

State Indicators

S-48 Academic Science and Engineering Article Output per 1,000 Science, Engineering, and Health Doctorate Holders in Academia

Description

The volume of peer-reviewed articles published per 1,000 academic science, engineering, and health (SEH) doctorate holders is an approximate measure of their contribution to scientific knowledge. This indicator should not be seen as a measure of an individual's efficiency; publications are only one measure of academic productivity; other measures may include personnel trained, patents, trademarks, copyrights, and other outputs. A high value on this indicator shows that the SEH faculties in a state's academic institutions are generating a high volume of publications relative to the number of SEH doctorate holders employed at academic institutions in the state. Academic institutions include 2-year colleges, 4-year colleges and universities, medical schools, and university-affiliated research centers. Research is more central to the mission of some of these institutions than others.

Publication counts are based on the number of articles that appear in a set of journals tracked by Elsevier's Scopus database as of December 2016. The journal set consists of S&E publications (including publications on the natural sciences, applied sciences, medical sciences, and social sciences but excluding the arts and humanities). Only documents published in refereed scientific journals were counted (mostly articles, reviews, and conference proceedings), as these documents were reviewed by peers prior to being accepted for publication. The peer-review process is designed to ensure that the research is of good quality and constitutes an original contribution to scientific knowledge. Fractional counting at the level of researchers is used to ensure that a single paper is not counted several times. For example, if two of three authors are in state A and the third author is in state B, then two-thirds of the publication is attributed to state A, and one-third is attributed to state B.

SEH doctorates include those in computer sciences; mathematics; biological, agricultural, or environmental life sciences; physical sciences; social sciences; psychology; engineering; and health fields. SEH doctorate data are estimates and exclude those with doctorates from foreign institutions and those older than 75. Data for SEH doctorate holders in academia are presented by employment location, regardless of residence. Estimates for states with smaller populations of SEH doctorate holders are generally less precise than estimates for states with larger populations.

Nationally, both S&E article output and employment of SEH doctorate holders in academia have experienced long-term increases. However, the growth in article output has outpaced that of employment, meaning that this indicator has risen over time for most states and the nation overall.

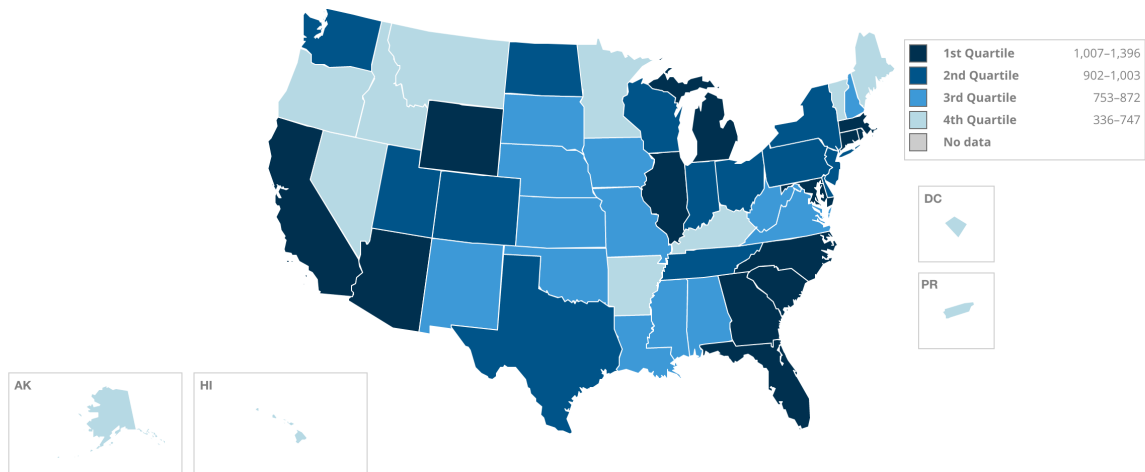
Data on employed SEH doctorate holders are collected by the Survey of Doctorate Recipients. Data include those with research doctoral degrees in computer and mathematical sciences; biological, agricultural, or environmental life sciences; physical sciences; social sciences; psychology; engineering; and health fields. SEH doctorate data exclude individuals with doctorates from foreign institutions and those older than 75. SEH doctorate holders are assigned to a state based on where they work.

Data sources: Science-Metrix, special tabulation from Scopus; National Science Foundation, National Center for Science and Engineering Statistics, Survey of Doctorate Recipients.

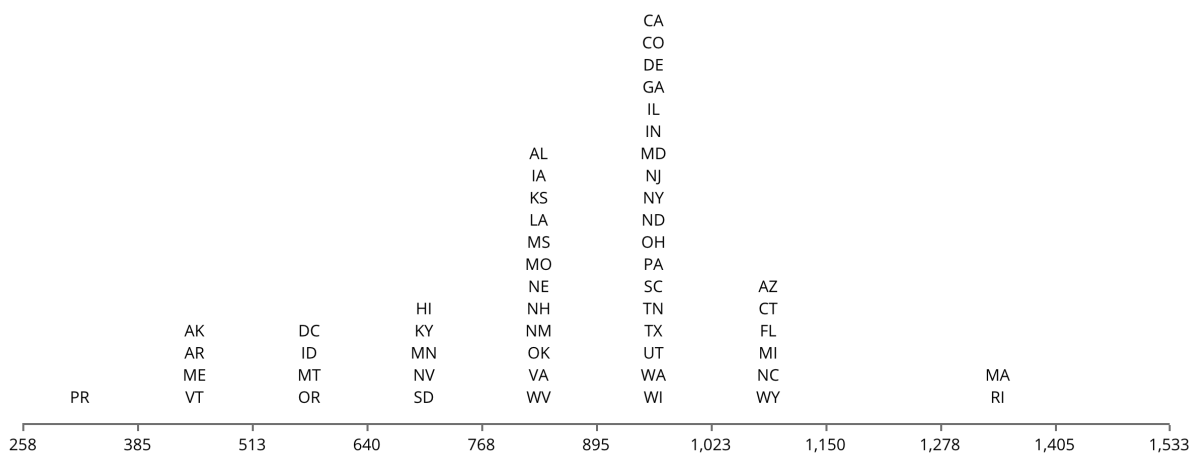
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2015



Distribution of states across indicator values, 2015



Histograms do not display states with extreme values. Please consult the data tables for exact indicator values for each state. State positions on the histogram are based on unrounded values of the indicator and may not always match the rounded values displayed in the table.

State Indicators

Academic Science and Engineering Article Output per 1,000 Science, Engineering, and Health Doctorate Holders in Academia

(Articles)

State	2003	2006	2008	2010	2013	2015
United States	861	982	1,027	999	1,031	964
Alabama	880	1,014	1,039	957	1,001	789
Alaska	458	557	573	577	568	513
Arizona	1,060	1,107	1,145	1,219	1,057	1,150
Arkansas	534	615	839	641	751	475
California	992	1,193	1,164	1,128	1,115	1,011
Colorado	750	865	945	876	955	910
Connecticut	947	1,065	994	986	1,103	1,094
Delaware	1,199	1,221	1,385	1,157	1,172	902
District of Columbia	813	921	1,064	1,000	921	624
Florida	891	1,071	1,096	993	935	1,075
Georgia	840	943	961	961	1,018	1,018
Hawaii	479	657	648	706	649	701
Idaho	434	484	492	535	536	636
Illinois	1,003	1,091	1,165	1,111	1,211	1,007
Indiana	848	1,003	1,108	1,031	1,047	987
Iowa	876	962	885	881	954	845
Kansas	790	789	766	947	964	792
Kentucky	646	703	791	763	812	747
Louisiana	784	847	967	1,062	1,026	829
Maine	415	442	445	540	470	402
Maryland	1,080	1,189	1,129	1,149	1,195	1,014
Massachusetts	1,102	1,340	1,533	1,484	1,495	1,396

State Indicators

State	2003	2006	2008	2010	2013	2015
Michigan	900	1,001	1,116	1,034	1,092	1,048
Minnesota	640	721	812	754	776	712
Mississippi	589	790	859	865	856	800
Missouri	797	935	992	907	890	872
Montana	463	548	528	485	508	548
Nebraska	784	975	989	876	1,066	857
Nevada	602	603	759	726	725	726
New Hampshire	777	957	741	748	798	778
New Jersey	877	934	950	918	919	909
New Mexico	444	731	691	669	695	778
New York	906	1,046	1,054	1,029	1,086	1,002
North Carolina	819	929	972	999	1,066	1,030
North Dakota	623	657	783	668	827	993
Ohio	793	951	1,030	992	1,036	902
Oklahoma	549	647	681	649	765	807
Oregon	669	831	931	861	861	636
Pennsylvania	900	1,019	1,150	1,115	1,181	1,003
Rhode Island	695	861	1,017	1,148	1,214	1,394
South Carolina	742	721	769	803	844	1,014
South Dakota	402	442	557	651	730	753
Tennessee	684	760	852	790	896	942
Texas	971	1,042	1,052	1,028	1,089	990
Utah	858	846	893	942	934	905
Vermont	523	679	750	772	751	508
Virginia	759	802	807	845	890	845
Washington	742	779	801	823	819	904

State Indicators

State	2003	2006	2008	2010	2013	2015
West Virginia	555	611	687	703	646	775
Wisconsin	873	894	900	810	812	919
Wyoming	600	761	822	860	1,062	1,042
Puerto Rico	300	400	415	395	258	336

Note(s):
 Articles were fractionally allocated among regions/countries/economies based on the proportion of residences of all named authors. The publication total for the United States reported here includes Puerto Rico, as well as articles for which the location could not be determined. Employed SEH doctorate holders are classified by employment location.

Source(s):
 Science-Matrix, special tabulations from Scopus, data as of January 2019; National Science Foundation, National Center for Science and Engineering Statistics, Survey of Doctorate Recipients (various years), data as of August 2017.

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Science and Engineering Indicators 2018

State Indicators

Academic S&E article output

State	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
United States	231,327	249,172	269,287	275,169	282,945	287,977	294,293	301,777	314,769	320,574
Alabama	2,798	3,094	3,273	3,365	3,464	3,533	3,499	3,445	3,647	3,763
Alaska	275	274	360	323	354	401	373	404	414	405
Arizona	3,614	3,786	4,170	4,207	4,437	4,465	4,553	4,755	4,875	4,871
Arkansas	982	1,101	1,236	1,186	1,298	1,259	1,267	1,282	1,354	1,378
California	28,299	29,825	32,119	32,954	33,896	34,343	35,385	35,880	37,106	37,767
Colorado	3,796	4,168	4,418	4,594	4,546	4,725	4,838	4,903	5,460	5,680
Connecticut	3,970	4,338	4,620	4,750	4,630	4,871	5,066	5,125	5,382	5,686
Delaware	887	972	1,053	1,026	1,067	1,108	1,084	1,041	1,119	1,147
District of Columbia	1,926	2,011	2,096	2,109	2,191	2,128	2,177	2,300	2,496	2,550
Florida	7,353	8,217	9,287	9,681	9,894	10,197	10,460	10,625	10,855	11,314
Georgia	5,847	6,460	6,963	6,952	7,549	7,498	7,730	8,069	8,279	8,425
Hawaii	843	920	946	1,019	1,108	1,166	1,111	1,130	1,143	1,108
Idaho	495	528	575	668	673	640	710	642	767	654
Illinois	10,546	11,353	12,087	12,423	12,775	12,931	13,129	13,558	13,727	13,898
Indiana	4,868	5,190	5,823	6,099	6,286	6,426	6,600	6,911	7,112	7,403
Iowa	2,953	3,122	3,356	3,368	3,316	3,452	3,418	3,436	3,451	3,500
Kansas	1,832	1,939	2,049	2,020	2,090	2,069	2,315	2,368	2,432	2,515
Kentucky	2,132	2,224	2,594	2,523	2,669	2,690	2,595	2,671	2,867	2,894
Louisiana	2,696	2,830	3,224	2,836	2,794	2,805	2,999	3,187	3,205	3,075
Maine	477	515	572	535	596	534	589	594	600	602
Maryland	7,345	7,971	8,550	8,535	8,926	8,804	8,864	9,074	9,649	9,920
Massachusetts	15,682	17,282	18,250	19,182	19,443	20,080	20,451	20,930	22,483	22,955
Michigan	8,001	8,437	9,258	9,351	9,681	9,825	10,414	10,546	11,098	11,050

State Indicators

State	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Minnesota	3,448	3,737	4,138	4,076	4,375	4,303	4,526	4,525	4,807	4,694
Mississippi	1,195	1,245	1,486	1,564	1,489	1,632	1,656	1,643	1,663	1,705
Missouri	4,461	4,715	5,129	5,254	5,459	5,654	5,661	5,715	5,720	5,927
Montana	495	497	541	657	641	634	640	630	665	676
Nebraska	1,434	1,732	1,812	1,774	1,819	1,780	1,782	1,839	2,029	1,980
Nevada	735	780	857	964	966	1,063	1,037	1,016	1,031	951
New Hampshire	963	1,006	1,116	1,158	1,149	1,111	1,156	1,196	1,222	1,241
New Jersey	4,991	5,114	5,561	5,635	5,704	5,698	5,812	5,781	5,982	6,051
New Mexico	1,247	1,403	1,491	1,513	1,505	1,521	1,601	1,538	1,588	1,597
New York	19,159	20,520	21,824	22,751	22,832	23,183	23,844	24,388	25,080	26,082
North Carolina	7,546	8,141	8,864	9,200	9,896	9,813	10,010	10,388	11,055	11,478
North Dakota	455	517	604	637	607	705	660	735	729	785
Ohio	8,193	8,773	9,537	9,628	9,923	9,989	9,966	10,016	10,623	10,862
Oklahoma	1,542	1,778	1,787	1,832	1,886	2,044	2,100	2,142	2,315	2,338
Oregon	2,436	2,690	2,830	2,925	3,042	3,071	3,030	3,014	3,299	3,384
Pennsylvania	13,744	14,495	16,116	16,074	16,424	16,912	16,979	17,841	18,554	18,508
Rhode Island	1,439	1,494	1,643	1,713	1,700	1,729	1,738	1,837	1,937	2,061
South Carolina	2,086	2,261	2,421	2,488	2,488	2,693	2,677	2,890	3,009	3,000
South Dakota	249	242	315	292	373	390	410	456	489	533
Tennessee	3,481	3,800	4,039	4,182	4,322	4,600	4,626	4,742	5,097	5,228
Texas	14,319	15,311	16,856	17,258	18,054	18,521	18,981	19,832	21,020	21,132
Utah	2,342	2,627	2,800	2,978	3,078	3,035	3,153	3,296	3,542	3,590
Vermont	533	600	628	679	680	675	672	695	699	742
Virginia	5,324	5,552	6,116	6,122	6,444	6,701	6,868	7,094	7,280	7,616
Washington	4,910	5,056	5,505	5,451	5,580	5,684	5,698	5,928	6,126	6,149
West Virginia	660	704	785	807	825	824	904	914	1,006	985



State Indicators

State	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Wisconsin	4,366	4,731	4,987	5,116	5,368	5,309	5,441	5,427	5,650	5,833
Wyoming	294	327	357	373	423	411	402	430	479	481
Puerto Rico	390	339	414	508	495	539	534	593	494	498

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State Indicators

Academic S&E article output

State	2013	2014	2015	2016	2017
United States	326,719	328,361	324,968	320,481	318,740
Alabama	3,905	3,799	3,746	3,715	3,816
Alaska	454	429	410	349	363
Arizona	4,862	5,103	5,058	5,106	4,882
Arkansas	1,427	1,414	1,355	1,419	1,476
California	37,694	37,559	37,106	36,111	35,912
Colorado	5,919	6,035	6,051	6,081	6,069
Connecticut	5,737	6,005	5,853	5,800	5,603
Delaware	1,172	1,150	1,082	1,006	1,047
District of Columbia	2,579	2,636	2,277	2,199	2,132
Florida	11,495	11,208	11,344	11,417	11,626
Georgia	8,751	8,778	8,704	8,538	8,390
Hawaii	1,168	1,201	1,122	1,112	994
Idaho	750	771	731	743	745
Illinois	14,165	14,294	14,306	13,857	13,817
Indiana	7,328	7,679	7,597	7,502	7,543
Iowa	3,626	3,731	3,591	3,496	3,599
Kansas	2,507	2,429	2,534	2,540	2,514
Kentucky	2,924	2,848	2,837	2,746	2,718
Louisiana	3,079	2,999	2,944	2,817	2,775
Maine	611	621	563	564	602
Maryland	10,273	10,209	10,341	10,085	9,920
Massachusetts	23,324	23,897	23,317	22,762	22,378
Michigan	11,470	11,338	11,266	11,195	11,158

State Indicators

State	2013	2014	2015	2016	2017
Minnesota	4,812	4,675	4,661	4,508	4,575
Mississippi	1,711	1,686	1,560	1,642	1,577
Missouri	5,965	5,987	5,931	5,775	5,846
Montana	660	695	713	685	661
Nebraska	2,025	2,030	2,100	2,153	2,132
Nevada	942	923	980	994	994
New Hampshire	1,277	1,284	1,323	1,263	1,272
New Jersey	6,157	5,907	5,955	5,899	5,873
New Mexico	1,598	1,707	1,633	1,540	1,520
New York	26,614	26,684	26,403	26,118	25,325
North Carolina	11,621	11,701	11,376	11,214	11,493
North Dakota	827	825	844	869	890
Ohio	11,192	11,157	11,046	10,680	10,738
Oklahoma	2,372	2,269	2,341	2,285	2,328
Oregon	3,359	3,514	3,404	3,518	3,535
Pennsylvania	19,125	19,043	18,949	18,457	18,056
Rhode Island	2,063	2,173	2,161	2,121	2,112
South Carolina	3,124	3,173	3,246	3,220	3,205
South Dakota	584	535	527	556	558
Tennessee	5,468	5,482	5,414	5,506	5,455
Texas	21,780	21,685	21,482	21,608	21,898
Utah	3,644	3,642	3,667	3,607	3,704
Vermont	751	771	686	725	667
Virginia	7,472	7,762	7,693	7,564	7,703
Washington	6,307	6,412	6,602	6,743	6,624
West Virginia	1,033	975	1,124	1,063	1,125



State Indicators

State	2013	2014	2015	2016	2017
Wisconsin	5,844	5,962	5,745	5,725	5,563
Wyoming	531	533	469	502	463
Puerto Rico	464	522	504	474	461

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State Indicators

SEH doctorate holders in academia

State	1997	1999	2001	2003	2006	2008	2010	2013	2015
United States	237,190	222,450	251,740	268,570	280,340	280,400	302,000	316,900	336,950
Alabama	4,560	3,200	3,000	3,180	3,320	3,400	3,600	3,900	4,750
Alaska	450	400	530	600	580	700	700	800	800
Arizona	2,920	2,900	3,170	3,410	3,800	3,900	3,900	4,600	4,400
Arkansas	1,520	1,650	1,600	1,840	1,930	1,500	2,000	1,900	2,850
California	24,780	21,150	25,140	28,530	27,620	29,500	31,800	33,800	36,700
Colorado	4,410	4,050	4,850	5,060	5,310	5,000	5,600	6,200	6,650
Connecticut	3,870	4,250	4,180	4,190	4,460	4,900	5,200	5,200	5,350
Delaware	720	500	760	740	840	800	900	1,000	1,200
District of Columbia	1,900	2,250	2,500	2,370	2,290	2,000	2,300	2,800	3,650
Florida	6,530	6,550	7,750	8,250	9,040	9,300	10,700	12,300	10,550
Georgia	5,550	5,350	6,340	6,960	7,370	7,800	8,400	8,600	8,550
Hawaii	1,250	1,100	1,500	1,760	1,550	1,800	1,600	1,800	1,600
Idaho	780	750	930	1,140	1,380	1,300	1,200	1,400	1,150
Illinois	10,190	9,200	10,570	10,510	11,390	11,100	12,200	11,700	14,200
Indiana	4,550	4,650	5,610	5,740	6,080	5,800	6,700	7,000	7,700
Iowa	3,100	3,000	3,160	3,370	3,500	3,900	3,900	3,800	4,250
Kansas	2,240	1,850	2,200	2,320	2,560	2,700	2,500	2,600	3,200
Kentucky	2,990	2,850	3,240	3,300	3,590	3,400	3,500	3,600	3,800
Louisiana	3,440	2,950	3,340	3,440	3,350	2,900	3,000	3,000	3,550
Maine	1,290	1,150	1,150	1,150	1,210	1,200	1,100	1,300	1,400
Maryland	5,920	4,850	5,830	6,800	7,180	7,800	7,900	8,600	10,200
Massachusetts	11,400	11,550	12,880	14,230	14,320	13,100	14,100	15,600	16,700
Michigan	7,760	7,250	8,720	8,890	9,340	8,800	10,200	10,500	10,750

State Indicators

State	1997	1999	2001	2003	2006	2008	2010	2013	2015
Minnesota	4,330	4,700	5,290	5,390	5,650	5,300	6,000	6,200	6,550
Mississippi	1,940	1,900	1,950	2,030	1,980	1,900	1,900	2,000	1,950
Missouri	5,690	5,000	5,610	5,600	5,620	5,700	6,300	6,700	6,800
Montana	990	1,000	810	1,070	1,200	1,200	1,300	1,300	1,300
Nebraska	2,280	1,600	1,940	1,830	1,820	1,800	2,100	1,900	2,450
Nevada	970	900	1,260	1,220	1,600	1,400	1,400	1,300	1,350
New Hampshire	1,090	950	1,210	1,240	1,210	1,500	1,600	1,600	1,700
New Jersey	4,870	4,450	5,430	5,690	6,030	6,000	6,300	6,700	6,550
New Mexico	2,280	1,600	2,760	2,810	2,070	2,200	2,300	2,300	2,100
New York	19,530	18,800	20,180	21,150	21,760	22,000	23,700	24,500	26,350
North Carolina	7,550	7,900	8,630	9,210	9,900	10,100	10,400	10,900	11,050
North Dakota	890	750	660	730	970	900	1,100	1,000	850
Ohio	9,560	9,150	9,760	10,330	10,120	9,700	10,100	10,800	12,250
Oklahoma	2,650	2,300	2,780	2,810	2,830	3,000	3,300	3,100	2,900
Oregon	2,620	2,750	3,120	3,640	3,520	3,300	3,500	3,900	5,350
Pennsylvania	11,770	12,300	13,280	15,270	15,770	14,700	16,000	16,200	18,900
Rhode Island	1,680	1,700	1,670	2,070	1,990	1,700	1,600	1,700	1,550
South Carolina	3,120	2,550	2,920	2,810	3,450	3,500	3,600	3,700	3,200
South Dakota	670	650	610	620	660	700	700	800	700
Tennessee	4,630	4,250	4,710	5,090	5,500	5,400	6,000	6,100	5,750
Texas	13,410	11,850	13,620	14,750	16,570	17,600	19,300	20,000	21,700
Utah	3,010	2,450	3,030	2,730	3,520	3,400	3,500	3,900	4,050
Vermont	1,080	1,000	980	1,020	1,000	900	900	1,000	1,350
Virginia	5,390	6,000	6,520	7,010	7,630	8,300	8,400	8,400	9,100
Washington	5,240	5,000	6,250	6,620	7,000	7,100	7,200	7,700	7,300
West Virginia	1,160	1,100	1,130	1,190	1,320	1,200	1,300	1,600	1,450



State Indicators

State	1997	1999	2001	2003	2006	2008	2010	2013	2015
Wisconsin	5,290	4,950	5,030	5,000	5,720	5,900	6,700	7,200	6,250
Wyoming	560	550	570	490	490	500	500	500	450
Puerto Rico	640	850	1,040	1,300	1,270	1,300	1,500	1,800	1,500

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