



National Center for Science and
Engineering Statistics

InfoBrief

Graduate Enrollment in Science, Engineering, and Health Continues to Increase among Foreign Nationals, while Postdoctoral Appointment Trends Vary across Fields

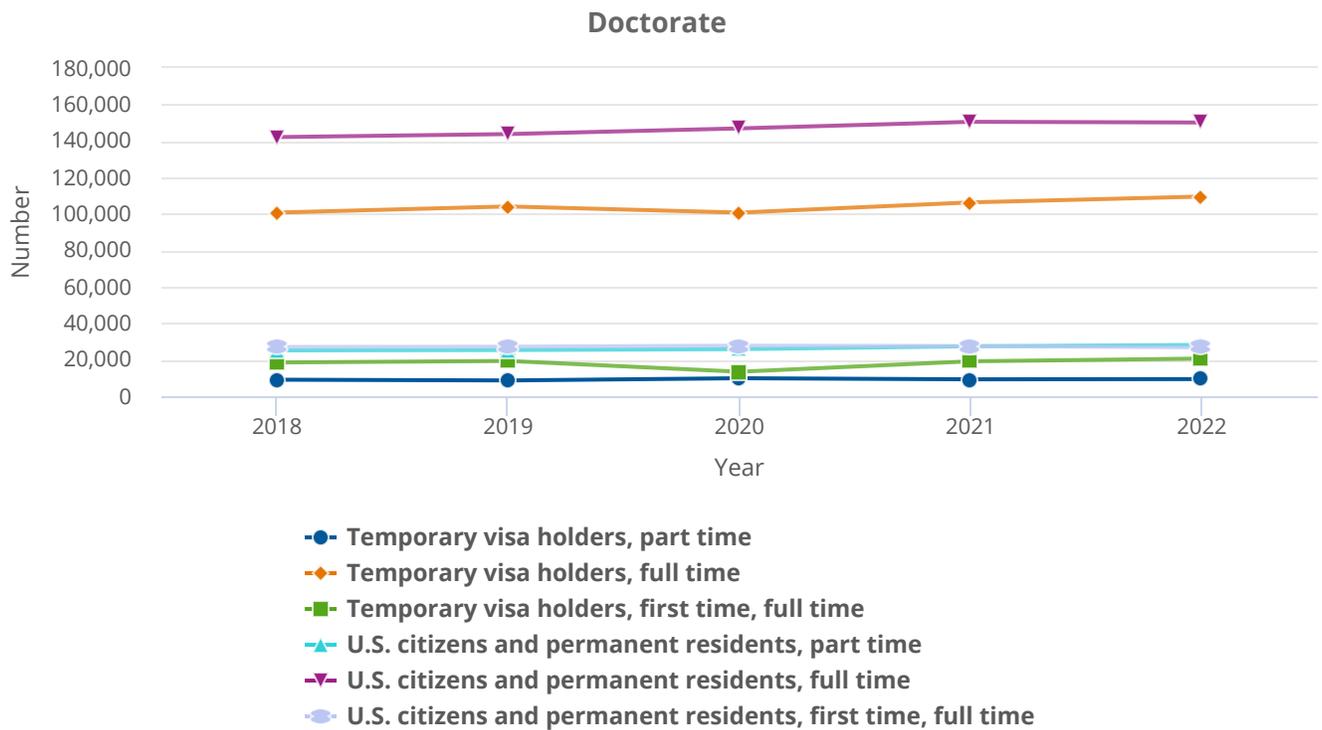
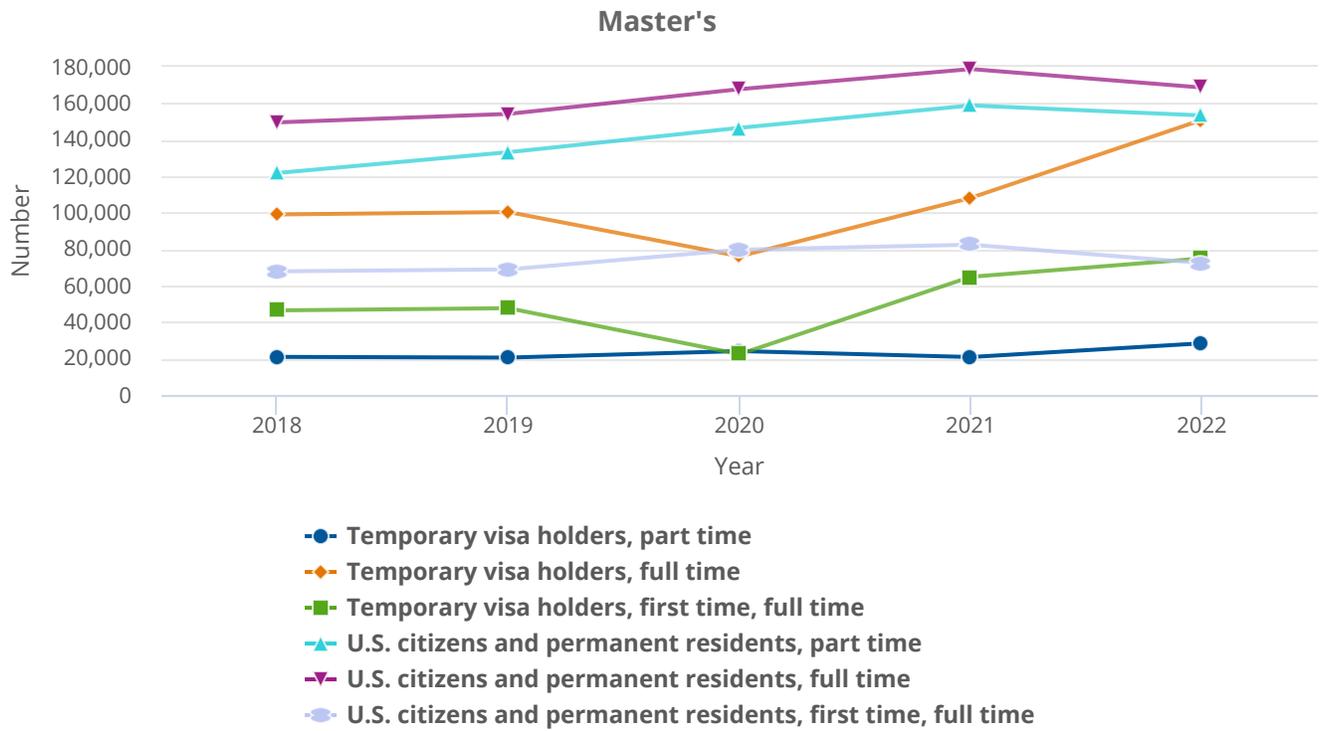
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Between 2021 and 2022, graduate student enrollment in science, engineering, and health (SEH) fields increased by 5.0% (up by 38,378 graduate students), mostly due to an increase of 42,816 temporary visa holders enrolled in full-time master's programs ([figure 1](#)). Full-time SEH master's enrollment in 2022 was 319,618, whereas full-time doctoral enrollment was 259,683 ([table 1](#)), the highest number recorded in the Survey of Graduate Students and Postdoctorates in Science and Engineering (GSS).¹

Figure 1

Enrollment of master's and doctoral students in science, engineering, and health fields, by citizenship status and enrollment type: 2018–22



Note(s):

For more information on the mapping of fields and codes in the Survey of Graduate Students and Postdoctorates in Science and Engineering, see technical table A-17 at <https://nces.nsf.gov/pubs/nsf24319/table/A-17>. Graduate student data in this table include master's students in health sciences. For more information on the comparability of these counts to other data published by the National Center for Science and Engineering Statistics, see the "Technical Notes" at <https://nces.nsf.gov/surveys/graduate-students-postdoctorates-s-e/2022#technical-notes>.

Source(s):

National Center for Science and Engineering Statistics, Survey of Graduate Students and Postdoctorates in Science and Engineering.

Table 1**Enrollment of master's students and doctoral students in science, engineering, and health, by enrollment type, citizenship, sex, race, and ethnicity: 2018–22**

(Number and percent change)

Characteristic	Master's							Doctoral						
	2018	2019	2020	2021	2022	% change 2018–22	% change 2021–22	2018	2019	2020	2021	2022	% change 2018–22	% change 2021–22
Part-time students	142,659	153,696	170,619	179,659	181,693	27.4	1.1	34,199	33,979	35,679	36,674	37,540	9.8	2.4
U.S. citizens and permanent residents ^a	121,757	133,180	146,539	158,843	153,345	25.9	-3.5	25,133	25,327	25,818	27,403	28,145	12.0	2.7
Male	64,500	69,495	75,037	78,723	76,439	18.5	-2.9	12,752	12,952	12,934	13,447	13,515	6.0	0.5
Female	57,257	63,685	71,502	80,120	76,906	34.3	-4.0	12,381	12,375	12,884	13,956	14,630	18.2	4.8
Hispanic or Latino	13,912	16,182	19,314	21,809	22,200	59.6	1.8	2,152	2,302	2,550	2,666	2,978	38.4	11.7
Not Hispanic or Latino														
American Indian or Alaska Native	534	581	562	612	537	0.6	-12.3	133	137	158	175	174	30.8	-0.6
Asian	12,675	14,401	16,531	18,932	19,522	54.0	3.1	1,961	2,127	2,061	2,218	2,359	20.3	6.4
Black or African American	12,584	13,615	14,853	16,213	15,518	23.3	-4.3	2,199	2,478	2,503	2,858	2,977	35.4	4.2
Native Hawaiian or Other Pacific Islander	228	257	284	280	269	18.0	-3.9	44	43	40	42	38	-13.6	-9.5
White	69,311	75,359	81,476	86,873	81,680	17.8	-6.0	16,482	16,121	16,204	17,071	17,081	3.6	0.1
More than one race	3,665	4,045	4,692	5,316	5,079	38.6	-4.5	697	741	784	913	874	25.4	-4.3
Unknown race and ethnicity	8,848	8,740	8,827	8,808	8,540	-3.5	-3.0	1,465	1,378	1,518	1,460	1,664	13.6	14.0
Temporary visa holders	20,902	20,516	24,080	20,816	28,348	35.6	36.2	9,066	8,652	9,861	9,271	9,395	3.6	1.3
Male	13,357	12,888	14,819	12,508	17,573	31.6	40.5	6,010	5,719	6,374	5,885	5,943	-1.1	1.0
Female	7,545	7,628	9,261	8,308	10,775	42.8	29.7	3,056	2,933	3,487	3,386	3,452	13.0	1.9
Full-time students	248,552	254,532	243,859	286,954	319,618	28.6	11.4	242,897	247,910	247,656	256,869	259,683	6.9	1.1

Table 1**Enrollment of master's students and doctoral students in science, engineering, and health, by enrollment type, citizenship, sex, race, and ethnicity: 2018–22**

(Number and percent change)

Characteristic	Master's							Doctoral						
	2018	2019	2020	2021	2022	% change 2018–22	% change 2021–22	2018	2019	2020	2021	2022	% change 2018–22	% change 2021–22
American Indian or Alaska Native	291	314	306	337	353	21.3	4.7	100	115	96	85	108	8.0	27.1
Asian	7,966	8,487	9,685	11,187	10,072	26.4	-10.0	2,954	3,008	3,153	3,329	3,384	14.6	1.7
Black or African American	5,789	6,188	7,664	7,606	6,717	16.0	-11.7	1,593	1,637	1,726	2,038	1,850	16.1	-9.2
Native Hawaiian or Other Pacific Islander	138	136	135	150	113	-18.1	-24.7	39	24	27	33	26	-33.3	-21.2
White	38,837	39,055	44,007	44,446	38,316	-1.3	-13.8	17,291	17,067	16,886	16,060	15,407	-10.9	-4.1
More than one race	2,480	2,498	3,063	3,293	3,141	26.7	-4.6	1,062	1,047	1,160	1,195	1,276	20.2	6.8
Unknown race and ethnicity	3,702	3,185	3,372	3,229	2,811	-24.1	-12.9	1,049	1,012	1,313	1,106	1,128	7.5	2.0
Temporary visa holders	46,393	47,610	22,381	64,825	74,913	61.5	15.6	18,501	19,348	13,429	19,155	20,658	11.7	7.8
Male	28,372	28,568	12,678	40,068	45,912	61.8	14.6	11,676	12,035	8,193	11,704	12,405	6.2	6.0
Female	18,021	19,042	9,703	24,757	29,001	60.9	17.1	6,825	7,313	5,236	7,451	8,253	20.9	10.8

* = value < 0.05%.

^a Race and ethnicity data are available for U.S. citizens and permanent residents only.**Note(s):**

Percentages may not add to total because of rounding. For more information on the mapping of fields and codes in the Survey of Graduate Students and Postdoctorates in Science and Engineering, see technical table A-17 <https://nces.nsf.gov/pubs/nsf24319/table/A-17>. Graduate student data in this table include master's students in health sciences. For more information on the comparability of these counts to other published data from the National Center for Science and Engineering Statistics, see the "Technical Notes" at <https://nces.nsf.gov/surveys/graduate-students-postdoctorates-s-e/2022#technical-notes>.

Source(s):

National Center for Science and Engineering Statistics, Survey of Graduate Students and Postdoctorates in Science and Engineering.

The number of SEH postdoctoral appointees (postdocs) in academic institutions declined slightly by 0.9% (578 postdocs) between 2021 and 2022 and has declined by 3.1% (2,033) since 2018. Postdoctoral employment among U.S. citizens and permanent residents declined by 8.3% (2,466) between 2021 and 2022, whereas postdoctoral employment of temporary visa holders increased by 5.6% (1,888) ([table 2](#)).

Table 2**Postdoctoral appointments, by citizenship, sex, race, and ethnicity: 2018–22**

(Number and percent change)

Characteristic	2018	2019	2020	2021	2022	% change 2018–22	% change 2021–22
All surveyed fields	64,783	66,247	65,681	63,328	62,750	-3.1	-0.9
U.S. citizens and permanent residents ^a	29,622	29,452	29,890	29,755	27,289	-7.9	-8.3
Male	15,934	15,570	15,579	15,480	14,247	-10.6	-8.0
Female	13,688	13,882	14,311	14,275	13,042	-4.7	-8.6
Hispanic or Latino	1,856	1,924	2,027	2,142	2,192	18.1	2.3
Not Hispanic or Latino							
American Indian or Alaska Native	81	69	72	80	92	13.6	15.0
Asian	6,020	5,891	5,696	6,014	5,286	-12.2	-12.1
Black or African American	1,104	1,088	1,081	1,138	1,141	3.4	0.3
Native Hawaiian or Other Pacific Islander	55	52	52	40	34	-38.2	-15.0
White	17,232	16,972	17,123	16,369	15,221	-11.7	-7.0
More than one race	506	519	555	687	638	26.1	-7.1
Unknown race and ethnicity	2,768	2,937	3,284	3,285	2,685	-3.0	-18.3
Temporary visa holders	35,161	36,795	35,791	33,573	35,461	0.9	5.6
Male	22,727	23,603	22,660	21,040	21,791	-4.1	3.6
Female	12,434	13,192	13,131	12,533	13,670	9.9	9.1

^a Race and ethnicity data are available for U.S. citizens and permanent residents only.**Source(s):**

National Center for Science and Engineering Statistics, Survey of Graduate Students and Postdoctorates in Science and Engineering.

These and other findings in this InfoBrief are from the 2022 GSS, and the trend data are from 2018 to 2022. Data from the GSS provide insight into the composition of the current and future science and engineering (S&E) workforce by collecting data on graduate students, postdocs, and doctorate-holding nonfaculty researchers (NFRs) in SEH fields. The GSS is sponsored by the National Center for Science and Engineering Statistics (NCSES) within the National Science Foundation and by the National Institutes of Health (NIH).

Trends in Graduate Enrollment, by Citizenship Status

Enrollment trends by citizenship status and race and ethnicity provide important information about the composition of the future S&E workforce. This section highlights the increase in overall SEH graduate student enrollment, with variation by enrollment type and degree level. Enrollment trends diverged for temporary visa holders and U.S. citizens and permanent residents.

Enrollment in full-time master's programs fluctuated between 2018 and 2022. After a temporary decline in 2020 followed by an increase in 2021, enrollment in full-time master's programs increased by 11.4% between 2021 and 2022, from 286,954 to 319,618. Full-time doctoral enrollment also rose from 2021 to 2022, growing by 1.1% from 256,869 to 259,683 ([table 1](#)).

Temporary Visa Holders

Continuing the upward trend from 2020 to 2021, and consistent with data on international students from the Department of Homeland Security's Student and Exchange Visitor Information System (SEVIS), the enrollment of temporary visa holders in SEH master's and doctoral fields increased between 2021 and 2022.² Among temporary visa holders, the number of full-time master's students increased 39.6% (from 108,142 to 150,958) and the number of full-time doctoral students increased 3.0% (from 106,330 to 109,534). First-time, full-time enrollment of master's students holding

temporary visas increased 15.6% in 2022. This increase caused the number of first-time, full-time master's students on temporary visas (74,913) to be larger than first-time, full-time U.S. citizens or permanent residents (72,404), a change from the previous 4 years. First-time, full-time enrollment for doctoral students holding temporary visas increased 7.8%, from 19,155 in 2021 to 20,658 in 2022 ([table 1](#), [figure 1](#)).

U.S. Citizens and Permanent Residents

Conversely, SEH enrollment of U.S. citizens and permanent resident graduate students decreased between 2021 and 2022, reversing the trend from the previous few years (decrease of 3.0%, from 515,597 in 2021 to 500,299 in 2022). Among master's students, this decrease includes a decline from 2021 to 2022 of 3.5% (5,498) for part-time enrollment and of 5.7% (10,152) for full-time enrollment. The drop in full-time master's enrollment is almost entirely due to the decline in first-time, full-time enrollment (decrease of 12.2%, or 10,037) ([table 1](#)).

The changes in doctoral student enrollment between 2021 and 2022 varied by enrollment type among U.S. citizens and permanent residents. Part-time doctoral enrollment rose by 2.7% (742), whereas full-time doctoral enrollment was mostly flat, decreasing by only 0.3% (390). However, first-time, full-time doctoral enrollment decreased by 2.8% (757) ([table 1](#)).

Full-time enrollment trends by race and ethnicity for U.S. citizens and permanent residents varied across racial and ethnic groups and between master's and doctoral enrollment. Among Hispanics or Latinos, master's enrollment decreased by 2.9% (769) between 2021 and 2022, whereas doctoral enrollment increased by 2.9% (513). Over the same period, among Blacks or African Americans, master's enrollment decreased by 6.1% (1,036), whereas doctoral enrollment increased by 3.5% (326). Among Asians, enrollment in master's programs decreased by 1.5% (324), whereas doctoral enrollment increased by 4.7% (326). Meanwhile, between 2021 and 2022, among Whites, enrollment decreased for master's and doctoral students by 7.4% (7,023) and by 2.3% (2,155), respectively ([table 1](#)).

Field of Study Trends for Master's and Doctoral Students

Although overall enrollment for master's and doctoral students grew between 2021 and 2022, growth was uneven across fields. This section focuses on the fastest growing fields.

Master's Enrollment Trends, by Field

From 2021 to 2022, master's enrollment grew by 8.6% (26,187) in science fields and by 8.3% (7,894) in engineering fields. Master's enrollment in health fields did not change substantially from 2021 to 2022. Since 2018, master's enrollment increased by 37.6% (90,656) in science fields, 10.7% (9,956) in engineering fields, and 16.7% (9,488) in health fields ([table 3](#)).

For master's students, multidisciplinary and interdisciplinary science studies had the largest percentage increase in enrollment, increasing 41.2% between 2021 and 2022. However, computer and information sciences had the largest numeric increase during this time, rising by 27.2% (27,773) to a total of 129,972 master's students. The next three largest growing fields for master's students in terms of percentage growth between 2021 and 2022 were electrical, electronics, communications, and computer engineering (16.7%, or 4,621), other engineering (9.8%, or 1,203), and civil, environmental, transportation and related engineering (7.6%, or 891). The three fields showing the largest numeric declines in enrollment during this time for master's students were psychology (3,557, or 6.9%), social sciences (2,915, or 6.1%), and clinical medicine (770, or 2.3%) ([table 3](#)).

Table 3**Enrollment of master's students and doctoral students in science, engineering, and health, by field: 2018–22**

(Number and percent change)

Characteristic	Master's							Doctoral						
	2018	2019	2020	2021	2022	% change 2018–22	% change 2021–22	2018	2019	2020	2021	2022	% change 2018–22	% change 2021–22
All graduate students	391,211	408,228	414,478	466,613	501,311	28.1	7.4	277,096	281,889	283,335	293,543	297,223	7.3	1.3
Science and engineering	334,391	351,734	354,354	400,922	435,003	30.1	8.5	261,165	265,961	268,021	276,912	279,163	6.9	0.8
Science	241,327	259,795	267,904	305,796	331,983	37.6	8.6	190,928	193,896	196,742	203,988	206,183	8.0	1.1
Agricultural and veterinary sciences	5,658	5,629	6,487	6,801	6,949	22.8	2.2	3,880	3,889	4,313	4,443	4,647	19.8	4.6
Biological and biomedical sciences	35,306	38,078	39,920	42,728	43,062	22.0	0.8	52,627	53,915	54,905	58,155	59,638	13.3	2.6
Computer and information sciences	77,351	84,092	80,690	102,199	129,972	68.0	27.2	16,127	17,192	18,174	19,531	20,583	27.6	5.4
Geosciences, atmospheric sciences, and ocean sciences	5,629	5,327	5,277	5,520	5,186	-7.9	-6.1	6,704	6,551	6,515	6,770	6,784	1.2	0.2
Mathematics and statistics	18,073	19,594	18,284	20,639	20,798	15.1	0.8	13,388	13,565	13,687	13,619	13,589	1.5	-0.2
Multidisciplinary and interdisciplinary studies	7,414	8,203	10,980	11,994	16,931	128.4	41.2	2,924	2,978	3,553	3,774	4,014	37.3	6.4
Natural resources and conservation	7,691	8,066	8,793	10,012	9,807	27.5	-2.0	3,716	3,677	3,705	3,910	3,955	6.4	1.2
Physical sciences	6,075	6,361	6,275	6,409	6,256	3.0	-2.4	36,000	36,506	36,341	37,732	37,836	5.1	0.3
Psychology	35,404	40,838	47,279	51,878	48,321	36.5	-6.9	20,303	20,231	21,115	21,447	21,121	4.0	-1.5
Social sciences	42,726	43,607	43,919	47,616	44,701	4.6	-6.1	35,259	35,392	34,434	34,607	34,016	-3.5	-1.7
Engineering	93,064	91,939	86,450	95,126	103,020	10.7	8.3	70,237	72,065	71,279	72,924	72,980	3.9	0.1
Aerospace, aeronautical, and astronautical engineering	3,342	3,701	4,326	5,065	5,263	57.5	3.9	2,506	2,554	2,645	2,773	2,832	13.0	2.1
Biological, biomedical, and biosystems engineering	4,282	4,424	4,536	5,192	5,177	20.9	-0.3	7,481	7,934	8,239	8,867	9,265	23.8	4.5
Chemical, petroleum, and chemical-related engineering	3,815	3,274	2,942	2,983	3,011	-21.1	0.9	7,599	7,664	7,612	7,713	7,590	-0.1	-1.6
Civil, environmental, transportation and related engineering fields	12,729	11,873	10,819	11,730	12,621	-0.8	7.6	7,732	7,752	7,485	7,878	7,754	0.3	-1.6
Electrical, electronics, communications and computer engineering	28,108	28,177	25,312	27,695	32,316	15.0	16.7	18,119	18,577	17,720	17,570	17,585	-2.9	0.1
Industrial, manufacturing, systems engineering and operations research	12,389	11,912	11,030	11,949	12,579	1.5	5.3	3,598	3,762	3,839	3,921	3,856	7.2	-1.7
Mechanical engineering	15,434	14,861	14,305	15,718	16,029	3.9	2.0	11,159	11,247	11,477	11,540	11,523	3.3	-0.1
Metallurgical, mining, materials and related engineering fields	2,395	2,266	2,299	2,518	2,545	6.3	1.1	4,821	4,817	4,882	4,904	4,573	-5.1	-6.7
Other engineering	10,570	11,451	10,881	12,276	13,479	27.5	9.8	7,222	7,758	7,380	7,758	8,002	10.8	3.1
Health	56,820	56,494	60,124	65,691	66,308	16.7	0.9	15,931	15,928	15,314	16,631	18,060	13.4	8.6
Clinical medicine	27,494	26,251	29,748	34,021	33,251	20.9	-2.3	4,508	4,571	4,796	5,612	5,966	32.3	6.3
Other health	29,326	30,243	30,376	31,670	33,057	12.7	4.4	11,423	11,357	10,518	11,019	12,094	5.9	9.8

Note(s):

For more information on the mapping of fields and codes in the Survey of Graduate Students and Postdoctorates in Science and Engineering, see technical table A-17 at <https://nces.nsf.gov/pubs/nsf24319/table/A-17>. Graduate student data in this table include master's students in health sciences. For more information on the comparability of these counts to other published data from the National Center for Science and Engineering Statistics, see the "Technical Notes" at <https://nces.nsf.gov/surveys/graduate-students-postdoctorates-s-e/2022#technical-notes>.

Source(s):

National Center for Science and Engineering Statistics, Survey of Graduate Students and Postdoctorates in Science and Engineering.

Doctoral Enrollment Trends, by Field

As with master's enrollment, doctoral enrollment also rose to a record high in 2022 (297,223), although 1- and 5-year gains were smaller. From 2021 to 2022, health fields grew the most percentagewise at 8.6% (1,429), followed by science fields at 1.1% (2,195). Engineering enrollment numbers remained stable over this time. Similarly, over the past 5 years, health fields had the largest percentage growth at 13.4% (2,129), followed by science fields at 8.0% (15,255) and engineering fields at 3.9% (2,783) (table 3).

The top three fastest growing fields for doctoral students percentagewise between 2021 and 2022 were other health (9.8%, or 1,075), multidisciplinary and interdisciplinary science studies (6.4%, or 240), and clinical medicine (6.3%, or 354). Biological and biomedical sciences had the largest numeric increase (1,483, or 2.6%) and remains the largest doctoral field (59,638).

Trends in Postdoc and Doctorate-Holding Nonfaculty Researcher Employment

Overall, the number of postdocs in GSS institutions decreased by 578 (0.9%) from 2021 to 2022, which was a smaller drop than the decline of 2,353 (3.6%) between 2020 and 2021. Since 2018, postdoctoral appointments have declined by 2,033 (3.1%). Conversely, the number of doctorate-holding NFRs increased by 1,731 (5.7%) from 2021 to 2022 and by 2,995 (10.2%) since 2018 (table 4).

Table 4

Employment of postdoctoral appointees and doctorate-holding nonfaculty researchers, by field: 2018–22

(Number and percent change)

Characteristic	Postdoctoral appointees							Doctorate-holding nonfaculty researchers						
	2018	2019	2020	2021	2022	% change 2018–22	% change 2021–22	2018	2019	2020	2021	2022	% change 2018–22	% change 2021–22
All surveyed fields	64,783	66,247	65,681	63,328	62,750	-3.1	-0.9	29,284	30,349	29,661	30,548	32,279	10.2	5.7
Science and engineering	45,478	46,769	47,203	45,529	45,008	-1.0	-1.1	21,848	22,728	22,133	22,720	23,778	8.8	4.7
Science	37,564	38,503	38,741	37,189	36,673	-2.4	-1.4	18,278	18,819	18,212	18,728	19,423	6.3	3.7
Agricultural and veterinary sciences	1,072	1,079	1,678	1,595	1,705	59.0	6.9	565	645	964	902	1,068	89.0	18.4
Biological and biomedical sciences	21,533	21,847	21,902	20,245	19,585	-9.0	-3.3	8,250	8,229	8,112	8,187	8,207	-0.5	0.2
Computer and information sciences	879	878	823	880	859	-2.3	-2.4	515	510	458	457	507	-1.6	10.9
Geosciences, atmospheric sciences, and ocean sciences	1,726	1,778	1,790	1,797	1,787	3.5	-0.6	2,106	2,177	2,150	2,308	2,448	16.2	6.1
Mathematics and statistics	982	1,070	1,076	1,112	1,110	13.0	-0.2	266	305	201	235	251	-5.6	6.8
Multidisciplinary and interdisciplinary studies	980	972	832	878	840	-14.3	-4.3	832	820	679	816	931	11.9	14.1
Natural resources and conservation	764	806	845	889	936	22.5	5.3	580	582	573	620	605	4.3	-2.4
Physical sciences	6,976	7,159	6,937	6,823	6,877	-1.4	0.8	3,056	3,316	2,890	2,895	2,894	-5.3	*

Table 4**Employment of postdoctoral appointees and doctorate-holding nonfaculty researchers, by field: 2018–22**

(Number and percent change)

Characteristic	Postdoctoral appointees							Doctorate-holding nonfaculty researchers						
	2018	2019	2020	2021	2022	% change 2018–22	% change 2021–22	2018	2019	2020	2021	2022	% change 2018–22	% change 2021–22
Psychology	1,145	1,152	1,312	1,325	1,308	14.2	-1.3	507	576	749	803	786	55.0	-2.1
Social sciences	1,507	1,762	1,546	1,645	1,666	10.6	1.3	1,601	1,659	1,436	1,505	1,726	7.8	14.7
Engineering	7,914	8,266	8,462	8,340	8,335	5.3	-0.1	3,570	3,909	3,921	3,992	4,355	22.0	9.1
Aerospace, aeronautical, and astronautical engineering	207	227	233	277	244	17.9	-11.9	115	124	149	144	153	33.0	6.3
Biological, biomedical, and biosystems engineering	1,529	1,602	1,696	1,616	1,540	0.7	-4.7	491	545	525	589	685	39.5	16.3
Chemical, petroleum, and chemical-related engineering	1,205	1,229	1,157	1,167	1,239	2.8	6.2	337	410	330	307	313	-7.1	2.0
Civil, environmental, transportation and related engineering fields	739	865	1,006	968	1,018	37.8	5.2	414	492	488	479	569	37.4	18.8
Electrical, electronics, communications and computer engineering	1,197	1,305	1,302	1,275	1,217	1.7	-4.5	588	637	706	755	734	24.8	-2.8
Industrial, manufacturing, systems engineering and operations research	156	167	194	127	143	-8.3	12.6	105	137	155	107	197	87.6	84.1
Mechanical engineering	1,069	1,142	1,149	1,200	1,189	11.2	-0.9	489	531	469	529	527	7.8	-0.4
Metallurgical, mining, materials and related engineering fields	575	665	630	562	542	-5.7	-3.6	267	303	299	259	280	4.9	8.1
Other engineering	1,237	1,064	1,095	1,148	1,203	-2.7	4.8	764	730	800	823	897	17.4	9.0
Health	19,305	19,478	18,478	17,799	17,742	-8.1	-0.3	7,436	7,621	7,528	7,828	8,501	14.3	8.6
Clinical medicine	16,563	16,650	16,287	15,561	15,630	-5.6	0.4	6,159	6,273	6,500	6,751	7,351	19.4	8.9
Other health	2,742	2,828	2,191	2,238	2,112	-23.0	-5.6	1,277	1,348	1,028	1,077	1,150	-9.9	6.8

* = value < 0.05%.

Note(s):For more information on the mapping of fields and codes in the Survey of Graduate Students and Postdoctorates in Science and Engineering, see technical table A-17 at <https://nces.nsf.gov/pubs/nsf24319/table/A-17>.**Source(s):**

National Center for Science and Engineering Statistics, Survey of Graduate Students and Postdoctorates in Science and Engineering.

Demographics of Postdocs

For the first time since 2019, the number of postdocs holding temporary visas increased from 33,537 in 2021 to 35,461 in 2022 (5.6%). At the same time, the number of postdocs who are U.S. citizens and permanent residents decreased from 29,755 to 27,289 (8.3%). Among U.S. citizens and permanent residents, the number of postdocs increased among a few racial or ethnic groups despite the overall declining trend. For example, the number of Hispanic or Latino postdocs increased by 50 (2.3%) from 2021 to 2022 and by 336 (18.1%) since 2018. The number of American Indian or Alaska Native postdocs increased by 12 (15.0%) between 2021 and 2022 ([table 2](#)).

Among postdocs who hold temporary visas, the number of female postdocs showed a larger percentage increase than did the number of male postdocs. Specifically, in 2022, 1,137 (9.1%) more female postdocs had temporary visas than in 2021, compared with a 751 (3.6%) increase among male postdocs who had temporary visas.

Field of Research

From 2021 to 2022, the number of postdocs declined by 516 (1.4%) in science, with most of the decline coming from biological and biomedical sciences (660, or 3.3%). In the science fields, agricultural and veterinary sciences postdocs increased by 110 (6.9%), and natural resources and conservation postdocs increased by 47 (5.3%). In engineering fields, the number of postdocs in aerospace, aeronautical, and astronautical engineering decreased by 33 (11.9%), whereas industrial, manufacturing, systems engineering, and operations research increased by 16 (12.6%). With the exception of mechanical engineering, postdoc counts in all other engineering fields rose or fell by more than 3%, although the overall number of postdocs in engineering only declined by 5 (0.1%) between 2021 and 2022 ([table 4](#), [table 5](#)).³

Table 5

Change in the number of postdoctoral appointees, by field: 2018–22

(Number)

Major field	2018–19	2019–20	2020–21	2021–22	2018–22 combined
All fields	1,464	-566	-2,353	-578	-2,033
Science and engineering	1,291	434	-1,674	-521	-470
Science	939	238	-1,552	-516	-891
Agricultural and veterinary sciences	7	599	-83	110	633
Biological and biomedical sciences	314	55	-1,657	-660	-1,948
Computer and information sciences	-1	-55	57	-21	-20
Geosciences, atmospheric sciences, and ocean sciences	52	12	7	-10	61
Mathematics and statistics	88	6	36	-2	128
Multidisciplinary and interdisciplinary studies	-8	-140	46	-38	-140
Natural resources and conservation	42	39	44	47	172
Physical sciences	183	-222	-114	54	-99
Psychology	7	160	13	-17	163
Social sciences	255	-216	99	21	159
Engineering	352	196	-122	-5	421
Health	173	-1,000	-679	-57	-1,563
Clinical medicine	87	-363	-726	69	-933
Other health	86	-637	47	-126	-630

Note(s):

For more information on the mapping of fields and codes in the Survey of Graduate Students and Postdoctorates in Science and Engineering, see technical table A-17 at <https://nces.nsf.gov/pubs/nsf24319/table/A-17>. Between 2019 and 2020, veterinary biomedical and clinical sciences moved from other health to agricultural and veterinary sciences; this move caused the large change in the number of postdocs for both fields.

Source(s):

National Center for Science and Engineering Statistics, Survey of Graduate Students and Postdoctorates in Science and Engineering.

Over half of postdocs in the GSS were in the biological and biomedical sciences (19,985) or clinical medicine (15,630); these were the only two fields with more than 10,000 postdocs. Between 2018 and 2022, the number of postdocs in the biological and biomedical sciences and in clinical medicine declined by 9.0% (1,948) and 5.6% (933), respectively. Between 2021 and 2022, postdoc counts in clinical medicine were relatively stable, increasing by 0.4% (69), whereas postdoc counts in biological and biomedical sciences continued their decline, decreasing by 3.3% (660). The primary source of support for 75.7% of postdocs in biological and biomedical sciences and for 88.3% of postdocs in clinical medicine in the GSS came from NIH.⁴ Consistent with the GSS findings for these fields, NIH recently reported a 3.6% decline in the number of postdocs it supported in FY 2022 compared with FY 2018.⁵

In 2022, the number of doctorate-holding NFRs increased from 2018 by 10.2% (2,995) and from 2021 by 5.7% (1,731). Between 2021 and 2022, industrial, manufacturing, systems engineering, and operations research experienced the largest 1-year percentage increase in the number of doctorate-holding NFRs (84.1%, or 90), rising to 197 NFRs. Additionally, clinical medicine had the largest numeric increase, rising by 600 NFRs (8.9%). Similar to findings for postdocs, biological and biomedical sciences remains the largest field for doctorate-holding NFRs, with 8,207 in 2022 (table 4).

Data Sources, Limitations, and Availability

Conducted since 1966, the GSS is an annual survey of all academic institutions in the United States that grant research-based master's or doctoral degrees in SEH fields. The 2022 GSS collected data from 22,519 organizational units (departments, programs, affiliated research centers, and health care facilities) at 690 eligible institutions and their affiliates in the United States, Puerto Rico, and Guam. The unit response rate was 98.7%. An overview of the survey is available at <https://nces.nsf.gov/surveys/graduate-students-postdoctorates-s-e/2022>.

In 2020, the GSS amended its taxonomy to align with the revised NCSES Taxonomy of Disciplines (TOD) and the 2020 National Center for Education Statistics' Classification of Instructional Programs (CIP). The only newly ineligible CIP codes were those dropped by the 2020 CIP. As such, these changes did not lead to a large shift in overall reported GSS counts, and data remain comparable with data from 2017 to 2019. Additionally, new CIP codes, such as data science and medical clinical sciences, were added, along with other codes in GSS-eligible series; although these CIP codes are newly eligible, a review of unit names from prior years indicates that many of them were being reported before 2020. Some further adjustments to allow for additional detail in some fields were made to the GSS taxonomy based on the 2020 CIP codes reported to the GSS. Finally, broad fields were added to engineering.

At the field level, some notable changes occurred that may impact trends. First, consistent with the 2020 CIP and TOD, veterinary biomedical and clinical sciences moved from the health sciences to agricultural sciences (which was then renamed agricultural and veterinary sciences). Human development is now reported under psychology, rather than social sciences, to align with the 2020 TOD. Finally, 22 new 2020 CIP codes were added to multidisciplinary and interdisciplinary studies; the addition of these CIP codes likely moved units that were already reported (i.e., many units named data science are now reported with new CIP codes that map to the new data science and data analytics GSS code). For more information about the 2020 GSS taxonomy change, see technical tables A-17, A-18a, and A-18b (<https://nces.nsf.gov/pubs/nsf22319>).

GSS health fields are collected under the advisement of NIH. These GSS fields are about a third of all health fields in the National Center for Education Statistics' CIP taxonomy. NIH information on trends seen within these selected health fields can be found at <https://report.nih.gov/nihdatabook/>. In the NCSES TOD, a master's degree in a health field is considered to be an S&E-related degree rather than an S&E degree. In the GSS, health fields are reported separately from S&E fields, although they are included in total counts of master's students.

The full set of data tables from the 2022 survey is available at <https://nces.nsf.gov/surveys/graduate-students-postdoctorates-s-e/2022>. Data are also available in NCSES's interactive data tool (<https://ncesdata.nsf.gov/ids/gss>). For more information about the survey, contact the GSS Survey Manager, Michael Yamaner.

Notes

- 1 For more information, see the full set of data tables: [table 1-5a](#).
- 2 The Student and Exchange Visitor Program produces the SEVIS by the numbers reported. SEVIS reported an increase of 15.7% for master's students and 3.2% for doctoral students between 2021 and 2022. It is important to note that not all SEVIS programs are GSS eligible, so there may be some differences between the GSS and SEVIS counts. For more information, see Immigration and Customs Enforcement (ICE). 2022. *SEVIS by the Numbers: Annual Report on International Student Trends*. Available at <https://www.ice.gov/doclib/sevis/pdf/sevisBTN2022.pdf>. Accessed 31 October 2023.
- 3 More specifically, the Survey of Earned Doctorates (SED) reported that the percentage of new doctorate holders taking jobs in academia declined 3.5 percentage points between 2021 and 2022 (Heuer et al. 2023) and that fewer new doctorate holders took postdoctoral appointments compared with 2017 (SED data tables: [table 2-3](#)). See Heuer R, Einaudi P, Kang K; National Center for Science and Engineering Statistics (NCSES). 2023. *Research Doctorate Conferrals Rebound, Leading to Record Number of U.S. Doctorate Recipients in 2022*. NSF 23-353. Alexandria, VA: National Science Foundation. Available at <https://nces.nsf.gov/pubs/nsf23353/>.
- 4 For more information, see the full set of data tables: [table 3-4](#).
- 5 NIH reported supporting 30,997 postdocs in 2018, compared with 28,953 in 2022. The NIH postdoc support numbers are higher than the GSS numbers due to the “primary” source of support qualification in the GSS; NIH counts being cumulative over the course of the fiscal year, whereas GSS counts represent a point in time (1 October); and some NIH postdocs may work in fields or institutions that are not GSS eligible. See Lauer M. 2023. *Number of Postdoctoral Researchers Supported by NIH Grant Awards FY 2017–FY 2022*. NIH Extramural Nexus. Available at <https://nexus.od.nih.gov/all/2023/03/02/number-of-postdoctoral-researchers-supported-by-nih-grant-awards-fy-2017-fy-2022/>. Accessed 9 October 2023.

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