



ACADEMIC R&D SPENDING TRENDS

Chemical research sector **GREW 7.3% IN 2004**, slightly less than the average for science as a whole

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FISCAL 2004 was another very good year in terms of investment in research and development in the academic science and engineering sector. Total academic R&D spending climbed 7.2% to \$42.9 billion that year, the most recent for which data are available from the National Science Foundation.

Although it is generous, that expansion pales beside the 10.1% growth of 2003 and 10.9% of 2002. In fact, 2004's increase was the smallest since 1999. The expansion was also smaller than the 7.4% average annual increase in total R&D spending from 1994 to 2004.

When inflation is taken into account, total R&D spending by universities and colleges rose 4.7% in terms of constant dollars between 2003 and 2004. Between 1994 and 2004, spending grew a total of 69.3% in constant dollars, compared with 104.2% in current dollars.

The federal government is by far the largest source of funds used in academic R&D. In terms of current dollars, it

boosted its investment by 10.6% in 2004 to \$27.4 billion. As a result, the federal government's share of the total expanded for the fourth year in a row to reach 63.8% in 2004. Institutions' share of funding slipped for the third year in a row to 18.1%. State and local governments chipped in 6.6% of the total in 2004—the same contribution as the prior year—while industry's share dropped for the fifth year in a row to 4.9%.

Each year, about three-quarters of the total academic research budget is funneled into basic R&D. The sector saw a 7.8% increase in funding to \$32.3 billion in 2004, an expansion somewhat smaller than the 8.7% annual average for the previous decade. Applied R&D investment rose 5.4% in 2004, besting the 10-year annual average of 4.2%.

Science consumed \$36.6 billion, or 85.3% of the total research budget in 2004, for a 7.5% rise over 2003. The share of total R&D spending devoted to the life sciences continued its slow but steady expansion, reaching 59.7% that year. The \$25.7 billion

STRONG PROGRAM

Chemistry professor Michael J. Krische with grad students Eduardas Skucas (from left), Vanessa Williams, and Ming-Yu Ngai at the University of Texas, Austin.

invested in the field represented an 8.0% upsurge over the prior year.

Funding for the physical sciences rose 8.2% to \$3.5 billion in 2004, bringing the sector's share of total R&D spending to 8.3%.

Outlays for chemistry, which represented 3.1% of the total R&D budget, increased 7.3% to \$1.3 billion.

On a constant-dollar basis, chemistry spending rose 4.8% from 2003 to 2004. Between 1994 and 2004, the outlay for chemical R&D grew a total of 43.6% in constant dollars and 73.3% in current dollars.

Engineering absorbed \$6.3 billion, or 14.7% of the overall R&D budget in 2004, an increase of 5.3% over 2003 in terms of current dollars. Chemical engineering, which accounted for a mere 1.1% of total R&D spending, enjoyed an 8.8% rise to \$493 million in 2004. Some 1.3% of the total R&D budget was invested in materials engineering, which saw a 3.1% increase to \$565 million.

Federal support for materials engineering shot up 12.1% to \$352 million in 2004. Federal backing for chemical engineering reached \$268 million, a boost of 8.1% compared with 2003. Investment in engineering as a whole rose by the same percentage to \$3.9 billion. Science did even better, with a generous 11.1% rise to \$23.5 billion. Within the sector, the government particularly favored chemistry, raising its allotment 12.1% to \$919 million in 2004. That increase was more than double the annual average over the prior decade. The federal government also boosted spending on the life sciences by 12.1%, bringing its contribution to \$16.4 billion in 2004.

WHICH INSTITUTIONS spent the most on chemical R&D in 2004? For the third year in a row, the University of California, San Francisco, headed the list. The school poured \$29.6 million into the sector, 2.8% more than the prior year. UC Berkeley, with an outlay of \$26.0 million, and the University of Texas, Austin, which spent \$24.2 million, once again placed second and third, respectively. Fourth place went to California Institute of Technology with

MORE ONLINE

For tables on postdocs and grad students; the source of academic funds; and spending on basic and applied R&D, chemical engineering, and research equipment, visit www.cen-online.org.

FIELDS OF ACADEMIC R&D SPENDING

Average annual growth in spending for chemistry has been outpaced by that for life sciences since 1994

\$ MILLIONS	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	ANNUAL CHANGE	
												2003-04	1994-2004
ALL SCIENCES	\$17,672	\$18,656	\$19,339	\$20,531	\$21,786	\$23,270	\$25,514	\$27,775	\$30,846	\$34,064	\$36,633	7.5%	7.6%
Life ^a	11,468	12,188	12,716	13,591	14,597	15,630	17,469	19,214	21,421	23,746	25,650	8.0	8.4
Physical ^b	2,178	2,256	2,258	2,371	2,483	2,605	2,712	2,804	3,018	3,277	3,545	8.2	5.0
Physics	957	989	988	1,059	1,079	1,149	1,207	1,240	1,286	1,418	1,522	7.3	4.7
Chemistry	760	772	802	821	876	919	961	1,007	1,131	1,227	1,317	7.3	5.7
Psychology & social	1,312	1,390	1,478	1,522	1,576	1,716	1,815	2,024	2,257	2,428	2,452	1.0	6.5
Environmental	1,397	1,434	1,489	1,533	1,625	1,692	1,765	1,831	2,019	2,190	2,354	7.5	5.4
Computer	646	682	690	710	747	861	876	956	1,125	1,305	1,405	7.7	8.1
Mathematical	282	279	288	290	311	313	341	360	388	428	450	5.1	4.8
Other	390	427	419	515	449	451	535	585	617	690	777	12.6	7.1
ALL ENGINEERING	\$3,355	\$3,515	\$3,708	\$3,839	\$4,070	\$4,261	\$4,555	\$5,019	\$5,521	\$5,993	\$6,312	5.3%	6.5%
Materials	310	330	349	389	391	384	399	453	468	548	565	3.1	6.2
Chemical	279	297	317	317	327	349	376	414	431	453	493	8.8	5.9
TOTAL	\$21,028	\$22,171	\$23,047	\$24,371	\$25,856	\$27,531	\$30,069	\$32,794	\$36,367	\$40,057	\$42,945	7.2%	7.4%

NOTE: Institutional fiscal years. Totals may not add because of rounding. **a** Includes agricultural, biological, medical, and other life sciences. **b** Includes astronomy, chemistry, physics, and other physical sciences. **SOURCE:** National Science Foundation, WebCASPASR Database System

FEDERALLY FINANCED R&D SPENDING AT UNIVERSITIES

Despite spurt in 2004, growth in funds for chemistry lagged other sciences during the past 10-year period

\$ MILLIONS	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	ANNUAL CHANGE	
												2003-04	1994-2004
ALL SCIENCES	\$10,656	\$11,230	\$11,608	\$12,059	\$12,797	\$13,655	\$14,957	\$16,371	\$18,633	\$21,134	\$23,477	11.1%	8.2%
Life ^a	6,738	7,114	7,406	7,764	8,334	8,958	10,068	11,194	12,856	14,645	16,413	12.1	9.3
Physical ^b	1,563	1,638	1,630	1,683	1,762	1,863	1,915	1,973	2,133	2,357	2,567	8.9	5.1
Physics	727	762	757	803	818	869	902	927	975	1,088	1,169	7.4	4.9
Chemistry	518	533	554	552	587	617	631	660	738	820	919	12.1	5.9
Environmental	944	962	1,007	1,013	1,077	1,103	1,134	1,186	1,292	1,442	1,596	10.7	5.4
Psychology & social	599	637	681	680	724	782	841	945	1,092	1,218	1,282	5.3	7.9
Computer	462	483	502	506	514	583	584	644	770	937	1,028	9.7	8.3
Mathematical	205	205	208	202	214	210	230	242	268	295	319	8.1	4.5
Other	145	192	174	210	173	156	184	187	221	240	271	12.9	6.5
ALL ENGINEERING	\$1,993	\$2,102	\$2,232	\$2,256	\$2,354	\$2,447	\$2,579	\$2,851	\$3,230	\$3,609	\$3,902	8.1%	6.9%
Materials	156	176	190	222	222	218	227	241	263	314	352	12.1	8.5
Chemical	150	161	174	166	169	180	196	215	230	248	268	8.1	6.0
TOTAL	\$12,650	\$13,332	\$13,841	\$14,315	\$15,151	\$16,102	\$17,536	\$19,222	\$21,863	\$24,744	\$27,379	10.6%	8.0%
ANNUAL CHANGE	5.8%	5.4%	3.8%	3.4%	5.8%	6.3%	8.9%	9.6%	13.7%	13.2%	10.6%		

NOTE: Institutional fiscal years. Totals may not add because of rounding. **a** Includes agricultural, biological, medical, and other life sciences. **b** Includes astronomy, chemistry, physics, and other physical sciences. **SOURCE:** National Science Foundation, WebCASPASR Database System

a \$23.0 million expenditure. And Pennsylvania State University came in fifth with a \$22.3 million outlay.

Altogether, the 10 schools that invested most in chemical R&D in 2004 increased their expenditures by 7.5% versus 2003, slightly beating the 7.3% average annual increase of the prior 10 years.

Although the order of the top 10 spenders changed a fair bit between 2003 and 2004, the composition of the list changed very little. Caltech was the only newcomer on the list. It displaced Texas A&M University, which placed seventh in 2003 but

dropped down to 12th place the following year.

In terms of federal support for chemical R&D, UC San Francisco again pulled in the most dollars in 2004. But the federal government's \$22.2 million contribution to the school was 2.5% less than in 2003. UC Berkeley, Caltech, Harvard University, and Massachusetts Institute of Technology rounded out the top five.

Purdue University spent the most on chemical engineering research in 2004, investing some \$22.4 million, though this number includes an outlay of \$17.2 million

for a chemical engineering research facility. Texas A&M, which spent \$16.6 million on chemical engineering R&D, placed second. MIT came in third with a \$15.1 million outlay. Penn State's \$14.1 million and North Carolina State University's \$13.3 million rounded out the top five.

Purdue and Princeton University were new to the top 10 list of spenders in 2004, displacing Stanford University and the University of Delaware.

The federal government's largest outlay for chemical engineering R&D went to MIT. The university's \$9.1 million share

SCHOOLS SPENDING MOST ON CHEMICAL R&D

University of California's San Francisco and Berkeley campuses and University of Texas, Austin,
held on to the top three spots in 2004

RANK		2004 2003	\$ THOUSANDS	1994	2000	2001	2002	2003	2004	% FEDERAL FUNDS, 2004	ANNUAL CHANGE	
											2003-04	1994-2004
1	1		U of California, San Francisco	na	\$12,332	\$13,845	\$27,256	\$28,798	\$29,609	75.0%	2.8%	nm
2	2		U of California, Berkeley	\$13,546	21,471	21,339	21,787	24,907	25,984	76.9	4.3	6.7%
3	3		U of Texas, Austin	14,411	10,142	11,640	22,782	23,382	24,154	66.8	3.3	5.3
4	11		California Inst. of Technology	13,443	15,538	15,357	15,590	18,099	22,968	85.7	26.9	5.5
5	10		Pennsylvania State U	12,854	16,075	18,042	17,070	18,214	22,330	65.3	22.6	5.7
6	9		Harvard U	15,386	16,957	17,446	15,549	19,456	22,135	88.6	13.8	3.7
7	4		U of Illinois, Urbana-Champaign	10,487	17,667	20,091	20,962	20,949	21,217	67.4	1.3	7.3
8	6		Massachusetts Inst. of Technology	12,879	18,756	18,063	18,352	20,184	20,926	89.7	3.7	5.0
9	5		Cornell U	10,594	14,002	11,013	13,340	20,804	20,600	74.5	-1.0	6.9
10	8		U of California, Los Angeles	10,422	13,564	15,071	17,758	19,607	20,453	75.6	4.3	7.0
			Total, first 10 institutions	\$114,022	\$156,504	\$161,907	\$190,446	\$214,400	\$230,376	76.4%	7.5%	7.3%
11	13		U of California, San Diego	7,538	9,831	11,131	14,593	17,530	19,638	74.6	12.0	10.0
12	7		Texas A&M U	10,538	15,385	17,206	18,587	19,703	19,475	44.4	-1.2	6.3
13	14		U of Washington, Seattle	6,526	9,167	9,597	13,934	16,947	19,354	92.5	14.2	11.5
14	12		Stanford U	10,885	12,947	15,752	17,856	18,097	18,863	88.4	4.2	5.7
15	17		U of Massachusetts, Amherst	8,936	11,267	10,509	13,387	15,688	18,074	57.1	15.2	7.3
16	15		Northwestern U	8,202	11,373	13,733	13,776	16,108	17,704	77.0	9.9	8.0
17	19		U of Wisconsin, Madison	11,430	14,758	12,935	15,214	15,546	17,115	63.3	10.1	4.1
18	18		Rutgers, State U of New Jersey	6,525	12,351	13,190	16,891	15,552	16,416	74.8	5.6	9.7
19	16		U of North Carolina, Chapel Hill	7,258	10,080	12,652	13,446	16,045	16,186	78.8	0.9	8.4
20	23		Indiana U	9,937	10,812	14,316	13,737	14,701	15,642	44.2	6.4	4.6
			Total, first 20 institutions	\$201,797	\$274,475	\$292,928	\$341,867	\$380,317	\$408,843	73.5%	7.5%	7.3%
21	22		U of Colorado	14,879	12,251	14,229	15,623	15,164	14,960	85.8	-1.3	0.1
22	21		U of Michigan	7,479	9,009	10,957	11,623	15,191	14,901	78.5	-1.9	7.1
23	43		Georgia Inst. of Technology	6,548	9,962	9,027	8,948	9,652	14,528	58.5	50.5	8.3
24	20		Ohio State U	10,913	13,141	12,174	14,174	15,512	14,423	65.6	-7.0	2.8
25	25		Florida State U	4,482	11,631	11,635	13,709	13,321	13,841	34.8	3.9	11.9
26	29		U of Utah	6,174	8,420	10,086	10,349	12,247	13,519	67.8	10.4	8.2
27	24		Louisiana State U	5,129	8,543	8,632	11,104	14,200	13,409	63.0	-5.6	10.1
28	27		Michigan State U	6,117	8,247	10,488	14,142	13,230	13,234	63.2	0.0	8.0
29	44		U of Pittsburgh	5,950	7,459	7,943	7,668	9,630	13,025	86.6	35.3	8.1
30	31		U of Florida	6,562	10,070	11,359	12,154	11,594	13,011	74.3	12.2	7.1
			Total, first 30 institutions	\$276,030	\$373,208	\$399,458	\$461,361	\$510,058	\$547,694	72.1%	7.4%	7.1%
31	26		Purdue U	9,759	11,260	12,194	13,553	13,268	12,776	65.9	-3.7	2.7
32	33		Princeton U	9,231	9,850	11,314	11,316	11,278	12,491	66.2	10.8	3.1
33	35		U of Pennsylvania	11,744	12,886	11,110	11,107	11,165	12,435	87.3	11.4	0.6
34	45		U of Minnesota	7,585	8,472	8,860	9,372	9,569	12,001	74.6	25.4	4.7
35	28		State U of New York, Buffalo	5,373	6,852	5,711	10,407	12,382	11,898	52.7	-3.9	8.3
36	32		Johns Hopkins U ^a	5,323	12,616	12,124	10,512	11,330	11,890	92.8	4.9	8.4
37	41		Arizona State U, Tempe	7,063	8,979	12,416	8,244	10,162	11,376	55.0	11.9	4.9
38	30		Virginia Polytechnic Inst. & State U	6,843	7,724	6,461	9,524	11,694	11,332	54.9	-3.1	5.2
39	39		U of Notre Dame	8,698	10,010	8,960	11,252	10,657	11,325	90.1	6.3	2.7
40	37		U of California, Irvine	6,433	9,683	9,863	9,949	10,856	11,315	61.3	4.2	5.8
			Total, first 40 institutions	\$354,082	\$471,540	\$498,471	\$566,597	\$622,419	\$666,533	71.8%	7.1%	6.5%
41	36		U of Arizona	6,319	9,699	9,908	9,253	10,874	11,312	77.4	4.0	6.0
42	47		State U of New York, Stony Brook	6,101	6,774	6,730	8,203	9,007	10,656	66.3	18.3	5.7
43	49		U of South Carolina	5,063	9,321	9,228	12,358	8,911	10,515	55.6	18.0	7.6
44	34		U of Akron	1,422	8,214	8,108	10,091	11,260	10,299	32.4	-8.5	21.9
45	46		Rice U	3,729	6,605	7,390	9,273	9,294	10,220	82.7	10.0	10.6
46	51		U of Chicago	8,801	8,676	9,403	7,387	8,802	10,083	72.5	14.6	1.4
47	48		U of Delaware	4,161	5,418	6,043	6,332	8,931	9,633	81.9	7.9	8.8
48	42		U of Maryland, College Park	11,666	6,197	7,242	8,480	10,067	9,432	77.7	-6.3	-2.1
49	50		U of Southern California	4,730	7,551	8,010	6,859	8,890	9,418	50.5	5.9	7.1
50	52		U of Virginia	6,932	7,697	6,583	7,535	8,377	9,088	88.4	8.5	2.7
			Total, first 50 institutions	\$413,006	\$547,692	\$577,116	\$652,368	\$716,832	\$767,189	71.3%	7.0%	6.4%
			TOTAL, ALL INSTITUTIONS	\$759,810	\$961,279	\$1,007,299	\$1,130,787	\$1,227,116	\$1,316,897	69.8%	7.3%	5.7%

NOTE: Institutional fiscal years. **a** Includes funding for the Applied Physics Lab. **na** = not available. **nm** = not meaningful.
SOURCE: National Science Foundation, WebCASPAR Database System

SCHOOLS WITH MOST FEDERAL SUPPORT FOR CHEMICAL R&D

Top 50 schools' growth in 2004 funding significantly outpaced the
10-year annual average rate

RANK		SCHOOLS	\$ THOUSANDS					ANNUAL CHANGE		
2004	2003		1994	2000	2001	2002	2003	2004	2003-04	1994-2004
1	1	U of California, San Francisco	na	\$9,033	\$11,198	\$20,915	\$22,787	\$22,215	-2.5%	nm
2	4	U of California, Berkeley	\$11,609	15,774	14,617	15,867	17,078	19,988	17.0	5.6%
3	7	California Inst. of Technology	10,345	12,866	13,092	12,135	15,279	19,685	28.8	6.6
4	3	Harvard U	13,080	14,788	14,166	13,637	17,490	19,617	12.2	4.1
5	2	Massachusetts Inst. of Technology	11,739	16,690	16,380	16,357	17,551	18,774	7.0	4.8
6	12	U of Washington, Seattle	4,703	6,493	6,437	8,656	12,522	17,900	42.9	14.3
7	6	Stanford U	9,686	10,973	13,425	14,844	15,496	16,668	7.6	5.6
8	8	U of Texas, Austin	7,974	5,749	5,163	14,104	15,122	16,136	6.7	7.3
9	9	U of California, Los Angeles	9,061	10,432	11,339	13,074	14,598	15,453	5.9	5.5
10	5	Cornell U	9,149	9,103	7,743	8,944	15,897	15,350	-3.4	5.3
Total, first 10 institutions			\$87,346	\$111,901	\$113,560	\$138,533	\$163,820	\$181,786	11.0%	7.6%
11	11	U of California, San Diego	6,280	7,251	8,742	11,311	12,749	14,648	14.9	8.8
12	17	Pennsylvania State U	7,995	9,797	10,201	10,312	11,001	14,573	32.5	6.2
13	14	U of Illinois, Urbana-Champaign	6,777	10,294	12,239	12,266	12,336	14,295	15.9	7.7
14	15	Northwestern U	5,564	8,865	10,383	10,134	11,484	13,631	18.7	9.4
15	10	U of Colorado	8,450	10,281	12,242	13,602	13,251	12,843	-3.1	4.3
16	13	U of North Carolina, Chapel Hill	5,999	7,556	10,150	9,294	12,455	12,753	2.4	7.8
17	18	Rutgers, State U of New Jersey	5,044	8,071	7,972	11,031	10,992	12,276	11.7	9.3
18	16	U of Michigan	3,865	7,317	8,722	9,041	11,202	11,701	4.5	11.7
19	25	U of Pittsburgh	4,993	6,436	6,812	6,628	8,516	11,283	32.5	8.5
20	19	Johns Hopkins U ^a	4,913	12,217	11,681	10,090	10,753	11,028	2.6	8.4
Total, first 20 institutions			\$147,226	\$199,986	\$212,704	\$242,242	\$278,559	\$310,817	11.6%	7.8%
21	21	U of Pennsylvania	9,342	11,992	10,112	10,158	9,505	10,852	14.2	1.5
22	22	U of Wisconsin, Madison	8,545	8,094	7,301	8,053	9,174	10,830	18.1	2.4
23	23	U of Massachusetts, Amherst	5,238	5,667	5,467	7,103	8,567	10,315	20.4	7.0
24	20	U of Notre Dame	7,787	8,826	8,177	8,886	9,559	10,204	6.7	2.7
25	36	U of Florida	3,286	6,088	7,180	7,901	7,262	9,667	33.1	11.4
26	26	Ohio State U	8,643	5,529	6,734	7,691	8,271	9,461	14.4	0.9
27	29	U of Utah	5,480	7,172	7,483	7,186	7,902	9,164	16.0	5.3
28	39	U of Minnesota	6,442	6,122	6,476	6,866	7,051	8,956	27.0	3.3
29	28	U of Arizona	4,511	7,265	7,336	6,853	8,174	8,758	7.1	6.9
30	24	Texas A&M U	4,948	6,986	6,629	8,450	8,532	8,652	1.4	5.7
Total, first 30 institutions			\$211,448	\$273,727	\$285,599	\$321,389	\$362,556	\$407,676	12.4%	6.8%
31	57	Georgia Inst. of Technology	3,283	4,127	4,236	4,356	4,934	8,500	72.3	10.0
32	30	Louisiana State U	2,510	5,254	5,828	7,005	7,470	8,454	13.2	12.9
33	33	Rice U	2,894	4,856	5,627	7,469	7,421	8,447	13.8	11.3
34	27	Purdue U	6,978	6,958	7,831	8,496	8,219	8,419	2.4	1.9
35	31	Michigan State U	4,261	4,486	5,425	6,186	7,452	8,358	12.2	7.0
36	34	Princeton U	5,130	6,068	6,291	7,920	7,397	8,271	11.8	4.9
37	37	U of Virginia	5,621	5,892	5,328	6,498	7,234	8,036	11.1	3.6
38	40	U of Delaware	2,939	3,576	4,023	4,050	6,894	7,890	14.4	10.4
39	32	U of Maryland, College Park	5,936	5,060	5,825	6,624	7,448	7,324	-1.7	2.1
40	41	U of Chicago	7,516	6,519	5,643	6,020	6,775	7,315	8.0	-0.3
Total, first 40 institutions			\$258,516	\$326,523	\$341,656	\$386,013	\$433,800	\$488,690	12.7%	6.6%
41	44	State U of New York, Stony Brook	4,048	4,773	4,446	5,735	6,287	7,060	12.3	5.7
42	38	U of California, Irvine	5,863	6,979	7,180	7,196	7,175	6,931	-3.4	1.7
43	43	Indiana U	7,319	5,988	6,212	5,584	6,503	6,920	6.4	-0.6
44	47	Emory U	3,441	4,917	5,537	4,615	5,729	6,764	18.1	7.0
45	35	Columbia U	6,956	6,747	7,306	6,145	7,341	6,655	-9.3	-0.4
46	51	U of California, Davis	3,097	4,752	5,645	4,783	5,488	6,628	20.8	7.9
47	45	Yale U	6,027	5,369	5,854	5,199	5,991	6,348	6.0	0.5
48	46	State U of New York, Buffalo	3,736	3,403	2,194	5,243	5,895	6,269	6.3	5.3
49	50	Arizona State U, Tempe	5,087	4,304	5,237	4,401	5,513	6,259	13.5	2.1
50	42	Virginia Polytechnic Inst. and State U	2,809	3,435	2,621	4,577	6,598	6,218	-5.8	8.3
Total, first 50 institutions			\$306,899	\$377,190	\$393,888	\$439,491	\$496,320	\$554,742	11.8%	6.1%
TOTAL, ALL INSTITUTIONS			\$517,834	\$630,992	\$659,757	\$738,292	\$820,302	\$919,489	12.1%	5.9%

NOTE: Institutional fiscal years. **a** Includes funding for the Applied Physics Lab. **na** = not available. **nm** = not meaningful.

SOURCE: National Science Foundation, WebCASPAR Database System

TOP 25 UNIVERSITIES IN 2004 R&D SPENDING

Accounted for 30% of spending in chemistry and 37% of spending in physical sciences

RANK		2004 2003	\$ MILLIONS	LIFE	ENGINEERING	PHYSICAL	CHEMISTRY ^c	MATH & COMPUTER	ENVIRON-	OTHER	TOTAL
2004	2003			SCIENCES ^a		SCIENCES ^b		SCIENCES	MENTAL	SCIENCES	
1	1		Johns Hopkins U ^d	\$620	\$417	\$149	\$12	\$102	\$39	\$49	\$1,375
2	2		U of California, Los Angeles	563	58	59	20	22	15	55	773
3	3		U of Michigan	441	163	39	15	14	8	104	769
4	4		U of Wisconsin, Madison	474	95	52	17	18	54	71	764
5	6		U of California, San Francisco	699	0	30	30	0	0	0	728
6	5		U of Washington, Seattle	482	70	35	19	5	79	43	714
7	7		U of California, San Diego	360	71	46	20	89	122	21	709
8	8		Stanford U	374	147	89	19	24	17	19	671
9	11		Pennsylvania State U	199	210	60	22	40	41	51	600
10	9		U of Pennsylvania	480	26	27	12	11	1	52	597
11	10		Cornell U	356	69	86	21	31	5	28	576
12	18		Massachusetts Inst. of Technology	130	201	105	21	50	29	29	543
13	15		U of California, Berkeley	178	151	98	26	9	9	80	526
14	13		Texas A&M U	229	157	37	19	16	67	14	521
14	12		Duke U	428	28	18	5	7	12	29	521
16	16		Ohio State U	289	111	31	14	30	11	45	518
17	14		U of Minnesota	372	52	26	12	19	12	33	515
18	19		U of California, Davis	382	50	24	8	6	27	22	512
19	17		U of Illinois, Urbana-Champaign	131	120	50	21	117	41	46	506
20	20		Washington U	444	12	14	7	6	5	9	490
21	24		U of Colorado	272	35	57	15	10	86	22	483
22	22		U of Arizona	256	54	125	11	11	12	22	479
23	21		Baylor College of Medicine	476	0	0	0	0	0	0	476
24	23		Columbia U	322	25	37	7	11	54	20	468
25	27		U of Pittsburgh	396	18	20	13	5	1	22	462
Total, first 25 institutions				\$9,353	\$2,342	\$1,314	\$389	\$653	\$748	\$884	\$15,294
TOTAL, ALL INSTITUTIONS				\$25,650	\$6,312	\$3,545	\$1,317	\$1,854	\$2,354	\$3,229	\$42,945

NOTE: Institutional fiscal years. Totals may not add because of rounding. **a** Includes agricultural, biological, medical, and other life sciences. **b** Includes astronomy, chemistry, physics, and other physical sciences. **c** Included in physical sciences. **d** Includes Applied Physics Lab expenditures.

SOURCE: National Science Foundation, WebCASPAR Database System

was 15.0% smaller than its 2003 allotment, however. Johns Hopkins University came in second, followed by Penn State, Georgia Institute of Technology, and Stanford.

ALTOGETHER, colleges and universities reduced their spending on chemical research equipment by 1.9% in 2004 compared with the previous year, bringing their total outlay down to \$116.6 million. Even the top 25 biggest spenders in 2004 barely managed to keep up with their 2003 expenditures. Caltech, which came in first, dropped its spending 9.4% to \$3.7 million. Second-place UC San Francisco cut back by 28.9% to \$2.5 million. Although third-place UC Berkeley raised its outlay 29.9%, spending declined at

both MIT and UC Los Angeles, which came in fourth and fifth, respectively.

Federal support for chemical research equipment can vary greatly from year to year. In 2004, it edged up just 0.1% to \$77.5 million for colleges and universities as a group. At the top 25 institutions, however, government backing jumped 16.6% to \$30.9 million. MIT; the University of Washington, Seattle; Harvard; UC San Francisco; and the University of Wisconsin, Madison, received the largest federal grants for chemical research equipment.

The number of students seeking graduate degrees in chemistry rose 3.6% to 20,776 in 2004, well above the 10-year average annual increase of just 0.5%. The num-

ber of those seeking chemical engineering graduate degrees slipped 0.9% to 7,452. Nearly half of the chemical engineering grad students were foreign, as were more than one-third of the chemistry students.

The number of postdoctoral appointments in chemistry edged up 1.9% to 4,108 in 2004, while those in chemical engineering rose 2.4% to 688.

Data for this article were drawn primarily from NSF's WebCASPAR database of academic science and engineering statistics, which can be reached online at caspar.nsf.gov. Further statistical information came from the annual Academic Research & Development Expenditures report managed by John E. Jankowski of NSF's Division of Science Resources Statistics. This report and other data can be viewed at nsf.gov/sbe/srs/rdexp/start.htm.

Note that numbers from different tables may not match because of rounding. ■

Academic R&D spending climbed 7.2% to \$42.9 billion in fiscal 2004.

CHARACTER OF ACADEMIC R&D SPENDING

R&D budget share devoted to basic research inched up in 2004

\$ MILLIONS	1994	1995	1996	1997	1998 ^a	1999	2000	2001	2002	2003	2004	ANNUAL CHANGE	
												2003-04	1994-2004
Basic research	\$13,987	\$14,809	\$15,479	\$16,600	\$19,048	\$20,365	\$22,453	\$24,372	\$27,276	\$29,961	\$32,308	7.8%	8.7%
Applied R&D	7,041	7,362	7,567	7,771	6,808	7,166	7,616	8,422	9,091	10,095	10,638	5.4	4.2
TOTAL	\$21,028	\$22,171	\$23,047	\$24,371	\$25,856	\$27,531	\$30,069	\$32,794	\$36,367	\$40,057	\$42,945	7.2%	7.4%
ANNUAL CHANGE	5.4%	5.4%	4.0%	5.7%	6.1%	6.5%	9.2%	9.1%	10.9%	10.1%	7.2%		

NOTE: Institutional fiscal years. Totals may not add because of rounding. ^a Calculation method was revised beginning in fiscal 1998.

SOURCE: National Science Foundation, 2006, "Academic Research and Development Expenditures: Fiscal Year 2004"

FEDERAL SUPPORT FOR CHEMICAL ENGINEERING R&D

Georgia Institute of Technology and Princeton University led growth in the top 10 in 2004

RANK		\$ THOUSANDS	1994	2000	2001	2002	2003	2004	ANNUAL CHANGE	
2004	2003								2003-04	1994-2004
1	1	Massachusetts Inst. of Technology	\$10,157	\$10,131	\$11,212	\$11,014	\$10,740	\$9,124	-15.0%	-1.1%
2	3	Johns Hopkins U	4,409	5,295	5,817	6,803	7,608	9,067	19.2	7.5
3	2	Pennsylvania State U	1,731	8,491	7,320	7,466	8,811	8,815	0.0	17.7
4	12	Georgia Inst. of Technology	1,934	2,460	3,629	4,596	4,615	6,865	48.8	13.5
5	4	Stanford U	3,564	5,378	6,354	7,655	7,137	6,310	-11.6	5.9
6	7	North Carolina State U, Raleigh	2,163	7,433	8,162	6,936	6,091	6,300	3.4	11.3
7	5	Clemson U	434	382	4,474	3,504	6,579	6,030	-8.3	30.1
8	14	Princeton U	1,460	1,564	1,839	1,816	4,143	5,778	39.5	14.7
9	8	U of Michigan	1,420	2,315	2,708	3,411	5,153	5,526	7.2	14.6
10	6	U of Delaware	3,030	2,940	3,417	4,657	6,173	5,523	-10.5	6.2
11	9	U of Texas, Austin	3,206	3,823	2,830	4,109	4,776	5,174	8.3	4.9
12	20	California Inst. of Technology	2,172	2,843	4,013	3,895	3,579	5,164	44.3	9.0
13	24	U of Tulsa	949	2,142	4,704	3,719	3,058	4,864	59.1	17.8
14	18	U of Minnesota	8,131	5,682	4,194	4,009	3,678	4,608	25.3	-5.5
15	27	U of California, Davis	1,222	2,512	3,023	2,775	2,957	4,573	54.6	14.1
16	15	U of Wisconsin, Madison	3,203	4,295	4,219	3,725	3,980	4,225	6.2	2.8
17	21	Arizona State U, Tempe	1,187	1,783	2,104	2,587	3,562	4,129	15.9	13.3
18	13	U of Washington, Seattle	781	2,753	3,417	4,714	4,163	4,123	-1.0	18.1
19	10	U of Utah	1,277	5,497	3,934	4,244	4,708	4,063	-13.7	12.3
20	17	U of California, Santa Barbara	3,222	3,907	3,475	3,377	3,698	4,059	9.8	2.3
21	16	U of Pittsburgh	1,776	2,469	2,061	2,849	3,762	4,044	7.5	8.6
22	11	Carnegie Mellon U	1,050	2,223	3,754	3,705	4,636	3,977	-14.2	14.2
23	45	Mississippi State U	1,161	412	607	2,035	1,837	3,929	113.9	13.0
24	22	U of South Carolina	1,869	3,000	3,513	3,207	3,529	3,795	7.5	7.3
25	30	U of Colorado	1,234	2,299	2,535	2,222	2,518	3,762	49.4	11.8
		Total, listed institutions	\$62,742	\$92,029	\$103,315	\$109,030	\$121,491	\$133,827	10.2%	7.9%
		TOTAL, ALL INSTITUTIONS	\$150,495	\$196,325	\$214,862	\$230,158	\$248,050	\$267,553	7.9%	5.9%

NOTE: Institutional fiscal years. **SOURCE:** National Science Foundation, WebCASPAR Database System

FEDERAL SUPPORT FOR CHEMICAL RESEARCH EQUIPMENT

Growth at the top 25 far outpaced that of total support in 2004, continuing a long-term trend

RANK		\$ THOUSANDS						ANNUAL CHANGE		
2004	2003		1994	2000	2001	2002	2003	2004	2003-04	1994-2004
1	3	Massachusetts Inst. of Technology	\$621	\$2,222	\$1,522	\$1,466	\$2,039	\$1,975	-3.1%	12.3%
2	19	U of Washington, Seattle	398	847	493	1,545	931	1,894	103.4	16.9
3	7	Harvard U	1,048	1,087	1,036	963	1,462	1,756	20.1	5.3
4	2	U of California, San Francisco	na	454	1,034	1,725	2,694	1,591	-40.9	nm
5	15	U of Wisconsin, Madison	1,263	1,328	586	763	1,070	1,546	44.5	2.0
6	50	U of Pittsburgh	321	941	987	415	554	1,400	152.7	15.9
7	6	U of California, Berkeley	490	1,421	568	1,603	1,587	1,381	-13.0	10.9
8	1	Cornell U	654	729	457	849	2,898	1,351	-53.4	7.5
9	10	U of California, San Diego	273	243	202	1,346	1,306	1,270	-2.8	16.6
10	23	U of South Carolina	374	872	684	1,425	853	1,259	47.6	12.9
11	9	Louisiana State U	194	748	315	1,121	1,353	1,230	-9.1	20.3
12	82	U of Virginia	450	532	462	259	312	1,222	291.7	10.5
13	52	U of Utah	585	507	725	75	548	1,221	122.8	7.6
14	46	Rowan College of New Jersey	na	na	na	na	599	1,201	100.5	nm
15	4	U of California, Los Angeles	488	1,007	469	1,598	1,732	1,068	-38.3	8.1
16	37	U of Arizona	514	881	610	630	670	1,055	57.5	7.5
17	141	Brandeis U	137	673	150	36	95	1,043	997.9	22.5
18	92	North Dakota State U	340	211	413	164	242	996	311.6	11.3
19	45	U of Texas, Austin	486	695	510	1,522	614	959	56.2	7.0
20	13	U of Illinois, Urbana-Champaign	389	908	1,469	1,259	1,101	949	-13.8	9.3
21	32	U of Pennsylvania	1,388	1,901	193	712	725	944	30.2	-3.8
22	8	Stanford U	581	1,033	1,639	2,325	1,398	902	-35.5	4.5
23	20	U of Notre Dame	1,194	1,075	978	1,026	919	895	-2.6	-2.8
24	114	Boston U	93	73	20	75	156	884	466.7	25.3
25	42	Rice U	407	404	767	767	629	882	40.2	8.0
Total, listed institutions			\$12,688	\$20,792	\$16,289	\$23,669	\$26,487	\$30,874	16.6%	9.3%
TOTAL, ALL INSTITUTIONS			\$53,502	\$63,343	\$58,001	\$75,497	\$77,446	\$77,486	0.1%	3.8%

NOTE: Institutional fiscal years. na = not available. nm = not meaningful. **SOURCE:** National Science Foundation, WebCASPAR Database System

SOURCES OF ACADEMIC R&D FUNDS

At 64% in 2004, federal share was highest it has been since 1985

\$ MILLIONS												ANNUAL CHANGE	
	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2003-04	1994-2004
Federal govt.	\$12,650	\$13,332	\$13,841	\$14,315	\$15,151	\$16,102	\$17,536	\$19,222	\$21,863	\$24,744	\$27,379	10.6%	8.0%
Institutional funds	3,827	4,047	4,171	4,698	5,003	5,381	5,924	6,607	7,126	7,659	7,771	1.5	7.3
State & local govt.	1,554	1,689	1,811	1,909	1,944	2,021	2,200	2,320	2,505	2,650	2,847	7.4	6.2
Industry	1,422	1,489	1,605	1,737	1,888	2,033	2,156	2,220	2,187	2,163	2,107	-2.6	4.0
All other sources	1,574	1,613	1,619	1,712	1,870	1,994	2,254	2,425	2,687	2,842	2,841	0.0	6.1
TOTAL	\$21,028	\$22,171	\$23,047	\$24,371	\$25,856	\$27,531	\$30,069	\$32,794	\$36,367	\$40,057	\$42,945	7.2%	7.4%

NOTE: Institutional fiscal years. Totals may not add because of rounding. **SOURCE:** National Science Foundation, 2006, "Academic Research and Development Expenditures: Fiscal Year 2004"

SCHOOLS SPENDING MOST ON CHEMICAL RESEARCH EQUIPMENT

Total spending dipped again in 2004, although a few schools saw whopping increases

RANK		2004 2003	\$ THOUSANDS	1994	2000	2001	2002	2003	2004	% FEDERAL FUNDS, 2004	ANNUAL CHANGE	
											2003-04	1994-2004
1	1	California Inst. of Technology	\$574	\$2,497	\$1,503	\$745	\$4,083	\$3,700	11.3%	-9.4%	20.5%	
2	2	U of California, San Francisco	na	1,123	1,739	3,262	3,462	2,461	64.6	-28.9	nm	
3	12	U of California, Berkeley	687	1,727	1,254	2,226	1,854	2,409	57.3	29.9	13.4	
4	6	Massachusetts Inst. of Technology	763	2,956	1,805	1,750	2,718	2,302	85.8	-15.3	11.7	
5	8	U of California, Los Angeles	543	1,256	820	2,129	2,601	2,187	48.8	-15.9	14.9	
6	5	Louisiana State U	1,209	1,530	1,112	1,913	2,819	2,049	60.0	-27.3	5.4	
7	16	Harvard U	1,174	1,451	1,312	1,038	1,522	1,992	88.2	30.9	5.4	
8	14	U of Wisconsin, Madison	1,676	2,527	850	1,826	1,699	1,961	78.8	15.4	1.6	
9	32	U of South Carolina	447	1,154	1,284	1,907	1,065	1,959	64.3	83.9	15.9	
10	17	U of Washington, Seattle	467	1,286	1,037	2,121	1,471	1,911	99.1	29.9	15.1	
11	3	Indiana U	1,002	1,232	2,521	3,391	3,399	1,864	29.1	-45.2	6.4	
12	65	U of Pittsburgh	384	968	1,018	415	555	1,797	77.9	223.8	16.7	
13	10	U of Illinois, Urbana-Champaign	1,062	1,871	2,213	2,029	2,124	1,655	57.3	-22.1	4.5	
14	4	Cornell U	698	822	534	1,013	3,069	1,589	85.0	-48.2	8.6	
15	25	U of Florida	712	857	1,371	989	1,262	1,534	56.1	21.6	8.0	
16	24	U of Texas, Austin	695	1,382	3,094	2,842	1,308	1,522	63.0	16.4	8.2	
17	36	U of Utah	628	962	1,164	88	943	1,485	82.2	57.5	9.0	
18	46	U of Arizona	585	914	720	863	809	1,408	74.9	74.0	9.2	
19	21	U of California, San Diego	347	392	337	1,444	1,409	1,376	92.3	-2.3	14.8	
20	15	U of Delaware	408	595	1,145	690	1,550	1,347	49.9	-13.1	12.7	
21	98	U of Virginia	489	971	485	266	341	1,229	99.4	260.4	9.7	
22	59	Rowan College of New Jersey	na	na	na	na	600	1,201	100.0	100.2	nm	
23	18	Michigan State U	354	1,147	1,426	1,378	1,471	1,188	54.8	-19.2	12.9	
24	26	Pennsylvania State U	1,562	1,137	1,601	1,376	1,221	1,152	61.4	-5.7	-3.0	
25	37	U of Notre Dame	1,420	1,345	1,609	1,299	943	1,150	77.8	22.0	-2.1	
TOTAL, LISTED INSTITUTIONS			\$17,886	\$32,102	\$31,954	\$37,000	\$44,298	\$44,428	65.4%	0.3%	9.5%	
TOTAL, ALL INSTITUTIONS			\$78,190	\$103,217	\$100,446	\$121,624	\$118,831	\$116,590	66.5%	-1.9%	4.1%	

NOTE: Institutional fiscal years. na = not available. nm = not meaningful. SOURCE: National Science Foundation, WebCASPAR Database System

UNIVERSITY SPENDING FOR RESEARCH EQUIPMENT

Two-thirds of the funding for chemistry equipment was provided by the federal government in 2004

\$ MILLIONS	1994	2000	2001	2002	2003	2004	% FEDERAL FUNDS, 2004	ANNUAL CHANGE	
								2003-04	1994-2004
ALL SCIENCES	\$857	\$1,129	\$1,178	\$1,335	\$1,429	\$1,485	63.8%	3.9%	5.7%
Life ^a	435	630	688	735	816	824	61.0	1.0	6.6
Physical ^b	207	250	241	274	297	337	68.3	13.5	5.0
Physics	90	109	113	121	139	160	71.4	15.1	5.9
Chemistry	78	103	100	122	119	117	66.5	-1.7	4.1
Environmental	83	100	87	132	121	125	74.4	3.3	4.2
Math & computer	74	66	76	111	106	113	80.0	6.6	4.3
Other	57	84	85	83	89	85	35.1	-4.5	4.1
ALL ENGINEERING	251	306	333	363	384	394	56.2%	2.6%	4.6%
Chemical	19	26	31	30	32	55	32.1	71.9	11.2
Materials	25	30	49	41	61	38	65.1	-37.7	4.3
TOTAL	\$1,108	\$1,435	\$1,510	\$1,699	\$1,814	\$1,879	62.2%	3.6%	5.4%

NOTE: Institutional fiscal years. Totals may not add because of rounding. a Includes agricultural, biological, medical, and other life sciences. b Includes astronomy, chemistry, physics, and other physical sciences. SOURCE: National Science Foundation, WebCASPAR Database System

SCHOOLS SPENDING MOST ON CHEMICAL ENGINEERING R&D

Purdue University bounded to the top of the list in 2004

RANK		2004	2003	\$ THOUSANDS	1994	2000	2001	2002	2003	2004	% FEDERAL FUNDS, 2004	ANNUAL CHANGE	
2004	2003											2003-04	1994-2004
1	26			Purdue U ^a	\$4,153	\$6,624	\$6,875	\$5,951	\$5,345	\$22,360	9.8%	318.3%	18.3%
2	5			Texas A&M U	10,371	9,364	9,135	9,541	9,528	16,554	15.0	73.7	4.8
3	1			Massachusetts Inst. of Technology	14,688	16,106	16,843	15,146	17,340	15,074	60.5	-13.1	0.3
4	3			Pennsylvania State U	3,456	14,257	13,167	14,149	15,060	14,057	62.7	-6.7	15.1
5	2			North Carolina State U, Raleigh	4,986	15,382	19,677	18,851	16,839	13,311	47.3	-21.0	10.3
6	6			Georgia Inst. of Technology	3,857	5,938	7,735	9,442	9,519	13,107	52.4	37.7	13.0
7	4			Clemson U	1,378	1,403	7,658	8,321	11,095	11,195	53.9	0.9	23.3
8	7			U of Texas, Austin	7,766	7,469	7,888	8,313	9,351	10,204	50.7	9.1	2.8
9	10			Johns Hopkins U	4,768	6,150	7,045	7,405	8,300	9,834	92.2	18.5	7.5
10	18			Princeton U	2,861	3,130	3,649	3,359	6,362	9,543	60.5	50.0	12.8
11	13			U of Minnesota	10,946	9,057	6,547	7,670	7,555	9,012	51.1	19.3	-1.9
12	8			Stanford U	3,943	6,468	8,001	9,361	8,844	8,218	76.8	-7.1	7.6
13	16			U of Wisconsin, Madison	5,742	7,317	6,920	6,474	6,850	7,735	54.6	12.9	3.0
14	11			U of Michigan	2,551	3,623	4,768	5,636	7,772	7,706	71.7	-0.8	11.7
15	9			U of Delaware	6,788	5,890	6,324	8,189	8,333	7,703	71.7	-7.6	1.3
16	12			Michigan State U	6,515	5,656	4,874	7,030	7,712	7,643	27.3	-0.9	1.6
17	30			Arizona State U, Tempe	2,344	2,690	3,333	3,965	5,233	7,554	54.7	44.4	12.4
18	27			U of California, Davis	1,972	4,081	4,793	4,675	5,310	7,259	63.0	36.7	13.9
19	31			U of Tulsa	3,416	4,434	7,353	6,389	5,102	6,918	70.3	35.6	7.3
20	17			U of South Carolina	2,613	5,961	6,280	5,890	6,607	6,852	55.4	3.7	10.1
21	15			Ohio State U	1,982	4,962	6,441	7,130	6,962	6,761	40.2	-2.9	13.1
22	14			U of Illinois, Urbana-Champaign	2,257	5,160	5,526	7,279	7,398	6,674	49.9	-9.8	11.5
23	20			U of California, Berkeley	1,478	4,842	5,866	6,842	6,161	6,592	43.9	7.0	16.1
24	23			Louisiana State U	2,559	2,344	2,121	4,077	5,543	6,236	33.0	12.5	9.3
25	22			New Mexico Inst. of Mining & Tech.	3,787	5,536	4,747	5,576	5,719	6,194	41.6	8.3	5.0
Total, listed institutions					\$117,177	\$163,844	\$183,566	\$196,661	\$209,840	\$244,296	49.6%	16.4%	7.6%
TOTAL, ALL INSTITUTIONS					\$278,687	\$375,709	\$414,477	\$430,741	\$453,277	\$493,353	54.2%	8.8%	5.9%

NOTE: Institutional fiscal years. ^a Spending in 2004 includes \$17,227 million for a chemical engineering research facility on the West Lafayette campus.

SOURCE: National Science Foundation, WebCASPAR Database System

FOREIGN GRADUATE STUDENTS

More than one-third of chemistry and nearly half of chemical engineering grad students are from outside the U.S.

NUMBER OF FOREIGN STUDENTS	2000		2001		2002		2003		2004	
	80,956	20.8%	88,258	22.1%	94,579	22.5%	94,903	21.6%	93,579	20.8%
ALL SCIENCES	80,956	20.8%	88,258	22.1%	94,579	22.5%	94,903	21.6%	93,579	20.8%
Math & computer	28,319	45.0	32,538	47.3	34,090	46.4	31,684	43.3	29,156	41.5
Life ^a	19,704	13.3	21,196	14.1	23,712	14.9	24,983	14.7	25,569	14.4
Biological	11,761	20.9	12,434	21.6	13,826	22.6	14,836	22.9	15,688	23.6
Agricultural	2,411	20.1	2,513	20.5	2,613	20.6	2,596	19.7	2,680	19.9
Psychology & social	18,586	13.9	19,539	14.4	20,919	14.8	21,376	14.5	21,523	14.2
Physical ^b	11,655	38.4	12,203	39.3	13,090	40.5	14,085	41.1	14,549	40.7
Chemistry	6,222	34.4	6,569	35.8	7,253	38.1	7,839	39.1	8,073	38.9
Physics	5,084	46.9	5,257	46.7	5,442	46.5	5,811	46.3	6,030	45.3
Geosciences	2,692	19.3	2,782	20.1	2,768	19.4	2,775	19.0	2,782	18.4
ALL ENGINEERING	47,401	45.5%	52,522	48.0%	58,306	48.7%	59,984	47.1%	56,722	45.9%
Chemical	3,330	47.2	3,495	50.6	3,713	50.1	3,763	50.1	3,622	48.6
Materials	2,112	48.3	2,336	49.5	2,510	50.3	2,585	50.4	2,557	50.5
TOTAL	128,357	26.0%	140,780	27.6%	152,885	28.3%	154,887	27.3%	150,301	26.2%

NOTE: Percent of total is the percentage of part- and full-time graduate students at M.S.- and Ph.D.-granting institutions who were not U.S. citizens or permanent residents.

^a Includes agricultural, biological, medical, and other life sciences. ^b Includes astronomy, chemistry, physics, and other physical sciences.

SOURCE: National Science Foundation, WebCASPAR Database System

SCIENCE GRADUATE STUDENTS

Number studying chemistry inched up again in 2004, besting the level of a decade earlier

	1994	2000	2001	2002	2003	2004	ANNUAL CHANGE	
							2003-04	1994-2004
ALL SCIENCES	391,375	389,199	400,127	420,765	439,757	450,633	2.5%	1.4%
Life ^a	143,544	148,080	150,252	159,372	170,338	177,968	4.5	2.2
Biological	57,676	56,282	57,639	61,133	64,701	66,520	2.8	1.4
Agricultural	12,611	12,023	12,235	12,698	13,197	13,445	1.9	0.6
Psychology & social	143,677	133,793	136,149	141,380	147,340	151,579	2.9	0.5
Math & computer	53,731	63,000	68,847	73,432	73,161	70,204	-4.0	2.7
Physical ^b	34,466	30,385	31,038	32,341	34,298	35,772	4.3	0.4
Chemistry	19,803	18,105	18,366	19,045	20,049	20,776	3.6	0.5
Physics	13,162	10,841	11,248	11,701	12,555	13,309	6.0	0.1
Geosciences	15,957	13,941	13,841	14,240	14,620	15,110	3.4	-0.5
ALL ENGINEERING	113,024	104,112	109,493	119,668	127,377	123,701	-2.9%	0.9%
Chemical	7,639	7,056	6,913	7,414	7,516	7,452	-0.9	-0.2
Materials	5,228	4,377	4,721	4,992	5,131	5,059	-1.4	-0.3
TOTAL	504,399	493,311	509,620	540,433	567,134	574,334	1.3%	1.3%

NOTE: Includes part- and full-time graduate students at M.S.- and Ph.D.-granting institutions. **a** Includes agricultural, biological, medical, and other life sciences. **b** Includes astronomy, chemistry, physics, and other physical sciences. **SOURCE:** National Science Foundation, WebCASPAR Database System

POSTDOCTORAL POSITIONS

Number of postdocs in chemistry has risen very slightly since 1994

	1994	2000	2001	2002	2003	2004	ANNUAL CHANGE	
							2003-04	1994-2004
ALL SCIENCES	33,771	39,802	40,149	41,435	42,706	41,605	-2.6%	2.1%
Life ^a	25,698	30,447	30,985	31,688	32,681	31,423	-3.8	2.0
Biological	14,379	16,734	17,029	17,644	18,565	17,894	-3.6	2.2
Agricultural	729	822	835	945	1,052	941	-10.6	2.6
Physical ^b	5,884	6,270	6,218	6,610	6,694	6,810	1.7	1.5
Chemistry	3,729	3,877	3,861	3,982	4,032	4,108	1.9	1.0
Physics	1,865	1,948	1,910	2,154	2,182	2,119	-2.9	1.3
Psychology & social	941	1,201	1,219	1,269	1,358	1,270	-6.5	3.0
Geosciences	824	1,155	1,036	1,114	1,166	1,252	7.4	4.3
Math & computer	424	729	691	754	807	850	5.3	7.2
ALL ENGINEERING	2,606	3,313	3,166	3,568	3,814	3,869	1.4%	4.0%
Chemical	527	703	575	743	672	688	2.4	2.7
Materials	441	507	479	507	539	545	1.1	2.1
TOTAL	36,377	43,115	43,315	45,003	46,520	45,474	-2.2%	2.3%

NOTE: Data for Ph.D.-granting institutions. **a** Includes agricultural, biological, medical, and other life sciences. **b** Includes astronomy, chemistry, physics, and other physical sciences. **SOURCE:** National Science Foundation, WebCASPAR Database System