



Unemployment among Doctoral Scientists and Engineers Increased but Remained Below the National Average

by Carolina Milesi, Lance A. Selfa, and Lynn M. Milan¹

In 2010, an estimated 805,500 individuals in the United States held research doctoral degrees in science, engineering, and health (SEH) fields, an increase of 6.2% from 2008.² Of these individuals, 709,700 were in the labor force, which includes those employed full time or part time and those actively seeking work (i.e., unemployed). The unemployment rate for SEH doctorate recipients was 2.4% in October 2010, up from 1.7% in October 2008 and similar to the rate in October 2003 (table 1).³ Moreover, the 2010 unemployment rate of the SEH doctoral labor force was about one-third of the October 2010 unemployment rate for the general population aged 25 years or older (8.2%).⁴

These and other findings in this InfoBrief are from the 2010 Survey of Doctorate Recipients (SDR), which collects information from individuals who have earned research doctorates in SEH fields from U.S. academic institutions.

Employment Status

Field of Doctoral Study and Years since Doctorate

Of the approximately 709,700 SEH doctoral degree holders in the labor force in 2010, about one-quarter

TABLE 1. Number in labor force and unemployment rate for scientists and engineers with U.S. doctoral degrees, by field of doctorate: 2001–10

Field of doctorate	2001	2003	2006	2008	2010
	Number in labor force				
All SEH fields	582,500	606,300	630,300	670,200	709,700
Biological, agricultural, and environmental life sciences	142,400	148,800	158,200	167,600	179,600
Computer and information sciences	10,900	12,300	13,700	16,300	19,400
Mathematics and statistics	26,300	29,000	29,500	31,200	32,500
Physical sciences	113,200	115,700	115,800	119,900	124,400
Psychology	89,600	93,000	97,500	101,000	104,200
Social sciences	77,200	79,600	81,000	85,100	88,700
Engineering	101,300	104,400	108,000	119,800	129,100
Health	21,500	23,600	26,500	29,300	31,800
	Unemployment rate (percent) ^a				
All SEH fields	1.3	2.1	1.4	1.7	2.4
Biological, agricultural, and environmental life sciences	1.1	2.0	1.4	1.9	2.2
Computer and information sciences	0.9	2.4	1.4	1.2	2.1
Mathematics and statistics	1.5	2.4	1.0	1.0	1.5
Physical sciences	1.7	2.5	2.1	2.4	3.5
Psychology	0.8	1.7	0.9	1.3	1.7
Social sciences	1.3	1.5	1.0	1.3	1.9
Engineering	1.7	2.7	1.4	1.8	2.8
Health	0.5	1.3	0.7	1.0	1.9

SEH = science, engineering, and health.

^a Based on count of doctorate recipients in labor force.

NOTES: Numbers represent weighted counts, rounded to the nearest 100. October was the survey reference month in 2003, 2008, and 2010; April was the survey reference month in 2001 and 2006. Estimates from 2001 to 2006 may vary slightly from those previously published due to revised nondisclosure procedures. Estimates from 2008 vary from those previously published to reflect a revised sample design that integrates the international component of the Survey of Doctorate Recipients. Estimates from 2010 also reflect the integrated sample design. See Data Sources and Availability for more detail.

SOURCE: National Science Foundation, National Center for Science and Engineering Statistics, Survey of Doctorate Recipients.

(25.3%) had earned a doctorate in the biological, agricultural, and environmental life sciences; 18.2% had doctorates in engineering; 17.5% in physical sciences; 14.7% in psychology; 12.5% in social sciences; 4.6% in mathematics and statistics; 4.5% in health; and 2.7% in computer and information sciences (percentages derived from table 1). Unemployment rates ranged from 1.5% for those who received doctorates in mathematics and statistics to 3.5% for those who received doctorates in the physical sciences.

Of the total SEH doctoral population in October 2010, 88.1% was in the labor force, with 76.1% working full time and

another 9.9% working part time (table 2). An additional 10.0% of the SEH doctoral population was retired in 2010, whereas the rest was not seeking work (1.9%). Across SEH degree fields, full-time employment ranged from 66.2% for those with psychology doctorates to 88.5% for those with computer and information sciences doctorates.

Retirement and part-time work status differed by years since doctorate award. Those who earned their doctorates more than 25 years ago were, as expected, more likely to be retired and out of the labor force (27.9% in 2010) and more likely to be working part time (14.4%) than were younger cohorts

(table 2).⁵ In contrast, years since doctorate award had no significant relationship with the unemployment rate.⁶

Demographics

Women continue to represent a growing share of doctorate holders, rising to 31.5% of all SEH doctorate holders in October 2010, from 30.2% in October 2008 and 29.0% in April 2006. In 2010, the labor force participation rate among SEH doctorate holders was 88.9% for women, compared with 87.7% for men (table 3). Female SEH doctorate holders were less likely than their male counterparts to be employed full time in 2010 (72.4% of women, 77.9% of men) and more likely not to be seeking work

TABLE 2. Employment status of scientists and engineers with U.S. doctoral degrees, by field and years since doctorate: 2010 (Percent)

Field and years since doctorate	Total (number)	In labor force					Not in labor force		
		All	Working for pay or profit			Unemployed ^a	All	Retired	Not working, not seeking work
			All working	Full time	Part time				
All U.S. SEH doctorate holders	805,500	88.1	86.0	76.1	9.9	2.1	11.9	10.0	1.9
Field of doctorate									
Biological, agricultural, and environmental life sciences	201,800	89.0	87.1	79.6	7.5	2.0	11.0	8.4	2.6
Computer and information sciences	20,000	97.0	95.0	88.5	6.5	2.0	3.0	2.0	1.0
Mathematics and statistics	38,200	85.1	83.8	75.4	8.1	1.3	15.2	13.1	1.8
Physical sciences	145,900	85.3	82.3	74.6	7.7	2.9	14.7	13.2	1.5
Psychology	116,700	89.3	87.7	66.2	21.6	1.5	10.7	8.3	2.4
Social sciences	103,600	85.6	84.0	73.3	10.7	1.6	14.4	12.6	1.7
Engineering	143,800	89.8	87.3	81.3	6.1	2.5	10.2	9.0	1.2
Health	35,500	89.6	87.9	76.9	11.3	1.7	10.4	8.5	1.7
Years since doctorate									
2 years or less	61,200	97.4	95.1	89.4	5.9	2.1	2.8	D	2.6
3–5 years	82,100	97.2	95.2	89.2	6.1	1.9	2.8	0.1	2.7
6–10 years	113,500	96.8	95.2	87.6	7.7	1.6	3.2	0.7	2.5
11–15 years	113,000	96.2	94.2	85.0	9.1	2.0	3.7	1.2	2.5
16–20 years	99,100	95.4	92.9	84.5	8.5	2.3	4.7	2.6	2.1
21–25 years	82,000	93.3	91.5	82.8	8.7	1.8	6.7	5.4	1.3
More than 25 years	254,500	71.0	68.8	54.3	14.4	2.3	29.0	27.9	1.0

D = suppressed to avoid disclosure of confidential information.

SEH = science, engineering, and health.

^aBased on count of all doctorate recipients.

NOTES: Numbers represent weighted counts, rounded to the nearest 100. Designation of full-time and part-time employment status is based on principal job only, not on all jobs held in labor force. Full-time employed persons are those working at least 35 hours per week at their principal job. Part-time employed persons are those working fewer than 35 hours per week.

SOURCE: National Science Foundation, National Center for Science and Engineering Statistics, Survey of Doctorate Recipients, 2010.

TABLE 3. Employment status of scientists and engineers with U.S. doctoral degrees, by sex, ethnicity, race, and citizenship: 2010
(Percent)

Sex, ethnicity, race, and citizenship	Total (number)	In labor force					Not in labor force		
		All	Working for pay or profit			Unemployed ^a	All	Retired	Not working, not seeking work
			All working	Full time	Part time				
All U.S. SEH doctorate holders	805,500	88.1	86.0	76.1	9.9	2.1	11.9	10.0	1.9
Sex									
Male	551,700	87.7	85.7	77.9	7.8	2.0	12.3	11.5	0.8
Female	253,700	88.9	86.8	72.4	14.4	2.1	11.1	6.7	4.3
Ethnicity and race									
Hispanic or Latino	25,800	93.0	91.1	81.8	8.9	1.9	7.0	5.0	1.9
Not Hispanic or Latino	779,700	87.9	85.9	76.0	9.9	2.1	12.1	10.2	1.9
American Indian or Alaska Native	1,700	88.2	88.2	76.5	11.8	D	5.9	D	D
Asian	147,500	93.6	91.3	86.4	4.7	2.3	6.4	4.7	1.7
Black or African American	24,500	93.9	91.0	80.4	11.0	2.4	6.1	4.9	1.2
Native Hawaiian or Other Pacific Islander	900	88.9	88.9	77.8	11.1	D	11.1	D	11.1
White	596,300	86.2	84.2	73.1	11.1	2.0	13.8	11.8	1.9
More than one race	8,800	93.2	89.8	79.5	10.2	2.3	6.8	4.5	2.3
Citizenship									
U.S. citizen or permanent resident	775,300	87.7	85.6	75.4	10.2	2.1	12.3	10.4	1.9
Temporary visa holder	30,200	98.3	97.4	95.4	2.0	1.0	1.7	D	1.3

D = suppressed to avoid disclosure of confidential information.

SEH = science, engineering, and health.

^a Based on the count of all doctorate recipients.

NOTES: Numbers represent weighted counts, rounded to the nearest 100. Designation of full-time and part-time employment status is based on principal job only, not on all jobs held in labor force. Full-time employed persons are those working at least 35 hours per week at their principal job. Part-time employed persons are those working fewer than 35 hours per week. Persons of Hispanic or Latino origin may be of any race.

SOURCE: National Science Foundation, National Center for Science and Engineering Statistics, Survey of Doctorate Recipients, 2010.

(4.3% of women, 0.8% of men). Female SEH doctorate holders, who as a group are younger than male SEH doctorate holders, were also less likely than their male counterparts to be retired (6.7% of women, 11.5% of men). In contrast, the proportions of men (2.0%) and women (2.1%) who reported themselves as unemployed in October 2010 were not significantly different.

Underrepresented minorities—racial and ethnic groups whose representation in science, engineering, and health fields is smaller than their representation in the U.S. population; namely, American Indians or Alaska Natives, blacks or African Americans, Hispanics or Latinos, Native Hawaiians or Other Pacific Islanders, and indi-

viduals reporting more than one race—collectively constituted 7.7% of all SEH doctorate recipients (derived from table 3). A majority of the SEH doctoral population was white (74.0%), followed by Asian (18.3%). The percentage of Hispanics or Latinos who were employed full time was higher than the percentage of all others employed full time (81.8% versus 76.0%). Among those who are not Hispanic or Latino, Asian doctorate holders exhibited a higher level of full-time employment (86.4%) than blacks or African Americans (80.4%), whites (73.1%), and those who reported more than one race (79.5%). Whites were more likely to be retired (11.8%) than Hispanics or Latinos (5.0%), Asians (4.7%), blacks or African Americans (4.9%), and those

reporting more than one race (4.5%) (table 3), reflecting the younger ages of the individuals in the SEH doctoral population who are not white.⁷

In 2010, 3.7% of the SEH doctoral population held temporary visas (derived from table 3). As might be expected based on U.S. visa requirements, almost all of these individuals (97.4%) were working full or part time; a small fraction was not in the labor force in October 2010 (1.7%).

Sector

Four-year educational institutions employed 41.8% of all working SEH doctorate recipients in 2010. Private for-profit firms employed the next-largest share of the doctoral workforce

at 32.3% of the total (derived from table 4). Employment in 4-year educational institutions was most common for doctorate recipients in the social sciences (62.1%). Employment in private for-profit firms was most prevalent for doctorate recipients in the field of engineering (56.9%) (derived from table 4).

Data Sources and Availability

Comparative terms in this InfoBrief (e.g., higher, more or less likely, differ, increase) are based on statistical tests for significant differences at the 95% level. Percentage comparisons in this report are based on unrounded estimates and may differ from percentages calculated from the rounded estimates displayed in the tables.

The ethnicity and race categories reported here are mutually exclusive. Hispanic or Latino ethnicity refers to all individuals who reported Hispanic

or Latino origin regardless of racial background. The estimates on racial backgrounds refer to individuals who were not of Hispanic or Latino origin and who reported only one racial background. Individuals who reported more than one racial background are shown as a separate group.

Data in this InfoBrief are from the SDR, a biennial longitudinal survey of individuals who earned doctoral degrees in SEH fields from U.S. institutions. A sample of doctorate recipients is followed throughout their careers until they reach age 76, and the panel is refreshed each survey cycle with a sample of recent doctoral graduates. The SDR has been conducted since 1973 and is sponsored by the National Science Foundation (NSF) in conjunction with the National Institutes of Health.

The 2010 SDR provides data from 31,462 responding sample members

(80% response rate), representing an estimated 805,500 SEH doctorate recipients in the United States. Historically, the SDR sample included only U.S.-degreed doctorate recipients residing or working in the United States on the survey reference date. In 2003, NSF initiated a feasibility study to include U.S.-degreed doctorate recipients located outside of the United States (i.e., an international sample). From 2003 to 2008, individuals selected for the international sample were considered ineligible for the survey if they were located in the United States. Beginning in 2010, an integrated sample design was implemented, allowing international sample members who were found in the United States to be considered eligible for the survey and counted among the national sample. Once developed, this integrated approach was also applied to the 2008 SDR data, resulting in the revised estimates shown in table 1.

TABLE 4. Employed scientists and engineers with U.S. doctoral degrees, by employment sector and field of doctorate: 2010

Field of doctorate	Employment sector							
	All employed	4-year educational institution ^a	Private for-profit ^b	Private non-profit	Federal government	State or local government	Self-employed ^c	Other ^d
All SEH fields	692,900	289,400	223,900	45,100	48,700	17,300	41,700	26,800
Biological, agricultural, and environmental life sciences	175,700	83,500	46,400	14,200	15,600	4,100	5,700	6,200
Computer and information sciences	19,000	7,400	9,400	700	600	100	500	300
Mathematics and statistics	32,000	18,100	9,000	1,300	1,300	300	700	1,300
Physical sciences	120,100	42,500	49,800	6,300	9,700	2,300	4,500	5,000
Psychology	102,400	34,100	20,700	9,800	6,000	5,200	20,200	6,400
Social sciences	87,000	54,000	10,900	5,400	5,100	2,400	4,300	4,900
Engineering	125,500	33,000	71,400	4,400	8,200	2,300	4,500	1,600
Health	31,200	16,800	6,200	3,000	2,300	700	1,100	1,100

SEH = science, engineering, and health.

^a Includes 4-year colleges or universities, medical schools (including university-affiliated hospitals or medical centers), and university-affiliated research institutes.

^b Includes those self-employed in an incorporated business.

^c Self-employed or business owner in a nonincorporated business.

^d Includes 2-year colleges, community colleges, technical institutes, other precollege institutions, and employers not broken out separately.

NOTE: Numbers represent weighted counts, rounded to the nearest 100.

SOURCE: National Science Foundation, National Center for Science and Engineering Statistics, Survey of Doctorate Recipients, 2010.

Detailed data tables from the 2010 SDR are forthcoming at <http://www.nsf.gov/statistics/doctoratework/>.⁸ Please contact Lynn Milan for more information. Data from the SDR are also available in the Scientists and Engineers Statistical Data System (SESTAT) at <http://www.nsf.gov/statistics/sestat/>.

Notes

1. Carolina Milesi and Lance A. Selfa are with NORC at the University of Chicago. For more information, contact Lynn M. Milan, Human Resources Statistics Program, National Center for Science and Engineering Statistics, National Science Foundation, 4201 Wilson Boulevard, Suite 965, Arlington, VA 22230 (lmilan@nsf.gov; 703-292-2275).

2. Counts in this InfoBrief represent weighted numbers rounded to the nearest 100. The standard error of the overall doctoral population of 805,500 is 950 (rounded up to the nearest 50). As such, the true number of doctorate recipients with U.S. doctoral degrees living in the United States in October 2010 is estimated (at a 95% confidence interval) to be between 803,600 and 807,400. For a listing of science, engi-

neering, and health fields included in the 2008 Survey of Doctorate Recipients (SDR), see appendix table B-1 at <http://www.nsf.gov/statistics/nsf13302/>. The estimated 2008 doctoral population count used in this InfoBrief reflects the integration of the SDR's international component. Therefore, the count is slightly higher than the previously reported estimate. See further details in the Data Sources and Availability section.

3. Although the 2010 unemployment rate of 2.4% appears to be the highest in a decade, it does not differ in a statistically significant way from the 2003 rate of 2.1%.

4. Unemployment statistics for the general population aged 25 years or older are published by the U.S. Bureau of Labor Statistics and were obtained from http://www.bls.gov/news.release/archives/empsit_11052010.pdf on 22 October 2012. The civilian unemployment rate for the population aged 16 years or older in October 2010 was 9.5%, which is available at <http://data.bls.gov/timeseries/LNS14000000> (accessed on 26 April 2013). Persons are classified as unemployed if they

do not have a job, have actively looked for work in the prior 4 weeks, and are currently available for work.

5. The length of time since doctorate receipt is associated with age: the median age of those with more than 25 years since doctorate receipt is 65 years, and the median age of those with 25 or fewer years since doctorate receipt is 45 years.

6. Two measures of unemployment are used in this InfoBrief: (1) the unemployment rate as noted in table 1, which is based on the count of doctorate recipients in the labor force, and (2) the percentage unemployed as noted in tables 2 and 3, which is based on the count of all doctorate recipients, regardless of whether they are in the labor force.

7. Because of the small sizes of the populations of (1) American Indians or Alaska Natives and (2) Native Hawaiians or Other Pacific Islanders, statistically reliable comparisons between these two groups and others were not possible.

8. Results from the 2013 SDR are expected to be available by the summer of 2014.

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