

UNIVERSITIES REPORT CONTINUED DECLINE IN REAL FEDERAL S&E R&D FUNDING IN FY 2007

by Ronda Britt¹

Federal funding of academic science and engineering (S&E) R&D failed to outpace inflation for the second year in a row, according to FY 2007 data from the National Science Foundation (NSF) Survey of Research and Development Expenditures at Universities and Colleges. In current dollars, federally funded academic R&D expenditures rose 1.1% in FY 2007 to \$30.4 billion. After adjusting for inflation, this represents a 1.6% decline from FY 2006 and follows a 0.2% decline from the FY 2005 level. A 2-year decline in federal funding in constant dollars is unprecedented for this data series, which began in 1972 (figure 1). The federal government remains the largest source of academic R&D funding, accounting for more than 60% of total R&D expenditures most years since FY 1972. The federal government's share, however, has declined in recent years, dropping from 64% in FY 2005 to 62% in FY 2007.

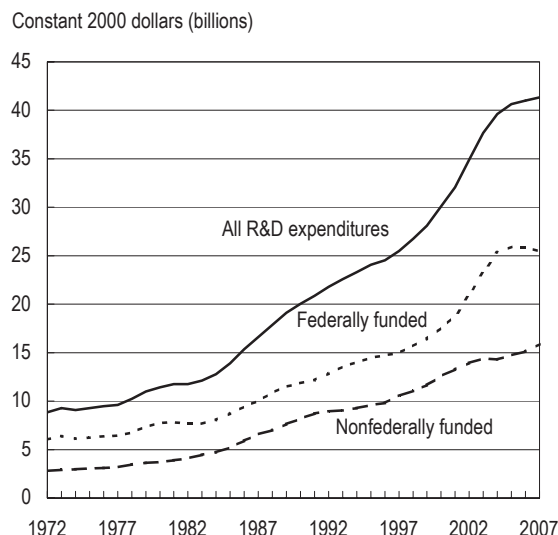
Overall, universities and colleges reported S&E R&D expenditures of \$49.4 billion in FY 2007, 3.5% more than in the previous year (\$47.7 billion) (table 1). When adjusted for inflation, academic R&D rose by 0.8% in FY 2007.

Unless otherwise indicated, all references to dollar amounts or percentages for the remainder of this InfoBrief are in current dollars.

Other Sources of R&D Funding

Funding from all nonfederal sources combined grew by 7.8% (5.0% in inflation-adjusted terms) in FY 2007. R&D

FIGURE 1. Science and engineering R&D expenditures at universities and colleges, by source of funds: FY 1972–2007



NOTE: Survey began annual data collection in FY 1972.

SOURCE: National Science Foundation/Division of Science Resources Statistics, Survey of Research and Development Expenditures at Universities and Colleges, FY 2007.

expenditures financed by state and local government funding grew by 6.1% in FY 2007, to \$3.1 billion.² The most noteworthy increases were reported for industry-funded expenditures. After three consecutive declines between FY 2001 and FY 2004, industry funding has more than regained its ground in recent years and in FY 2007



TABLE 1. Science and engineering R&D expenditures at universities and colleges: FY 2002–07

(Millions of current dollars)

Source of funds and character of work	2002	2003	2004	2005	2006	2007
All R&D expenditures	36,405	40,100	43,258	45,793	47,743	49,431
Source of funds						
Federal government	21,873	24,771	27,644	29,203	30,124	30,441
State and local government	2,506	2,647	2,879	2,942	2,963	3,145
Industry	2,191	2,162	2,129	2,294	2,404	2,672
Institutional funds	7,134	7,664	7,753	8,261	9,057	9,655
Other	2,701	2,857	2,852	3,093	3,196	3,517
Character of work						
Basic research	27,320	30,006	31,958	34,358	36,063	37,609
Applied research and development	9,085	10,094	11,300	11,434	11,680	11,822

NOTE: Because of rounding, detail may not add to total.

SOURCE: National Science Foundation/Division of Science Resources Statistics, Survey of Research and Development Expenditures at Universities and Colleges, FY 2007.

grew 11.2% to \$2.7 billion. Funding originating from academic institutions' own funds increased 6.6% in FY 2007 to \$9.7 billion. Funding from all other sources combined (nonprofit organizations and other nongovernmental entities) increased 10.0% to \$3.5 billion.

Funding by Federal Agency

The Department of Health and Human Services (HHS), including the National Institutes of Health, has historically been the largest provider of federal R&D funding to universities and colleges. In FY 2007 HHS funding constituted 56% of total federally funded expenditures (\$17.1 billion) and was concentrated within the medical and biological sciences (table 2). NSF was the second largest provider in FY 2007, funding \$3.6 billion across numerous academic R&D fields.

Funding by Field

Medical sciences (\$16.5 billion) and biological sciences (\$9.2 billion) once again accounted for more

TABLE 2. Federally funded R&D expenditures at universities and colleges, by science and engineering field and agency: FY 2007

(Millions of current dollars)

Science and engineering field	All federal R&D	DOD	DOE	HHS	NASA	NSF	USDA	Other ^a
All fields	30,441	2,773	1,115	17,065	1,041	3,551	910	2,835
Computer sciences	1,014	272	36	54	24	402	39	98
Environmental sciences	1,835	167	94	59	250	595	67	514
Life sciences	18,348	442	140	15,179	90	576	714	1,021
Agricultural sciences	897	12	24	66	11	83	477	171
Biological sciences	6,199	145	64	4,942	36	422	183	310
Medical sciences	10,574	257	43	9,651	40	48	36	467
Life sciences, nec	678	28	8	520	3	22	18	73
Mathematical sciences	408	42	14	85	4	193	2	33
Physical sciences	2,677	342	389	475	357	785	9	181
Psychology	600	32	6	437	11	46	2	60
Social sciences	755	48	15	298	10	108	34	231
Sciences, nec	342	62	14	77	12	71	5	73
Engineering	4,462	1,366	407	398	283	774	39	620

DOD = Department of Defense; DOE = Department of Energy; HHS = Department of Health and Human Services; NASA = National Aeronautics and Space Administration; nec = not elsewhere classified; NSF = National Science Foundation; USDA = U.S. Department of Agriculture.

^a Includes all other agencies reported.

NOTES: Not all fields are reported in this table. Agency detail may not add to field totals because some institutions were unable to provide field data by agency.

SOURCE: National Science Foundation/Division of Science Resources Statistics, Survey of Research and Development Expenditures at Universities and Colleges, FY 2007.

than one-half of all R&D at universities and colleges in FY 2007 (table 3). These two fields have held the largest field shares of academia's R&D performance total throughout the survey's history. The following

TABLE 3. R&D expenditures at universities and colleges, by science and engineering field: FY 2006-07

(Millions of current dollars)

Field	FY 2006	FY 2007	% change 2006-07
All R&D expenditures	47,743	49,431	3.5
Computer sciences	1,438	1,417	-1.4
Environmental sciences	2,601	2,725	4.8
Atmospheric sciences	508	492	-3.1
Earth sciences	896	910	1.5
Oceanography	839	996	18.6
Environmental sciences, nec	358	327	-8.5
Life sciences	28,802	29,764	3.3
Agricultural sciences	2,797	2,902	3.7
Biological sciences	9,048	9,218	1.9
Medical sciences	15,805	16,515	4.5
Life sciences, nec	1,152	1,130	-1.9
Mathematical sciences	533	572	7.3
Physical sciences	3,812	3,842	0.8
Astronomy	470	463	-1.5
Chemistry	1,413	1,447	2.4
Physics	1,610	1,613	0.2
Physical sciences, nec	318	319	0.2
Psychology	875	863	-1.4
Social sciences	1,702	1,781	4.7
Economics	338	349	3.3
Political sciences	316	337	6.7
Sociology	399	393	-1.5
Social sciences, nec	648	701	8.2
Sciences, nec	888	949	7.0
Engineering	7,092	7,517	6.0
Aeronautical/astronautical engineering	385	424	10.1
Bioengineering/biomedical engineering	477	537	12.8
Chemical engineering	560	602	7.5
Civil engineering	858	863	0.6
Electrical engineering	1,615	1,675	3.7
Mechanical engineering	1,048	1,130	7.8
Metallurgical/materials engineering	643	638	-0.8
Engineering, nec	1,506	1,648	9.4

nec = not elsewhere classified.

NOTE: Percentages are calculated on unrounded data.

SOURCE: National Science Foundation/Division of Science Resources Statistics, Survey of Research and Development Expenditures at Universities and Colleges, FY 2007.

fields showed the largest percentage increases for FY 2007: oceanography (18.6%), bioengineering/biomedical engineering (12.8%), and aeronautical/astronautical engineering (10.1%). Spending in aeronautical/astronautical engineering declined 13.5% in FY 2006. Bioengineering/biomedical engineering R&D continues to be the fastest growing field, with an average increase of 15.0% annually since FY 2000.

Top Academic Research Performers

Of the 672 institutions surveyed, the top 20 in terms of total R&D expenditures accounted for 30% of total academic R&D spending (table 4). Historically the top 100

TABLE 4. Twenty institutions reporting the largest FY 2007 academic R&D expenditures in science and engineering fields: FY 2006-07

(Millions of current dollars)

Rank 2007	Institution	2006	2007
	All R&D expenditures ^a	47,743	49,431
	Leading 20 institutions	14,189	14,673
1	Johns Hopkins U., The ^b	1,500	1,554
2	U. CA San Francisco	796	843
3	U. WI Madison	832	841
4	U. CA Los Angeles	811	823
5	U. MI all campuses	800	809
6	U. CA San Diego	755	799
7	Duke U.	657	782
8	U. WA	778	757
9	OH State U. all campuses	652	720
10	Stanford U.	679	688
11	PA State U. all campuses	644	652
12	U. PA	676	648
13	Cornell U. all campuses	649	642
14	U. MN all campuses	595	624
15	MA Institute of Technology	601	614
16	U. CA, Davis	573	601
17	U. FL	565	593
18	Washington U. St. Louis	548	573
19	U. Pittsburgh all campuses	530	559
20	U. CA Berkeley	546	552
	All other institutions	33,554	34,758

^a Excludes R&D performed by university-administered federally funded research and development centers.

^b The Johns Hopkins University includes the Applied Physics Laboratory, with \$709 (FY 2006) and \$778 million (FY 2007) in total R&D expenditures.

NOTE: Because of rounding, detail may not add to total.

SOURCE: National Science Foundation/Division of Science Resources Statistics, Survey of Research and Development Expenditures at Universities and Colleges, FY 2007.

research performers have accounted for roughly 80% of all R&D dollars reported on the survey. The University of California, San Francisco, moved from number 5 in FY 2006 to number 2 in FY 2007, with an increase of \$47 million. Most of the change reflects increased funding from nongovernmental sources and the university itself. Duke University continued to increase its R&D spending at a higher rate than many of the other top 20, moving from 14th in FY 2004 (\$521 million) to 7th in FY 2007 (\$782 million). Between FY 2006 and FY 2007 Duke's spending increased \$125 million, primarily due to increased industry funding as well as federal funding from HHS. Most of the increased spending for both of these institutions is in the field of medical sciences. The institutions constituting the top 5 remained the same from FY 2006 to FY 2007.

As an indicator of how much R&D within medical schools contributes to the total R&D reported, only 2 institutions within the top 20 listed in table 4 do not have a medical school within their institution: the Massachusetts Institute of Technology and the University of California, Berkeley. Among the institutions surveyed with no M.D.-granting medical school component, the top 20 in R&D expenditures (table 5) constitute 15% (\$7.6 billion) of total R&D among all surveyed institutions (\$49.4 billion).

R&D Expenditures at Minority-Serving Institutions

This InfoBrief is the first to present R&D expenditure rankings specifically for high-Hispanic-enrollment (HHE) institutions.³ A total of \$888 million was spent on R&D at HHE institutions in FY 2007, with 65% funded by the federal government (table 6). The top-spending HHE institution in FY 2007 was the University of New Mexico (\$177 million).

A total of \$421 million was spent on R&D at historically black universities and colleges (HBCUs), with 84% funded by the federal government (table 7). The top-spending HBCU in FY 2007 was Howard University (\$38 million), with Jackson State University a close second at \$37 million.

Non-S&E R&D Expenditures

Academic institutions spent a total of \$2.0 billion on R&D in non-S&E fields in FY 2007 (table 8).⁴ This amount is in addition to the \$49.4 billion expended on

TABLE 5. Twenty institutions without a medical school reporting the largest academic R&D expenditures: FY 2007

(Millions of current dollars)

Rank	Institution	R&D expenditures
All institutions without a medical school		15,733
Leading 20 institutions		7,637
1	MA Institute of Technology	614
2	U. CA Berkeley	552
3	TX A&M U.	544
4	U. TX M. D. Anderson Cancer Ctr.	497
5	U. IL Urbana-Champaign	474
6	GA Institute of Technology all campuses	473
7	U. TX Austin	447
8	Purdue U. all campuses	415
9	VA Polytechnic Institute and State U.	367
10	Scripps Research Institute, The	361
11	U. MD College Park	360
12	U. GA	333
13	NC State U.	332
14	Rutgers, The State U. NJ all campuses	312
15	SUNY Albany	309
16	CO State U.	288
17	CA Institute of Technology	285
18	Rockefeller U.	234
19	AZ State U.	224
20	IA State U.	217
All other institutions		8,096

NOTES: Because of rounding, detail may not add to total. Source for medical schools is the list of accredited M.D.-granting U.S. medical schools approved by the Association of American Medical Colleges.

SOURCE: National Science Foundation/Division of Science Resources Statistics, Survey of Research and Development Expenditures at Universities and Colleges, FY 2007.

S&E R&D. The largest amounts reported for individual non-S&E fields were in education (\$901 million), business and management (\$265 million), and humanities (\$242 million). Similar to the top institutions in S&E R&D spending, the top 20 performers of non-S&E R&D accounted for 36% of the total non-S&E R&D expenditures in FY 2007. The University of Wisconsin, Madison, ranked third in S&E R&D expenditures, holds the number-one spot for non-S&E R&D for the second year in a row at \$72 million. Five other institutions within the top 20 are also in the top 20 for S&E R&D expenditures: the University of Florida (5th), the University of Michigan (8th), the University of California, Los Angeles (10th), the University of Washington (12th), and the Massachusetts Institute of Technology

TABLE 6. Total and federally funded R&D expenditures at the 20 high-Hispanic-enrollment institutions that led in total R&D: FY 2007
(Thousands of current dollars)

Rank	Institution	R&D expenditures	
		Total	Federal
	All HHE institutions	888,389	576,919
	Leading 20 institutions	851,140	549,553
1	U. NM main campus	177,430	123,039
2	U. TX Health Science Ctr. San Antonio	160,282	95,610
3	NM State U. main campus	148,120	100,773
4	FL International U.	90,903	52,141
5	U. TX El Paso	39,965	21,018
6	U. PR Medical Sciences Campus	38,863	31,955
7	CUNY The City C.	32,840	21,776
8	U. TX San Antonio	30,542	20,545
9	U. PR Rio Piedras Campus	21,379	16,114
10	U. PR Mayaguez Campus	19,813	11,164
11	TX A&M U. Kingsville	13,794	5,067
12	CA State U. Northridge	12,412	7,339
13	TX A&M U. Corpus Christi	11,933	6,609
14	CA State U. Los Angeles	10,053	9,819
15	Universidad Central del Caribe	9,446	8,672
16	CA State U. San Bernardino	8,323	3,553
17	CA State U. Monterey Bay	7,032	3,832
18	Nova Southeastern U.	6,697	3,470
19	CA State U. Dominguez Hills	6,016	4,580
20	CA State U. Fresno	5,297	2,477
	All other surveyed HHE institutions	37,249	27,366

HHE = high-Hispanic-enrollment.

NOTE: HHE institutions are those whose full-time equivalent undergraduate enrollment is at least 25% Hispanic, according to fall 2005 enrollment data in the Integrated Postsecondary Education Data System (IPEDS).

SOURCE: National Science Foundation/Division of Science Resources Statistics, Survey of Research and Development Expenditures at Universities and Colleges, FY 2007.

(15th). The University of South Florida moved from 23rd in FY 2006 to 2nd in FY 2007 with an increase of almost \$46 million in non-S&E R&D spending, primarily in the field of education.

Data Comments

The academic R&D expenditures data presented in this InfoBrief were obtained from 672 universities and colleges that grant degrees in the sciences or engineering and expended at least \$150,000 in S&E R&D in the survey period. The amounts reported include all funds

TABLE 7. Total and federally funded R&D expenditures at the 20 historically black colleges and universities that led in total R&D: FY 2007
(Thousands of current dollars)

Rank	Institution	R&D expenditures	
		Total	Federal
	All institutions	420,898	353,838
	Leading 20 institutions	333,717	277,873
1	Howard U.	38,020	33,996
2	Jackson State U.	36,888	30,980
3	Meharry Medical C.	33,218	31,263
4	Morehouse School of Medicine	27,886	23,230
5	NC Agricultural and Technical State U.	24,044	15,362
6	Hampton U.	24,017	23,836
7	U. of the Virgin Islands	17,842	12,561
8	FL A&M U.	16,541	14,502
9	Tuskegee U.	14,329	11,033
10	AL A&M U.	13,672	8,467
11	TN State U.	12,475	8,475
12	Prairie View A&M U.	12,019	9,217
13	Morgan State U.	11,257	9,992
14	Alcorn State U.	9,056	7,874
15	Clark Atlanta U.	8,543	7,905
16	VA State U.	8,170	7,604
17	DE State U.	7,418	6,487
18	Norfolk State U.	6,491	5,998
19	Fisk U.	6,000	6,000
20	U. AR Pine Bluff	5,831	3,091
	All other surveyed HBCUs	87,181	75,965

HBCU = historically black college or university.

SOURCE: National Science Foundation/Division of Science Resources Statistics, Survey of Research and Development Expenditures at Universities and Colleges, FY 2007.

expended for S&E activities specifically organized to produce research outcomes and commissioned by an agency external to the academic institution or separately budgeted using institution funds. Non-S&E R&D expenditures are reported separately in the survey and are not included in the overall R&D expenditure totals. For a complete listing of the fields included under the S&E and non-S&E categories, refer to the FY 2007 survey questionnaire, available at <http://www.nsf.gov/statistics/question.cfm#12>.

Universities have been asked to identify specific agency sources of federal funding since FY 2003. In FY 2006 and 2007 virtually all (99%) of the federal totals were identified by agency source. However, the data for this item still represent slightly lower-bound estimates

TABLE 8. Twenty institutions reporting the largest FY 2007 academic R&D expenditures in non-science and engineering fields

(Millions of current dollars)

Rank	Institution	All non-S&E fields	Education	Business and management	Humanities	Other
	All non-S&E R&D expenditures	2,037	901	265	242	629
	Leading 20 institutions	730	296	123	58	253
1	U. WI Madison	72	26	20	18	7
2	U. South FL	65	38	8	2	16
3	Purdue U. all campuses	57	7	17	2	31
4	U. TX Austin	56	28	5	1	22
5	U. FL	43	4	2	1	36
6	Harvard U.	43	9	0	1	33
7	OR State U.	43	1	0	0	42
8	U. MI all campuses	40	20	9	2	9
9	MI State U.	35	21	4	2	9
10	U. CA Los Angeles	31	19	6	5	2
11	Northwestern U.	30	5	19	1	5
12	U. WA	30	11	0	3	15
13	U. Central FL	30	17	10	1	2
14	George Washington U.	23	19	0	1	3
15	MA Institute of Technology	23	5	14	2	3
16	Brown U.	23	6	0	12	4
17	U. CA Santa Cruz	23	20	0	1	1
18	NY U.	22	9	2	1	10
19	FL State U.	22	16	2	1	4
20	TX A&M U.	22	16	4	1	0
	All other institutions	1,307	605	143	184	376

S&E = science and engineering.

NOTE: Because of rounding, detail may not add to total.

SOURCE: National Science Foundation/Division of Science Resources Statistics, Survey of Research and Development Expenditures at Universities and Colleges, FY 2007.

of agencies' actual support totals, because NSF did not attempt to allocate the undistributed amounts to individual agencies.

Data reported on non-S&E R&D expenditures are also lower-bound estimates for the national totals because NSF did not attempt to estimate for nonresponse on this item. Also, only institutions that conducted at least \$150,000 of S&E R&D were surveyed. The activities of institutions that do not perform S&E R&D (but may conduct substantial amounts of non-S&E R&D) are not reflected here.

NSF makes available institutional profiles for institutions of higher education with S&E departments that grant master's degrees or higher (<http://www.nsf.gov/statistics/profiles/>). The profiles contain data from this

survey as well as from two other NSF academic S&E surveys: the Survey of Federal Science and Engineering Support to Universities, Colleges, and Nonprofit Institutions and the Survey of Graduate Students and Postdoctorates in Science and Engineering. Data from the three surveys are available on the Web at <http://www.nsf.gov/statistics/> and through the NSF Web-CASPAR database system, a Web tool for retrieval and analysis of institutional data on academic S&E resources (<http://webcaspar.nsf.gov/>).

The full set of detailed tables from this survey will be available in the report Academic Research and Development Expenditures: Fiscal Year 2007 at <http://www.nsf.gov/statistics/rdexpenditures/>. Individual detailed tables from the 2007 survey may be available

in advance of publication of the full report. For further information, please contact the author.

Notes

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2. Figures reported for state and local government support of academic R&D exclude general-purpose funds

that schools receive from these sources and devote to R&D activities. These funds are included in figures reported as institutional funds.

3. HHE institutions are those whose full-time equivalent undergraduate enrollment is at least 25% Hispanic, according to fall 2005 enrollment data in the Integrated Postsecondary Education Data System (IPEDS).

4. Only institutions reporting S&E R&D expenditures are surveyed for non-S&E R&D spending. See “Data Comments.”

NSF 08-320

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