA and industry by enabling new missions or greatly enhancing existing ones. Chosen technologies are thoroughly ground- and flight-tested in relevant operating environments—reducing risks to future flight missions, gaining operational heritage and continuing NASA's long history as a technological leader.														
		Website: <a href="https://www.nasa.gov/mission_pages/tdm/main/index.html">https://www.nasa.gov/mission_pages/tdm/main/index.html</a>														
	Flight Opportunities	Program goals: The Flight Opportunities program advances innovative space technologies of interest to NASA while also stimulating the growth and use of the U.S. commercial spaceflight industry as well as supporting capability development in the suborbital and orbital small satellite launch vehicle market.														
		Program activities: The program provides access to space-relevant environments through the use of commercial reusable suborbital launch vehicles, rocket-powered vertical takeoff, vertical landing platforms, high-altitude balloons and parabolic aircraft flights. The program entails two activities. Through Suborbital Flight Testing and Capability Development, NASA selects promising technologies from industry, academia and government, and tests them on commercial suborbital platforms. This approach takes technologies from a laboratory environment and gives them flight heritage, increasing their Technology Readiness Level (TRL), while also nurturing the development of U.S. commercial spaceflight capabilities, services, and skills. Through Small Launch Vehicle Technology Development, NASA uses public-private partnerships to accelerate the development of commercial capabilities that enable the frequent launch of small satellites to low Earth orbit (LEO) at a cost per kilogram of payload much lower than currently available.														
Website: <a href="https://www.nasa.gov/directorates/spacetech/flightopportunities/index.html">https://www.nasa.gov/directorates/spacetech/flightopportunities/index.html</a>																

## CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

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	Centennial Challenges	Program goals: Centennial Challenges directly engage the public in the process of advanced technology development by offering incentive prizes to generate revolutionary solutions to problems of interest to NASA and the nation.														
		Program activities: The program seeks innovations from diverse and non-traditional sources. Competitors are not supported by government funding and awards are only made to successful teams when the challenges are met. The Centennial Challenge prizes are offered to independent inventors including small businesses, student groups, and individuals. These independent inventors are sought to generate innovative solutions for technical problems of interest to NASA and the nation and to provide them with the opportunity to stimulate or create new business ventures.														
		Website: <a href="https://www.nasa.gov/directorates/spacetech/centennial_challenges/index.html">https://www.nasa.gov/directorates/spacetech/centennial_challenges/index.html</a>														
	RED	Program goals: The RED program creates, contributes to, catalyzes, and supports economic and innovative ecosystems across the country through strategic regional partnerships with external public and private sector organizations in business sectors of critical importance to the region of interest.														
		Program activities: The RED process is different in every region, but follows four general steps in order to be successful. In Step One: "Asset Inventory," an inventory of the regional and federal assets is conducted. In Step Two: "Market Analysis and Vision Gathering," an industry and market analysis is conducted to understand what opportunities both provide. In Step Three: "Demonstration Projects," the regional players are brought together to determine common goals and alignment between industry and NASA, as well as what assets can be utilized and how they are linked. Demonstration projects include technology showcases, technology interchange forums, technology roadshows, technology docking, and NASA Executive-in-Residence programs. In Step Four: "Ecosystem Sustainability," the motivation is expected to come from the ecosystem and its customers.														
		Website: <a href="https://www.nasa.gov/directorates/spacetech/regional_economic_development">https://www.nasa.gov/directorates/spacetech/regional_economic_development</a>														
	QuickLaunch	Program goals: QuickLaunch allows NASA to quickly turn license applications into license agreements and transfer technologies to the licensee.														
		Program activities: NASA offers a specially selected portfolio of technologies available for commercial nonexclusive licensing. QuickLaunch licenses have a set initial fee, annual royalty, and standard terms. For many technologies, licensees may request an evaluation license for a short term prior to requesting a commercial license.														
		Website: <a href="https://quicklaunch.nasa.gov/about.php">https://quicklaunch.nasa.gov/about.php</a>														

## CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

Agency	Office	Program	Science and technology development							Enterprise development						
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	Startup NASA	Program goals: Startup NASA offers licenses with no up-front costs for commercial use of NASA's patented technologies.														
		Program activities: Startup NASA licenses waives initial licensing fees and require no minimum fees for the first three years. Once a company starts selling a product, NASA collects a standard net royalty fee. This allows companies to hold onto their cash while securing the intellectual property needed to carve out competitive market space. Startup NASA licenses are only available for U.S. companies formed with the express intent of commercializing the licensed NASA technology. The startup agreement applies only to non-exclusive licenses, which means other companies may apply for similar rights to use the technology for commercial purposes. Companies entering into these licenses must develop a commercialization plan and report on efforts to achieve practical application. Startup NASA qualifying technologies have been vetted for technical and commercial viability by NASA and external sources. In addition, licensees have access to NASA technical personnel and facilities for additional support.														
		Website: <a href="https://technology.nasa.gov/startup">https://technology.nasa.gov/startup</a>														
	NASA Software Catalog	Program goals: The NASA Software Catalog offers an extensive portfolio of software products for a wide variety of technical applications, all free of charge to the public, without any royalty or copyright fees.														
		Program activities: The catalog has contributions from all of NASA's centers on data processing/storage, business systems, operations, propulsion, and aeronautics. It includes many of the tools NASA uses to explore space and broaden our understanding of the universe. Each catalog entry is accompanied with a plain language description of what it does. The NASA Software Catalog was the first comprehensive listing of publicly available software to be compiled by a federal government agency -- the largest creator of custom code. While access restrictions apply to some codes, NASA has automated and updated its software release process to ensure that it is as quick, easy, and straightforward as possible.														
		Website: <a href="https://software.nasa.gov/">https://software.nasa.gov/</a>														
	T2U	Program goals: T2U brings real-world, NASA-proven technologies into the classroom so that business students can practice creating market assessments and business plans for high-tech patents.														

## CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

Agency	Office	Program	Science and technology development							Enterprise development						
			Tech. devt.	Tech. scouting	Govt. need	Financial support	Talent devt.	Standard setting	IP mgmt./ tech. transfer	Business training	Business networks	Business mentors and peers	Business services	Talent devt.	Liability protn.	Financial support
		Program activities: In this program, business students have access to the NASA scientists and innovators, giving them a unique look into the fine-grained details of the technology they are working on. Through the T2U program, NASA field centers across the country engage business schools and hundreds of students each year. T2U educates young entrepreneurs about the benefits of using federal government research and development assets in commercial applications.														
		Website: <a href="https://technology.nasa.gov/t2u">https://technology.nasa.gov/t2u</a>														
National Science Foundation																
Directorate for Engineering	Division of Industrial Innovation and Partnerships (IIP)	Innovation Corps Program (I-Corps™)								X	X	X		X		
		Industry-University Cooperative Research Centers Program (IUCRC)	X					X				X				
		Partnerships for Innovation: Building Innovation Capacity (PFI:BIC)	X				X					X				

## CHAPTER 8 | Invention, Knowledge Transfer, and Innovation

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		Partnerships for Innovation: Accelerating Innovation Research-Technology Translation (PFI:AIR-TT)	X			X				X				X		
		Grant Opportunities for Academic Liaison with Industry (GOALI)	X			X	X				X					
	Division of Engineering Education and Centers (EEC)	Engineering Research Centers (ERC)	X				X		X		X					
Program descriptions	I-Corps™	Program goals: The I-Corps Program aims to foster entrepreneurship that will lead to the commercialization of technology that has been supported previously by NSF-funded research. The program provides entrepreneurial education for federally-funded scientists and engineers, pairing them with business mentors for an intensive curriculum focused on discovering a demand-driven path from their lab work to a marketable product.														



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			Program activities: There are three distinct components of I-Corps: Teams, Nodes, and Sites. I-Corps Teams include NSF-funded researchers who will receive additional support—in the form of mentoring and funding—to accelerate innovation that can attract subsequent third-party funding. Nodes serve as hubs for education, infrastructure, and research that engage academic scientists and engineers in innovation; they also deliver the I-Corps Curriculum to I-Corps Teams. I-Corps Sites are academic institutions that catalyze the engagement of multiple, local teams in technology transition and strengthen local innovation.													
			Website: <a href="https://www.nsf.gov/news/special_reports/i-corps/">https://www.nsf.gov/news/special_reports/i-corps/</a>													
	IUCRC		Program goals: The IUCRC program enables industrially-relevant, pre-competitive research via multi-member, sustained partnerships among industry, academe, and government. The NSF invests in these partnerships to promote research programs of mutual interest to industry members and Center faculty, to contribute to the nation's research infrastructure base, to enhance the intellectual capacity of the engineering or science workforce through the integration of research and education, and to facilitate technology transfer.													
			Program activities: The IUCRC program seeks to achieve its goals by: (1) contributing to the nation's research enterprise by developing long-term partnerships among industry, academia, and government; (2) leveraging NSF funds with industry to support graduate students performing industrially-relevant pre-competitive research; (3) expanding the innovation capacity of our nation's competitive workforce through partnerships between industries and universities; and (4) encouraging the nation's research enterprise to remain competitive through active engagement with academic and industrial leaders throughout the world.													
			Website: <a href="https://www.nsf.gov/eng/iip/iucrc/home.jsp">https://www.nsf.gov/eng/iip/iucrc/home.jsp</a>													
	PFI:BIC		Program goals: PFI:BIC supports interdisciplinary academic-industry partnerships that carry out research to advance, adapt, and integrate technology(ies) into specified, human-centered smart service systems with the potential to achieve transformational change in an existing service system or to spur an entirely new service system. These partnerships are led by an interdisciplinary academic research team with at least one industry partner. The PFI:BIC program places a heavy emphasis on the quality, composition, and participation of the partners, including their appropriate contributions.													
		Program activities: PFI:BIC funds research partnerships working on projects that operate in the post-fundamental/translational space that require additional effort to integrate the technology into a real service system, one that can identify, learn, adapt, and make decisions. The research tasks in turn can spawn additional discoveries inspired by this interaction of humans with the technology. The research components included in these projects are engineered system design and integration; computing, sensing, and information technologies; and human factors, behavioral sciences, and cognitive engineering.														

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		Website: <a href="https://www.nsf.gov/eng/iip/pfi/bic.jsp">https://www.nsf.gov/eng/iip/pfi/bic.jsp</a>														
	PFI:AIR-TT	Program goals: The PFI:AIR-TT program supports research to overcome technology barriers or knowledge gaps in the transformation of fundamental science and engineering discoveries into market-valued solutions.														
		Program activities: PFI:AIR-TT enables the translation of research discoveries along a path toward commercial reality while engaging faculty and students in entrepreneurial and market-oriented thinking, leveraging prior NSF investments, and providing NSF-funded research alliances the opportunity to develop academic-based innovation ecosystems. Researchers are expected to develop a proof of concept, prototype, or scale-up of the prototype that addresses real-world constraints and provides a competitive value in a potential application space. During the course of the AIR-TT award, it is also expected that the team will advance their understanding of business as it relates to their technology, and that students are engaged to learn about innovation and technology translation.														
		Website: <a href="https://www.nsf.gov/eng/iip/pfi/air-tt.jsp">https://www.nsf.gov/eng/iip/pfi/air-tt.jsp</a>														
	GOALI	Program goals: GOALI promotes university-industry collaboration by making project funds or fellowships/traineeships available to support an eclectic mix of industry-university linkages across the Foundation. By increasing the number of industrial partnerships and collaborations, NSF aims to improve the nation's capacity for intellectual and economic growth. By serving as a catalyst for industry-university partnerships, NSF helps ensure that intellectual capital and emerging technologies are brought together in ways that promote economic growth and an improved quality of life.														
		Program activities: Academic scientists and engineers can request GOALI funding either in conjunction with a regular proposal submitted to a standing NSF program or as a supplemental funding request to an existing NSF-funded award. NSF funding can be used for university research/education activities and may support activities of faculty and their students and research associates in the industrial setting. NSF funds are not permitted to be used to support the industrial research partner. GOALI projects focus on research that addresses shared interests by academic researchers and industrial partners. The research furthers scientific and engineering foundations to enable future breakthrough technologies with the potential to address critical industry needs.														
		Website: <a href="https://www.nsf.gov/eng/iip/goali.jsp">https://www.nsf.gov/eng/iip/goali.jsp</a>														

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	ERC	Program goals: ERCs support basic and translational research on national priorities such as water, clean energy, biotechnology and healthcare, advanced manufacturing, and critical civil infrastructure. The program aims to integrate engineering research and education with technological innovation to transform national prosperity, health, and security. ERCs create an innovative, inclusive culture in engineering to cultivate new ideas and pursue engineering discovery that achieves a significant science, technology, and societal outcome within the 10-year timeframe of NSF support.														
		Program activities: The ERC program has three key elements: (1) cross-disciplinary and systems-oriented research; (2) education and outreach; and (3) industrial collaboration and technology transfer. Each ERC is established as a three-way partnership involving academe, industry, and NSF (in some cases with the participation of state, local, and/or other federal government agencies). Total annual funding for each Center ranges from \$3.1 to \$19.4 million, with NSF's contribution ranging from \$1.8 to \$4 million per year, averaging \$3 million per year.														
		Website: <a href="http://erc-assoc.org/">http://erc-assoc.org/</a>														

Govt. need = government need; IP mgmt./ tech. transfer = intellectual property management/ technology transfer; Liability protn. = liability protection; NA = not available; Talent devt. = talent development; Tech. devt. = technology development; Tech. scouting = technology scouting.

### Note(s)

The table summarizes policy and program information collected during the spring and fall of 2017 from federal staff for a selected set of U.S. agencies with major R&D and technology development activities. The table reflects agency responses and is not intended to be exhaustive.

### Source(s)

National Science Foundation, National Center for Science and Engineering Statistics; SRI International, special tabulations of federal program information (2017).

*Science and Engineering Indicators 2018*