Section 16

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. 782. Research and Development (R&D) Expenditures by Source and Objective: 1970 to 2002

[**In millions of dollars (26,280 represents $26,280,000,000) except as indicated.** For calendar years]

Year	Sources of funds						Objective (percent of total)			Character of work		
	Total	Federal government	Industry	Universities/ colleges	Nonprofit	Nonfederal government [1]	Defense related [2]	Space related [3]	Other	Basic research	Applied research	Development
1970	26,280	14,993	10,449	259	343	237	33	10	57	3,592	5,737	16,950
1971	26,980	15,239	10,824	290	366	262	33	10	57	3,723	5,853	17,404
1972	28,739	16,038	11,715	312	393	282	33	8	59	3,849	6,148	18,742
1973	31,003	16,639	13,299	343	422	302	32	7	61	4,106	6,660	20,237
1974	33,398	17,326	14,885	393	474	320	29	7	64	4,513	7,354	21,532
1975	35,753	18,615	15,824	432	534	348	28	8	64	4,883	8,105	22,765
1976	39,471	20,328	17,702	480	592	369	27	8	65	5,376	8,999	25,096
1977	43,368	22,101	19,642	569	662	394	27	7	66	6,013	9,668	27,687
1978	48,740	24,434	22,457	679	727	443	26	6	68	6,961	10,708	31,070
1979	55,407	27,253	26,097	785	791	482	25	6	69	7,840	12,103	35,463
1980	63,240	30,002	30,929	920	871	519	24	5	71	8,794	13,751	40,695
1981	72,293	33,740	35,948	1,058	967	581	24	5	71	9,828	16,409	46,057
1982	80,808	37,194	40,692	1,207	1,095	621	26	5	69	10,821	18,291	51,696
1983	90,010	41,511	45,264	1,357	1,220	658	28	4	68	12,064	20,406	57,540
1984	102,282	46,508	52,187	1,514	1,351	721	29	3	68	13,483	22,526	66,273
1985	114,692	52,662	57,962	1,743	1,491	834	30	3	67	14,854	25,410	74,428
1986	120,285	54,659	60,991	2,019	1,647	969	31	3	66	17,253	27,257	75,775
1987	126,249	58,498	62,576	2,262	1,849	1,065	32	3	65	18,547	27,852	79,850
1988	133,898	60,148	67,977	2,527	2,081	1,165	30	4	66	19,801	29,528	84,569
1989	141,921	60,495	74,966	2,852	2,333	1,274	28	4	68	21,914	32,280	87,727
1990	151,978	61,596	83,208	3,187	2,589	1,399	25	4	71	23,018	34,907	94,053
1991	160,891	60,799	92,300	3,457	2,852	1,483	22	4	74	27,143	38,648	95,101
1992	165,250	60,815	96,229	3,568	3,113	1,525	22	4	74	27,608	37,915	99,726
1993	165,782	60,581	96,549	3,708	3,387	1,557	21	4	75	28,742	37,297	99,744
1994	169,212	60,787	99,203	3,937	3,664	1,622	20	5	75	29,650	36,623	102,939
1995	183,617	62,965	110,870	4,109	3,924	1,750	19	4	77	29,647	40,856	113,115
1996	197,288	63,341	123,416	4,434	4,238	1,860	18	4	78	32,770	43,160	121,359
1997	212,121	64,548	136,227	4,836	4,589	1,921	17	4	79	36,903	46,547	128,671
1998	226,305	66,340	147,843	5,168	4,984	1,970	16	4	80	35,252	46,364	144,689
1999	243,517	67,015	163,229	5,630	5,549	2,095	15	3	82	38,710	51,864	152,943
2000 [4]	264,725	66,371	183,703	6,205	6,204	2,242	13	2	85	42,367	56,511	165,847
2001 [4]	273,565	72,637	184,978	6,819	6,756	2,375	14	2	84	46,723	63,609	163,233
2002 [4]	276,185	78,185	180,769	7,455	7,304	2,472	15	2	83	49,567	64,802	161,816

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

Source: U.S. National Science Foundation, *National Patterns of R&D Resources,* annual. See also <http://www.nsf.gov/sbe/srs/nsf99335/pdf/nsf99335.pdf> (released June 2003).

No. 783. Performance Sector of R&D Expenditures: 1995 to 2002

[**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			
			Funded by—					Funded by—							Funded by—		
	Total	Federal government	Total	Federal government	Industry [1]	Industry FFRDCs	Total	Federal government	Nonfederal government [2]	Industry	Universities & colleges	Nonprofits	Universities & colleges FFRDCs [3]	Total	Federal government	Industry	Nonprofits FFRDCs
RESEARCH AND DEVELOPMENT TOTAL																	
1995	183,617	16,904	129,830	21,178	108,652	2,279	22,603	13,582	1,750	1,547	4,109	1,616	5,367	5,827	2,847	671	2,308
1998	226,305	17,362	167,102	22,086	145,016	2,062	26,151	15,147	1,970	1,947	5,168	1,919	5,559	7,225	3,281	880	3,064
1999	243,517	17,851	180,712	20,536	160,176	1,999	28,135	16,223	2,095	2,077	5,630	2,110	5,652	8,175	3,761	975	3,440
2000	264,725	17,917	197,604	17,183	180,421	1,935	30,633	17,681	2,242	2,180	6,205	2,327	5,741	9,429	4,449	1,103	3,877
2001, prel.	273,565	21,048	198,505	16,899	181,606	1,965	33,295	19,332	2,375	2,263	6,819	2,507	5,957	10,667	5,309	1,110	4,248
2002, prel.	276,185	23,788	194,430	17,085	177,345	2,235	36,019	21,066	2,472	2,341	7,455	2,685	6,060	11,620	5,918	1,083	4,619
BASIC RESEARCH																	
1995	29,647	2,689	5,569	190	5,379	575	15,139	9,629	1,069	945	2,509	987	2,702	2,899	1,170	390	1,338
1998	35,252	3,003	5,853	1,002	4,851	564	19,309	11,875	1,331	1,315	3,491	1,296	2,660	3,651	1,461	489	1,701
1999	38,710	3,347	6,571	1,209	5,362	546	20,900	12,773	1,429	1,417	3,841	1,439	2,765	4,185	1,734	541	1,910
2000	42,367	3,765	6,960	943	6,017	529	22,760	13,887	1,536	1,493	4,250	1,594	2,873	4,864	2,099	612	2,153
2001, prel.	46,723	4,317	7,911	754	7,157	537	24,646	15,127	1,619	1,542	4,649	1,709	2,912	5,495	2,520	616	2,359
2002, prel.	49,567	4,617	7,751	762	6,989	611	26,678	16,484	1,685	1,596	5,082	1,830	2,962	6,020	2,854	601	2,565
APPLIED RESEARCH																	
1995	40,856	4,952	26,919	3,164	23,755	459	5,655	2,775	559	494	1,311	516	1,050	1,692	934	170	589
1998	46,364	5,146	32,208	2,632	29,576	241	5,215	2,286	524	518	1,375	511	1,372	2,060	1,060	223	777
1999	51,864	5,530	36,418	3,109	33,309	272	5,843	2,739	546	542	1,467	550	1,251	2,420	1,301	247	872
2000	56,511	6,105	38,818	2,688	36,130	263	6,688	3,342	579	563	1,603	601	1,329	3,099	1,837	279	983
2001, prel.	63,609	7,164	43,486	3,603	39,883	267	7,350	3,706	620	591	1,780	654	1,473	3,567	2,209	281	1,077
2002, prel.	64,802	8,083	42,590	3,643	38,947	304	8,007	4,105	645	611	1,946	701	1,645	3,901	2,456	275	1,171
DEVELOPMENT																	
1995	113,115	9,262	97,342	17,824	79,518	1,246	1,810	1,178	123	108	288	113	1,616	1,236	744	111	381
1998	144,689	9,214	129,041	18,452	110,589	1,257	1,628	985	115	114	302	112	1,527	1,515	760	168	586
1999	152,943	8,974	137,724	16,219	121,505	1,180	1,392	711	120	119	322	121	1,636	1,570	726	187	658
2000	165,847	8,047	151,826	13,552	138,274	1,143	1,186	451	127	124	352	132	1,539	1,466	513	211	742
2001, prel.	163,233	9,567	147,108	12,542	134,566	1,160	1,299	499	136	130	391	144	1,571	1,606	581	212	813
2002, prel.	161,816	11,088	144,088	12,680	131,409	1,320	1,334	477	142	134	427	154	1,452	1,699	608	207	884

[1] For R&D funded by the federal government. FFRDCs are federally funded research and development centers. [2] Includes all nonfederal sources. [3] Includes all R&D expenditures of FFRDCs 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. 784. National R&D Expenditures as a Percent of Gross Domestic Product by Country: 1985 to 2001

Year	Total R&D						Nondefense R&D [1]					
	United States	Japan	Unified Germany	France	United Kingdom	Italy	United States	Japan	Unified Germany	France	United Kingdom	Italy
1985	2.72	2.54	2.75	2.22	2.24	1.12	1.9	2.5	2.6	1.8	1.8	1.1
1990	2.62	2.78	2.75	2.37	2.15	1.29	2.0	2.8	2.6	1.9	1.7	1.3
1995	2.48	2.69	2.26	2.31	1.95	1.00	2.0	2.7	2.2	2.0	1.7	1.0
1996	2.53	2.77	2.26	2.30	1.88	1.01	2.1	2.7	2.2	2.0	1.6	1.0
1997	2.55	2.83	2.29	2.22	1.81	1.05	2.1	2.8	2.2	2.0	1.5	1.1
1998	2.58	2.94	2.31	2.17	1.80	1.07	2.2	2.9	2.3	2.0	1.5	1.1
1999	2.63	2.94	2.44	2.19	1.88	1.04	2.2	2.9	2.4	2.0	1.6	1.0
2000	2.69	2.98	2.48	2.15	1.86	(NA)	2.3	3.0	2.4	(NA)	1.6	(NA)
2001	2.71	(NA)	2.52	(NA)	(NA)	(NA)	2.3	(NA)	2.5	(NA)	(NA)	(NA)

NA Not available. [1] Estimated.
Source: National Science Foundation, *National Patterns of R&D Resources,* annual; and Organization for Economic Cooperation and Development.

No. 785. Federal Obligations for R&D in Current and Constant (1996) Dollars by Agency: 1980 to 2002

[**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 [1]			
	1980	1990	2001, prel.	2002, prel.	1980	1990	2001, prel.	2002, prel.
Obligations, total [2]	**29,830**	**63,559**	**80,898**	**80,645**	**53,278**	**73,863**	**73,961**	**72,191**
Dept. of Defense	13,981	37,268	36,334	34,235	24,971	43,310	33,218	30,646
Dept. of Health and Human Services	3,780	8,406	21,355	23,816	6,752	9,769	19,524	21,319
National Aeronautics and Space Administration [3]	3,234	6,533	7,221	7,259	5,776	7,592	6,602	6,498
Dept. of Energy	4,754	5,631	6,712	6,322	8,490	6,544	6,136	5,659
National Science Foundation	882	1,690	3,015	3,017	1,575	1,964	2,756	2,701
Dept. of Agriculture	688	1,108	1,980	1,806	1,228	1,288	1,810	1,617

[1] Based on gross domestic product implicit price deflator. [2] Includes other agencies, not shown separately. [3] Beginning in fiscal year 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 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/>.

No. 786. Federal Obligations for Research in Current and Constant (1996) Dollars by Field of Science: 1980 to 2002

[**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	1998	1999	2000	2001, prel.	2002, prel.
CURRENT DOLLARS									
Research, total	**11,597**	**16,133**	**21,622**	**28,434**	**30,922**	**33,528**	**38,471**	**43,836**	**45,327**
Basic	4,674	7,819	11,286	13,877	15,613	17,444	19,570	22,705	23,399
Applied	6,923	8,315	10,337	14,557	15,309	16,084	18,901	21,131	21,928
Life sciences	4,192	6,363	8,830	11,811	13,558	15,422	17,965	21,118	22,204
Psychology	199	327	449	623	591	633	1,627	1,871	2,075
Physical sciences	2,001	3,046	3,809	4,278	4,210	4,066	4,788	5,163	5,145
Environmental sciences	1,261	1,404	2,174	2,854	3,062	3,095	3,329	3,661	3,644
Mathematics and computer sciences	241	575	841	1,579	1,837	1,981	2,206	2,458	2,618
Engineering	2,830	3,618	4,227	5,708	5,895	6,263	6,346	7,091	7,031
Social sciences	524	460	630	679	806	855	1,050	1,216	1,271
Other sciences, n.e.c. [1]	350	342	664	902	964	1,212	1,160	1,259	1,338
CONSTANT (1996) DOLLARS [2]									
Research, total	**20,713**	**21,953**	**25,127**	**29,002**	**29,908**	**32,011**	**35,988**	**40,077**	**40,576**
Basic	8,348	10,640	13,116	14,154	15,101	16,655	18,307	20,758	20,946
Applied	12,365	11,314	12,013	14,848	14,807	15,356	17,681	19,319	19,629
Life sciences	7,487	8,658	10,261	12,047	13,113	14,724	16,805	19,307	19,876
Psychology	355	445	522	635	572	604	1,522	1,711	1,857
Physical sciences	3,574	4,145	4,426	4,364	4,072	3,882	4,479	4,720	4,606
Environmental sciences	2,252	1,910	2,526	2,911	2,962	2,955	3,114	3,347	3,262
Mathematics and computer sciences	430	782	977	1,611	1,777	1,891	2,064	2,247	2,344
Engineering	5,054	4,923	4,912	5,822	5,702	5,980	5,936	6,483	6,294
Social sciences	936	626	732	693	780	816	982	1,112	1,138
Other sciences, n.e.c. [1]	625	465	772	920	932	1,157	1,085	1,151	1,198

[1] N.e.c. = Not elsewhere classified. [2] Based on gross domestic product implicit price deflator.
Source: U.S. National Science Foundation, *Federal Funds for Research and Development,* annual. Also see <http://128.150.4.107:80/sbe/srs/pubdata.htm>.

No. 787. Federal Budget Authority for R&D in Current and Constant (1996) Dollars by Selected Budget Functions: 1980 to 2003

[**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	1999	2000	2001	2002, prel.	2003, prel.
CURRENT DOLLARS									
Total [1]	**29,739**	**49,887**	**63,781**	**68,791**	**77,637**	**78,664**	**86,756**	**98,029**	**107,057**
Eight functions, percent of total	96.5	98.3	98.0	97.7	97.6	97.7	97.7	97.9	98.1
National defense	14,946	33,698	39,925	37,204	41,306	42,580	45,713	52,922	58,259
Health	3,694	5,418	8,308	11,407	15,553	17,869	20,758	23,654	26,615
Space research and technology [2]	2,738	2,725	5,765	7,916	8,245	5,363	6,126	6,556	7,435
Energy [3]	3,603	2,389	2,726	2,844	1,131	996	1,314	1,547	1,408
General science [3]	1,233	1,862	2,410	2,794	4,690	4,977	5,468	5,717	5,890
Natural resources and environment	999	1,059	1,386	1,988	1,842	1,999	2,096	2,159	2,136
Transportation	887	1,030	1,045	1,833	1,725	1,636	1,640	1,696	1,554
Agriculture	585	836	950	1,194	1,288	1,426	1,657	1,703	1,703
CONSTANT (1996) DOLLARS [4]									
Total [1]	**53,115**	**67,883**	**74,121**	**70,166**	**74,124**	**73,587**	**79,316**	**87,753**	**94,116**
National defense	26,694	45,854	46,397	37,948	39,437	39,832	41,793	47,374	51,217
Health	6,598	7,372	9,655	11,635	14,849	16,716	18,978	21,174	23,398
Space research and technology [2]	4,890	3,708	6,700	8,074	7,872	5,017	5,601	5,869	6,536
Energy [3]	6,435	3,251	3,168	2,901	1,080	932	1,201	1,385	1,238
General science [3]	2,202	2,534	2,801	2,850	4,478	4,656	4,999	5,118	5,178
Natural resources and environment	1,784	1,441	1,611	2,028	1,759	1,870	1,916	1,933	1,878
Transportation	1,584	1,402	1,214	1,870	1,647	1,530	1,499	1,518	1,366
Agriculture	1,045	1,138	1,104	1,218	1,230	1,334	1,515	1,524	1,497

[1] Includes other functions, not shown separately. [2] 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. [3] Beginning in FY 1998, a number of DOE programs were reclassified from energy (270). [4] Based on gross domestic product implicit price deflator.

Source: U.S. National Science Foundation, *Federal R&D Funding by Budget Function,* annual. For most recent report, see <http://www.nsf.gov/>.

No. 788. R&D Expenditures in Science and Engineering at Universities and Colleges in Current and Constant (1996) Dollars: 1990 to 2001

[**In millions of dollars (16,286 represents $16,286,000,000)**]

Characteristic	Current dollars				Constant (1996) dollars [1]			
	1990	1995	2000	2001	1990	1995	2000	2001
Total	**16,286**	**22,161**	**30,042**	**32,723**	**18,863**	**22,604**	**28,103**	**29,917**
Basic research	10,643	14,802	22,416	24,242	12,327	15,098	20,969	22,163
Applied R&D	5,643	7,359	7,626	8,481	6,536	7,506	7,134	7,754
Source of funds:								
All governments	10,962	15,015	19,704	21,506	12,696	15,315	18,432	19,662
Institutions' own funds	3,006	4,046	5,933	6,553	3,482	4,127	5,550	5,991
Industry	1,127	1,488	2,152	2,234	1,305	1,518	2,013	2,042
Other	1,191	1,613	2,253	2,430	1,379	1,645	2,108	2,222
Fields:								
Physical sciences	1,807	2,254	2,708	2,800	2,093	2,299	2,533	2,560
Environmental sciences	1,069	1,433	1,763	1,827	1,238	1,462	1,649	1,670
Mathematical sciences	222	279	341	357	257	285	319	326
Computer sciences	515	682	875	954	596	696	819	872
Life sciences	8,726	12,185	17,460	19,189	10,107	12,429	16,333	17,543
Psychology	253	370	516	582	293	377	483	532
Social sciences	703	1,018	1,297	1,436	814	1,038	1,213	1,313
Other sciences	336	426	534	579	389	435	500	529
Engineering	2,656	3,515	4,547	4,999	3,076	3,585	4,254	4,570

[1] Based on gross domestic product implicit price deflator.

Source: U.S. National Science Foundation, *Survey of Research and Development Expenditures at Universities and Colleges,* annual. Also see <http://www.nsf.gov/>.

No. 789. Federal Obligations for Science and Engineering to Universities and Colleges in Current and Constant (1996) Dollars: 1990 to 2001

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

Item	Current dollars				Constant (1996) dollars [1]			
	1990	1995	2000	2001	1990	1995	2000	2001
Academic science/engineering obligations	**10,471**	**14,461**	**19,877**	**22,488**	**12,168**	**14,750**	**18,601**	**20,543**
Research and development	9,017	12,181	17,290	19,385	10,478	12,424	16,180	17,708
Research and development plant	142	341	240	401	165	348	224	366
Other science/engineering activities	1,312	1,939	2,348	2,703	1,525	1,978	2,197	2,469

[1] 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. Also see <http://www.nsf.gov/>.

No. 790. Federal R&D Obligations to Selected Universities and Colleges: 2000 and 2001

[**In millions of dollars (17,289.8 represents $17,289,800,000), except rank. For fiscal years ending in year shown;** see text, Section 8. 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 2001 federal R&D obligations	2000	2001	Major institution ranked by total 2001 federal R&D obligations	2000	2001
Total, all institutions [1]	**17,289.8**	**19,384.7**	Columbia University—Main Division	282.2	305.8
			University of Pittsburgh	246.2	300.8
Johns Hopkins University	795.5	838.0	University of Colorado	272.3	290.7
University of Washington	396.1	474.5	University of Wisconsin—Madison	263.4	290.2
University of Pennsylvania	348.5	412.0	Yale University	260.0	276.2
University of Michigan	346.7	403.4	Univ. of North Carolina at Chapel Hill	232.7	275.9
University of California—Los Angeles	372.4	363.9	Duke University	232.2	274.1
Stanford University	355.0	351.1	University of Minnesota	276.8	273.1
University of California—San Francisco	289.2	344.9	Cornell University	240.1	271.9
University of California—San Diego	314.4	333.9	Pennsylvania State University	230.1	253.6
Harvard University	299.9	321.7	Massachusetts Institute of Technology	248.9	252.5
Washington University	287.3	314.7	University Southern California	203.9	232.5

[1] 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. 791. Graduate Science/Engineering Students in Doctorate-Granting Colleges by Characteristic and Field: 1990 to 2001

[**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	2000	2001	1990	2000	2001	2000	2001	1990	2000	2001
Total, all surveyed fields	**397.8**	**434.3**	**452.4**	**149.7**	**195.5**	**204.9**	**121.3**	**133.0**	**123.2**	**118.6**	**122.4**
Science/engineering	350.5	367.6	384.1	113.4	145.8	153.9	115.9	127.0	100.7	95.0	98.1
Engineering, total	99.9	99.0	103.5	13.6	19.6	21.0	45.5	50.5	35.9	28.1	27.8
Sciences, total	250.7	268.6	280.6	99.8	126.2	133.0	70.4	76.5	64.8	66.9	70.3
Physical sciences	32.5	29.3	30.0	7.6	8.7	9.0	11.4	11.9	3.6	3.2	3.3
Environmental	12.9	12.7	12.6	3.8	5.2	5.3	2.6	2.7	3.0	2.6	2.6
Mathematical sciences	17.3	13.8	15.1	5.3	4.9	5.6	5.7	6.3	4.0	2.7	3.1
Computer sciences	27.7	39.6	43.9	6.4	11.4	12.5	19.2	22.4	12.9	16.4	16.9
Agricultural sciences	10.6	10.9	11.0	3.1	4.6	4.8	2.3	2.4	1.9	2.2	2.3
Biological sciences	46.3	52.5	54.1	21.1	27.5	28.8	11.6	12.1	6.8	7.2	7.4
Psychology	35.8	37.8	39.3	23.6	27.1	28.6	2.0	2.3	10.3	9.5	10.9
Social sciences	67.7	71.9	74.6	29.0	36.9	38.5	15.6	16.4	22.1	23.1	23.9
Health fields, total	47.2	66.7	68.3	36.3	49.7	51.0	5.4	6.0	22.5	23.5	24.3

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

No. 792. Doctorates Conferred by Recipients' Characteristics: 1990 and 2001

[**In percent, except as indicated**]

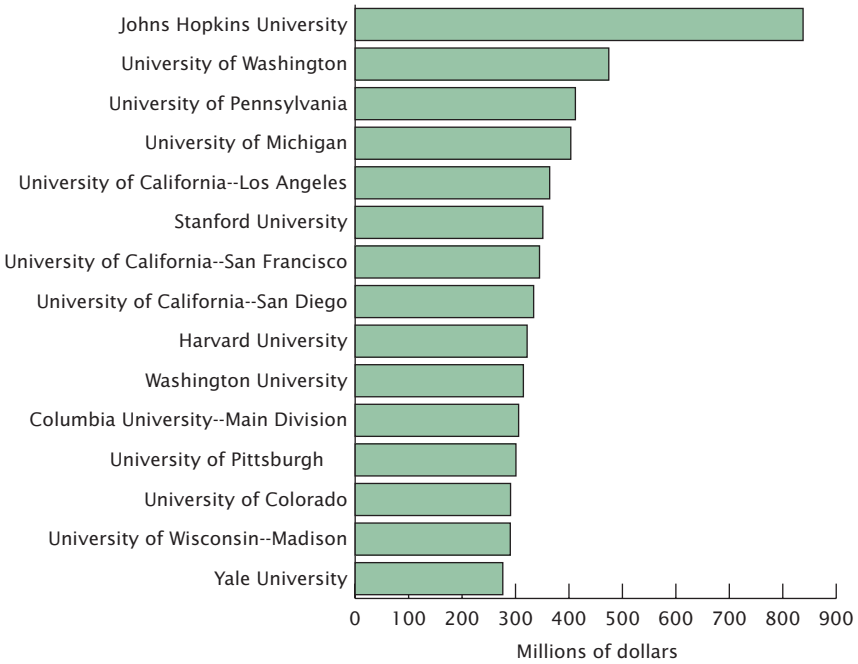
Characteristic	1990, total	2001									
		All fields [1]	Engineering	Physical sciences [2]	Earth sciences	Mathematics	Computer sciences	Biological sciences [3]	Agricultural	Social sciences [4]	Psychology
Total conferred (number)	**36,068**	**40,744**	**5,502**	**3,358**	**780**	**1,006**	**826**	**5,678**	**1,005**	**3,392**	**3,433**
Male	63.7	55.9	83.0	75.3	68.3	72.6	80.9	55.9	66.1	58.2	33.0
Female	36.3	44.1	16.8	24.5	31.5	27.4	18.8	44.9	33.4	41.6	66.8
Median age [5]	33.9	33.3	31.2	29.9	33.2	30.5	32.0	30.7	34.0	33.9	32.1
CITIZENSHIP [6]											
Total conferred (number)	**34,697**	**38,509**	**5,207**	**3,256**	**716**	**957**	**776**	**5,455**	**787**	**3,868**	**3,165**
U.S. citizen	71.8	74.6	41.1	57.1	59.8	48.9	47.0	71.1	51.0	65.3	92.8
Foreign citizen	28.2	25.4	58.9	42.9	40.2	51.1	53.0	28.9	49.0	34.7	7.2
RACE/ETHNICITY [7]											
Total conferred (number)	**26,604**	**28,729**	**2,435**	**2,043**	**464**	**522**	**420**	**4,216**	**429**	**2,720**	**3,013**
White [8]	86.5	78.6	71.7	80.6	84.9	81.8	76.0	76.9	86.5	78.2	80.9
Black [8]	3.8	6.0	3.8	2.6	1.1	3.6	3.6	3.2	2.8	6.9	5.8
Asian/Pacific [8]	4.9	7.5	17.3	9.9	7.5	9.2	14.5	13.1	3.7	6.6	4.0
Indian/Alaskan [8]	0.4	0.5	0.3	0.6	-	0.4	0.2	0.4	-	0.7	0.6
Hispanic	3.1	4.4	3.7	3.2	3.2	2.9	1.9	3.9	4.4	4.3	5.8
Other/unknown [9]	1.4	3.0	3.4	3.3	3.4	2.1	3.8	2.9	3.0	2.6	3.2

- Represents zero. [1] Includes other fields, not shown separately. [2] Astronomy, physics, and chemistry. [3] Biochemistry, botany, microbiology, physiology, zoology, and related fields. [4] Anthropology, sociology, political science, economics, international relations and related fields. [5] For definition of median, see Guide to Tabular Presentation. [6] For those with known citizenship. Includes those with temporary visas. [7] Excludes those with temporary visas. [8] Non-Hispanic. [9] For the year 2001, 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/>.

Figure 16.1

Top 15 Universities - Federal Research and Development Obligations: 2001

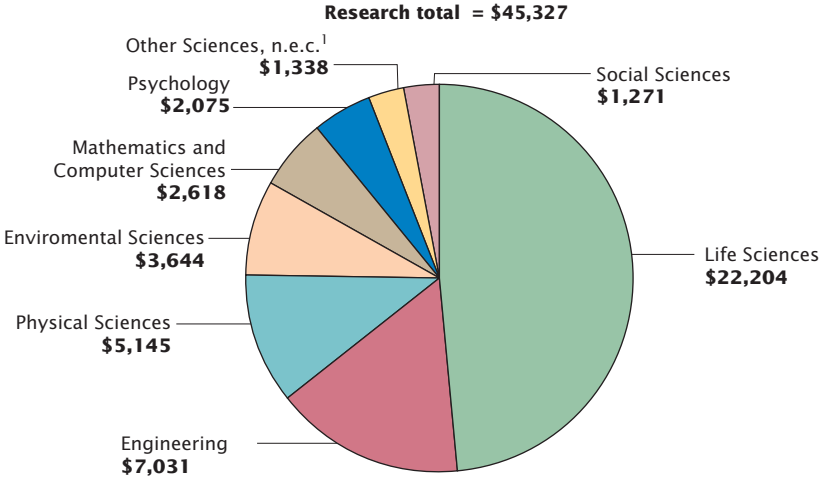


Source: Chart prepared by U.S. Census Bureau. For data, see Table 790.

Figure 16.2

Federal Funding for Research by Field of Science: 2002

Millions of dollars



[1] n.e.c = not elsewhere classified.

Source: Chart prepared by U.S. Census Bureau. For data, see Table 786.

No. 793. Funds for Performance of Industrial R&D in Current and Constant (1996) Dollars by Source of Funds and Selected Industries: 1998 to 2001

[**In millions of dollars (169,180 represents $169,180,000,000). 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 [1] code	1998	1999	2000	2001
CURRENT DOLLARS					
Total funds	(X)	**169,180**	**182,823**	**199,539**	**198,505**
Petroleum and coal products	324	1,395	615	(D)	(D)
Chemicals and allied products	325	18,969	20,246	20,918	17,892
Machinery	333	(D)	6,057	6,580	6,404
Navigational, measuring, electromedical, and control instruments	3345	11,232	14,337	15,116	12,947
Electrical equipment, appliances, and components	335	2,280	(D)	(D)	4,980
Motor vehicles, trailers, and parts	3361-3363	(D)	(D)	(D)	(D)
Aerospace products and parts	3364	16,359	14,425	10,319	7,868
All other [2]	(X)	(D)	(D)	(D)	(D)
Company funds	(X)	**145,016**	**160,288**	**180,421**	**181,606**
Petroleum and coal products	324	1,390	(D)	1,172	1,057
Chemicals	325	18,733	20,051	20,768	17,713
Machinery	333	5,831	5,658	6,539	6,337
Navigational, measuring, electromedical, and control instruments	3345	5,483	8,632	10,114	7,565
Electrical equipment, appliances, and components	335	2,139	3,820	3,390	4,680
Motor vehicles, trailers, and parts	3361-3363	13,781	17,987	18,306	16,089
Aerospace products and parts	3364	6,521	5,309	3,895	4,083
All other [2]	(X)	91,138	(D)	116,237	124,082
CONSTANT (1996) DOLLARS [3]					
Total funds	(X)	**163,934**	**174,383**	**186,729**	**181,333**
Petroleum and coal products	324	1,352	587	(D)	(D)
Chemicals	325	18,381	19,311	19,575	16,344
Machinery	333	(D)	5,777	6,158	5,850
Navigational, measuring, electromedical, and control instruments	3345	10,884	13,675	14,146	11,827
Electrical equipment, appliances, and components	335	2,209	(D)	(D)	4,549
Motor vehicles, trailers, and parts	3361-3363	(D)	(D)	(D)	(D)
Aerospace products and parts	3364	15,852	13,759	9,657	7,187
All other [2]	(X)	(D)	(D)	(D)	(D)
Company funds	(X)	**140,519**	**152,888**	**168,839**	**165,896**
Petroleum and coal products	324	1,347	(D)	1,097	966
Chemicals	325	18,152	19,125	19,435	16,181
Machinery	333	5,650	5,397	6,119	5,789
Navigational, measuring, electromedical, and control instruments	3345	5,313	8,233	9,465	6,911
Electrical equipment, appliances, and components	335	2,073	3,644	3,172	4,275
Motor vehicles, trailers, and parts	3361-3363	13,354	17,157	17,131	14,697
Aerospace products and parts	3364	6,319	5,064	3,645	3,730
All other [2]	(X)	88,312	(D)	108,775	113,348

D Figure withheld to avoid disclosure of information pertaining to a specific organization or individual. X Not applicable.
[1] North American Industry Classification System, 1997; see text, Section 15. [2] All other manufacturing and nonmanufacturing.
[3] Based on gross domestic product implicit price deflator.

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

No. 794. R&D Funds in R&D-Performing Manufacturing Companies by Industry: 1999 to 2001

Industry	NAICS [1] code	Total R&D funds as a percent of net sales			Company R&D funds as a percent of net sales		
		1999	2000	2001	1999	2000	2001
All industries, total	(X)	**3.7**	**3.8**	**4.1**	**3.3**	**3.4**	**3.8**
All manufacturing industries, total	(X)	**3.7**	**3.6**	**4.0**	**3.2**	**3.3**	**3.6**
Food	311	0.4	(D)	0.5	0.4	0.4	0.5
Paper, printing, and support activities	322, 326	(D)	(D)	(D)	1.4	1.6	2.1
Petroleum and coal products	324	0.4	(D)	(D)	(D)	0.3	0.3
Chemicals	325	5.2	5.9	4.9	5.1	5.9	4.8
Plastic and rubber products	326	1.9	(D)	(D)	1.9	1.8	2.9
Nonmetallic mineral products	327	(D)	1.8	2.4	1.5	1.8	2.3
Primary metals	331	0.4	0.5	0.7	0.4	0.5	0.7
Fabricated metal products	332	1.5	1.4	1.7	1.4	1.4	1.6
Machinery	333	3.5	3.9	4.3	3.3	3.8	4.2
Navigational, measuring, electromedical, and control instruments	3345	15.2	12.0	12.6	9.1	8.0	7.3
Electrical equipment, appliances, and components	335	(D)	(D)	3.1	2.3	2.1	2.9
Motor vehicles, trailers, and parts	3361-3363	(D)	(D)	(D)	2.9	3.2	3.5
Aerospace products and parts	3364	8.8	7.3	5.7	3.2	2.8	3.0
All nonmanufacturing industries, total	(X)	**3.7**	**4.1**	**4.3**	**3.2**	**3.3**	**4.0**
Transportation and warehousing services	48, 49	0.5	(D)	2.5	0.4	0.4	2.4
Software publishing	5112	16.8	20.5	19.4	1.4	1.6	19.3
Architectural, engineering, and related services	5413	10.1	10.8	7.5	(D)	0.3	5.2
Computer systems design and related services	5415	(D)	12.3	17.4	5.1	5.9	16.5
Scientific R&D services	5417	45.3	42.9	47.7	1.9	1.8	36.5
Management of companies and enterprises	55	(D)	4.4	7.8	1.5	1.8	7.8

D Figure withheld to avoid disclosure of information pertaining to a specific organization or individual. X Not applicable.
[1] North American Industry Classification System, 1997; see text, Section 15.

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

No. 795. R&D Scientists and Engineers—Employment and Cost by Industry: 1999 to 2001

[1,015.7 represents 1,015,700. Data are estimates; on average full-time-equivalent (FTE) basis]

Industry	NAICS [1] code	1999	2000	2001
EMPLOYED SCIENTISTS (1,000)				
Average FTE of scientists and engineers [2] [3]	(X)	1,015.7	1,037.5	1,050.8
Chemicals	325	86.7	82.0	81.4
Machinery	333	74.1	51.9	53.8
Electrical equipment, appliances, and components	335	98.8	23.3	11.4
Motor vehicles, trailers, and parts	3361-3363	69.2	75.4	74.4
Aerospace products and parts	3364	60.9	40.2	22.1
Transportation and warehousing services	48, 49	0.5	1.5	1.3
Software publishing	5112	38.1	79.7	82.2
Architectural, engineering, and related services	5413	16.0	33.0	28.9
Computer systems design and related services	5415	18.4	41.6	54.6
Scientific R&D services	5417	24.0	52.4	58.4
Management of companies and enterprises	55	0.2	0.4	0.9
CONSTANT (1996) DOLLARS [4] ($1,000)				
Cost per scientist or engineer [3] [5]	(X)	171.7	180.0	172.6
Chemicals	325	234.2	238.7	200.8
Machinery	333	113.5	118.8	108.8
Electrical equipment, appliances, and components	335	(D)	(D)	(D)
Motor vehicles, trailers, and parts	3361-3363	(D)	(D)	(D)
Aerospace products and parts	3364	209.8	(D)	326
Transportation and warehousing services	48, 49	494.5	(D)	(D)
Software publishing	5112	146.5	148.4	145.8
Architectural, engineering, and related services	5413	114.9	96.0	107.2
Computer systems design and related services	5415	(D)	116.3	153.1
Scientific R&D services	5417	241.2	230.4	223.0
Management of companies and enterprises	55	(D)	124.4	385.9

D Withheld to avoid disclosure. X Not applicable. [1] North American Industry Classification System, 1997; see text, Section 15. [2] The mean number of FTE R&D scientists and engineers employed in January of the year shown and the following January. [3] Includes industries not shown separately. [4] Based on gross domestic product implicit price deflator. [5] 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. 796. Civilian Employment of Scientists, Engineers, and Technicians by Occupation and Industry: 2000

[In thousands (6,412.4 represents 6,412,400). Based on sample and subject to sampling error. For details, see source]

Occupation	Wage and salary workers									Self employed [5]
	Total [1]	Mining [2]	Construction	Manufacturing	Transportation [3]	Trade	Fire [4]	Services	Government	
Scientists, engineers, and technicians, total	**6,412.4**	**38.1**	**81.6**	**1,423.1**	**264.1**	**377.7**	**370.2**	**2,772.7**	**726.9**	**343.6**
Scientists	922.8	7.4	0.5	108.1	15.2	21.7	43.8	374.0	227.0	118.0
Physical scientists	239.1	7.0	0.2	60.5	5.5	2.3	0.7	82.1	73.8	7.0
Life scientists	184.4	0.2	(6)	21.9	0.2	3.8	0.5	77.1	60.8	12.9
Mathematical scientists	89.4	0.1	(6)	6.9	2.6	1.3	23.0	37.5	17.9	(6)
Social scientists and related occupations	409.9	0.2	0.3	18.8	6.9	14.3	19.5	177.4	74.5	98.1
Computer specialists	2,903.4	4.5	9.5	318.2	115.4	247.3	315.7	1,557.9	179.2	154.3
Engineers [6]	1,465.3	14.5	44.6	642.1	82.4	48.3	8.4	401.2	179.4	42.7
Civil engineers	232.0	0.9	19.1	3.8	2.7	0.2	1.0	120.7	70.0	12.1
Electrical/electronics	287.6	0.4	6.1	139.0	20.4	22.2	0.9	59.1	31.1	8.3
Mechanical engineers	221.4	0.6	5.4	122.3	2.5	8.2	1.0	62.5	11.8	7.1
Engineering and science technicians	1,062.6	9.2	24.6	354.7	50.2	60.3	2.1	396.2	135.5	26.1
Electrical/electronics technicians	232.7	0.8	4.0	101.7	22.1	34.0	0.5	48.3	15.0	6.3
Other engineering technicians	286.6	1.1	5.4	104.1	17.0	16.7	0.6	85.0	52.0	4.6
Drafters	213.1	0.7	15.0	65.5	4.9	5.5	0.5	103.2	6.5	10.0
Life, physical, and social science technicians	330.1	6.7	0.2	83.5	6.1	4.1	0.5	159.7	62.0	5.2
Surveyors [7]	58.3	2.5	2.5	0.1	1.0	0.1	0.4	43.4	5.8	2.5

[1] Includes agriculture, forestry, and fishing not shown separately. [2] Includes oil and gas extraction. [3] Includes communications and public utilities. [4] Finance, insurance, and real estate. [5] Includes secondary jobs. [6] Includes kinds of engineers and technicians not shown separately. [7] Includes cartographers, photogrammetrists, and surveying and mapping technicians.

Source: U.S. Bureau of Labor Statistics, *National Industry-Occupation Employment Matrix* November 2001; and unpublished data. (Data collected biennially.)

No. 797. Space Vehicle Systems—Net Sales and Backlog Orders: 1970 to 2001

[**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
1970	1,956	1,025	931	1,184	786	398	1996	11,698	5,613	6,085	23,004	9,125	13,879
1975	2,119	1,096	1,023	1,304	1,019	285	1997	13,410	4,916	8,494	23,357	8,790	14,567
1980	3,483	1,461	2,022	1,814	951	863	1998	9,490	4,227	5,264	20,371	7,970	12,402
1985	6,300	4,241	2,059	6,707	4,941	1,766	1999	9,022	5,107	3,915	22,356	10,666	11,690
1990	9,691	6,556	3,135	12,462	8,130	4,332	2000	8,164	3,723	4,441	21,395	8,942	12,453
1995	11,314	4,782	6,532	15,650	5,872	9,778	2001	7,792	4,270	3,522	18,479	8,277	10,202

Source: U.S. Census Bureau, Current Industrial Reports, M336G, *Civil Aircraft and Aircraft Engines, annual* and, beginning 1994, Internet site <http://www.census.gov/industry/1/m336g0113.pdf>.

No. 798. Federal Outlays for General Science, Space, and Other Technology, 1970 to 2002, and Projections, 2003 to 2007, in Current and Constant (1996) 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 (1996) dollars		
	Total	General science/basic research	Space and other technologies	Total	General science/basic research	Space and other technologies
1970	4.5	0.9	3.6	18.5	3.9	14.6
1980	5.8	1.4	4.5	11.6	2.7	8.9
1985	8.6	2.0	6.6	12.8	3.0	9.8
1990	14.4	2.8	11.6	18.4	3.6	14.8
1995	16.7	4.1	12.6	17.3	4.3	13.0
1996	16.7	4.0	12.7	16.7	4.0	12.7
1997	17.1	4.1	13.1	16.9	4.0	12.9
1998	18.2	5.3	12.9	17.5	5.1	12.4
1999	18.1	5.6	12.4	17.0	5.3	11.7
2000	18.6	6.2	12.4	17.0	5.6	11.4
2001	19.8	6.5	13.2	17.8	5.9	11.9
2002	20.7	7.2	13.5	18.0	6.3	11.7
2003, proj.	21.6	7.9	13.6	18.6	6.9	11.8
2004, proj.	22.7	8.5	14.3	19.2	7.2	12.1
2005, proj.	23.7	8.9	14.9	19.8	7.4	12.4
2006, proj.	24.7	9.1	15.6	20.2	7.5	12.8
2007, proj.	25.4	9.4	16.0	20.5	7.6	12.9

Source: U.S. Office of Management and Budget, *Budget of the United States, Historical Tables, Fiscal Year 2004,* annual. Also see <http://www.whitehouse.gov/omb/budget/fy2004/pdf/hist.pdf>.

No. 799. 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,** est.	**2000**	**2001**	**2002,** est.
Revenue, total	**35.4**	**20.8**	**22.7**	**73.7**	**78.6**	**86.8**
Satellite manufacturing [1]	6.0	3.8	4.4	11.5	9.5	12.1
Launch industry	2.7	1.1	1.0	5.3	3.0	3.7
Satellite services [2]	11.8	15.9	17.3	39.2	46.5	49.8
Ground equipment manufacturing [3]	14.9	(NA)	(NA)	17.7	19.6	21.2

NA Not available. [1] Includes revenues from the construction and sale of satellites to both commercial and government. [2] Includes revenues derived from transponder leasing and subscription/retail services such as direct-to-home television and satellite mobile and data communications. [3] 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. 800. National Aeronautics and Space Administration—Budget Authority: 1999 to 2003 and Projections, 2004

[In millions of dollars (13,653.0 represents $13,653,000,000)]

Item	1999	2000	2001	2002	2003	2004
Budget authority, total	**13,653.0**	**13,600.8**	**14,357.2**	**15,012.7**	**15,117.0**	**15,690.4**
Human space flight	5,480.0	5,467.7	7,153.5	6,830.1	6,130.9	5,868.9
International space station	2,299.7	2,323.1	2,127.8	1,721.7	1,492.1	1,195.9
Space flight operations (space shuttle)	2,998.3	2,979.5	3,118.8	3,272.8	3,208.0	3,301.0
Payload utilization and operations	182.0	165.1	(NA)	(NA)	(NA)	(NA)
Payload and elv support	(X)	(X)	90.0	91.3	87.5	91.0
Investments and support	(X)	(X)	1,247.8	1,214.5	1,178.2	1,159.9
Science, aeronautics, and technology	5,653.9	5,580.9	7,076.5	8,047.8	8,844.5	9,679.0
Space science	2,119.2	2,192.8	2,606.6	2,867.1	3,414.3	3,906.9
Earth science	1,413.8	1,443.4	1,762.2	1,625.7	1,628.4	1,620.5
Aerospace technology	1,338.9	1,124.9	2,212.8	2,507.7	2,815.8	3,124.9
Academic programs	138.5	138.8	132.7	227.3	143.7	143.7
Safety, mission assurance, engineering, and advanced concepts	35.6	43.0	47.4	47.6	47.6	47.8
Inspector General	19.6	20.0	22.9	23.7	24.6	25.5

NA Not available. X Not applicable.

Source: U.S. National Aeronautics and Space Administration, <http://ifmp.nasa.gov/codeb/budget2003/2003websites.html> (released February 2002).

No. 801. NASA Space Shuttle Operations Expenditures: 1996 to 2001

[In millions of dollars (2,485.4 represents $2,485,400,000). Data are funding requirements for fiscal years shown]

Operation	1996	1997	1998	1999	2000	2001
Total	**2,485.4**	**2,464.9**	**2,369.4**	**2,998.3**	**2,999.9**	**3,165.7**
Shuttle operations	2,485.4	2,464.9	2,369.4	2,426.7	2,530.9	2,672.8
Orbiter and integration	521.0	492.6	502.9	608.0	746.9	724.5
Propulsion	1,061.5	1,124.7	1,061.8	1,071.2	1,037.6	1,167.4
External tank	327.5	352.4	341.3	363.2	359.2	318.8
Space shuttle main engine	185.0	208.3	204.6	200.0	195.7	263.4
Reusable solid rocket motor	395.7	412.8	380.4	339.0	347.9	377.7
Solid rocket booster	153.3	151.2	135.5	169.0	134.8	125.8
Mission and launch operations	902.9	847.6	804.7	747.5	746.4	780.9
Safety and performance upgrades	(X)	(X)	(X)	571.6	469.0	492.9
Orbiter improvements	(X)	(X)	(X)	234.8	183.7	327.2
Propulsion upgrades	(X)	(X)	(X)	175.7	181.6	60.2
Flight operations and launch site equipment	(X)	(X)	(X)	147.6	92.5	90.0
Construction of facilities	(X)	(X)	(X)	13.5	11.0	15.5

X Not applicable.

Source: U.S. National Aeronautics and Space Administration, *NASA, 1996-97, Pocket Statistics,* annual; thereafter, <http://ifmp.nasa.gov/codeb/budget2003/2003websites.html> (released February 2002).

No. 802. World-Wide Successful Space Launches: 1957 to 2002

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

Country	Total, 1957-02	1957-64	1965-69	1970-74	1975-79	1980-84	1985-89	1990-94	1995-00	2001	2002
Total	**4,244**	**289**	**586**	**555**	**607**	**605**	**1,016**	**466**	**466**	**58**	**62**
Soviet Union/Russia [1]	2,680	82	302	405	461	483	617	283	170	23	24
United States	**1,254**	**207**	**279**	**139**	**126**	**93**	**250**	**122**	**189**	**21**	**17**
Japan	58	-	-	5	10	12	18	9	7	1	3
ESA [2]	148	-	-	-	1	8	87	33	66	8	11
China	69	-	-	2	6	6	35	15	26	1	4
France	10	-	4	3	3	-	-	-	-	-	(NA)
India	12	-	-	-	-	3	-	3	3	2	1
Israel	4	-	-	-	-	-	2	1	1	-	1
Ukraine [1]	7	-	-	-	-	-	-	-	4	2	1
Australia	1	-	1	-	-	-	-	-	-	-	(NA)
United Kingdom	1	-	-	1	-	-	-	-	-	-	(NA)

- Represents zero. NA Not available. [1] Launches conducted by the former Soviet Union are listed separately as Russia or Ukraine. [2] European Space Agency. Includes launches by Arianespace.

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, 2002.

No. 803. Space Shuttle Launches—Summary: 1981 to January 2003

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

- Represents zero. [1] Differences in crew size due to docking with the Mir Space Station. [2] Loss of vehicle and crew.

Source: U.S. National Aeronautics and Space Administration, Internet site <http://www.ksc.nasa.gov/shuttle/missions /missions.html> (accessed 24 June 2003).

No. 804. Nobel Prize Laureates in Selected Sciences: 1901 to 2002

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

Country	1901-2002				1901-1930	1931-1945	1946-1960	1961-1975	1976-1990	1991-2001	2002
	Total	Physics	Chemistry	Physiology/ Medicine							
Total	**487**	**168**	**141**	**178**	**93**	**49**	**74**	**92**	**98**	**73**	**9**
United States	214	72	49	89	6	14	38	41	63	49	5
United Kingdom	75	21	27	27	15	11	14	20	9	4	1
Germany [1]	63	19	29	15	27	11	4	8	7	4	-
France	25	11	7	7	13	2	-	5	2	3	-
Soviet Union	11	8	1	2	2	-	4	3	1	1	-
Japan	8	4	4	-	-	-	1	2	1	2	2
Other countries	91	30	22	39	30	11	13	13	15	3	1

- Represents zero. [1] Between 1946 and 1991, data are for the former West Germany only.

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