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FIRST-TIME S&E GRADUATE ENROLLMENT OF FOREIGN STUDENTS DROPS FOR THE THIRD STRAIGHT YEAR

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2004 marks the third straight year of declining first-time, full-time enrollments of foreign graduate students (students with temporary visas) in U.S. science and engineering programs. Between 2003 and 2004, enrollment of these students dropped 7 percent; since 2001, enrollment has dropped 20 percent (table 1). First-time, full-time S&E graduate enrollment of U.S. citizens and permanent residents declined 1 percent between 2003 and 2004, the first such drop since 2000, when collection of these data began.

The number of postdoctoral appointees (postdocs) in S&E fields who hold temporary visas (foreign postdocs) also dropped between 2003 and 2004. Although the number of U.S. citizen and permanent resident postdocs increased slightly from 2003 to 2004, the increase was not enough to offset the drop in foreign postdocs, resulting in an overall decline of 2 percent in S&E postdocs at U.S. educational institutions, the first substantial decline since 1978.

S&E Graduate-Student Enrollment

S&E graduate enrollment increased overall in 2004, but the slight increase (less than 0.5 percent) resulted entirely from a rise in enrollment of U.S. citizens and permanent residents.

The number and proportion of foreign graduate students enrolled in U.S. academic institutions increased each year from 1997 to 2002 (table 1). In 2003, although total enrollment of these students rose, as a proportion of all S&E graduate students temporary-visa holders declined from 32 to 31 percent. In 2004 declines occurred in both number (3 percent) and proportion (dropping from 31 to 30 percent).

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. Enrollment of U.S. citizens and permanent residents in 2004 was the highest it has been since 1993, its peak year, but the gain in numbers in 2004 was much smaller than it was in either of the preceding 2 years.

Enrollment Status

Enrollment status refers to whether a student is enrolled full or part time. Full-time S&E enrollment exceeded 340,600 in 2004—a gain of less than 1 percent from 2003. Full-time students constituted 72 percent of all S&E graduate students in 2004, compared with 68 percent in 1994. Part-time enrollment grew by less than 0.05 percent between 2003 and 2004, reflecting the long-term trend for an increasing proportion of full-time enrollment.

Students with temporary visas were more likely to be enrolled full time in a graduate S&E program than were U.S. citizens and permanent residents. Eighty-five percent of foreign students were enrolled full time in 2004 (essentially the same as in 2003), compared with 65 percent of U.S. citizens and permanent residents. But for the first time in the past decade, full-time enrollment of students with temporary visas dropped,

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TABLE 1. S&E graduate enrollment by citizenship, enrollment status, sex, and race/ethnicity, and S&E postdocs by citizenship: 1994–2004

Characteristic	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	% change 2003–04
All S&E graduate students	431,142	422,466	415,181	407,630	404,856	411,182	413,536	429,242	454,892	474,694	476,331	0.3
Full time	292,979	287,171	284,039	280,669	278,943	283,893	291,355	304,021	325,517	339,028	340,615	0.5
First time	78,038	74,364	73,448	73,600	74,373	75,447	78,332	82,411	86,833	89,331	86,447	-3.2
Other	214,941	212,807	210,591	207,069	204,570	208,446	213,023	221,610	238,684	249,697	254,168	1.8
Part time	138,163	135,295	131,142	126,961	125,913	127,289	122,181	125,221	129,375	135,666	135,716	*
Men	272,031	262,256	253,510	245,619	241,429	242,786	243,057	251,812	266,248	276,260	274,311	-0.7
Women	159,111	160,210	161,671	162,011	163,427	168,396	170,479	177,430	188,644	198,434	202,020	1.8
U.S. citizens and permanent residents												
S&E graduate students	329,026	323,962	317,075	308,668	302,879	301,254	290,711	294,711	309,280	327,358	333,231	1.8
Full time	206,809	204,113	200,674	195,974	191,945	190,076	185,673	188,225	200,245	212,988	218,266	2.5
First time	NA	NA	NA	NA	NA	NA	46,316	48,232	54,659	59,669	58,961	-1.2
Other	NA	NA	NA	NA	NA	NA	139,357	139,993	145,586	153,319	159,305	3.9
Part time	122,217	119,849	116,401	112,694	110,934	111,178	105,038	106,486	109,035	114,370	114,965	0.5
Men	195,794	189,915	182,519	174,934	169,490	165,823	157,023	158,015	165,004	174,927	177,113	1.2
Women	133,232	134,047	134,556	133,734	133,389	135,431	133,688	136,696	144,276	152,431	156,118	2.4
White, non-Hispanic	255,660	245,857	238,032	228,007	220,667	216,750	205,569	206,027	213,162	222,709	224,982	1.0
Asian/Pacific Islander	26,471	25,902	25,929	26,012	26,726	27,570	25,058	26,584	29,352	31,921	31,508	-1.3
Black, non-Hispanic	17,610	18,285	19,066	19,341	19,651	20,273	20,834	21,459	22,673	24,174	24,695	2.2
Hispanic	13,273	14,112	14,571	14,984	15,487	16,520	17,203	17,974	19,639	21,244	22,388	5.4
American Indian/Alaska Native	1,382	1,516	1,538	1,599	1,607	1,553	1,602	1,683	1,735	1,879	1,863	-0.9
Other/unknown race/ethnicity	14,630	18,290	17,939	18,725	18,741	18,588	20,445	20,984	22,719	25,431	27,795	9.3
Temporary-visa holders												
S&E graduate students	102,116	98,504	98,106	98,962	101,977	109,928	122,825	134,531	145,612	147,336	143,100	-2.9
Full time	86,170	83,058	83,365	84,695	86,998	93,817	105,682	115,796	125,272	126,040	122,349	-2.9
First time	NA	NA	NA	NA	NA	NA	32,016	34,179	32,174	29,662	27,486	-7.3
Other	NA	NA	NA	NA	NA	NA	73,666	81,617	93,098	96,378	94,863	-1.6
Part time	15,946	15,446	14,741	14,267	14,979	16,111	17,143	18,735	20,340	21,296	20,751	-2.6
Men	76,237	72,341	70,991	70,685	71,939	76,963	86,034	93,797	101,244	101,333	97,198	-4.1
Women	25,879	26,163	27,115	28,277	30,038	32,965	36,791	40,734	44,368	46,003	45,902	-0.2
All S&E postdocs	25,787	26,160	26,569	27,264	27,876	28,980	30,224	30,194	31,904	33,456	32,886	-1.7
U.S. citizens and permanent residents	12,469	12,823	12,930	12,835	12,966	12,725	12,627	12,088	13,523	13,456	13,542	0.6
Temporary-visa holders	13,318	13,337	13,639	14,429	14,910	16,255	17,597	18,106	18,381	20,000	19,344	-3.3

NA = not available; information on race/ethnicity and citizenship for full-time students enrolled for the first time was not collected before 2000.

* = % change < 0.05.

NOTE: Beginning in 2000, the few graduate students who were reported as being "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.

by 3 percent, whereas full-time enrollment of students who were U.S. citizens or permanent residents rose by about 3 percent. This combination of a decline in foreign students and an increase in U.S. citizen and permanent resident students also occurred in part-time graduate enrollments, although the increase was slight for U.S. citizens and permanent residents (less than 1 percent).

Field of Study

Total graduate enrollment in 2004 grew in all major S&E fields with the exception of computer sciences and engineering (table 2). Computer sciences dropped by 6 percent, continuing the decline that started in 2003. Engineering enrollment dropped by 3 percent from 2003, the first decrease in that field since 1998. All but two engineering subfields (aerospace and biomedical engineering) experienced declines in enrollment; the largest occurring in electrical engineering, with a 7 percent decrease. Of the fields of study with the largest graduate enrollments (10,000 or more),

TABLE 2. S&E graduate enrollment, by field: 1994–2004

Field	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	% change 2003–04
All S&E fields	431,142	422,466	415,181	407,630	404,856	411,182	413,536	429,242	454,892	474,694	476,331	0.3
Science	318,118	315,265	311,957	306,482	304,818	309,491	309,424	319,749	335,224	347,317	352,630	1.5
Agricultural sciences	12,611	12,768	12,301	12,203	12,168	12,312	12,023	12,235	12,698	13,197	13,445	1.9
Biological sciences	57,676	58,344	57,749	56,705	56,695	56,959	56,282	57,639	61,133	64,701	66,520	2.8
Computer sciences	34,158	33,458	34,626	35,991	38,027	42,478	47,350	52,196	55,269	53,696	50,331	-6.3
Earth, atmospheric, and ocean sciences	15,957	15,716	15,183	14,548	14,258	14,083	13,941	13,841	14,240	14,620	15,110	3.4
Atmospheric sciences	1,109	1,072	1,086	1,092	965	913	963	924	1,036	1,150	1,086	-5.6
Geosciences	7,713	7,582	7,304	6,959	6,687	6,637	6,596	6,544	6,712	6,889	7,337	6.5
Oceanography	2,870	2,723	2,615	2,479	2,562	2,624	2,668	2,585	2,618	2,695	2,801	3.9
Other earth, atmospheric, and ocean sciences	4,265	4,339	4,178	4,018	4,044	3,909	3,714	3,788	3,874	3,886	3,886	0.0
Mathematical sciences	19,573	18,504	18,008	16,719	16,485	16,257	15,650	16,651	18,163	19,465	19,873	2.1
Physical sciences	34,466	33,399	32,333	31,105	30,575	30,691	30,385	31,038	32,341	34,298	35,772	4.3
Astronomy	973	912	874	778	820	832	888	916	990	1,080	1,119	3.6
Chemistry	19,803	19,570	19,334	18,774	18,482	18,416	18,105	18,366	19,045	20,049	20,776	3.6
Physics	13,162	12,425	11,728	11,147	10,809	10,869	10,841	11,248	11,701	12,555	13,309	6.0
Other physical sciences	528	492	397	406	464	574	551	508	605	614	568	-7.5
Psychology	54,554	53,641	53,122	53,126	52,557	51,727	50,466	50,467	51,165	52,211	54,052	3.5
Social sciences	89,123	89,435	88,635	86,085	84,053	84,984	83,327	85,682	90,215	95,129	97,527	2.5
Agricultural economics	2,289	2,338	2,117	2,043	1,995	2,014	2,079	2,161	2,187	2,318	2,195	-5.3
Anthropology	7,665	7,693	7,773	7,560	7,577	7,633	7,626	7,491	7,481	7,789	7,826	0.5
Economics	12,913	12,673	12,080	11,097	10,701	10,562	10,748	11,408	12,009	12,316	12,250	-0.5
Geography	4,502	4,371	4,331	4,287	4,326	4,250	4,036	4,304	4,383	4,721	4,809	1.9
History and philosophy of science	387	401	409	443	508	557	532	571	663	737	994	34.9
Linguistics	3,279	3,194	3,156	3,068	2,935	2,799	2,674	2,744	2,875	3,028	2,941	-2.9
Political science	34,317	34,298	33,252	32,083	30,828	31,372	31,131	31,805	34,934	36,880	39,238	6.4
Sociology	9,498	9,564	9,425	9,413	9,058	8,966	8,652	8,812	8,946	9,127	8,895	-2.5
Sociology/anthropology	987	941	923	948	857	741	745	808	719	773	839	8.5
Other social sciences	13,286	13,962	15,169	15,143	15,268	16,090	15,104	15,578	16,018	17,440	17,540	0.6
Engineering	113,024	107,201	103,224	101,148	100,038	101,691	104,112	109,493	119,668	127,377	123,701	-2.9
Aerospace engineering	3,715	3,343	3,208	3,083	3,137	3,349	3,407	3,451	3,685	4,048	4,089	1.0
Biomedical engineering	2,750	2,732	2,732	2,847	2,905	3,121	3,241	3,639	4,378	5,347	5,892	10.2
Chemical engineering	7,639	7,452	7,408	7,288	7,093	6,883	7,056	6,913	7,414	7,516	7,452	-0.9
Civil engineering	19,925	19,218	18,528	17,193	16,517	16,226	16,451	16,665	17,713	18,890	18,560	-1.7
Electrical engineering	33,067	30,861	29,941	30,787	31,384	31,822	33,611	36,100	39,948	41,763	38,995	-6.6
Industrial engineering	13,992	13,475	12,675	11,957	11,221	11,803	12,119	12,940	14,033	14,313	13,852	-3.2
Mechanical engineering	17,761	16,363	15,509	15,045	14,696	14,956	15,235	15,852	17,139	18,393	17,946	-2.4
Metallurgical/materials engineering	5,228	4,956	4,747	4,688	4,680	4,481	4,377	4,721	4,992	5,131	5,059	-1.4
Other engineering	8,947	8,801	8,476	8,260	8,405	9,050	8,615	9,212	10,366	11,976	11,856	-1.0

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

growth was greatest in political science and physics, each with 6 percent gains. Following were chemistry and psychology, each with 4 percent gains.

First-time, full-time enrollment of students with temporary visas dropped from 2003 across all major S&E fields. Earth, atmospheric, and ocean sciences had the greatest percentage decline but engineering lost the greatest number of students and accounted for 64 percent of the overall decline (table 3). Computer sciences, physical sciences, and social sciences had the next highest losses in numbers of first-time, full-time foreign students enrolled.

Among U.S. citizens and permanent residents, the greatest percentage drops and decreases in number of first-time, full-time enrollments occurred in the fields of agricultural sciences, computer sciences, and engineering. The greatest increases were in mathematical sciences and psychology.

Trends in first-time, full-time S&E enrollment also varied by field (table 3, figure 1). The decline since 2001 in first-time, full-time enrollment of temporary-visa holders resulted mainly from declines in engineering and computer sciences enrollments. The proportion of foreign students among first-time, full-time students in these two fields dropped from 60–70 percent in 2000 to about 50 percent in 2004. Foreign-student graduate enrollment in other S&E fields, exemplified by the biological sciences, was relatively stable. Social sciences, engineering, and psychology contributed most to the overall increase since 2000 in first-time, full-time enrollments of U.S. citizens and permanent residents.

Demographics

The proportion of women among all S&E graduate students grew from 37 percent in 1994 to 42 percent in 2003 and remained at that level in 2004 (table 1). Enrollment of female students has increased every year for the last 20 years, including a 2 percent increase in 2004. In contrast, after reaching a peak of about 279,200 in 1993, enrollment of men declined every year from 1994 to 1998. The number of male graduate students in S&E fields decreased by less than 1 percent between 2003 and 2004.

Enrollment of foreign men dropped 4 percent from 2003, accounting for the small overall drop in enrollment of male S&E graduate students in 2004. Foreign men also accounted for the majority of the decrease in the number of first-time, full-time foreign students enrolled. First-time, full-time enrollment of female foreign students, however, had the greater percentage drop (table 4).

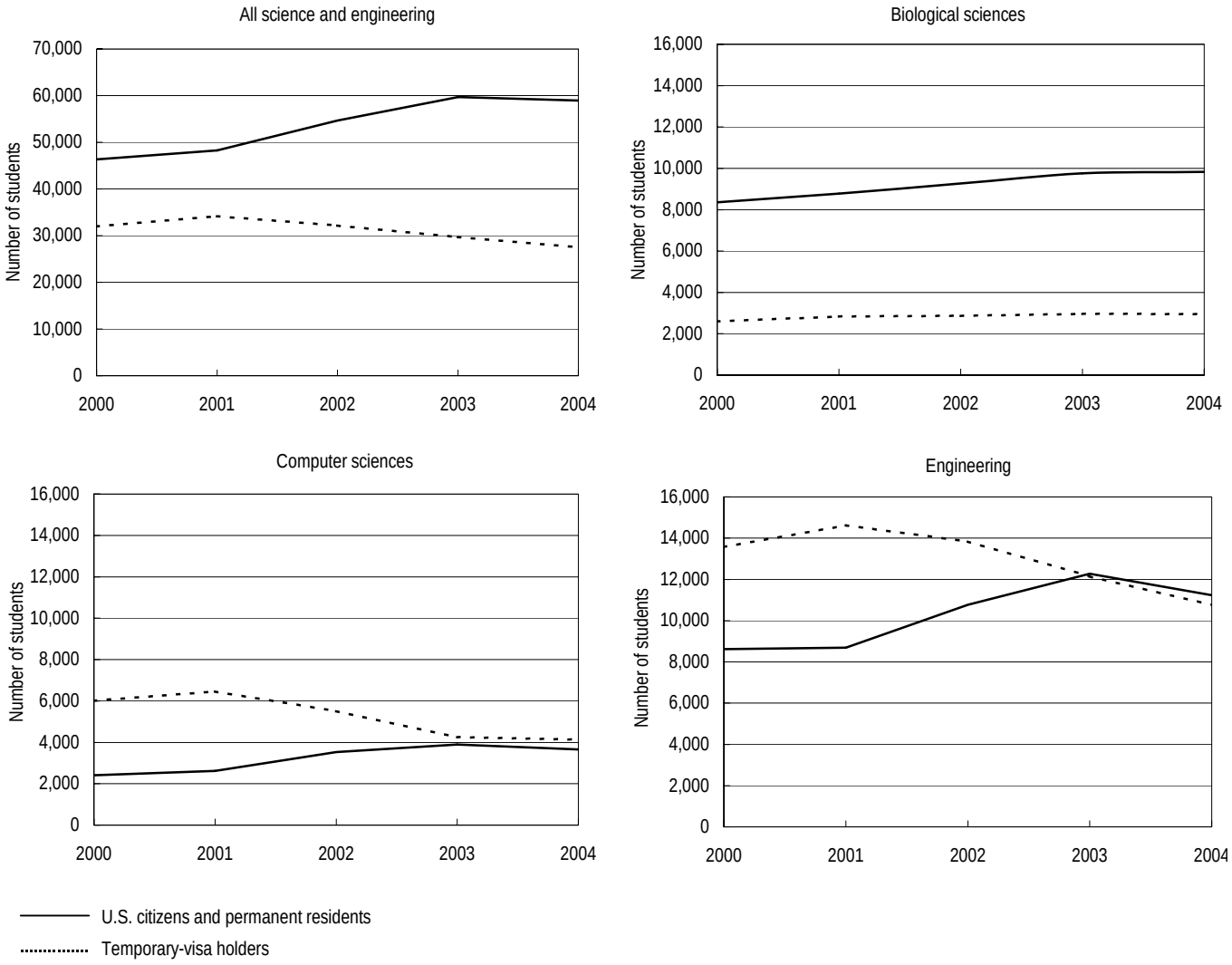
The proportion of women among U.S. citizen and permanent resident S&E graduate students increased to 47 percent in 2004. Enrollment of female U.S. citizens and permanent residents increased by 2 percent in 2004, whereas enrollment of foreign women declined slightly, the first such decline in the past decade. Enrollment of male U.S. citizens and permanent residents increased by 1 percent in 2004 but was still considerably below the 1993 peak enrollment.

TABLE 3. First-time, full-time S&E graduate enrollment and percentage change, by field and citizenship: 2000–04

	U.S. citizens and permanent residents						Temporary-visa holders					
Field	2000	2001	2002	2003	2004	% change 2003–04	2000	2001	2002	2003	2004	% change 2003–04
All science and engineering	46,316	48,232	54,659	59,669	58,961	-1.2	32,016	34,179	32,174	29,662	27,486	-7.3
Agricultural sciences	1,916	1,845	1,856	1,971	1,870	-5.1	419	493	464	453	446	-1.5
Biological sciences	8,355	8,772	9,269	9,763	9,824	0.6	2,600	2,836	2,864	2,956	2,939	-0.6
Computer sciences	2,414	2,621	3,534	3,891	3,651	-6.2	6,017	6,456	5,503	4,243	4,116	-3.0
Earth, atmospheric, and ocean sciences	2,082	2,210	2,550	2,573	2,480	-3.6	567	584	535	531	462	-13.0
Mathematical sciences	1,849	2,030	2,311	2,527	2,629	4.0	1,570	1,656	1,607	1,658	1,614	-2.7
Physical sciences	3,323	3,325	3,775	4,095	4,034	-1.5	2,506	2,686	2,505	2,746	2,557	-6.9
Psychology	7,060	7,167	7,902	8,285	8,938	7.9	485	524	518	573	517	-9.8
Social sciences	10,699	11,573	12,689	14,285	14,306	0.1	4,279	4,327	4,344	4,352	4,079	-6.3
Engineering	8,618	8,689	10,773	12,279	11,229	-8.6	13,573	14,617	13,834	12,150	10,756	-11.5

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

FIGURE 1. First-time, full-time graduate S&E enrollment, by citizenship and selected fields: 2000–04



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

Over the past decade, enrollment of minority students in graduate S&E programs has grown, whereas enrollment of white students has declined (table 1). In both 2003 and 2004, white, non-Hispanic students accounted for 68 percent of all U.S. citizens and permanent residents enrolled in S&E graduate programs, down from 78 percent in 1994. Asian/Pacific Islanders were the second largest racial/ethnic group among U.S. citizens and permanent residents, accounting for 9 percent of enrollment in S&E graduate programs in 2004. Blacks accounted for 7.4 percent of all U.S. citizens and permanent residents, followed by Hispanics (6.7 percent), and American Indian/Alaska Natives (less than 1 percent). Changes from 2003 to 2004 in S&E graduate enrollment for minority students ranged from a 5.4 percent increase for Hispanics to a 1.3 percent decrease for Asians/Pacific Islanders. Underrepresented minority enrollment (black, non-Hispanic; Hispanic; American Indian/Alaska Native) has grown every year since 1994 by approximately 5 percent and in 2004 accounted for 15 percent of the U.S. citizens and permanent residents enrolled.

Postdoctoral Appointees

Almost 33,000 people held S&E postdoctoral positions in U.S. academic institutions in 2004, a slight drop from 2003 (table 1). Although the number of postdocs who were U.S. citizens or permanent residents increased by 1 percent over 2003, postdocs with temporary visas

TABLE 4. S&E graduate students and postdocs with temporary visas, by enrollment status and sex: 2000–04

	2000		2001		2002		2003		2004	
Characteristic	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
All foreign S&E graduate students	86,034	36,791	93,797	40,734	101,244	44,368	101,333	46,003	97,198	45,902
Full time	74,458	31,224	81,030	34,766	87,024	38,248	86,424	39,616	82,922	39,427
First time	22,472	9,544	23,667	10,512	21,785	10,389	19,546	10,116	18,210	9,276
Other	51,986	21,680	57,363	24,254	65,239	27,859	66,878	29,500	64,712	30,151
Part time	11,576	5,567	12,767	5,968	14,220	6,120	14,909	6,387	14,276	6,475
Foreign S&E postdoctorates	13,024	4,573	13,218	4,888	13,300	5,081	14,279	5,721	13,850	5,494

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

decreased 3 percent, for a net decrease of 2 percent. Male temporary-visa holders accounted for most of the overall drop in numbers of postdocs (table 4). Even though the decline in numbers of men with temporary visas was larger than that for women, the percentage decrease for women was slightly larger than for men (4 percent compared with 3 percent). Both of these declines were off record 2003 highs.

The decrease in foreign S&E postdocs is the first since 1977, when the practice of reporting foreign postdocs separately started. Even with the 3 percent decrease in 2004, the number of foreign postdocs has increased by 45 percent during the past 10 years. In contrast, the number of U.S. citizen and permanent resident postdocs grew by 9 percent in the same period.

Data Notes

This publication provides the first release of data from the fall 2004 Survey of Graduate Students and Postdoctorates in Science and Engineering. Data were collected from approximately 12,240 departments at 589 institutions of higher education in the United States and outlying areas. The department response rate was 98 percent; however, 12 percent of the reporting departments required partial imputation of missing data.

The full set of detailed tables from this survey will be available in the report *Graduate Students and Postdoctorates in Science and Engineering: Fall 2004*, at http://www.nsf.gov/statistics/gradpostdoc/. Individual detailed tables from the 2004 survey may be available in advance of the full report. For further information, contact

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