InfoBrief
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Graduate Enrollment in Science and Engineering Grew Substantially in the Past Decade but Slowed in 2010

by Kelly Kang[1]

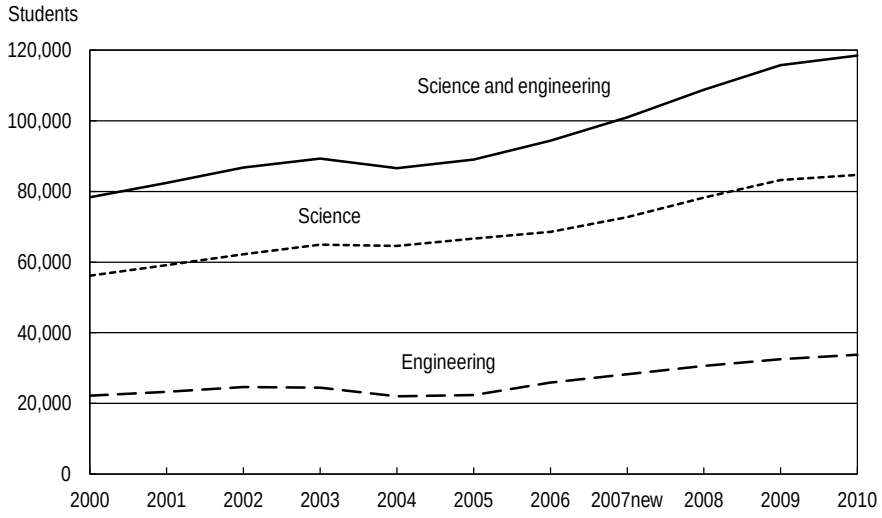
Approximately 632,700 graduate students were enrolled in science, engineering, and health (SEH) programs in the United States as of fall 2010, a 30% increase from approximately 493,300 students in 2000, according to the National Science Foundation's (NSF's) Survey of Graduate Students and Postdoctorates in Science and Engineering (GSS). The growth in first-time, full-time (FTFT) graduate student enrollment in science and engineering (S&E) programs over this time was even greater, with a 50% increase from approximately 78,400 students in 2000 to approximately 118,500 students in 2010 (figure 1).

Due to the extra variability that may have resulted from the methodological changes in the 2007 GSS, all growth rate calculations comparing pre- and post-2007 counts are rounded to the nearest 5%. See "Data Sources and Limitations" for more information.

Continuing the decade-long trend, overall graduate enrollment in S&E reached a new peak in 2010, with 407,291 students in science fields and 149,241 students in engineering fields (table 1). However, rates of growth in these fields slowed considerably between 2009 and 2010 from the two previous years—particularly in FTFT enrollment, which had only a 1.7% gain in science programs and 4.0% gain in engineering programs. Annual increases in 2007–08 and 2008–09 for FTFT graduate enrollment were 7.6% and 6.4% in science and 8.2% and 6.2% in engineering, respectively (figure 1).

Enrollment in biomedical engineering, which increased by 7.5% between 2009 and 2010, continues to be one of the fastest growing S&E fields and has

FIGURE 1. First-time, full-time graduate students in science and engineering fields: 2000–10



NOTES: In 2007 survey was redesigned and five fields were added or reclassified to improve reporting. "2007new" shows data as collected in 2007. Due to methodological changes, counts should be used with caution for trend analysis. See http://www.nsf.gov/statistics/nsf10307/ for more detail.

SOURCE: National Science Foundation/National Center for Science and Engineering Statistics, NSF-NIH Survey of Graduate Students and Postdoctorates in Science and Engineering.

TABLE 1. Graduate enrollment in science, engineering, and health fields, by field: 2000–10

Field	2000	2001	2002	2003	2004	2005	2006	2007 old[a]	2007 new[a]	2008	2009	2010	% change 2000 –10[b]	% change 2009 –10
All survey fields	493,311	509,607	540,404	567,121	574,463	582,226	597,643	607,823	619,499	631,489	631,645	632,652	30	0.2
Science and engineering	413,536	429,229	454,834	474,645	475,873	478,275	486,287	502,375	516,199	529,275	545,685	556,532	35	2.0
Science	309,424	319,736	335,166	347,268	352,307	357,710	363,246	372,120	384,523	391,419	401,008	407,291	30	1.6
Agricultural sciences	12,023	12,235	12,698	13,197	13,445	13,123	13,016	13,222	13,528	14,153	15,200	15,656	30	3.0
Biological sciences	56,282	57,639	61,088	64,701	66,565	68,479	69,941	71,663	71,932	72,666	73,304	74,928	35	2.2
Computer sciences	47,350	52,196	55,269	53,696	50,016	47,978	47,653	48,959	48,246	49,553	51,161	51,546	10	0.8
Earth, atmospheric, and ocean sciences	13,941	13,841	14,240	14,620	15,131	14,836	14,920	14,675	14,100	14,389	14,839	15,655	10	5.5
Mathematical sciences	15,650	16,651	18,163	19,465	19,931	20,210	20,815	21,335	20,975	21,400	22,226	23,136	50	4.1
Physical sciences	30,385	31,038	32,341	34,298	35,761	36,375	36,901	37,111	36,824	37,319	38,149	38,973	30	2.2
Psychology[c]	50,466	50,454	51,152	52,162	54,126	57,282	57,653	60,284	59,617	58,991	56,184	53,419	5	-4.9
Social sciences	83,327	85,682	90,215	95,129	97,332	99,427	102,347	104,871	103,150	103,384	107,820	109,220	30	1.3
Other sciences[a,d]	ne	ne	ne	ne	ne	ne	ne	ne	16,151	19,564	22,125	24,758	-	11.9
Engineering	104,112	109,493	119,668	127,377	123,566	120,565	123,041	130,255	131,676	137,856	144,677	149,241	45	3.2
Aerospace engineering	3,407	3,451	3,685	4,048	4,089	4,170	4,482	4,616	4,616	4,902	5,266	5,540	65	5.2
Architecture[a]	ne	ne	ne	ne	ne	ne	ne	ne	4,601	5,905	6,804	6,795	-	-0.1
Biomedical engineering	3,197	3,599	4,338	5,301	5,807	6,067	6,482	6,881	6,904	7,339	7,904	8,497	165	7.5
Chemical engineering	7,056	6,913	7,414	7,516	7,452	7,173	7,261	7,383	7,584	7,892	8,188	8,668	25	5.9
Civil engineering[a]	16,451	16,665	17,713	18,890	18,561	18,114	17,802	19,867	16,071	16,931	18,638	19,559	20	4.9
Electrical engineering	33,611	36,100	39,948	41,763	38,995	37,450	38,265	40,207	40,588	41,164	41,218	41,336	25	0.3
Industrial engineering	12,119	12,940	14,033	14,313	13,852	13,650	13,829	14,290	14,474	15,692	15,825	15,205	25	-3.9
Mechanical engineering	15,235	15,852	17,139	18,393	17,852	17,373	17,919	18,366	18,347	19,585	21,243	22,509	50	6.0
Metallurgical/materials engineering	4,377	4,721	4,992	5,131	5,059	5,160	5,268	5,365	5,314	5,539	5,863	6,274	45	7.0
Other engineering	8,659	9,252	10,406	12,022	11,899	11,408	11,733	13,280	13,177	12,907	13,728	14,858	70	8.2
Health	79,775	80,378	85,570	92,476	98,590	103,951	111,356	105,448	103,300	102,214	85,960	76,120	-5	-11.4
Clinical medicine[a,e]	16,407	17,363	19,166	20,574	20,866	21,414	23,441	24,616	22,751	23,939	24,125	25,699	55	6.5
Other health[c]	63,368	63,015	66,404	71,902	77,724	82,537	87,915	80,832	80,549	78,275	61,835	50,421	-20	-18.5

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

[a] In 2007 survey was redesigned and five fields were added or reclassified to improve reporting. "2007new" shows data as collected in 2007; "2007old" shows data as they would have been collected in prior years. Due to methodological changes, counts should be used with caution for trend analysis. See http://www.nsf.gov/statistics/nsf10307/ for more detail.

[b] "% change 2000–10" is rounded to nearest 5% to reflect potential imprecision of this estimate due to methodological changes in 2007.

[c] Counts in psychology and other health declined in 2008, 2009, and 2010, potentially due to more rigorous follow-up with institutions regarding the exclusion of practitioner-oriented graduate degree programs. These decreases may not reflect changes in actual enrollments, and care should be used when examining trends.

[d] Includes communication, family and consumer sciences/human sciences, neuroscience, and multidisciplinary/interdisciplinary studies. These fields were added in 2007, although some programs reported within them had been reported prior to 2007 within other fields.

[e] Includes research-oriented graduate students in anesthesiology, cardiology, endocrinology, gastroenterology, hematology, neurology, obstetrics/gynecology, oncology/cancer research, ophthalmology, otorhinolaryngology, pediatrics, preventive medicine/community health, psychiatry, pulmonary disease, radiology, surgery, and clinical medicine, not elsewhere classified.

SOURCE: National Science Foundation/National Center for Science and Engineering Statistics, NSF-NIH Survey of Graduate Students and Postdoctorates in Science and Engineering.

experienced the most rapid growth over the last decade (165%), from approximately 3,200 graduate students in 2000 to 8,500 students in 2010 (table 1).

These and other findings in this InfoBrief are from the fall 2010 GSS, cosponsored by NSF and the National Institutes of Health (NIH). The GSS is an annual survey of all academic institutions in the United States that grant research-based master's degrees or doctorates in SEH fields. The GSS collects data on the number and characteristics of graduate students, postdoctoral appointees (postdocs), and other doctorate-holding non-faculty researchers in SEH fields. This InfoBrief focuses on the graduate students and postdocs within S&E fields. Further analysis of GSS data on grad-

uate enrollment in selected health fields can be obtained from NIH.[2]

Graduate Student Enrollment in S&E

Between 2000 and 2010 enrollment in S&E graduate programs rose at a slightly faster pace for woman than for men (approximately 40% versus approximately 30%) (table 2). As a result, women's share of graduate S&E enrollment also rose over this period (41.2% in 2000 to 43.2% in 2010, peaking at 44.0% in 2007). The slight drop in the women's share since 2007 has been due to the faster rise in men's S&E graduate enrollment (9.4% for men versus 5.8% for women).

Over the last decade S&E graduate enrollment grew at the same rate for U.S. citizens and permanent residents and for temporary visa holders, both increasing by 35% (table 2). However, among U.S. citizens and permanent resident graduate students, S&E enrollment for students in underrepresented minority groups, except for Native Hawaiian/Other Pacific Islanders, grew at a much higher rate than for whites not of Hispanic origin or Asians. Over the last decade S&E graduate enrollment by Hispanic/Latino students, American Indian/Alaska Native students, and black/African American students not of Hispanic origin grew by approximately 65%, 55%, and 50%, respectively.[3]

Enrollment Status

Full-time graduate student enrollment in S&E grew at a higher rate (approximately 40%) than part-time enrollment (approximately 20%) between 2000 and 2010. The number of FTFT S&E graduate students went up by approximately 50% over the decade, increasing annually except for a brief period of decline in 2004–05, which was primarily driven by the mid-decade dip in engineering enrollment (figure 1). Annual growth in FTFT S&E graduate enrollment slowed in 2010 to its lowest level since 2004–05. This slowdown in growth between 2009 and 2010 was more evident in science programs than in engineering programs (1.7% versus

TABLE 2. Graduate enrollment in science and engineering fields, by enrollment status, sex, citizenship, and race/ethnicity of U.S. citizens and permanent residents: 2000–10

Characteristic	2000	2001	2002	2003	2004	2005	2006	2007 old[a]	2007 new[a]	2008	2009	2010	% change 2000–10[b]	% change 2009–10
All science and engineering	413,536	429,229	454,834	474,645	475,873	478,275	486,287	502,375	516,199	529,275	545,685	556,532	35	2.0
Full time	291,355	304,021	325,472	339,028	340,529	341,742	349,802	362,976	371,542	383,560	398,498	409,107	40	2.7
Part time	122,181	125,208	129,362	135,617	135,344	136,533	136,485	139,399	144,657	145,715	147,187	147,425	20	0.2
Male	243,057	251,810	266,217	276,248	274,008	271,967	275,181	284,080	288,926	297,278	307,936	316,051	30	2.6
Female	170,479	177,419	188,617	198,397	201,865	206,308	211,106	218,295	227,273	231,997	237,749	240,481	40	1.1
U.S. citizen or permanent resident	290,651	294,608	309,119	327,181	332,022	338,513	343,603	353,142	365,091	369,781	382,342	390,403	35	2.1
Hispanic or Latino	17,203	17,974	19,634	21,241	22,212	23,387	24,140	25,032	25,739	26,098	27,265	28,609	65	4.9
Not Hispanic or latino														
American Indian or Alaska Native	1,602	1,683	1,734	1,879	1,848	1,958	2,112	2,168	2,262	2,618	2,549	2,500	55	-1.9
Asian	23,748	25,467	28,290	30,746	29,570	29,547	29,232	30,134	30,697	30,356	31,754	32,185	35	1.4
Black or African American	20,834	21,455	22,668	24,174	24,624	25,248	25,664	26,565	27,637	28,680	29,973	31,094	50	3.7
Native Hawaiian or Other Pacific Islander[c]	1,250	1,027	939	1,040	1,075	1,027	947	1,145	1,200	1,121	1,125	1,088	-15	-3.3
White	205,569	206,018	213,135	222,674	224,850	225,776	227,993	232,043	240,204	242,623	250,443	255,256	25	2.0
More than one race[c]	439	464	384	423	493	528	501	543	551	1,319	2,300	4,989	1,035	116.9
Unknown race/ethnicity	20,006	20,520	22,335	25,004	27,350	31,042	33,014	35,512	36,801	36,966	36,933	34,682	75	-6.1
Temporary visa holder	122,885	134,621	145,715	147,464	143,851	139,762	142,684	149,233	151,108	159,494	163,343	166,129	35	1.7

[a] In 2007 survey was redesigned and five fields were added or reclassified to improve reporting. "2007new" shows data as collected in 2007; "2007old" shows data as they would have been collected in prior years. Due to methodological changes, counts should be used with caution for trend analysis. See www.nsf.gov/statistics/nsf10307/ for more detail.

[b] "% change 2000–10" is rounded to nearest 5% to reflect potential imprecision of this estimate due to methodological changes in 2007.

[c] Reporting of race/ethnicity in 2008–10 GSS has been affected by changes in reporting of race/ethnicity in the Integrated Postsecondary Education Data System (IPEDS). Starting in 2008 IPEDS respondents were asked to use a new race/ethnicity classification that included a category for two or more races (see http://nces.ed.gov/ipeds/reic/resource.asp) and separate reporting of Native Hawaiians and Other Pacific Islanders from Asians. New classification was optional in 2008 and 2009 IPEDS but mandatory in 2010 and may have contributed to significant increase in GSS reporting of "More than one race," not Hispanic.

SOURCE: National Science Foundation/National Center for Science and Engineering Statistics, NSF-NIH Survey of Graduate Students and Postdoctorates in Science and Engineering.

4.0%). In comparison, growth in S&E graduate enrollment was much larger in 2007–08 (7.6% in science versus 8.2% in engineering) and 2008–09 (6.4% in science versus 6.2% in engineering).

Postdoctoral Appointees in S&E

A total of 44,051 S&E postdocs were reported in 2010, an 8.0% increase over 2009 and an approximately 45% increase over 2000 (table 3). The growth of postdocs in engineering (approximately 110%) outpaced that of postdocs in science (approximately 40%) over the last decade. Although most S&E postdocs (84.2%) in 2010 are still in science, the proportion has steadily declined from a high of 89.6% in 2001.

As in the graduate student enrollment, biomedical engineering was the fastest growing postdoctoral field between 2000 and 2010, measuring an increase of approximately 370%.

Over the last decade the number of female postdocs grew approximately twice as fast as the number of male postdocs, narrowing the gender gap in S&E postdoctoral appointments. Among the postdocs in S&E fields, women appointees increased by approximately 70%, growing from approximately 8,900 in 2000 to approximately 15,300 in 2010 (table 3). Women accounted for 34.7% of all S&E postdocs in 2010, compared with 29.5% of all S&E postdocs in 2000.

The share of foreign postdocs in S&E continued its 5-year decline in 2010 as growth of postdocs among U.S. citizens and permanent residents (12.3%) outpaced that of postdocs among temporary visa holders (4.4%). From 2000 to 2006 the proportion of postdocs on temporary visas was relatively steady and averaged 59.1%. In 2010, 53.6% of all postdocs held temporary visas.

Data Sources and Limitations

This publication provides the first release of data from the fall 2010 cycle of the GSS, which collected data from 13,711 organizational units (departments, programs, affiliated research centers, and health care facilities) at 574 institutions of higher education and their affiliates in the United States, Puerto Rico, and Guam. The institutional response rate was 99.3%. An overview of the survey objectives and design can be found at http://www.nsf.gov/statistics/srvygradpostdoc/.

The GSS collects data on graduate students, postdocs, and other doctorate-holding non-faculty researchers in research-oriented SEH fields. Practitioner-oriented degrees within these fields (e.g., master's degrees in nursing and physical therapy) are not eligible for the GSS. Declines in psychology and other health fields in 2008–10 are likely due to more rigorous follow-up with institutions regarding the exclusion of practitioner-oriented graduate degree programs. These decreases may not reflect changes in actual enrollments, and care should be used when examining long-term trends.

In 2010 the postdoc section of the survey was expanded and significant effort was made to ensure that appropriate personnel were providing postdoc data (see http://www.nsf.gov/statistics/srvygradpostdoc/ for more information). As a result, it is unclear how much of the increase reported in 2010 represents growth in postdoctoral appointments and how much results from improved data collection. More information on the improved data collection and changes in postdoc data will be released in a forthcoming InfoBrief, which will be available at http://www.nsf.gov/statistics/gradpostdoc/.

The full set of detailed statistical tables from this survey will be available in the forthcoming report *Graduate Students and Postdoctorates in Science and Engineering: Fall 2010* at http://www.nsf.gov/statistics/gradpostdoc/. Individual detailed tables may be available upon request in advance of the full report by contacting the author.

Due to methodological changes in 2007, the data collected from 2007 through 2010 are not strictly comparable to those collected prior to 2007. As a result, care should be used when assessing trends within the GSS data. In this InfoBrief, "2007new" reports the data as collected in 2007 and "2007old" provides data as they would have been collected in 2006. Ten-year trends reported in the tables are labeled "% change 2000–10." Note that these percentages are rounded to the nearest 5% to reflect the extra variability in the estimate that may have resulted from the methodological changes that occurred in 2007. Please see appendix A, "Technical Notes," in *Graduate Students and Postdoctorates in Science and Engineering: Fall 2007* (NSF 10-307) for a more detailed discussion of these changes.

TABLE 3. Postdoctoral appointees in science, engineering, and health fields by sex, citizenship, and field: 2000–10

Characteristic	2000	2001	2002	2003	2004	2005	2006	2007 old[a]	2007 new[a]	2008	2009	2010[b]	% change 2000 –10[c]	% change 2009 –10
All survey fields	43,115	43,311	45,034	46,728	47,240	48,555	49,343	50,712	50,840	54,164	57,805	63,415	45	9.7
Science and engineering	30,224	30,196	31,937	33,666	34,065	34,456	34,887	35,894	36,223	38,203	40,804	44,051	45	8.0
Male	21,296	20,941	21,807	22,882	23,080	23,227	23,361	24,412	24,631	25,119	26,647	28,752	35	7.9
Female	8,928	9,255	10,130	10,784	10,985	11,229	11,526	11,482	11,592	13,084	14,157	15,299	70	8.1
U.S. citizens and permanent residents	12,627	12,073	13,524	13,542	13,969	14,078	14,111	14,903	15,107	16,274	18,175	20,419	60	12.3
Temporary visa holders	17,597	18,123	18,413	20,124	20,096	20,378	20,776	20,991	21,116	21,929	22,629	23,632	35	4.4
Science	26,911	27,044	28,371	29,856	30,116	30,290	30,245	30,986	31,281	32,741	34,388	37,095	40	7.9
Agricultural sciences	822	833	963	1,054	959	1,007	927	948	985	1,147	1,083	1,195	45	10.3
Biological sciences	16,734	17,032	17,640	18,625	18,716	18,747	18,807	19,218	19,109	19,827	20,159	21,537	30	6.8
Computer sciences	344	336	356	355	384	406	467	516	456	493	594	748	115	25.9
Earth, atmospheric, and ocean sciences	1,155	1,049	1,129	1,182	1,263	1,364	1,495	1,322	1,250	1,339	1,424	1,760	50	23.6
Mathematical sciences	385	353	395	449	468	500	579	621	624	723	737	756	95	2.6
Physical sciences	6,270	6,223	6,619	6,829	7,059	7,011	6,703	6,760	6,719	6,885	7,447	7,703	25	3.4
Psychology	730	809	815	960	902	884	873	1,106	1,088	1,077	1,219	1,077	50	-11.6
Social sciences	471	409	454	402	365	371	394	495	483	508	561	646	35	15.2
Other sciences[a,d]	ne	ne	ne	ne	ne	ne	ne	ne	567	742	1,164	1,673	-	43.7
Engineering	3,313	3,152	3,566	3,810	3,949	4,166	4,642	4,908	4,942	5,462	6,416	6,956	110	8.4
Aerospace engineering	111	128	140	141	141	153	165	178	178	154	168	191	70	13.7
Architecture[a]	ne	ne	ne	ne	ne	ne	ne	ne	5	11	22	10	-	-54.5
Biomedical engineering	220	262	284	388	425	477	591	640	640	710	960	1,036	370	7.9
Chemical engineering	703	574	758	686	689	702	735	758	790	880	1,084	1,092	55	0.7
Civil engineering[a]	295	268	342	300	313	384	458	419	417	465	535	570	95	6.5
Electrical engineering	525	436	613	646	654	689	721	885	884	987	1,025	1,097	110	7.0
Industrial engineering	48	21	43	45	50	51	51	73	71	115	109	163	240	49.5
Mechanical engineering	480	501	441	543	514	562	644	725	722	784	948	1,009	110	6.4
Metallurgical/materials engineering	507	479	507	539	567	578	571	555	564	605	758	835	65	10.2
Other engineering	424	483	438	522	596	570	706	675	671	751	807	953	125	18.1
Health	12,891	13,115	13,097	13,062	13,175	14,099	14,456	14,818	14,617	15,961	17,001	19,364	50	13.9
Clinical medicine[a,e]	11,555	11,663	11,582	11,445	11,477	12,323	12,584	12,805	12,472	13,837	14,601	16,610	45	13.8
Other health	1,336	1,452	1,515	1,617	1,698	1,776	1,872	2,013	2,145	2,124	2,400	2,754	105	14.8

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

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[b] In 2010 postdoc section of survey was expanded and significant effort was made to ensure that appropriate personnel were providing postdoc data (see http://www.nsf.gov/statistics/gradpostdoc/ for more detail). As a result, it is unclear how much of increase reported in 2010 represents growth in postdoctoral appointments and how much results from improved data collection. More information will be forthcoming on improved data collection and changes in postdoc data.

[c] "% change 2000–10" shows growth from 2000 to 2010 and is rounded to nearest 5% to reflect potential imprecision of this estimate due to methodological changes in 2007.

[d] Includes communication, family and consumer sciences/human sciences, neuroscience, and multidisciplinary/interdisciplinary studies. These fields were added in 2007, although some programs reported within them had been reported prior to 2007 within other fields.

[e] Includes postdoctoral appointees in anesthesiology, cardiology, endocrinology, gastroenterology, hematology, neurology, obstetrics/gynecology, oncology/cancer research, ophthalmology, otorhinolaryngology, pediatrics, preventive medicine/community health, psychiatry, pulmonary disease, radiology, surgery, and clinical medicine, not elsewhere classified.

SOURCE: National Science Foundation/National Center for Science and Engineering Statistics, NSF-NIH Survey of Graduate Students and Postdoctorates in Science and Engineering.

Notes

1. Kelly H. Kang, Human Resources Statistics Program, National Center for Science and Engineering Statistics, National Science Foundation, 4201 Wilson Boulevard, Suite 965, Arlington, VA 22230 (kkang@nsf.gov; 703-292-7776).

2. The data on health fields collected in GSS are selected by NIH. These fields make up about one-third of all health fields in the U.S. Department of Education Classification of Instructional Programs taxonomy. NIH information on trends seen within these selected health fields can be found at http://www.report.nih.gov/nihdatabook/.

3. Reporting of race/ethnicity in the 2008–10 GSS has been affected by changes in the reporting of race/ethnicity in the Integrated Postsecondary Education Data System (IPEDS). Starting in 2008 IPEDS respondents were asked to use a new race/ethnicity classification that included a category for two or more races (see http://nces.ed.gov/ipeds/reic/resource.asp) and a separate reporting of Native Hawaiians and Other Pacific Islanders from Asians. The new classification was optional in 2008 and 2009 IPEDS but mandatory in 2010 and may have contributed to the significant increase in GSS for More than one race, not Hispanic.

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