

## Science and Technology

This section presents statistics on scientific, engineering, and technological resources, with emphasis on patterns of research and development (R&D) funding and on scientific, engineering, and technical personnel; education; and employment. Also included are statistics on space program outlays and accomplishments. Principal sources of these data are the National Science Foundation (NSF) and the National Aeronautics and Space Administration (NASA).

NSF gathers data chiefly through recurring surveys. Current NSF publications containing data on funds for research and development and on scientific and engineering personnel include detailed statistical tables; issue briefs; and annual, biennial, triennial, and special reports. Titles or the areas of coverage of these reports include the following: *Science and Engineering Indicators*; *National Patterns of R&D Resources*; *Women, Minorities, and Persons with Disabilities in Science and Engineering*—science and technology data presented in chart and tabular form in a pocket-sized publication—*Federal Funds for Research and Development*; *Federal R&D Funding by Budget Function*; *Federal Support to Universities, Colleges, and Selected Nonprofit Institutions*; *Research and Development in Industry*; R&D expenditures and graduate enrollment and support in academic science and engineering; and characteristics of doctoral scientists and engineers and of recent graduates in the United States. Statistical surveys in these areas pose problems of concept and definition and the data should therefore be regarded as broad estimates rather than precise, quantitative statements. See sources for methodological and technical details.

The National Science Board's biennial *Science and Engineering Indicators* contains data and analysis of international and domestic science and technology, including measures of inputs and outputs.

*The Budget of the United States Government*, published by the U.S. Office of Management and Budget, contains summary financial data on federal R&D programs.

**Research and development outlays**—NSF defines research as “systematic study directed toward fuller scientific knowledge of the subject studied” and development as “the systematic use of scientific knowledge directed toward the production of useful materials, devices, systems, or methods, including design and development of prototypes and processes.”

National coverage of R&D expenditures is developed primarily from periodic surveys in four principal economic sectors: (1) *Government*, made up primarily of federal executive agencies; (2) *industry*, consisting of manufacturing and nonmanufacturing firms and the federally funded research and development centers (FFRDCs) they administer; (3) *universities and colleges*, composed of universities, colleges, and their affiliated institutions, agricultural experiment stations, and associated schools of agriculture and of medicine, and FFRDCs administered by educational institutions; and (4) *other nonprofit institutions*, consisting of such organizations as private philanthropic foundations, nonprofit research institutes, voluntary health agencies, and FFRDCs administered by nonprofit organizations.

The R&D funds reported consist of current operating costs, including planning and administration costs, except as otherwise noted. They exclude funds for routine testing, mapping and surveying, collection of general-purpose data, dissemination of scientific information, and training of scientific personnel.

**Scientists, engineers, and technicians**—Scientists and engineers are defined as persons engaged in scientific and engineering work at a level requiring a knowledge of sciences equivalent at least to that acquired through completion

of a 4-year college course. Technicians are defined as persons engaged in technical work at a level requiring knowledge acquired through a technical institute,

junior college, or other type of training less extensive than 4-year college training. Craftsmen and skilled workers are excluded.

## No. 764. Research and Development (R&D) Expenditures by Source and Objective: 1970 to 2003

[In millions of dollars (26,271 represents \$26,271,000,000) except as indicated. For calendar years]

Year	Sources of funds						Objective (percent of total)			Character of work		
	Total	Federal government	Industry	Universities/colleges	Non-profit	Non-federal government <sup>1</sup>	Defense related <sup>2</sup>	Space related <sup>3</sup>	Other	Basic research	Applied research	Development
1970 . . . . .	26,271	14,984	10,449	259	343	237	33	10	56	3,594	5,752	16,925
1971 . . . . .	26,952	15,210	10,824	290	366	262	33	10	58	3,720	5,833	17,399
1972 . . . . .	28,740	16,039	11,715	312	393	282	33	8	59	3,850	6,147	18,743
1973 . . . . .	30,952	16,587	13,299	343	422	302	32	7	61	4,099	6,655	20,197
1974 . . . . .	33,359	17,287	14,885	393	474	320	29	7	64	4,511	7,344	21,504
1975 . . . . .	35,671	18,533	15,824	432	534	348	28	8	65	4,875	8,091	22,706
1976 . . . . .	39,435	20,292	17,702	480	592	369	27	8	65	5,373	8,976	25,085
1977 . . . . .	43,338	22,071	19,642	569	662	394	27	7	66	6,008	9,662	27,667
1978 . . . . .	48,719	24,414	22,457	679	727	443	26	6	68	6,959	10,704	31,056
1979 . . . . .	55,379	27,225	26,097	785	791	482	25	6	70	7,836	12,277	35,445
1980 . . . . .	63,213	29,975	30,929	920	871	519	24	5	70	8,790	13,745	40,678
1981 . . . . .	72,269	33,715	35,948	1,058	967	581	24	5	70	9,830	16,391	46,047
1982 . . . . .	80,783	37,168	40,692	1,207	1,095	621	26	5	69	10,824	18,280	51,679
1983 . . . . .	89,971	41,472	45,264	1,357	1,220	658	28	4	68	12,059	20,373	57,540
1984 . . . . .	102,251	46,477	52,187	1,514	1,351	721	29	3	68	13,484	22,505	66,261
1985 . . . . .	114,685	52,655	57,962	1,743	1,491	834	30	3	67	14,857	25,410	74,417
1986 . . . . .	120,259	54,633	60,991	2,019	1,647	969	31	3	66	17,247	27,259	75,754
1987 . . . . .	126,217	58,466	62,576	2,262	1,849	1,065	32	3	65	18,498	27,915	79,804
1988 . . . . .	133,880	60,130	67,977	2,527	2,081	1,165	30	4	66	19,786	29,528	84,566
1989 . . . . .	141,889	60,463	74,966	2,852	2,333	1,274	28	4	69	21,889	32,277	87,723
1990 . . . . .	151,990	61,607	83,208	3,187	2,589	1,399	25	4	71	23,028	34,896	94,067
1991 . . . . .	160,872	60,780	92,300	3,457	2,852	1,483	22	4	73	27,139	38,629	95,104
1992 . . . . .	165,347	60,912	96,229	3,568	3,113	1,525	22	4	74	27,604	37,933	99,810
1993 . . . . .	165,723	60,522	96,549	3,708	3,387	1,557	21	4	74	28,739	37,280	99,704
1994 . . . . .	169,195	60,769	99,203	3,937	3,664	1,622	20	5	76	29,644	36,615	102,936
1995 . . . . .	183,611	62,959	110,870	4,109	3,924	1,750	19	4	77	29,602	40,932	113,077
1996 . . . . .	197,330	63,383	123,416	4,434	4,238	1,860	18	4	78	32,790	43,165	121,375
1997 . . . . .	212,134	64,561	136,227	4,836	4,589	1,921	17	4	79	36,918	46,542	128,674
1998 . . . . .	226,321	66,356	147,843	5,168	4,984	1,970	16	4	80	35,256	46,353	144,712
1999 . . . . .	243,517	67,015	163,229	5,630	5,549	2,095	15	3	82	38,710	51,865	152,941
2000 . . . . .	264,634	66,327	183,688	6,211	6,170	2,238	13	2	84	42,321	56,481	165,827
2001 . . . . .	274,211	73,341	184,892	6,778	6,818	2,382	14	2	84	47,112	64,401	162,698
2002 <sup>4</sup> . . . . .	276,434	80,490	178,514	7,332	7,550	2,548	15	3	82	50,807	65,559	160,068
2003 <sup>4</sup> . . . . .	283,795	85,279	179,615	7,944	8,247	2,710	16	3	81	54,103	67,780	161,911

<sup>1</sup> Nonfederal R&D expenditures to university and college performers. <sup>2</sup> R&D spending by the Department of Defense, including space activities, and a portion of the Department of Energy funds. <sup>3</sup> For the National Aeronautics and Space Administration only. <sup>4</sup> Preliminary.

Source: U.S. National Science Foundation, *National Patterns of R&D Resources*, annual. See also <<http://www.nsf.gov/sbe/srs/nprdr/start.htm>>.

## No. 765. Performance Sector of R&D Expenditures: 1995 to 2003

[In millions of dollars (183,617 represents \$183,617,000,000). For calendar year. FFRDCs are federally funded research and development centers. For most academic institutions and the Federal Government before 1997, began on July 1 instead of October 1]

Year	Industry						Universities and colleges						Other nonprofit institutions				
	Total	Federal government	Funded by—			Total	Federal government	Funded by—			Total	Federal government	Funded by—				
			Total	Federal government	Industry <sup>1</sup>			Industry FFRDC's	Total	Federal government			Non-federal government <sup>2</sup>	Universities & colleges	Nonprofits	Total	Federal government
<b>RESEARCH AND DEVELOPMENT TOTAL</b>																	
1995	183,611	16,904	129,830	21,178	108,652	2,273	22,603	13,582	1,750	1,547	4,109	1,616	5,367	5,827	2,847	671	2,308
1999	243,517	17,851	180,672	20,496	160,176	2,039	28,135	16,223	2,095	2,077	5,630	2,110	5,652	8,175	3,761	975	3,440
2000	264,634	17,917	197,539	17,118	180,421	2,000	30,566	17,637	2,238	2,165	6,211	2,316	5,742	9,404	4,447	1,103	3,854
2001	274,211	21,048	198,505	16,899	181,606	2,020	33,518	19,654	2,382	2,177	6,778	2,528	6,225	10,702	5,302	1,110	4,290
2002, prel.	276,434	23,788	192,379	17,085	175,294	2,235	36,846	22,052	2,548	2,150	7,332	2,764	7,132	11,766	5,910	1,070	4,786
2003, prel.	283,795	24,959	193,729	17,314	176,415	2,383	40,262	24,499	2,710	2,123	7,944	2,986	7,421	12,661	6,323	1,077	5,261
<b>BASIC RESEARCH</b>																	
1995	29,602	2,689	5,569	190	5,379	530	15,139	9,629	1,069	945	2,509	987	2,702	2,899	1,170	390	1,338
1999	38,710	3,347	6,560	1,198	5,362	557	20,900	12,773	1,429	1,417	3,841	1,439	2,765	4,185	1,734	541	1,910
2000	42,321	3,765	6,942	925	6,017	547	22,726	13,836	1,539	1,488	4,271	1,592	2,873	4,852	2,099	612	2,140
2001	47,112	4,317	7,911	754	7,157	552	24,862	15,299	1,643	1,501	4,675	1,744	3,041	5,518	2,520	616	2,382
2002, prel.	50,807	4,617	7,671	762	6,908	611	27,369	17,122	1,765	1,489	5,079	1,915	3,484	6,105	2,854	594	2,657
2003, prel.	54,103	4,463	7,725	773	6,952	651	29,940	19,022	1,877	1,470	5,503	2,069	3,625	6,709	3,190	598	2,921
<b>APPLIED RESEARCH</b>																	
1995	40,932	4,952	26,919	3,164	23,755	535	5,655	2,775	559	494	1,311	516	1,050	1,692	934	170	589
1999	51,865	5,530	36,418	3,109	33,309	274	5,843	2,740	546	542	1,467	550	1,251	2,419	1,300	247	872
2000	56,481	6,105	38,812	2,682	36,130	269	6,661	3,349	573	554	1,591	593	1,330	3,087	1,831	279	977
2001	64,401	7,164	43,486	3,603	39,883	916	7,366	3,839	606	554	1,724	643	1,548	3,570	2,202	281	1,087
2002, prel.	65,559	8,083	42,140	3,643	38,497	955	8,146	4,418	642	542	1,848	697	1,938	3,933	2,448	271	1,213
2003, prel.	67,780	8,837	42,434	3,691	38,743	1,040	8,927	4,954	683	535	2,002	753	1,968	4,215	2,609	273	1,333
<b>DEVELOPMENT</b>																	
1995	113,077	9,262	97,342	17,824	79,518	1,208	1,810	1,178	123	108	288	113	1,616	1,236	744	111	381
1999	152,941	8,974	137,694	16,189	121,505	1,208	1,392	711	120	119	322	121	1,636	1,570	726	187	658
2000	165,827	8,047	151,784	13,510	138,274	1,185	1,179	452	126	122	349	130	1,540	1,461	513	211	737
2001	162,698	9,567	147,108	12,542	134,566	552	1,290	516	133	122	378	141	1,636	1,614	581	212	821
2002, prel.	160,068	11,088	142,569	12,680	129,889	669	1,331	512	141	119	406	153	1,710	1,728	608	205	916
2003, prel.	161,911	11,658	143,569	12,850	130,719	692	1,395	523	150	117	439	165	1,828	1,736	524	206	1,006

<sup>1</sup> For R&D funded by the federal government. <sup>2</sup> Includes all non-federal sources. <sup>3</sup> Includes all R&D expenditures of FFRDC's administered by academic institutions and funded by the federal government.

Source: National Science Foundation. Data derived from: *Research and Development in Industry*, annual; *Academic Research and Development Expenditures*, annual; and *Federal Funds For Research and Development*, annual. Also see <<http://www.nsf.gov/sbe/srs/nprdr/start.htm>>.

## No. 766. National R&D Expenditures as a Percent of Gross Domestic Product by Country: 1985 to 2001

Year	Total R&D						Nondefense R&D <sup>1</sup>					
	United States	Japan	Unified Germany	France	United Kingdom	Italy	United States	Japan	Unified Germany	France	United Kingdom	Italy
1985 ..	2.76	2.54	2.68	2.22	2.24	1.12	1.9	2.5	2.6	1.8	1.8	1.1
1990 ..	2.65	2.78	2.67	2.37	2.15	1.29	2.0	2.8	2.5	1.9	1.7	1.3
1995 ..	2.51	2.69	2.26	2.31	1.95	1.00	2.0	2.8	2.2	2.0	1.7	1.0
1996 ..	2.55	2.77	2.26	2.30	1.88	1.01	2.1	2.7	2.2	2.0	1.6	1.0
1997 ..	2.58	2.83	2.29	2.22	1.81	1.05	2.1	2.8	2.2	2.0	1.5	1.1
1998 ..	2.60	2.94	2.31	2.17	1.80	1.07	2.2	2.9	2.3	2.0	1.5	1.1
1999 ..	2.65	2.94	2.44	2.18	1.88	1.04	2.3	2.9	2.4	2.0	1.6	1.0
2000 ..	2.72	2.98	2.49	2.18	1.85	1.10	2.4	3.0	2.4	2.0	1.6	1.1
2001 ..	2.82	(NA)	2.53	2.20	(NA)	(NA)	2.4	(NA)	2.5	2.0	(NA)	(NA)

NA Not available. <sup>1</sup> Estimated.

Source: National Science Foundation, *National Patterns of R&D Resources*, annual; and Organization for Economic Cooperation and Development.

## No. 767. Federal Obligations for R&D in Current and Constant (1996) Dollars, by Agency: 1980 to 2003

[In millions of dollars (29,830 represents \$29,830,000,000). For fiscal years ending in year shown; see text, Section 8. Includes those agencies with obligations of \$1 billion or more in 2000]

Agency	Current dollars				Constant (1996) dollars <sup>1</sup>			
	1980	1990	2002, prel.	2003, prel.	1980	1990	2002, prel.	2003, prel.
<b>Obligations, total <sup>2</sup></b> .....	<b>29,830</b>	<b>63,559</b>	<b>92,979</b>	<b>98,608</b>	<b>53,278</b>	<b>73,863</b>	<b>83,916</b>	<b>87,878</b>
Dept. of Defense .....	13,981	37,268	43,164	45,012	24,971	43,310	38,957	40,114
Dept. of Health and Human Services .....	3,780	8,406	24,189	27,551	6,752	9,769	21,831	24,553
National Aeronautics and Space Administration <sup>3</sup> .....	3,234	6,533	8,095	8,598	5,776	7,592	7,306	7,663
Dept. of Energy .....	4,754	5,631	7,484	7,541	8,490	6,544	6,754	6,720
National Science Foundation .....	882	1,690	3,250	3,404	1,575	1,964	2,933	3,033
Dept. of Agriculture .....	688	1,108	2,050	1,984	1,228	1,288	1,850	1,768

<sup>1</sup> Based on gross domestic product implicit price deflator. <sup>2</sup> Includes other agencies, not shown separately. <sup>3</sup> Beginning in fiscal year 2001, the National Aeronautics and Space Administration reclassified Space Station as a physical asset and Space Station research as equipment and transferred funding for the program from R&D to R&D plant.

Source: U.S. National Science Foundation, *Federal Funds for Research and Development*, annual. See also <<http://www.nsf.gov/sbe/srs/nsf04310/pdf/nsf04310.pdf>> (released March 2004).

## No. 768. Federal Obligations for Research in Current and Constant (1996) Dollars by Field of Science: 1980 to 2003

[In millions of dollars (11,597 represents \$11,597,000,000). For fiscal years ending in year shown; see text, Section 8. Excludes R&D plant]

Field of science	1980	1985	1990	1995	1999	2000	2001	2002, prel.	2003, prel.
<b>CURRENT DOLLARS</b>									
<b>Research, total</b> .....	<b>11,597</b>	<b>16,133</b>	<b>21,622</b>	<b>28,434</b>	<b>33,528</b>	<b>38,471</b>	<b>44,714</b>	<b>49,809</b>	<b>53,377</b>
Basic .....	4,674	7,819	11,286	13,877	17,444	19,570	21,958	24,174	25,977
Applied .....	6,923	8,315	10,337	14,557	16,084	18,901	22,756	25,635	27,400
Life sciences .....	4,192	6,363	8,830	11,811	15,422	17,965	23,057	25,868	28,673
Psychology .....	199	327	449	623	633	1,627	742	839	955
Physical sciences .....	2,001	3,046	3,809	4,278	4,066	4,788	4,601	5,145	5,200
Environmental sciences .....	1,261	1,404	2,174	2,854	3,095	3,329	3,252	3,668	3,879
Mathematics and computer sciences .....	241	575	841	1,579	1,981	2,206	2,611	2,751	2,866
Engineering .....	2,830	3,618	4,227	5,708	6,263	6,346	8,197	8,951	9,161
Social sciences .....	524	460	630	679	855	1,050	1,009	1,027	1,050
Other sciences, n.e.c. <sup>1</sup> .....	350	342	664	902	1,212	1,160	1,246	1,559	1,593
<b>CONSTANT (1996) DOLLARS <sup>2</sup></b>									
<b>Research, total</b> .....	<b>20,713</b>	<b>21,953</b>	<b>25,127</b>	<b>29,002</b>	<b>32,011</b>	<b>35,988</b>	<b>40,872</b>	<b>44,954</b>	<b>47,569</b>
Basic .....	8,348	10,640	13,116	14,154	16,655	18,307	20,071	21,817	23,150
Applied .....	12,365	11,314	12,013	14,848	15,356	17,681	20,800	23,136	24,419
Life sciences .....	7,487	8,658	10,261	12,047	14,724	16,805	21,076	23,347	25,553
Psychology .....	355	445	522	635	604	1,522	678	757	851
Physical sciences .....	3,574	4,145	4,426	4,364	3,882	4,479	4,205	4,644	4,635
Environmental sciences .....	2,252	1,910	2,526	2,911	2,955	3,114	2,972	3,310	3,457
Mathematics and computer sciences .....	430	782	977	1,611	1,891	2,064	2,386	2,483	2,554
Engineering .....	5,054	4,923	4,912	5,822	5,980	5,936	7,493	8,079	8,164
Social sciences .....	936	626	732	693	816	982	922	927	936
Other sciences, n.e.c. <sup>1</sup> .....	625	465	772	920	1,157	1,085	1,139	1,407	1,419

<sup>1</sup> N.e.c. = Not elsewhere classified. <sup>2</sup> Based on gross domestic product implicit price deflator.

Source: U.S. National Science Foundation, *Federal Funds for Research and Development*, annual. See also <<http://128.150.4.107:80/sbe/srs/pubdata.htm>>.

## No. 769. Federal Budget Authority for R&D in Current and Constant (1996) Dollars by Selected Budget Functions: 1980 to 2004

[In millions of dollars (29,739 represents \$29,739,000,000). For fiscal years ending in year shown; see text, Section 8. Excludes R&D plant. Represents budget authority. Functions shown are those for which \$1 billion or more was authorized since 1995]

Function	1980	1985	1990	1995	2000	2001	2002	2003, prel.	2004, prel.
	<b>CURRENT DOLLARS</b>								
<b>Total</b> <sup>1</sup>	<b>29,739</b>	<b>49,887</b>	<b>63,781</b>	<b>68,791</b>	<b>78,664</b>	<b>86,756</b>	<b>97,624</b>	<b>111,593</b>	<b>117,967</b>
Eight functions, percent of total	96	98	98	98	98	98	98	98	98
National defense	14,946	33,698	39,925	37,204	42,580	45,713	53,016	62,463	66,835
Health	3,694	5,418	8,308	11,407	17,869	20,758	23,560	26,358	28,059
Space research and technology <sup>2</sup>	2,738	2,725	5,765	7,916	5,363	6,126	6,270	7,215	7,550
Energy <sup>3</sup>	3,603	2,389	2,726	2,844	996	1,314	1,327	1,359	1,358
General science <sup>3</sup>	1,233	1,862	2,410	2,794	4,977	5,468	5,753	6,165	6,441
Natural resources and environment	999	1,059	1,386	1,988	1,999	2,096	2,160	2,234	2,195
Transportation	887	1,030	1,045	1,833	1,636	1,640	1,838	1,867	1,860
Agriculture	585	836	950	1,194	1,426	1,657	1,606	1,710	1,564
<b>CONSTANT (1996) DOLLARS</b> <sup>4</sup>									
<b>Total</b> <sup>1</sup>	<b>53,115</b>	<b>67,883</b>	<b>74,121</b>	<b>70,166</b>	<b>73,662</b>	<b>79,302</b>	<b>88,108</b>	<b>99,450</b>	<b>103,616</b>
National defense	26,694	45,854	46,397	37,948	39,873	41,785	47,848	55,666	58,704
Health	6,598	7,372	9,655	11,635	16,733	18,974	21,264	23,490	24,646
Space research and technology <sup>2</sup>	4,890	3,708	6,700	8,074	5,022	5,600	5,659	6,430	6,632
Energy <sup>3</sup>	6,435	3,251	3,168	2,901	933	1,201	1,198	1,211	1,193
General science <sup>3</sup>	2,202	2,534	2,801	2,850	4,661	4,998	5,192	5,494	5,657
Natural resources and environment	1,784	1,441	1,611	2,028	1,872	1,916	1,949	1,991	1,928
Transportation	1,584	1,402	1,214	1,870	1,532	1,499	1,659	1,664	1,634
Agriculture	1,045	1,138	1,104	1,218	1,335	1,515	1,449	1,524	1,374

<sup>1</sup> Includes other functions, not shown separately. <sup>2</sup> In FY 2000, the National Aeronautics and Space Administration reclassified Space Station as a physical asset and Space Station research as equipment and transferred funding for the Space Station program from R&D to R&D plant. <sup>3</sup> Beginning in FY 2000, a number of DOE programs were reclassified from energy. <sup>4</sup> Based on gross domestic product implicit price deflator.

Source: U.S. National Science Foundation, *Federal R&D Funding by Budget Function*, annual. See also <<http://www.nsf.gov/>>.

## No. 770. R&D Expenditures in Science and Engineering at Universities and Colleges in Current and Constant (1996) Dollars: 1990 to 2002

[In millions of dollars (16,286 represents \$16,286,000,000). Due to rounding, detail may not add to totals]

Characteristic	Current dollars				Constant (1996) dollars <sup>1</sup>			
	1990	1995	2001	2002	1990	1995	2001	2002
<b>Total</b> <sup>2</sup>	<b>16,286</b>	<b>22,170</b>	<b>32,767</b>	<b>36,333</b>	<b>18,926</b>	<b>22,613</b>	<b>29,932</b>	<b>32,943</b>
Basic research <sup>2</sup>	10,643	14,808	24,273	26,959	12,368	15,104	22,173	24,443
Applied R&D <sup>2</sup>	5,643	7,362	8,494	9,374	6,558	7,509	7,759	8,499
Source of funds:								
All governments	9,638	13,331	19,213	21,834	11,200	13,598	17,551	19,797
Institutions' own funds	1,324	1,689	2,316	2,501	1,539	1,723	2,116	2,268
Industry	3,006	4,047	6,587	7,109	3,493	4,128	6,017	6,446
Other	1,127	1,489	2,214	2,188	1,310	1,519	2,022	1,984
Fields:								
Physical sciences	1,807	2,256	2,805	3,008	2,100	2,301	2,562	2,727
Environmental sciences	1,069	1,434	1,830	2,022	1,242	1,463	1,672	1,833
Mathematical sciences	222	279	359	387	258	285	328	351
Computer sciences	515	682	954	1,126	598	696	871	1,021
Life sciences	8,726	12,188	19,213	21,404	10,141	12,432	17,551	19,407
Psychology	253	371	583	671	294	378	533	608
Social sciences	703	1,019	1,440	1,583	817	1,039	1,315	1,435
Other sciences	336	427	577	627	390	436	527	568
Engineering	2,656	3,515	5,007	5,504	3,087	3,585	4,574	4,990

<sup>1</sup> Based on gross domestic product implicit price deflator. <sup>2</sup> Basic research and applied R&D statistics were re-estimated for FY 2001 and forward. These data are not directly comparable to those from earlier years.

Source: U.S. National Science Foundation, *Survey of Research and Development Expenditures at Universities and Colleges*, annual. See also <<http://www.nsf.gov/sbe/srs/rdexp/start.htm>>.

## No. 771. Federal Obligations in Science and Engineering to Universities and Colleges in Current and Constant (1996) Dollars: 1990 to 2002

[In millions of dollars (10,471 represents \$10,471,000,000) except percent. For fiscal years ending in year shown; see text, Section 8.]

Item	Current dollars				Constant (1996) dollars <sup>1</sup>			
	1990	1995	2001	2002	1990	1995	2001	2002
<b>Academic science/engineering obligations</b>	<b>10,471</b>	<b>14,461</b>	<b>22,492</b>	<b>24,394</b>	<b>12,887</b>	<b>15,688</b>	<b>21,977</b>	<b>23,422</b>
Research and development	9,017	12,181	19,390	21,118	11,097	13,214	18,947	20,276
Research and development plant	142	341	399	301	174	370	390	289
Other science/engineering activities	1,312	1,939	2,702	2,975	1,615	2,103	2,641	2,856

<sup>1</sup> Based on gross domestic product implicit price deflator.

Source: U.S. National Science Foundation, *Survey of Federal S&E Support to Universities, Colleges, and Nonprofit Institutions*, annual. See also <<http://www.nsf.gov/>>.

## No. 772. Federal R&D Obligations to Selected Universities and Colleges: 2001 and 2002

[In millions of dollars (19,390.2 represents \$19,390,200,000), except rank. For fiscal years ending in year shown; see text, Section 8. For the top 51 institutions receiving Federal R&D funds in 2002. Awards to the administrative offices of university systems are excluded from totals for individual institutions because that allocation of funds is unknown, but those awards are included in "total all institutions"]

Major institution ranked by total 2002 Federal R&D obligations	2001	2002	Major institution ranked by total 2002 Federal R&D obligations	2001	2002
<b>Total, all institutions</b> <sup>1</sup>	<b>19,390.2</b>	<b>21,117.9</b>	Case Western Reserve University	200.0	213.4
Johns Hopkins University	838.0	974.7	University of Illinois—Urbana-Champaign	186.9	194.0
University of Washington	474.5	525.6	The Scripps Research Institute	157.4	193.6
University of Pennsylvania	412.0	447.2	University of Rochester	171.2	189.2
University of Michigan	403.4	419.7	University of California—Berkeley	210.6	187.3
University of California—Los Angeles	363.9	415.7	University of California—Davis	166.2	185.3
Stanford University	351.1	381.0	Boston University	154.4	182.9
University of California—San Diego	333.9	373.6	Emory University	161.9	180.6
University of California—San Francisco	344.9	361.0	Ohio State University	156.6	174.7
Washington University	314.7	348.0	Northwestern University	164.0	174.0
University of Pittsburgh	300.8	335.8	University of Iowa	163.9	172.7
Columbia University—Main Division	305.8	330.2	University of Arizona	166.9	168.5
University of Wisconsin—Madison	290.2	327.9	University of Florida	157.4	167.1
Duke University	274.1	327.5	University of Texas SW Medical Ctr Dallas	146.9	162.3
Harvard University	321.7	313.4	University of Chicago	160.1	161.5
University of Colorado	290.7	308.3	University of Virginia	153.0	159.1
Yale University	276.2	306.9	University of Utah	149.7	157.9
University of North Carolina at Chapel Hill	275.9	297.9	Oregon Health & Science University	138.4	154.4
University of Minnesota	273.1	291.9	California Institute of Technology	127.6	152.2
Pennsylvania State University	253.6	287.1	Mt. Sinai School of Medicine	133.1	146.3
Cornell University	271.9	283.1	University of Texas at Austin	164.5	146.0
Massachusetts Institute of Technology	252.5	268.8	Indiana University	143.7	143.1
Baylor College of Medicine	231.7	266.8	New York University	134.4	142.5
University Southern California	232.5	254.3	Carnegie Mellon University	95.7	131.4
University of Alabama—Birmingham	201.6	224.2	University of Miami	111.2	127.0
Vanderbilt University	166.1	215.5	University of Maryland—College Park	133.9	126.7

<sup>1</sup> Includes other institutions, not shown separately.

Source: U.S. National Science Foundation, *Federal S&E Support to Universities and Colleges and Nonprofit Institutions*, annual.

## No. 773. Science and Engineering Degree Recipients: 1999 to 2001

[In thousands (758.3 represents 758,300). FT represents full-time. Based on a survey and subject to sampling error; see source for details]

Degree and field	Graduates 1999 and 2000 (1,000)	2001 <sup>1</sup>				Median salary <sup>4</sup> (\$1,000)
		In school <sup>2</sup>	Employed		Not employed or not FT students	
			In S&E <sup>3</sup>	In other		
<b>Bachelor's recipients</b>	<b>758.3</b>	<b>168.4</b>	<b>171.5</b>	<b>373.8</b>	<b>44.6</b>	<b>34</b>
All science fields	649.0	154.5	94.7	358.4	41.4	31
Computer and information sciences	61.5	(B)	35.6	19.5	4.4	51
Mathematical sciences	24.4	4.3	3.8	14.6	(B)	33
Life and related sciences	159.4	52.9	17.8	81.6	7.1	29
Physical and related sciences	32.2	10.1	10.6	9.9	1.6	34
Psychology	152.9	41.0	11.1	91.2	9.6	28
Social and related sciences	218.7	44.2	15.9	141.7	17.0	30
All engineering fields	109.2	13.8	76.8	15.3	3.3	49
Aerospace and related engineering	2.2	0.4	1.3	0.4	(B)	44
Chemical engineering	10.8	2.2	6.4	1.7	(B)	50
Civil and architectural engineering	16.8	1.5	12.5	2.2	(B)	42
Electrical, electronics, computer and communications engineering	34.2	4.3	25.8	3.3	(B)	54
Industrial engineering	6.9	(B)	4.6	1.7	(B)	49
Mechanical engineering	25.8	2.7	18.8	3.6	(B)	48
Other engineering	12.6	2.3	7.5	2.2	(B)	45
<b>Master's recipients</b>	<b>160.1</b>	<b>29.5</b>	<b>77.3</b>	<b>45.9</b>	<b>7.4</b>	<b>51</b>
All science fields	115.3	23.9	44.1	41.4	5.8	45
Computer and mathematical sciences	24.3	1.6	17.1	4.4	(B)	65
Mathematical sciences	6.2	1.6	2.5	2.0	(B)	45
Life and related sciences	16.2	4.7	5.9	5.0	(B)	37
Physical and related sciences	8.6	3.2	3.9	1.1	(B)	45
Psychology	33.0	5.8	9.1	16.1	2.0	35
Social and related sciences	27.1	7.1	5.6	12.8	1.5	43
All engineering fields	44.8	5.6	33.2	4.5	1.5	60
Aerospace and related engineering	1.2	0.2	0.8	(B)	(B)	62
Chemical engineering	2.0	0.6	1.2	(B)	(B)	58
Civil and architectural engineering	6.3	(B)	5.1	(B)	(B)	50
Electrical, electronics, computer and communications engineering	16.4	1.7	13.0	1.0	(B)	66
Industrial engineering	3.2	(B)	2.4	(B)	(B)	62
Mechanical engineering	6.1	1.0	4.5	(B)	(B)	60
Other engineering	9.5	1.6	6.3	1.2	(B)	61

<sup>3</sup> In science and engineering. <sup>4</sup> For the principal job. Excludes full-time students, the self-employed, and persons whose principal job is less than 35 hours per week. For Definition of Median, see Guide to Tabular Presentation.

Source: National Science Foundation, *National Survey of Recent College Graduates: 2001*.

## No. 774. Graduate Science/Engineering Students in Doctorate-Granting Colleges by Characteristic and Field: 1990 to 2002

[In thousands (397.8 represents 397,800). As of fall. Includes outlying areas]

Field of science or engineering	Total			Characteristic								
				Female			Foreign		Part-time			
	1990	2001	2002	1990	2001	2002	2001	2002	1990	2001	2002	
<b>Total, all surveyed fields</b>	<b>397.8</b>	<b>452.3</b>	<b>482.2</b>	<b>149.7</b>	<b>204.8</b>	<b>219.6</b>	<b>134.2</b>	<b>145.6</b>	<b>123.2</b>	<b>122.6</b>	<b>129.4</b>	
Science/engineering	350.6	384.3	409.3	113.4	154.0	165.3	128.2	138.7	100.7	98.5	103.0	
Engineering, total	99.9	103.4	112.5	13.6	21.0	23.3	51.1	56.6	35.9	27.9	29.4	
Sciences, total	250.7	280.9	296.9	99.8	133.0	142.0	77.1	82.1	64.8	70.7	73.7	
Physical sciences	32.5	30.0	31.3	7.6	9.0	9.7	12.1	12.9	3.6	3.3	3.1	
Environmental	12.9	12.6	13.1	3.8	5.3	5.7	2.7	2.7	3.0	2.6	2.5	
Mathematical sciences	17.3	15.1	16.4	5.3	5.5	6.0	6.3	6.8	4.0	3.1	3.3	
Computer sciences	27.7	43.9	47.6	6.4	12.5	13.4	22.6	23.8	12.9	16.9	17.8	
Agricultural sciences	10.9	11.3	11.8	3.2	4.9	5.2	2.5	2.5	2.0	2.5	2.6	
Biological sciences	46.0	53.9	57.2	21.0	28.8	31.0	12.2	13.5	6.8	7.4	7.5	
Psychology	35.8	39.3	40.8	23.6	28.6	29.8	2.3	2.6	10.3	10.9	11.9	
Social sciences	67.7	74.7	78.8	29.0	38.4	41.2	16.5	17.3	22.1	24.0	24.9	
Health fields, total	47.2	68.0	72.9	36.3	50.8	54.4	6.0	6.8	22.5	24.1	26.4	

Source: U.S. National Science Foundation, *Survey of Graduate Science Engineering Students and Postdoctorates*, annual.

## No. 775. Doctorates Conferred by Recipients' Characteristics: 1990 and 2002

[In percent, except as indicated. Based on the Survey of Earned Doctorate Awards; for description of methodology, see <<http://www.nsf.gov/sbe/srs/ssed/sedmeth.htm>>.]

Characteristic	2002										
	1990, total	All fields <sup>1</sup>	Engineering	Physical sciences <sup>2</sup>	Earth sciences	Mathematics	Computer sciences	Biological sciences <sup>3</sup>	Agricultural	Social sciences <sup>4</sup>	Psychology
<b>Total conferred (number)</b>	<b>36,068</b>	<b>39,955</b>	<b>5,073</b>	<b>3,190</b>	<b>797</b>	<b>917</b>	<b>811</b>	<b>5,680</b>	<b>1,011</b>	<b>3,412</b>	<b>3,199</b>
Male	63.7	54.5	82.3	73.2	68.4	70.9	78.9	55.3	69.0	55.3	33.1
Female	36.3	45.4	17.5	26.7	31.4	28.8	20.7	44.7	30.7	44.4	66.7
Median age <sup>5</sup>	33.9	33.3	31.4	29.8	33.1	30.3	32.1	20.6	34.3	34.6	32.1
<b>CITIZENSHIP<sup>6</sup></b>											
<b>Total conferred (number)</b>	<b>34,697</b>	<b>37,289</b>	<b>4,806</b>	<b>3,048</b>	<b>742</b>	<b>881</b>	<b>772</b>	<b>5,388</b>	<b>820</b>	<b>3,756</b>	<b>2,942</b>
U.S. citizen	71.8	74.0	39.3	58.2	61.5	46.7	46.2	70.3	47.4	67.4	92.4
Foreign citizen	28.2	26.0	60.7	41.8	38.5	53.3	53.4	29.7	52.6	32.6	7.6
<b>RACE/ETHNICITY<sup>7</sup></b>											
<b>Total conferred (number)</b>	<b>26,604</b>	<b>27,585</b>	<b>2,164</b>	<b>1,940</b>	<b>493</b>	<b>443</b>	<b>421</b>	<b>4,122</b>	<b>424</b>	<b>2,703</b>	<b>2,796</b>
White <sup>8</sup>	86.5	77.4	68.1	79.6	85.8	83.3	69.1	75.5	84.2	77.5	79.6
Black <sup>8</sup>	3.8	6.3	4.0	3.3	1.2	3.2	4.0	3.0	2.8	7.0	6.2
Asian/Pacific <sup>8</sup>	4.9	7.6	19.0	10.4	6.3	6.5	20.4	14.1	5.7	6.3	4.5
Indian/Alaskan <sup>8</sup>	0.4	0.5	0.3	0.4	-	0.7	0.5	0.3	0.5	0.8	0.5
Hispanic	3.1	4.9	4.4	3.3	3.2	2.7	3.3	4.3	4.0	5.0	6.6
Other/unknown <sup>9</sup>	1.4	3.2	4.1	3.1	3.4	3.6	2.6	2.8	2.8	3.5	2.6

- Represents zero. <sup>1</sup> Includes other fields, not shown separately. <sup>2</sup> Astronomy, physics, and chemistry. <sup>3</sup> Biochemistry, botany, microbiology, physiology, zoology, and related fields. <sup>4</sup> Anthropology, sociology, political science, economics, international relations and related fields. <sup>5</sup> For definition of median, see Guide to Tabular Presentation. <sup>6</sup> For those with known citizenship. Includes those with temporary visas. <sup>7</sup> Excludes those with temporary visas. <sup>8</sup> Non-Hispanic. <sup>9</sup> For the year 2002, includes Native Hawaiians and other Pacific Islanders, respondents choosing multiple races (excluding those selecting an Hispanic ethnicity), and respondents with unknown race/ethnicity.

Source: U.S. National Science Foundation, *Science and Engineering Doctorate Awards*, annual. See also <<http://www.nsf.gov/sbe/srs/nsf03300/pdf/nsf03300.pdf>> (released October 2003).

## No. 776. Funds for Performance of Industrial R&D in Current and Constant (1996) Dollars by Source of Funds and Selected Industries: 1999 to 2002

[In millions of dollars (182,823 represents \$182,823,000,000). For calendar years. Covers basic research, applied research, and development. Based on the Survey of Industry Research and Development]

Source of funds and industry	NAICS <sup>1</sup> code	1999	2000	2001	2002
<b>CURRENT DOLLARS</b>					
<b>Total funds</b> . . . . .	<b>(X)</b>	<b>182,823</b>	<b>199,539</b>	<b>198,505</b>	<b>190,809</b>
Petroleum and coal products . . . . .	324	615	(D)	(D)	(D)
Chemicals and allied products . . . . .	325	20,246	20,918	17,892	20,641
Machinery . . . . .	333	6,057	6,580	6,404	6,429
Navigational, measuring, electromedical, and control instruments . . . . .	3345	14,337	15,116	12,947	13,729
Electrical equipment, appliances, and components . . . . .	335	(D)	(D)	4,980	2,039
Motor vehicles, trailers, and parts . . . . .	3361-3363	(D)	(D)	(D)	(D)
Aerospace products and parts . . . . .	3364	14,425	10,319	7,868	9,654
All other <sup>2</sup> . . . . .	(X)	(D)	(D)	(D)	(D)
<b>Company funds</b> . . . . .	<b>(X)</b>	<b>160,288</b>	<b>180,421</b>	<b>181,606</b>	<b>174,408</b>
Petroleum and coal products . . . . .	324	(D)	1,172	1,057	1,233
Chemicals . . . . .	325	20,051	20,768	17,713	20,395
Machinery . . . . .	333	5,658	6,539	6,337	6,366
Navigational, measuring, electromedical, and control instruments . . . . .	3345	8,632	10,114	7,565	8,549
Electrical equipment, appliances, and components . . . . .	335	3,820	3,390	4,680	1,978
Motor vehicles, trailers, and parts . . . . .	3361-3363	17,987	18,306	16,089	15,199
Aerospace products and parts . . . . .	3364	5,309	3,895	4,083	5,349
All other <sup>2</sup> . . . . .	(X)	(D)	116,237	124,082	115,339
<b>CONSTANT (1996) DOLLARS <sup>3</sup></b>					
<b>Total funds</b> . . . . .	<b>(X)</b>	<b>174,699</b>	<b>186,677</b>	<b>181,416</b>	<b>172,491</b>
Petroleum and coal products . . . . .	324	588	(D)	(D)	(D)
Chemicals . . . . .	325	19,346	19,570	16,352	18,659
Machinery . . . . .	333	5,788	6,156	5,853	5,812
Navigational, measuring, electromedical, and control instruments . . . . .	3345	13,700	14,142	11,832	12,411
Electrical equipment, appliances, and components . . . . .	335	(D)	(D)	4,551	1,843
Motor vehicles, trailers, and parts . . . . .	3361-3363	(D)	(D)	(D)	(D)
Aerospace products and parts . . . . .	3364	13,784	9,654	7,191	8,727
All other <sup>2</sup> . . . . .	(X)	(D)	(D)	(D)	(D)
<b>Company funds</b> . . . . .	<b>(X)</b>	<b>153,166</b>	<b>168,791</b>	<b>165,971</b>	<b>157,664</b>
Petroleum and coal products . . . . .	324	(D)	1,096	966	1,115
Chemicals . . . . .	325	19,160	19,429	16,188	18,437
Machinery . . . . .	333	5,407	6,118	5,791	5,755
Navigational, measuring, electromedical, and control instruments . . . . .	3345	8,248	9,462	6,914	7,728
Electrical equipment, appliances, and components . . . . .	335	3,650	3,171	4,277	1,788
Motor vehicles, trailers, and parts . . . . .	3361-3363	17,188	17,126	14,704	13,740
Aerospace products and parts . . . . .	3364	5,073	3,644	3,731	4,835
All other <sup>2</sup> . . . . .	(X)	(D)	108,745	113,400	104,266

D Figure withheld to avoid disclosure of information pertaining to a specific organization or individual. X Not applicable. <sup>1</sup> North American Industry Classification System, 1997; see text, Section 15. <sup>2</sup> All other manufacturing and nonmanufacturing.

<sup>3</sup> Based on gross domestic product implicit price deflator.

Source: U.S. National Science Foundation, *Research and Development in Industry*, annual.

## No. 777. R&D Funds in R&D-Performing Manufacturing and Nonmanufacturing Companies by Industry: 2000 to 2002

Industry	NAICS <sup>1</sup> code	Total R&D funds as a percent of net sales			Company R&D funds as a percent of net sales		
		2000	2001	2002	2000	2001	2002
<b>All industries, total</b> . . . . .	<b>(X)</b>	<b>3.8</b>	<b>4.1</b>	<b>3.9</b>	<b>3.4</b>	<b>3.8</b>	<b>3.6</b>
<b>All manufacturing industries, total</b> . . . . .	<b>(X)</b>	<b>3.6</b>	<b>4.0</b>	<b>3.6</b>	<b>3.3</b>	<b>3.6</b>	<b>3.2</b>
Food . . . . .	311	(D)	0.5	(D)	0.4	0.5	0.6
Paper, printing, and support activities . . . . .	322, 326	(D)	(D)	(D)	1.6	2.1	1.3
Petroleum and coal products . . . . .	324	(D)	(D)	(D)	0.3	0.3	0.4
Chemicals . . . . .	325	5.9	4.9	6.0	5.9	4.8	5.9
Plastic and rubber products . . . . .	326	(D)	(D)	(D)	1.8	2.9	1.8
Nonmetallic mineral products . . . . .	327	1.8	2.4	(D)	1.8	2.3	1.2
Primary metals . . . . .	331	0.5	0.7	0.7	0.5	0.7	0.7
Fabricated metal products . . . . .	332	1.4	1.7	1.5	1.4	1.6	1.4
Machinery . . . . .	333	3.9	4.3	4.4	3.8	4.2	4.3
Navigational, measuring, electromedical, and control instruments . . . . .	3345	12.0	12.6	8.7	8.0	7.3	5.4
Electrical equipment, appliances, and components . . . . .	335	(D)	3.1	2.8	2.1	2.9	2.7
Motor vehicles, trailers, and parts . . . . .	3361-3363	(D)	(D)	(D)	3.2	3.5	3.1
Aerospace products and parts . . . . .	3364	7.3	5.7	4.1	2.8	3.0	2.3
<b>All nonmanufacturing industries, total</b> . . . . .	<b>(X)</b>	<b>4.1</b>	<b>4.3</b>	<b>4.4</b>	<b>3.3</b>	<b>4.0</b>	<b>4.1</b>
Transportation and warehousing services . . . . .	48, 49	(D)	2.5	(D)	0.4	2.4	0.5
Software publishing . . . . .	5112	20.5	19.4	21.5	1.6	19.3	21.4
Architectural, engineering, and related services . . . . .	5413	10.8	7.5	7.8	0.3	5.2	5.3
Computer systems design and related services . . . . .	5415	12.3	17.4	16.5	5.9	16.5	14.3
Scientific R&D services . . . . .	5417	42.9	47.7	21.3	1.8	36.5	17.6
Management of companies and enterprises . . . . .	55	4.4	7.8	7.6	1.8	7.8	7.6

D Figure withheld to avoid disclosure of information pertaining to a specific organization or individual. X Not applicable. <sup>1</sup> North American Industry Classification System 1997 (NAICS); see text, Section 15.

Source: U.S. National Science Foundation, *Research and Development in Industry*, annual. See also <<http://www.nsf.gov/sbe/srs/sird/sirdmeth.htm>>.



## No. 778. R&D Scientists and Engineers— Employment and Cost, by Industry: 2000 to 2002

[1,037.5 represents 1,037,500. Data are estimates; on average full-time-equivalent (FTE) basis]

Industry	NAICS <sup>1</sup> code	2000	2001	2002
<b>EMPLOYED SCIENTISTS (1,000)</b>				
<b>Average FTE of scientists and engineers<sup>2 3</sup></b>	<b>(X)</b>	<b>1,037.5</b>	<b>1,050.8</b>	<b>1,063.2</b>
Chemicals	325	82.0	81.4	84.2
Machinery	333	51.9	53.8	56.2
Electrical equipment, appliances, and components	335	23.3	11.4	7.0
Motor vehicles, trailers, and parts	3361-3363	75.4	74.4	78.4
Aerospace products and parts	3364	40.2	22.1	25.8
Transportation and warehousing services	48, 49	1.5	1.3	0.4
Software publishing	5112	79.7	82.2	81.0
Architectural, engineering, and related services	5413	33.0	28.9	28.0
Computer systems design and related services	5415	41.6	54.6	76.8
Scientific R&D services	5417	52.4	58.4	55.0
Management of companies and enterprises	55	0.4	0.9	1.5
<b>CONSTANT (1996) DOLLARS<sup>4</sup> (\$1,000)</b>				
<b>Cost per scientist or engineer<sup>3 5</sup></b>	<b>(X)</b>	<b>179.9</b>	<b>172.7</b>	<b>170.9</b>
Chemicals	325	238.6	200.9	225.3
Machinery	333	118.7	108.8	108.7
Electrical equipment, appliances, and components	335	(D)	(D)	(D)
Motor vehicles, trailers, and parts	3361-3363	(D)	(D)	(D)
Aerospace products and parts	3364	(D)	325.9	(D)
Transportation and warehousing services	48, 49	(D)	(D)	(D)
Software publishing	5112	148.3	145.8	153.6
Architectural, engineering, and related services	5413	95.9	107.3	143.8
Computer systems design and related services	5415	116.2	153.2	125.5
Scientific R&D services	5417	230.3	223.1	245.1
Management of companies and enterprises	55	124.4	386.1	157.9

D Withheld to avoid disclosure. X Not applicable. <sup>1</sup> North American Industry Classification System 1997 (NAICS); see text, Section 15. <sup>2</sup> The mean number of FTE R&D scientists and engineers employed in January of the year shown and the following January. <sup>3</sup> Includes industries not shown separately. <sup>4</sup> Based on gross domestic product implicit price deflator. <sup>5</sup> Represents the arithmetic mean of the numbers of R&D scientists and engineers reported in each industry for January in 2 consecutive years divided into total R&D expenditures in each industry.

Source: U.S. National Science Foundation, *Research and Development in Industry*, annual.

## No. 779. Civilian Employment of Scientists, Engineers, and Technicians by Occupation and Industry: 2002

[In thousands (6,703.1 represents 6,703,100). Based on sample and subject to sampling error. For details, see source]

Occupation	Wage and salary workers								
	Total <sup>1</sup>	Min- ing <sup>2</sup>	Con- struc- tion	Manu- facturing	Informa- tion	Profession- al, sci- entific and technical services	Government	Other service- provid- ing indus- tries	Self em- ploy- ed <sup>3</sup>
<b>Scientists, engineers, and technicians, total</b>	<b>6,703.1</b>	<b>42.2</b>	<b>86.8</b>	<b>1,301.9</b>	<b>529.8</b>	<b>1,799.2</b>	<b>1,075.1</b>	<b>1,544.9</b>	<b>304.7</b>
Scientists	998.6	7.0	1.4	99.3	29.4	210.0	323.6	224.9	93.5
Physical scientists	251.1	6.8	(NA)	47.7	1.3	77.4	84.3	22.8	10.2
Life scientists	214.0	(NA)	(NA)	23.5	0.1	43.4	90.1	39.0	9.6
Mathematical science occupations	107.0	(NA)	0.2	9.7	7.4	24.0	20.7	39.9	5.1
Social scientists and related occupations	426.4	0.2	1.2	18.3	20.6	65.2	128.4	123.3	68.6
Computer specialists	2,911.2	5.0	11.9	269.6	407.9	853.4	313.8	916.9	131.5
Engineers <sup>4</sup>	1,478.3	16.0	42.5	565.6	59.8	354.5	191.6	192.9	54.8
Civil engineers	228.1	0.7	19.8	4.1	0.8	106.2	72.0	9.1	15.3
Electrical/electronics engineers	291.9	0.5	5.5	106.7	34.1	62.3	31.6	41.9	9.3
Mechanical engineers	215.1	0.7	5.2	116.2	2.4	44.8	12.8	26.4	6.6
Drafters, engineering, and mapping technicians <sup>5</sup>	904.8	5.0	27.6	297.7	31.3	268.9	119.5	133.9	20.2
Electrical/electronics engineering technicians	203.6	0.9	3.5	82.9	22.0	26.3	17.0	49.9	0.9
Other engineering technicians	274.7	1.3	5.4	105.6	3.5	70.7	51.4	35.6	1.1
Drafters	216.1	0.6	14.3	60.5	1.9	105.4	6.7	18.6	8.1
Surveying and mapping technicians	60.1	0.7	1.0	(NA)	0.4	38.7	11.0	4.8	3.3
Life, physical, and social science technicians	345.9	8.3	0.3	69.6	0.9	66.3	118.0	73.3	2.4
Surveyors, cartographers, and photo- grammetrists	64.3	0.8	3.1	0.1	0.4	46.1	8.6	2.9	2.2

<sup>1</sup> NA Not available. <sup>2</sup> Includes agriculture, forestry, and fishing not shown separately. <sup>3</sup> Includes oil and gas extraction. <sup>4</sup> Includes secondary jobs. <sup>5</sup> Includes kinds of engineers and technicians not shown separately. <sup>6</sup> Includes other drafters, technicians, and mapping technicians not shown separately.

Source: U.S. Bureau of Labor Statistics, *National Industry-Occupation Employment Matrix*, February 2004. (Data collected biennially.)

## No. 780. Space Vehicle Systems—Net Sales and Backlog Orders: 1970 to 2002

[In millions of dollars (1,956 represents \$1,956,000,000). Backlog orders as of Dec. 31. Based on data from major companies engaged in manufacture of aerospace products. Includes parts but excludes engines and propulsion units]

Year	Net sales			Backlog orders			Year	Net sales			Backlog orders		
	Total	Military	Non-military	Total	Military	Non-military		Total	Military	Non-military	Total	Military	Non-military
1975 . . .	2,119	1,096	1,023	1,304	1,019	285	1998 . . .	9,490	4,227	5,264	20,371	7,970	12,402
1980 . . .	3,483	1,461	2,022	1,814	951	863	1999 . . .	9,022	5,107	3,915	22,356	10,666	11,690
1985 . . .	6,300	4,241	2,059	6,707	4,941	1,766	2000 . . .	8,164	3,723	4,441	21,395	8,942	12,453
1990 . . .	9,691	6,556	3,135	12,462	8,130	4,332	2001 . . .	5,112	3,605	1,507	18,893	8,039	10,854
1995 . . .	11,314	4,782	6,532	15,650	5,872	9,778	2002 . . .	5,983	3,092	2,891	22,562	12,677	9,886

<sup>1</sup> Includes engines and/or propulsion units for space vehicles, including parts.

Source: U.S. Census Bureau, *Current Industrial Reports*, M336G, *Civil Aircraft and Aircraft Engines*, annual and, beginning 1995, Internet site <<http://www.census.gov/industry/1/m336g0213.pdf>>.

## No. 781. Federal Outlays for General Science, Space, and Other Technology, 1970 to 2003, and Projections, 2004 to 2009 in Current and Constant (2000) Dollars

[In billions of dollars (4.5 represents \$4,500,000,000). For fiscal years ending in year shown; see text, Section 8.]

Year	Current dollars			Constant (2000) dollars		
	Total	General science/basic research	Space and other technologies	Total	General science/basic research	Space and other technologies
1980 . . . . .	5.8	1.4	4.5	12.0	2.8	9.1
1985 . . . . .	8.6	2.0	6.6	13.7	3.2	10.5
1990 . . . . .	14.4	2.8	11.6	20.0	3.9	16.1
1995 . . . . .	16.7	4.1	12.6	18.7	4.6	14.1
1996 . . . . .	16.7	4.0	12.7	18.0	4.3	13.7
1997 . . . . .	17.1	4.1	13.1	18.2	4.4	13.9
1998 . . . . .	18.2	5.3	12.9	19.2	5.6	13.6
1999 . . . . .	18.1	5.6	12.4	18.7	5.8	12.9
2000 . . . . .	18.6	6.2	12.4	18.6	6.2	12.4
2001 . . . . .	19.7	6.5	13.2	19.3	6.4	12.9
2002 . . . . .	20.7	7.2	13.5	19.7	6.9	12.8
2003 . . . . .	20.8	7.9	12.9	19.4	7.4	12.0
2004, proj. . . . .	22.1	8.6	13.6	20.3	7.8	12.4
2005, proj. . . . .	24.3	8.9	15.4	22.0	8.0	13.9
2006, proj. . . . .	24.6	9.0	15.6	21.4	7.8	13.6
2007, proj. . . . .	25.6	8.9	16.7	22.0	7.7	14.3
2008, proj. . . . .	26.0	9.0	17.0	21.9	7.6	14.3
2009, proj. . . . .	26.0	9.0	17.0	21.5	7.4	14.0

Source: U.S. Office of Management and Budget, *Budget of the United States, Historical Tables, Fiscal Year 2005*, annual. Also see <<http://www.whitehouse.gov/omb/budget/fy2005/hist.html>>.

## No. 782. U.S. and Worldwide Commercial Space Industry Revenue by Type: 2000 to 2002

[In billions of dollars (35.4 represents \$35,400,000,000). For calendar years]

Industry	U.S.			World		
	2000	2001	2002	2000	2001	2002
<b>Revenue, total . . . . .</b>	<b>35.4</b>	<b>20.8</b>	<b>22.7</b>	<b>73.7</b>	<b>78.6</b>	<b>86.8</b>
Satellite manufacturing <sup>1</sup> . . . . .	6.0	3.8	4.4	11.5	9.5	12.1
Launch industry <sup>2</sup> . . . . .	2.7	1.1	1.0	5.3	3.0	3.7
Satellite services <sup>3</sup> . . . . .	11.8	15.9	17.3	39.2	46.5	49.8
Ground equipment manufacturing <sup>3</sup> . . . . .	14.9	(NA)	(NA)	17.7	19.6	21.2

NA Not available. <sup>1</sup> Includes revenues from the construction and sale of satellites to both commercial and government. <sup>2</sup> Includes revenues derived from transponder leasing and subscription/retail services such as direct-to-home television and satellite mobile and data communications. <sup>3</sup> Includes revenues from the manufacture of gateways and satellite control stations, satellite news-gathering trucks, very small aperture terminals, direct-to-home television equipment and mobile satellite phones.

Source: Satellite Industry Association/Futron Corporation, Bethesda, MD, *2002-2003 Satellite Industry Indicators Survey* (copyright). Also see <<http://www.sia.org/>>.

## No. 783. National Aeronautics and Space Administration—Budget Appropriations: 2004 and Projections, 2005 to 2009

[In millions of dollars (15,378 represents \$15,378,000,000). Figures may not add due to rounding]

Item	2004	2005	2006	2007	2008	2009
<b>Appropriation, total . . . . .</b>	<b>15,378</b>	<b>16,244</b>	<b>17,002</b>	<b>17,815</b>	<b>18,001</b>	<b>18,034</b>
Exploration, science & aeronautics . . . . .	7,831	7,760	7,869	8,320	8,900	9,091
Space science . . . . .	3,943	4,138	4,404	4,906	5,520	5,561
Solar system exploration . . . . .	1,302	1,187	1,202	1,300	1,392	1,438
Mars exploration . . . . .	595	691	724	944	1,188	1,268
Lunar exploration . . . . .	(NA)	70	135	280	375	420
Astronomical search for origins . . . . .	894	1,067	1,196	1,212	1,182	927
Structure & evolution of the universe . . . . .	404	378	365	382	425	457
Sun-Earth connections . . . . .	749	746	781	788	958	1,051
Earth science . . . . .	1,526	1,485	1,390	1,368	1,343	1,474
Earth system science . . . . .	1,451	1,409	1,313	1,290	1,266	1,397
Earth science applications . . . . .	74	77	77	77	77	77
Biological & physical research . . . . .	965	1,049	950	938	941	944
Biological sciences research . . . . .	356	492	499	496	500	502
Physical sciences research . . . . .	350	300	220	210	210	210
Research partnerships & flight support . . . . .	259	257	232	232	231	232
Aeronautics technology . . . . .	946	919	957	938	926	942
Education . . . . .	164	169	169	171	170	170
Earmarks <sup>1</sup> . . . . .	287	(NA)	(NA)	(NA)	(NA)	(NA)
Exploration capabilities . . . . .	7,521	8,456	9,104	9,465	9,070	8,911
Exploration systems . . . . .	1,563	1,782	2,579	2,941	2,809	3,313
Human & robotic technology . . . . .	655	1,094	1,318	1,317	1,386	1,450
Transportation systems . . . . .	909	689	1,261	1,624	1,423	1,863
Space flight . . . . .	5,857	6,674	6,525	6,524	6,261	5,598
Space station . . . . .	1,497	1,863	1,764	1,780	1,779	2,115
Space shuttle . . . . .	3,928	4,319	4,326	4,314	4,027	3,030
Space flight support . . . . .	432	492	435	430	456	453
Earmarks . . . . .	101	(NA)	(NA)	(NA)	(NA)	(NA)
Inspector General . . . . .	27	28	29	30	31	32

NA Not available. <sup>1</sup> FY 2004 budget column does not allocate earmarks across budget functions/categories.

Source: U.S. National Aeronautics and Space Administration, <<http://ifmp.nasa.gov/codeb/budget2005>>, (released February 2004).

## No. 784. World-Wide Successful Space Launches: 1957 to 2003

[Criterion of success is attainment of Earth orbit or Earth escape]

Country	Total, 1957-03	1957-64	1965-69	1970-74	1975-79	1980-84	1985-89	1990-94	1995-01	2002	2003
<b>Total . . . . .</b>	<b>4,305</b>	<b>289</b>	<b>586</b>	<b>555</b>	<b>607</b>	<b>605</b>	<b>550</b>	<b>466</b>	<b>524</b>	<b>62</b>	<b>61</b>
Soviet Union/Russia <sup>1</sup> . . . . .	2,701	82	302	405	461	483	447	283	193	24	21
<b>United States . . . . .</b>	<b>1,277</b>	<b>207</b>	<b>279</b>	<b>139</b>	<b>126</b>	<b>93</b>	<b>61</b>	<b>122</b>	<b>210</b>	<b>17</b>	<b>23</b>
Japan . . . . .	60	-	-	5	10	12	11	9	8	3	2
ESA <sup>2</sup> . . . . .	152	-	-	-	1	8	21	33	74	11	4
China . . . . .	75	-	-	2	6	6	9	15	27	4	6
France . . . . .	10	-	4	3	3	-	-	-	-	-	-
India . . . . .	14	-	-	-	-	3	-	3	5	1	2
Israel . . . . .	4	-	-	-	-	-	1	1	1	1	-
Ukraine . . . . .	10	-	-	-	-	-	-	-	6	1	3
Australia . . . . .	1	-	1	-	-	-	-	-	-	-	-
United Kingdom . . . . .	1	-	-	1	-	-	-	-	-	-	-

- Represents zero. NA Not available. <sup>1</sup> Launches conducted by the former Soviet Union are listed separately as Russia or Ukraine.

<sup>2</sup> European Space Agency. Includes launches by Ariespace.

Source: Library of Congress, Congressional Research Service, Science Policy Research Division, *Space Activities of the United States, CIS, and Other Launching Countries/Organizations 1957-1999*; thereafter, Resources, Science, and Industry Division, 2003.

## No. 785. Space Shuttle Launches—Summary: 1981 to January 2003

Flight number	Mission date	Orbiter name	Crew size (up/down) <sup>1</sup>	Days/hours duration	Flight number	Mission date	Orbiter name	Crew size (up/down) <sup>1</sup>	Days/hours duration
1	04/12/81	Columbia	2	2	58	10/18/93	Columbia	7	14
2	11/12/81	Columbia	2	2	61	12/02/93	Endeavour	7	11
3	03/22/82	Columbia	2	8	60	02/03/94	Discovery	6	8
4	06/27/82	Columbia	2	7	62	03/04/94	Columbia	5	14
5	11/11/82	Columbia	4	5	59	04/09/94	Endeavour	6	11
6	04/04/83	Challenger	4	5	65	07/08/94	Columbia	7	15
7	06/18/83	Challenger	5	6	64	09/09/94	Discovery	6	11
8	08/30/83	Challenger	5	6	68	09/30/94	Endeavour	6	11
9	11/28/83	Columbia	6	10	66	11/03/94	Atlantis	6	11
10	02/03/84	Challenger	5	8	63	02/03/95	Discovery	6	8
11	04/06/84	Challenger	5	7	67	03/02/95	Endeavour	7	17
12	08/30/84	Discovery	6	7	71	06/27/95	Atlantis	7/8	10
13	10/05/84	Challenger	7	8	70	07/13/95	Discovery	5	9
14	11/08/84	Discovery	5	8	69	09/07/95	Endeavour	5	11
15	01/24/85	Discovery	5	4	73	10/20/95	Columbia	7	16
16	04/12/85	Discovery	7	7	74	11/08/95	Atlantis	5	8
17	04/29/85	Challenger	7	7	72	01/11/96	Endeavour	6	08/22
18	06/17/85	Discovery	7	7	75	02/22/96	Columbia	7	15/18
19	07/29/85	Challenger	7	8	76	03/22/96	Atlantis	6/5	09/05
20	08/27/85	Discovery	5	7	77	05/19/96	Endeavour	6	10/01
21	10/03/85	Atlantis	5	4	78	06/20/96	Columbia	7	16/22
22	10/30/85	Challenger	8	7	79	09/16/96	Atlantis	6/7	10/03
23	11/26/85	Atlantis	7	7	80	11/19/96	Columbia	5	17/16
24	01/12/86	Columbia	7	6	81	01/12/97	Atlantis	6/6	10/05
25	01/28/86	Challenger <sup>2</sup>	7	-	82	02/11/97	Discovery	7	10/00
26	09/29/88	Discovery	5	4	83	04/04/97	Columbia	7	03/23
27	12/02/88	Atlantis	5	4	84	05/15/97	Atlantis	7/7	09/05
29	03/13/89	Discovery	5	5	94	07/01/97	Columbia	7	15/17
30	05/04/89	Atlantis	5	4	85	08/07/97	Discovery	6	11/20
28	08/08/89	Columbia	5	5	86	09/25/97	Atlantis	7/8	10/19
34	10/18/89	Atlantis	5	5	87	11/19/97	Columbia	6	15/17
33	11/22/89	Discovery	5	5	89	01/22/98	Endeavour	7/7	08/20
32	01/09/90	Columbia	5	11	90	04/17/98	Columbia	7	15/22
36	02/28/90	Atlantis	5	4	91	06/02/98	Discovery	6/7	09/20
31	04/24/90	Discovery	5	5	95	10/29/98	Discovery	7	08/22
41	10/06/90	Discovery	5	4	88	12/04/98	Endeavour	6	11/19
38	11/15/90	Atlantis	5	5	96	05/27/99	Discovery	7	09/19
35	12/02/90	Columbia	7	9	93	07/23/99	Columbia	5	04/23
37	04/05/91	Atlantis	5	6	103	12/19/99	Discovery	7	07/23
39	04/28/91	Discovery	7	8	99	02/11/00	Endeavour	6	11/06
40	06/05/91	Columbia	7	9	101	05/19/00	Atlantis	7	09/21
43	08/02/91	Atlantis	5	9	106	09/08/00	Atlantis	7	11/19
48	09/12/91	Discovery	5	5	92	10/11/00	Discovery	7	12/22
44	11/24/91	Atlantis	6	7	97	11/30/00	Endeavour	5	10/20
42	01/22/92	Discovery	7	8	98	02/07/01	Atlantis	5	12/21
45	03/24/92	Atlantis	7	9	102	03/08/01	Discovery	7/7	12/20
49	05/07/92	Endeavour	7	9	100	04/19/01	Endeavour	7	11/20
50	06/25/92	Columbia	7	14	104	07/12/01	Atlantis	5	12/19
46	07/31/92	Atlantis	7	8	105	08/10/01	Discovery	7/7	11/21
47	09/12/92	Endeavour	7	8	108	12/05/01	Endeavour	8/7	10/20
52	10/22/92	Columbia	6	10	109	03/01/02	Columbia	7	10/22
53	12/02/92	Discovery	5	7	110	04/08/02	Atlantis	7	10/20
54	01/13/93	Endeavour	5	6	111	06/05/02	Endeavour	7/7	13/25
56	04/08/93	Discovery	5	9	112	10/07/02	Atlantis	6	10/20
55	04/26/93	Columbia	7	10	113	11/23/02	Endeavour	7/7	13/19
57	06/21/93	Endeavour	6	10	107	01/16/03	Columbia <sup>2</sup>	7	15/22
51	09/12/93	Discovery	5	10					

- Represents zero. <sup>1</sup> Differences in crew size due to docking with the Mir Space Station. <sup>2</sup> Loss of vehicle and crew.

Source: U.S. National Aeronautics and Space Administration, Internet site <<http://science.ksc.nasa.gov/shuttle/missions/missions.html>> (Accessed 24 May 2004).

## No. 786. Nobel Prize Laureates in Selected Sciences: 1901 to 2003

[Presented by location of award-winning research and by date of award]

Country	1901-2003				1901-1930	1931-1945	1946-1960	1961-1975	1976-1990	1991-2002	2003
	Total	Phys-ics	Chem-istry	Physiology/ Medicine							
<b>Total</b>	<b>494</b>	<b>171</b>	<b>143</b>	<b>180</b>	<b>93</b>	<b>49</b>	<b>74</b>	<b>92</b>	<b>98</b>	<b>82</b>	<b>7</b>
United States	219	74	51	90	6	14	38	41	63	54	5
United Kingdom	76	21	27	28	15	11	14	20	9	5	1
Germany	63	19	29	15	27	11	4	8	7	4	-
France	25	11	7	7	13	2	-	5	2	3	-
Soviet Union	12	9	1	2	2	-	4	3	1	1	1
Japan	8	4	4	-	-	-	1	2	1	4	-
Other countries	91	30	22	39	30	11	13	13	15	4	-

- Represents zero. <sup>1</sup> Between 1946 and 1991, data are for the former West Germany only.

Source: U.S. National Science Foundation, unpublished data.