

GRADUATE ENROLLMENT IN SCIENCE AND ENGINEERING PROGRAMS UP IN 2003, BUT DECLINES FOR FIRST-TIME FOREIGN STUDENTS

by Julia Oliver

Graduate enrollment in science and engineering (S&E) programs reached an all-time high of 474,203 students in fall 2003 (table 1), a gain of 4 percent over S&E enrollment in 2002 and a gain of 9 percent over 1993. Between 2002 and 2003 S&E graduate enrollment increased by 19,311 students: 18,052 U.S. citizens and permanent visa holders and 1,259 temporary visa holders. U.S. institutions reported 33,685 postdoctoral appointees (postdocs) in S&E fields, also an all-time high.

Trends in Graduate Enrollment

Enrollment Status

Full-time S&E enrollment exceeded 339,000 in 2003—a gain of 4 percent from the previous year. Full-time students constituted 72 percent of all S&E graduate students in 2003, compared with 67 percent in 1993. Although part-time enrollment also grew 4 percent be-

tween fall 2002 and fall 2003, the long-term trend shows an increasing proportion of full-time enrollment.

About 26 percent of full-time S&E graduate students in 2003 were enrolled for the first time. First-time, full-time enrollment grew almost 3 percent between 2002 and 2003 to more than 89,000, an all-time peak.

Field of Study

Graduate enrollment in 2003 grew in all major S&E fields and in all subfields except computer sciences (table 2). Computer sciences enrollment dropped 3 percent from the previous year, the first decrease in that field since 1995. Of the fields of study with the largest graduate enrollments (10,000 or more), mechanical engineering led with an 8 percent gain, followed by mathematical sciences and physics, each with 7 percent gains.

TABLE 1. Graduate S&E enrollment, by enrollment status and sex, and postdocs in S&E fields: 1993–2003

Characteristic	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	% change 2002–03
All S&E graduate students	435,723	431,142	422,466	415,181	407,630	404,856	411,182	413,536	429,242	454,892	474,203	4.2
Full time	293,905	292,979	287,171	284,039	280,669	278,943	283,893	291,355	304,021	325,498	339,208	4.2
First time	79,280	78,038	74,364	73,448	73,600	74,373	75,447	78,332	82,411	86,822	89,344	2.9
Other	214,625	214,941	212,807	210,591	207,069	204,570	208,446	213,023	221,610	238,676	249,864	4.7
Part time	141,818	138,163	135,295	131,142	126,961	125,913	127,289	122,181	125,221	129,394	134,995	4.3
Male	279,185	272,031	262,256	253,510	245,619	241,429	242,786	243,057	251,812	266,248	276,090	3.7
Female	156,538	159,111	160,210	161,671	162,011	163,427	168,396	170,479	177,430	188,644	198,113	5.0
Postdocs	24,665	25,787	26,160	26,569	27,264	27,876	28,980	30,224	30,194	31,904	33,685	5.6

SOURCE: National Science Foundation/Division of Science Resources Statistics, Survey of Graduate Students and Postdoctorates in Science and Engineering.



TABLE 2. Graduate S&E enrollment, by field: 1993–2003

Field	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	% change 2002–03
All S&E fields	435,723	431,142	422,466	415,181	407,630	404,856	411,182	413,536	429,242	454,892	474,203	4.2
Science	318,851	318,118	315,265	311,957	306,482	304,818	309,491	309,424	319,749	335,224	346,828	3.5
Agricultural sciences	12,305	12,611	12,768	12,301	12,203	12,168	12,312	12,023	12,235	12,698	13,197	3.9
Biological sciences	55,950	57,676	58,344	57,749	56,705	56,695	56,959	56,282	57,639	61,133	64,684	5.8
Computer sciences	36,213	34,158	33,458	34,626	35,991	38,027	42,478	47,350	52,196	55,269	53,678	-2.9
Earth, atmospheric, and ocean sciences	15,721	15,957	15,716	15,183	14,548	14,258	14,083	13,941	13,841	14,240	14,655	2.9
Atmospheric sciences	1,112	1,109	1,072	1,086	1,092	965	913	963	924	1,036	1,150	11.0
Geosciences	7,759	7,713	7,582	7,304	6,959	6,687	6,637	6,596	6,544	6,712	6,889	2.6
Oceanography	2,627	2,870	2,723	2,615	2,479	2,562	2,624	2,668	2,585	2,618	2,695	2.9
Other earth, atmospheric, and ocean sciences	4,223	4,265	4,339	4,178	4,018	4,044	3,909	3,714	3,788	3,874	3,921	1.2
Mathematical sciences	20,000	19,573	18,504	18,008	16,719	16,485	16,257	15,650	16,651	18,163	19,465	7.2
Physical sciences	35,328	34,466	33,399	32,333	31,105	30,575	30,691	30,385	31,038	32,341	34,298	6.1
Astronomy	880	973	912	874	778	820	832	888	916	990	1,080	9.1
Chemistry	20,131	19,803	19,570	19,334	18,774	18,482	18,416	18,105	18,366	19,045	20,049	5.3
Physics	13,841	13,162	12,425	11,728	11,147	10,809	10,869	10,841	11,248	11,701	12,555	7.3
Other physical sciences	476	528	492	397	406	464	574	551	508	605	614	1.5
Psychology	54,557	54,554	53,641	53,122	53,126	52,557	51,727	50,466	50,467	51,165	52,025	1.7
Social sciences	88,777	89,123	89,435	88,635	86,085	84,053	84,984	83,327	85,682	90,215	94,826	5.1
Agricultural economics	2,415	2,289	2,338	2,117	2,043	1,995	2,014	2,079	2,161	2,187	2,296	5.0
Anthropology	7,361	7,665	7,693	7,773	7,560	7,577	7,633	7,626	7,491	7,481	7,806	4.3
Economics	13,214	12,913	12,673	12,080	11,097	10,701	10,562	10,748	11,408	12,009	12,307	2.5
Geography	4,378	4,502	4,371	4,331	4,287	4,326	4,250	4,036	4,304	4,383	4,654	6.2
History and philosophy of science	369	387	401	409	443	508	557	532	571	663	677	2.1
Linguistics	3,321	3,279	3,194	3,156	3,068	2,935	2,799	2,674	2,744	2,875	3,028	5.3
Political science	35,076	34,317	34,298	33,252	32,083	30,828	31,372	31,131	31,805	34,934	36,855	5.5
Sociology	9,425	9,498	9,564	9,425	9,413	9,058	8,966	8,652	8,812	8,946	9,127	2.0
Sociology/anthropology	935	987	941	923	948	857	741	745	808	719	773	7.5
Other social sciences	12,283	13,286	13,962	15,169	15,143	15,268	16,090	15,104	15,578	16,018	17,303	8.0
Engineering	116,872	113,024	107,201	103,224	101,148	100,038	101,691	104,112	109,493	119,668	127,375	6.4
Aerospace engineering	3,940	3,715	3,343	3,208	3,083	3,137	3,349	3,407	3,451	3,685	4,048	9.9
Biomedical engineering	2,675	2,750	2,732	2,732	2,847	2,905	3,121	3,241	3,639	4,378	5,347	22.1
Chemical engineering	7,554	7,639	7,452	7,408	7,288	7,093	6,883	7,056	6,913	7,414	7,516	1.4
Civil engineering	19,583	19,925	19,218	18,528	17,193	16,517	16,226	16,451	16,665	17,713	18,838	6.4
Electrical engineering	35,290	33,067	30,861	29,941	30,787	31,384	31,822	33,611	36,100	39,948	41,745	4.5
Industrial/manufacturing engineering	13,905	13,992	13,475	12,675	11,957	11,221	11,803	12,119	12,940	14,033	14,295	1.9
Mechanical engineering	18,477	17,761	16,363	15,509	15,045	14,696	14,956	15,235	15,852	17,139	18,440	7.6
Metallurgical/materials engineering	5,410	5,228	4,956	4,747	4,688	4,680	4,481	4,377	4,721	4,992	5,154	3.2
Other engineering	10,038	8,947	8,801	8,476	8,260	8,405	9,050	8,615	9,212	10,366	11,992	15.7

SOURCE: National Science Foundation/Division of Science Resources Statistics, Survey of Graduate Students and Postdoctorates in Science and Engineering.

Demographics

The proportion of women among S&E graduate students grew from 36 percent in 1993 to 42 percent in 2003 (table 1). The number of female students has increased every year since 1983 and in 2003 increased 5 percent. In contrast, after reaching a peak of 279,185 in 1993, enrollment of men declined every year from 1993 to 1998. The number of male graduate students in S&E fields in 2003 was up 4 percent over 2002 but was still below the 1993 peak enrollment.

Over the past decade, enrollment of minority students in graduate S&E programs has grown, whereas enrollment of white students has declined (table 3). In 2003 white enrollment rose 4 percent over the 2002 figure but remained below the 1993 peak. White, non-His-

panic students accounted for 68 percent of all U.S. citizens and permanent residents enrolled in S&E graduate programs in 2003, down from 78 percent in 1993. Asians/Pacific Islanders were the second largest race/ethnicity group among U.S. citizens and permanent residents in S&E graduate programs in 2003, accounting for 10 percent of enrollment. They were followed by blacks (7 percent), Hispanics (6 percent), and American Indians/Alaska Natives (less than 1 percent). Increases from 2002 to 2003 in S&E graduate enrollment for minority students ranged from 6 percent for blacks to 11 percent for Asians/Pacific Islanders. Underrepresented minority enrollment (black, non-Hispanic; Hispanic; or American Indian/Alaska Native) continued to grow and in 2003 accounted for 14 percent of the U.S. citizens and permanent residents enrolled.

TABLE 3. Graduate S&E enrollment, by citizenship, enrollment status, sex, and race/ethnicity, and postdocs in S&E fields: 1993–2003

Characteristic	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	% change 2002–03
U.S. citizens and permanent residents												
S&E graduate students	330,057	329,026	323,962	317,075	308,668	302,879	301,254	290,711	294,711	309,280	327,332	5.8
Full time	204,405	206,809	204,113	200,674	195,974	191,945	190,076	185,673	188,225	200,232	213,349	6.6
First time	NA	NA	NA	NA	NA	NA	NA	46,316	48,232	54,652	59,770	9.4
Other	NA	NA	NA	NA	NA	NA	NA	139,357	139,993	145,580	153,579	5.5
Part time	125,652	122,217	119,849	116,401	112,694	110,934	111,178	105,038	106,486	109,048	113,983	4.5
Male	NA	195,794	189,915	182,519	174,934	169,490	165,823	157,023	158,015	165,004	175,027	6.1
Female	NA	133,232	134,047	134,556	133,734	133,389	135,431	133,688	136,696	144,276	152,305	5.6
White, non-Hispanic	256,772	255,660	245,857	238,032	228,007	220,667	216,750	205,569	206,027	213,162	222,118	4.2
Asian/Pacific Islander	24,048	26,471	25,902	25,929	26,012	26,726	27,570	25,058	26,584	29,352	32,450	10.6
Black, non-Hispanic	17,113	17,610	18,285	19,066	19,341	19,651	20,273	20,834	21,459	22,673	24,134	6.4
Hispanic	13,380	13,273	14,112	14,571	14,984	15,487	16,520	17,203	17,974	19,639	21,264	8.3
American Indian/Alaskan Native	1,309	1,382	1,516	1,538	1,599	1,607	1,553	1,602	1,683	1,735	1,872	7.9
Other or unknown race/ethnicity	17,435	14,630	18,290	17,939	18,725	18,741	18,588	20,445	20,984	22,719	25,494	12.2
Postdocs	11,635	12,469	12,823	12,930	12,835	12,966	12,725	12,627	12,088	13,523	13,590	0.5
Temporary visa holders												
S&E graduate students	105,666	102,116	98,504	98,106	98,962	101,977	109,928	122,825	134,531	145,612	146,871	0.9
Full time	89,500	86,170	83,058	83,365	84,695	86,998	93,817	105,682	115,796	125,266	125,859	0.5
First time	NA	NA	NA	NA	NA	NA	NA	32,016	34,179	32,170	29,574	-8.1
Other	NA	NA	NA	NA	NA	NA	NA	73,666	81,617	93,096	96,285	3.4
Part time	16,166	15,946	15,446	14,741	14,267	14,979	16,111	17,143	18,735	20,346	21,012	3.3
Male	NA	76,237	72,341	70,991	70,685	71,939	76,963	86,034	93,797	101,244	101,063	-0.2
Female	NA	25,879	26,163	27,115	28,277	30,038	32,965	36,791	40,734	44,368	45,808	3.2
Postdocs	13,030	13,318	13,337	13,639	14,429	14,910	16,255	17,597	18,106	18,381	20,095	9.3

NA = not available; information within citizenship groups on sex and on full-time, first-time enrollment was not collected before 1994 and 2000, respectively.

NOTE: For 2000, 2001, 2002, and 2003, the few graduate students who were reported as "Native Hawaiian/Other Pacific Islander" or "multiracial" were included in "Asian/Pacific Islander" or "other/unknown race/ethnicity," respectively.

SOURCE: National Science Foundation/Division of Science Resources Statistics, Survey of Graduate Students and Postdoctorates in Science and Engineering.

Foreign-Student Enrollment

The number and proportion of foreign students (graduate students with temporary visas) increased every year from 1997 through 2002 (table 3). Although the number of temporary-visa holders rose in 2003, temporary-visa holders as a proportion of all S&E graduate students declined slightly, from 32 to 31 percent. Between 2002 and 2003 the number of students with temporary visas increased by almost 1,300, compared with increases of over 10,000 in each of the previous 3 years.

In 2003 students with temporary visas were more likely to enroll full time in a graduate S&E program than were U.S. citizens and permanent residents (table 3). Eighty-six percent of temporary-visa holders were enrolled full time, compared with 65 percent of U.S. citizens and permanent residents. But for the first time since 1994, the growth in full-time enrollment was greater for U.S. citizens and permanent residents (7 percent) than it was for foreign students (less than 1 percent). This trend reversal was also seen in part-time graduate enrollments. Although part-time graduate enrollment for temporary-visa holders increased, the gain (3 percent) was less than that of previous years and is below the gain for U.S. citizens and permanent residents (5 percent).

For the second consecutive year, first-time, full-time enrollment declined among students with temporary visas and increased among U.S. citizens and permanent residents. After a decline of 6 percent between 2001 and 2002, first-time, full-time enrollment of students with temporary visas fell 8 percent in 2003. As a result, 20 percent of temporary-visa holders were first-time, full-time students in 2003, compared with 26 percent in 2000. Between 2002 and 2003 the number of full-time,

first-time students with temporary visas declined by 2,600, with almost all of the decrease being among male students (table 4).

The 20-year trend for graduate S&E enrollment of U.S. citizens and permanent residents shows less growth and more years of decline than does the trend for temporary-visa holders. The enrollment of U.S. citizens and permanent residents in 2003 was 1 percent below peak enrollment, in 1993. The rise in 2003 represents the largest numerical increase in S&E graduate enrollment of U.S. citizens and permanent residents in the past two decades.

The overall declines in first-time, full-time enrollment of students with temporary visas did not occur in all S&E fields. In 2003 the number of full-time students with temporary visas who were enrolled for the first time declined in agricultural sciences, in computer sciences, in earth, atmospheric, and ocean sciences, and in engineering (figure 1). Enrollment for this group increased in biological sciences, mathematical sciences, physical sciences, and psychology. The field of study with the greatest percent gain in temporary-visa holder enrollment was psychology; computer sciences had the greatest drop. In contrast, first-time, full-time enrollment of U.S. citizens and permanent residents increased in every major field.

Postdoctoral Appointees

About 33,700 postdocs held postdoctoral positions in U.S. academic institutions in 2003, a 6 percent increase from 2002.¹ Of this number, most (60 percent) were temporary-visa holders (table 3). The 2003 increase in postdocs with temporary visas (9 percent) was almost

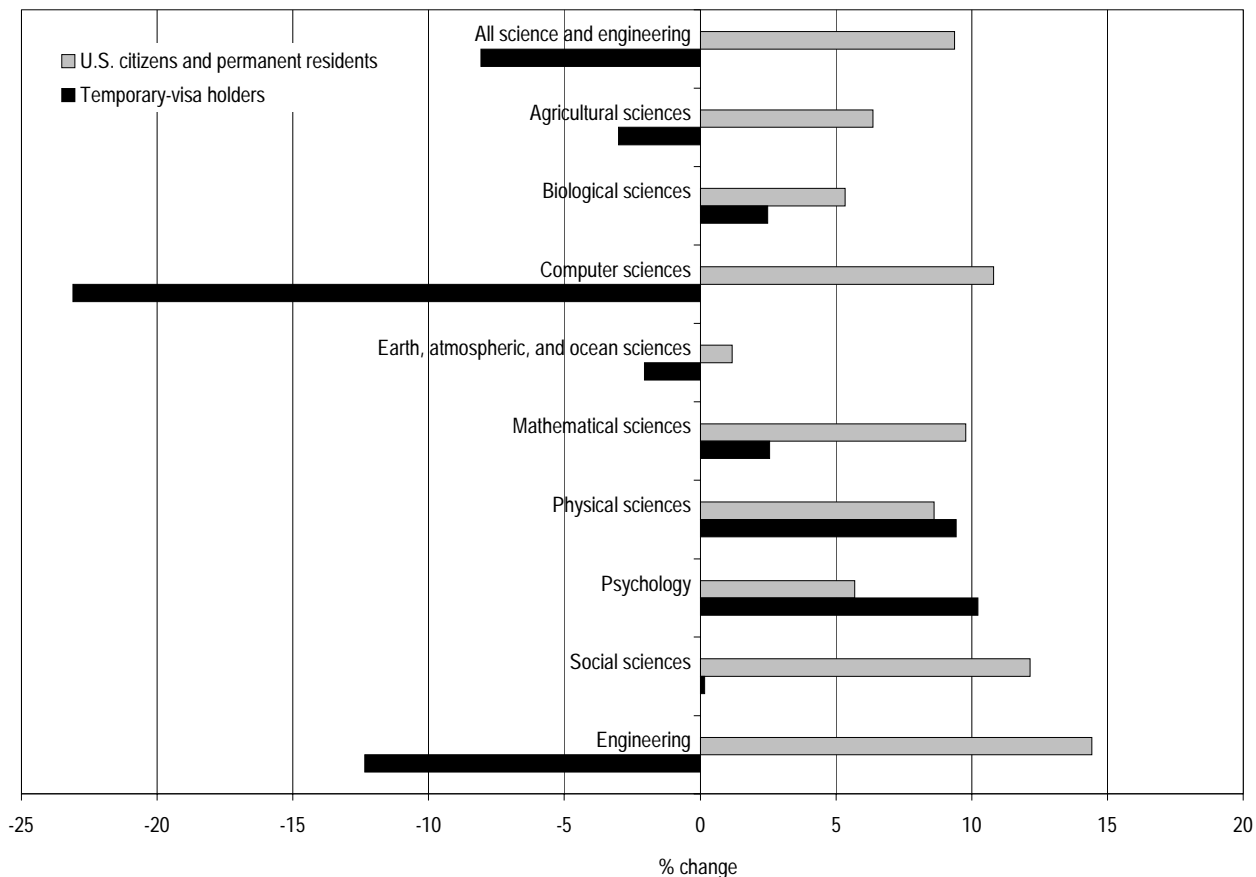
TABLE 4. Graduate S&E enrollment of temporary-visa holders, by sex and enrollment status: 2000–03

Enrollment status	2000		2001		2002		2003	
	Male	Female	Male	Female	Male	Female	Male	Female
All foreign S&E students	86,034	36,791	93,797	40,734	101,244	44,368	101,063	45,808
Full time	74,458	31,224	81,030	34,766	87,019	38,247	86,330	39,529
First time	22,472	9,544	23,667	10,512	21,781	10,389	19,489	10,085
Other	51,986	21,680	57,363	24,254	65,238	27,858	66,841	29,444
Part time	11,576	5,567	12,767	5,968	14,225	6,121	14,733	6,279

SOURCE: National Science Foundation, Division of Science Resources Statistics, Survey of Graduate Students and Postdoctorates in Science and Engineering.

¹ The data do not distinguish between new postdocs and continuing postdocs.

FIGURE 1. Full-time, first-time graduate enrollment by citizenship and S&E field: 2002-03



SOURCE: National Science Foundation/Division of Science Resources Statistics, Survey of Graduate Students and Postdoctorates in Science and Engineering, 2003.

six times the 2002 rate of increase (1.5 percent) and resembled the gains recorded in 2000 and 1999 (8 and 9 percent, respectively). In contrast, the number of U.S. citizens and permanent residents holding postdoctoral positions in U.S. colleges and universities increased by less than 1 percent in 2003, compared with a 12 percent increase in 2002.

Data Notes

Data presented here are from the fall 2003 Survey of Graduate Students and Postdoctorates in Science and Engineering. Data were collected from approximately 12,000 departments at 591 institutions of higher education in the United States and outlying areas. The department response rate was 99 percent; however, 13 percent of the reporting departments required partial imputation of missing data.

More detailed data are available in the forthcoming report “Graduate Students and Postdoctorates in Science and Engineering: Fall 2003,” which will be available at <http://www.nsf.gov/statistics/>.

For further information, contact

Julia Oliver
 Human Resources Statistics Program
 Division of Science Resources Statistics
 National Science Foundation
 4201 Wilson Boulevard, Suite 965
 Arlington, VA 22230
 joliver@nsf.gov
 703-292-7809

NATIONAL SCIENCE FOUNDATION
ARLINGTON, VA 22230

OFFICIAL BUSINESS

RETURN THIS COVER SHEET TO ROOM P35 IF YOU DO NOT WISH TO RECEIVE THIS MATERIAL , OR IF CHANGE OF ADDRESS IS NEEDED , INDICATE CHANGE INCLUDING ZIP CODE ON THE LABEL (DO NOT REMOVE LABEL).

**PRESORTED STANDARD
U.S. POSTAGE PAID
National Science Foundation**

NSF 05-317