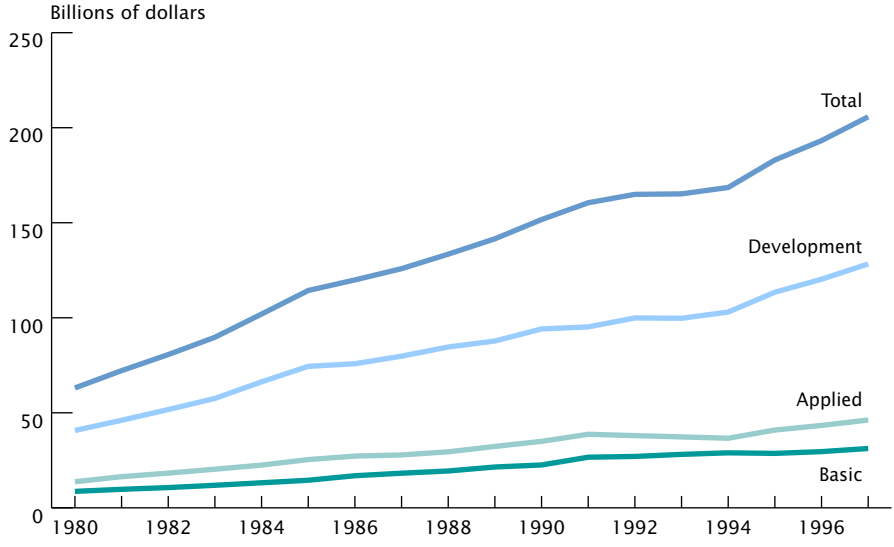
Figure 20.1

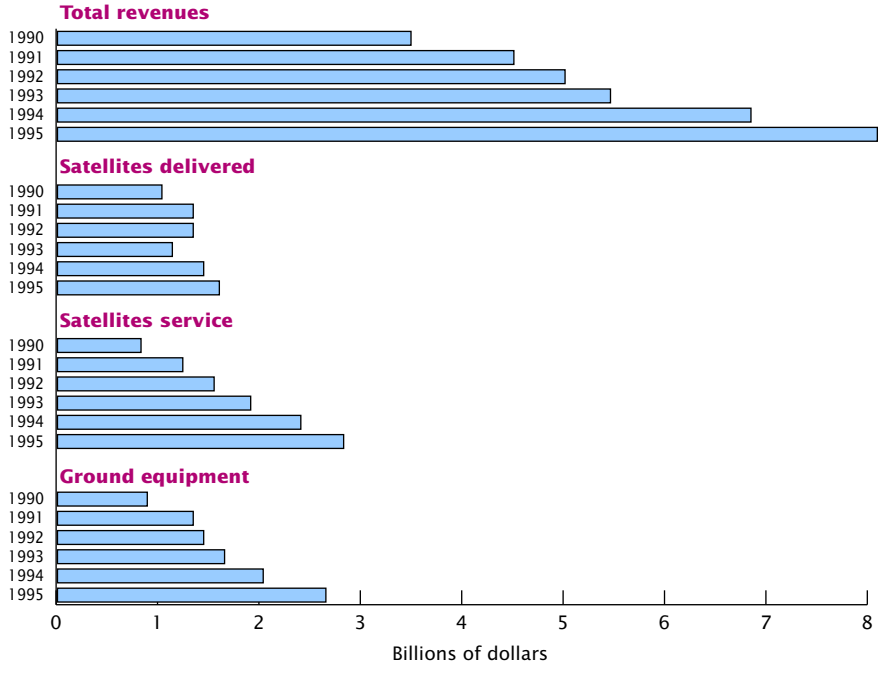
Research and Development Expenditures: 1980 to 1997



Source: Chart prepared by U.S. Census Bureau. For data, see Table 988.

Figure 20.2

U.S. Commercial Space Revenues, by Type: 1990 to 1995



Source: Chart prepared by U.S. Census Bureau. For data, see Table 1007.

Section 20

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 the *Science Resources Studies Highlights* summaries series; *Detailed Statistical Tables*; 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; Science and Engineering Personnel—A National Overview; Women and Minorities in Science and Engineering*; science and technology data presented in chart and tabular form in a pocket-size publication; *International Science and Technology Data Update*; profiles on human resources and funding in individual fields of science and engineering; *Federal Funds for Research and Development; Federal R&D Funding by Budget Function; Federal Support to Universities, Colleges, and Selected Nonprofit Institutions; Scientific and Engineering Facilities at Universities and Colleges; Geographic Distribution of Industrial R&D Expenditures; Research and Development in Industry*; R&D funds and graduate enrollment and support in academic science and engineering; characteristics of doctoral scientists and engineers and of recent graduates in the United States; *U.S. Scientists and Engineers*; and scientists, engineers, and technicians in manufacturing, nonmanufacturing, and trade and regulated industries. 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 details.

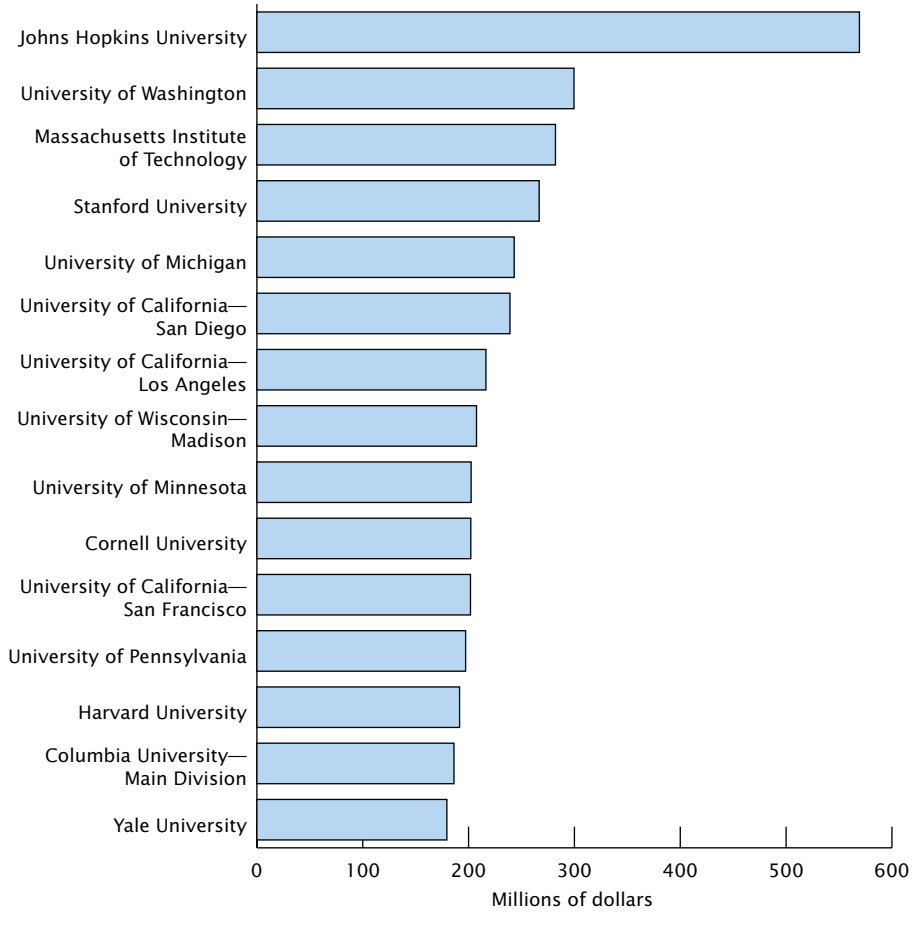
The National Science Board's biennial *Science and Engineering* Indicators contains data and analysis of international and domestic science and technology, including measures of inputs and outputs. The *Budget of the United States Government,* published by the U.S. Office of Management and Budget, contains summary financial data on Federal R&D programs.

Research and development outlays—NSF defines research as a "systematic and intensive study directed toward a fuller knowledge of the subject studied" and development as "the systematic use of scientific knowledge directed toward the production of useful materials, devices, systems, methods, or 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 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.

Figure 20.3
Top 15 Universities—Federal Research and Development Obligations: 1995



Source: Chart prepared by U.S. Census Bureau. For data, see Table 996.

No. 988. R&D Expenditures: 1960 to 1998

[**In millions of dollars, (13,669 represents $13,669,000,000) except as indicated.** For calendar years]

Year	Total	Sources of funds					Objective (percent of total)			Character of work		
		Federal Government	Industry	Universities/ colleges	Nonprofit	Non-Federal Government [1]	Defense related [2]	Space related [3]	Other	Basic research	Applied research	Development
1960	13,669	8,879	4,516	66	122	88	53	3	44	1,256	3,059	9,355
1961	14,514	9,441	4,757	72	146	98	50	6	44	1,476	3,115	9,924
1962	15,577	10,086	5,123	82	177	109	49	7	44	1,780	3,688	10,110
1963	17,446	11,582	5,456	93	195	122	42	14	45	2,060	3,855	11,531
1964	19,053	12,726	5,887	108	198	135	37	19	44	2,358	4,189	12,507
1965	20,192	13,147	6,548	130	221	146	33	21	46	2,618	4,361	13,214
1966	22,010	14,117	7,330	156	249	158	32	20	48	2,886	4,638	14,486
1967	23,279	14,511	8,144	190	267	166	35	14	50	3,113	4,838	15,328
1968	24,646	14,956	9,006	219	286	178	35	14	52	3,361	5,141	16,144
1969	25,965	15,213	10,010	228	311	203	35	11	54	3,471	5,448	17,046
1970	26,235	14,970	10,446	251	340	228	33	10	56	3,567	5,742	16,926
1971	26,910	15,183	10,823	282	364	259	33	10	58	3,698	5,817	17,395
1972	28,661	15,976	11,713	308	389	276	33	8	59	3,829	6,098	18,734
1973	30,905	16,563	13,296	331	417	298	32	7	61	4,051	6,662	20,193
1974	33,238	17,193	14,882	380	470	314	29	7	64	4,439	7,312	21,488
1975	35,565	18,437	15,823	424	542	340	28	7	65	4,827	8,048	22,691
1976	39,314	20,179	17,698	463	608	367	27	8	65	5,291	8,964	25,059
1977	43,233	21,988	19,637	541	683	384	27	7	66	5,925	9,653	27,655
1978	48,582	24,279	22,456	651	768	429	26	6	68	6,841	10,695	31,047
1979	55,269	27,100	26,092	760	841	477	25	6	70	7,736	12,073	35,460
1980	63,076	29,857	30,926	877	911	505	24	5	70	8,651	13,724	40,701
1981	72,190	33,666	35,956	1,031	974	564	24	5	70	9,741	16,389	46,060
1982	80,633	37,113	40,705	1,159	1,037	619	26	5	69	10,658	18,261	51,714
1983	89,742	41,362	45,274	1,329	1,135	642	28	4	68	11,859	20,323	57,560
1984	101,940	46,319	52,225	1,463	1,228	706	29	3	68	13,176	22,481	66,284
1985	114,344	52,493	58,013	1,680	1,365	793	30	3	67	14,510	25,389	74,444
1986	119,907	54,475	61,079	1,944	1,466	942	32	3	65	16,885	27,225	75,796
1987	125,841	58,254	62,669	2,215	1,658	1,044	32	3	65	18,213	27,819	79,809
1988	133,463	59,930	68,076	2,441	1,880	1,135	30	3	66	19,381	29,466	84,614
1989	141,550	60,301	75,091	2,774	2,136	1,248	28	4	68	21,477	32,304	87,767
1990	151,655	61,456	83,374	3,096	2,367	1,361	25	4	70	22,556	34,981	94,118
1991	160,521	60,564	92,484	3,411	2,585	1,477	23	5	73	26,630	38,699	95,193
1992	164,933	60,694	96,404	3,558	2,770	1,507	22	4	74	27,044	37,996	99,894
1993	165,188	60,351	96,702	3,654	2,928	1,554	22	4	74	28,115	37,325	99,749
1994	168,586	60,700	99,324	3,904	3,081	1,576	20	4	76	28,917	36,643	103,024
1995	183,045	63,102	110,985	4,112	3,154	1,692	19	5	77	28,756	40,973	113,316
1996	196,011	63,215	123,520	4,322	3,225	1,730	18	4	78	31,545	43,057	121,410
1997, prel.	205,561	64,865	130,952	4,667	3,314	1,764	17	4	79	32,978	45,982	126,601
1998, prel.	220,617	66,636	143,714	4,974	3,449	1,845	16	4	80	34,426	49,753	136,438

[1] Non-Federal 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.

Source: U.S. National Science Foundation, *National Patterns of R&D Resources*, annual.

No. 989. Federal Obligations for R&D, by Agency: 1980 to 1999

[**In millions of dollars, (29,830 represents $29,830,000,000). For fiscal years ending in year shown;** see text, Section 9, State and Local Government. Includes those agencies with obligations of $1 billion or more in 1999]

Agency	1980	1985	1990	1994	1995	1996	1997	1998, prel.	1999, prel.
CURRENT DOLLARS									
Obligations, total [1]	**29,830**	**48,360**	**63,559**	**67,257**	**68,736**	**67,663**	**69,830**	**72,114**	**73,333**
Dept. of Defense	13,981	29,792	37,268	34,575	34,346	34,495	34,788	34,833	34,350
Dept. of Health and Human Services	3,780	5,451	8,406	11,022	11,455	11,953	12,788	13,718	14,821
National Aeronautics and Space Administration	3,234	3,327	6,533	8,296	9,015	8,570	9,327	9,851	9,201
Dept. of Energy	4,754	4,966	5,631	6,048	6,145	5,345	5,604	5,833	6,541
National Science Foundation	882	1,346	1,690	2,040	2,149	2,188	2,249	2,357	2,655
Dept. of Agriculture	688	943	1,108	1,400	1,380	1,302	1,389	1,442	1,426
CONSTANT (1992) DOLLARS [2]									
Obligations, total [1]	**50,321**	**61,707**	**68,233**	**63,981**	**63,751**	**61,339**	**61,939**	**62,773**	**62,582**
Dept. of Defense	23,585	38,014	40,009	32,891	31,855	31,271	30,857	30,321	29,314
Dept. of Health and Human Services	6,377	6,955	9,024	10,485	10,624	10,836	11,343	11,941	12,648
National Aeronautics and Space Administration	5,456	4,246	7,013	7,892	8,361	7,769	8,273	8,575	7,852
Dept. of Energy	8,019	6,337	6,045	5,753	5,699	4,845	4,970	5,078	5,582
National Science Foundation	1,488	1,717	1,814	1,941	1,993	1,984	1,994	2,052	2,266
Dept. of Agriculture	1,160	1,203	1,189	1,332	1,280	1,180	1,232	1,255	1,217

[1] Includes other agencies, not shown separately. [2] Based on gross domestic product implicit price deflator.

Source: U.S. National Science Foundation, *Federal Funds for Research and Development,* annual.

No. 990. Performance Sector of R&D Expenditures 1993 to 1998

[**In millions of dollars, (165,188 represents $165,188,000,000).** For calendar years]

Year	Total	Industry				Universities and colleges						Other nonprofit institutions				
		Federal Government [1]	Funded by—				Funded by—						Funded by—			
			Total	Federal Government	Industry [2]	Industry FFRDCs [1]	Total	Federal Government	Non-Federal Government	Industry	Universities & colleges	Non-profits	Universities & colleges FFRDCs [3]	Total	Federal Government	Industry	Non-profits	Nonprofit FFRDCs [1]
RESEARCH AND DEVELOPMENT TOTAL																		
1993	165,188	16,532	115,435	20,844	94,591	1,965	20,224	12,133	1,554	1,374	3,654	1,509	5,289	4,995	2,839	737	1,418	749
1994	168,586	16,432	117,393	20,261	97,131	2,202	21,340	12,840	1,576	1,431	3,904	1,589	5,305	5,155	2,900	762	1,493	759
1995	183,045	17,133	129,830	21,178	108,652	2,273	22,406	13,470	1,692	1,506	4,112	1,626	5,388	5,203	2,848	827	1,528	812
1996	196,011	16,574	142,370	21,356	121,015	2,297	23,280	13,962	1,730	1,604	4,322	1,663	5,362	5,359	2,896	901	1,562	769
1997, prel	205,561	16,585	150,337	22,061	128,276	2,373	24,438	14,582	1,764	1,717	4,667	1,708	5,459	5,561	2,996	960	1,605	810
1998, prel	220,617	16,936	163,328	22,481	140,847	2,418	25,672	15,247	1,845	1,829	4,974	1,778	5,529	5,928	3,219	1,038	1,671	807
BASIC RESEARCH																		
1993	28,115	2,623	6,427	466	5,961	492	13,490	8,528	953	843	2,240	925	2,953	2,059	1,153	339	567	72
1994	28,917	2,553	6,514	436	6,078	503	14,266	9,057	966	877	2,393	974	2,934	2,073	1,126	351	597	74
1995	28,756	2,695	5,569	190	5,379	530	15,034	9,554	1,038	924	2,522	997	2,690	2,162	1,170	381	611	76
1996	31,545	2,682	7,498	650	6,848	708	15,728	9,997	1,064	987	2,658	1,022	2,563	2,287	1,248	415	625	79
1997, prel	32,978	2,699	7,674	671	7,003	731	16,727	10,530	1,109	1,079	2,934	1,074	2,654	2,398	1,315	441	642	94
1998, prel	34,426	2,867	7,845	684	7,161	745	17,606	11,009	1,167	1,157	3,147	1,125	2,688	2,564	1,418	478	668	111
APPLIED RESEARCH																		
1993	37,325	4,838	24,251	4,295	19,956	435	5,075	2,508	493	436	1,159	479	962	1,661	900	251	511	103
1994	36,643	5,003	22,988	3,616	19,372	503	5,296	2,598	500	454	1,239	504	985	1,756	960	259	537	112
1995	40,973	5,007	26,919	3,164	23,755	535	5,555	2,721	537	478	1,304	516	1,060	1,766	935	281	550	131
1996	43,057	4,815	29,010	3,640	25,370	231	5,783	2,841	546	506	1,364	525	1,275	1,821	952	306	562	122
1997, prel	45,982	4,830	31,653	3,760	27,893	239	5,868	2,868	537	522	1,420	520	1,385	1,884	980	326	578	123
1998, prel	49,753	5,135	34,580	3,832	30,748	243	6,164	3,024	556	551	1,498	535	1,562	1,966	1,012	353	602	104
DEVELOPMENT																		
1993	99,749	9,071	84,757	16,083	68,674	1,039	1,659	1,096	108	96	254	105	1,374	1,274	787	147	340	574
1994	103,024	8,876	87,890	16,209	71,681	1,196	1,778	1,185	110	100	272	111	1,386	1,325	815	152	358	573
1995	113,316	9,431	97,342	17,824	79,518	1,209	1,816	1,194	118	105	286	113	1,638	1,275	743	165	367	606
1996	121,410	9,077	105,863	17,066	88,797	1,358	1,769	1,123	120	111	299	115	1,524	1,251	696	180	375	568
1997, prel	126,601	9,055	111,010	17,629	93,380	1,403	1,843	1,184	118	115	312	114	1,420	1,279	701	192	385	593
1998, prel	136,438	8,934	120,903	17,965	102,939	1,430	1,902	1,213	122	121	329	118	1,279	1,398	789	208	401	592

[1] For R&D funded by the Federal Government. FFRDCs are federally funded research and development centers. [2] Includes all non-Federal sources. [3] Includes all R&D expenditures of FFRDCs administered by academic institutions and funded by the Federal Government. In 1994, 99 percent of total funds used were from Federal sources.

Source: National Science Foundation, *National Patterns of R&D Resources,* annual series.

No. 991. Performance Sector of R&D Expenditures by State: 1995

[**In millions of dollars, (183,013 represents $183,013,000,000)**. For the fiscal year]

State	Total [1]	Federal Government [2]	Industry			Universities and colleges					
			Total	Funded by—		Total	Funded by—				
				Federal Government [3]	Industry [4]		Federal Government	Industry	Nonprofits	Other [5]	Nonprofits [6]
United States . . .	**183,013**	**17,343**	**132,103**	**23,451**	**108,652**	**22,101**	**13,331**	**1,492**	**1,599**	**5,679**	**5,983**
Alabama	1,681	642	686	273	413	335	190	29	22	94	18
Alaska	163	61	30	(D)	(D)	72	37	5	-	30	1
Arizona	1,995	178	1,356	620	736	380	210	23	12	134	6
Arkansas	330	58	181	(D)	(D)	88	33	8	3	44	3
California	36,133	1,844	28,710	6,925	21,785	2,594	1,797	120	198	480	607
Colorado	2,603	168	1,865	274	1,591	394	260	24	35	74	51
Connecticut	4,311	18	3,906	389	3,517	377	228	20	32	97	10
Delaware	1,149	15	1,077	12	1,065	53	27	4	5	17	3
District of Columbia	3,128	2,106	672	17	656	181	133	13	15	21	169
Florida	5,223	554	4,101	1,634	2,467	559	317	36	29	176	8
Georgia	2,113	272	1,175	142	1,031	658	302	55	25	276	8
Hawaii	509	402	14	(D)	(D)	78	44	-	3	31	15
Idaho	914	28	827	(D)	(D)	59	20	7	2	30	1
Illinois	7,487	81	5,776	146	5,630	818	468	43	65	242	41
Indiana	3,163	62	2,721	382	2,339	376	197	35	20	123	4
Iowa	1,391	37	998	(D)	(D)	323	164	19	15	125	1
Kansas	764	12	569	(D)	(D)	181	70	11	8	92	1
Kentucky	594	6	452	4	448	135	60	17	5	54	1
Louisiana	423	45	61	(D)	(D)	315	136	21	19	138	2
Maine	345	4	286	(D)	(D)	32	16	4	1	11	23
Maryland	6,519	4,159	1,075	287	788	1,160	895	55	50	160	125
Massachusetts	9,969	316	7,416	1,458	5,958	1,147	825	89	128	105	746
Michigan	13,275	82	12,388	148	12,240	755	418	51	57	230	50
Minnesota	3,087	30	2,636	315	2,321	337	195	23	23	96	85
Mississippi	315	133	66	(D)	(D)	113	63	9	6	35	3
Missouri	2,499	55	2,028	584	1,443	397	213	37	33	114	18
Montana	119	34	17	(D)	(D)	67	27	6	1	33	2
Nebraska	336	23	150	(D)	(D)	157	55	11	3	88	6
Nevada	445	35	322	(D)	(D)	87	48	7	1	31	1
New Hampshire	598	31	472	36	436	93	60	4	12	17	2
New Jersey	9,128	344	8,200	197	8,002	443	209	26	33	176	15
New Mexico	3,295	481	1,461	1,380	81	230	157	11	7	56	13
New York	10,954	117	8,651	1,821	6,831	1,702	1,107	98	195	302	203
North Carolina	3,191	220	2,226	15	2,212	687	432	74	21	160	59
North Dakota	98	25	12	(D)	(D)	60	28	3	2	27	1
Ohio	5,314	599	4,001	574	3,428	643	375	54	59	155	72
Oklahoma	529	45	288	38	249	186	60	11	17	99	9
Oregon	1,089	56	741	35	706	259	158	12	21	67	33
Pennsylvania	6,919	228	5,331	376	4,955	1,140	754	120	66	199	189
Rhode Island	896	254	520	(D)	(D)	106	72	2	2	29	17
South Carolina	996	34	739	(D)	(D)	220	109	19	19	72	3
South Dakota	55	13	19	-	19	21	11	-	1	9	1
Tennessee	1,402	62	1,003	(D)	(D)	308	192	16	20	80	20
Texas	8,385	538	6,211	912	5,298	1,472	748	102	167	456	164
Utah	1,144	131	803	178	625	202	141	9	9	43	8
Vermont	308	5	248	(D)	(D)	54	33	5	4	12	1
Virginia	3,897	1,581	1,577	743	834	447	262	46	28	111	219
Washington	5,241	160	4,294	(D)	(D)	486	340	39	15	91	301
West Virginia	475	140	243	(D)	(D)	53	30	3	4	15	6
Wisconsin	2,226	40	1,706	33	1,673	473	271	17	51	135	7
Wyoming	87	9	25	(D)	(D)	40	15	2	3	20	13
Other/unknown	5,805	771	1,772	3,502	8,875	548	320	30	30	167	2,620

- Represents or rounds to zero. D Data withheld to avoiding disclosing information about individual companies. [1]Includes university and college Federally Funded Research and Development Centers (FFRDCs), not shown separately. [2]For R&D funded by the Federal Government. [3]Includes performance at industry FFRDCs. [4]Includes all non-Federal sources. [5]Represents funding by state and local governments and universities and colleges. [6]Data by state are for R&D funded by the Federal Government. United States total includes other support, not allocated by location.

Source: U.S. National Science Foundation, *National Patterns of R&D Resources,* 1998.

No. 992. Federal Funding for R&D, by Selected Budget Functions: 1970 to 1999

[**In millions of dollars, (15,339 represents $15,339,000,000).** For fiscal years ending in year shown; see text, Section 9, State and Local Government. Excludes R&D plant. Represents budget authority. Functions shown are those for which $1 billion or more was authorized for 1999]

Function	1970	1980	1985	1990	1995	1996	1997	1998, prel.	1999, prel.
CURRENT DOLLARS									
Total [1]	**15,339**	**29,739**	**49,887**	**63,781**	**68,791**	**69,049**	**71,653**	**73,639**	**75,229**
Eight functions, percent of total	96.6	96.5	98.3	98.0	97.7	98.0	98.1	98.1	97.9
National defense	7,981	14,946	33,698	39,925	37,204	37,801	39,591	39,871	39,699
Health	1,084	3,694	5,418	8,308	11,407	11,867	12,670	13,557	14,622
Space research and technology [2]	3,606	2,738	2,725	5,765	7,916	7,844	7,844	8,265	8,037
Energy [2]	574	3,603	2,389	2,715	2,844	2,521	2,372	1,143	1,470
General science	452	1,233	1,862	2,410	2,794	2,846	2,944	4,210	4,649
Natural resources and environment	340	999	1,059	1,386	1,988	1,802	1,886	2,015	2,013
Transportation	535	887	1,030	1,045	1,833	1,795	1,785	1,920	1,904
Agriculture	238	585	836	950	1,194	1,176	1,203	1,243	1,272
CONSTANT (1992) DOLLARS [3]									
Total [1]	**51,113**	**50,108**	**63,623**	**68,448**	**63,931**	**62,728**	**63,556**	**64,101**	**64,199**
National defense	26,594	25,183	42,977	42,847	34,575	34,341	35,117	34,707	33,879
Health	3,612	6,224	6,910	8,916	10,601	10,781	11,239	11,801	12,478
Space research and technology [2]	12,016	4,613	3,475	6,187	7,357	7,126	6,958	7,195	6,859
Energy [2]	1,913	6,071	3,047	2,925	2,643	2,290	2,104	995	1,254
General science	1,506	2,078	2,375	2,586	2,596	2,586	2,612	3,665	3,967
Natural resources and environment	1,133	1,683	1,351	1,487	1,848	1,637	1,673	1,754	1,718
Transportation	1,783	1,495	1,314	1,121	1,704	1,630	1,584	1,671	1,625
Agriculture	793	986	1,066	1,020	1,109	1,068	1,067	1,082	1,085

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

Source: U.S. National Science Foundation, *Federal R&D Funding by Budget Function,* annual.

No. 993. National R&D Expenditures as a Percent of Gross Domestic Product, by Country: 1981 to 1997

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
1981	2.32	2.13	2.43	1.97	2.37	0.88	1.75	(NA)	2.34	1.57	1.84	0.85
1985	2.74	2.58	2.72	2.25	2.23	1.13	1.92	2.56	2.60	1.87	1.76	1.07
1990	2.64	2.85	2.75	2.41	2.18	1.30	1.97	2.83	2.62	1.95	1.84	1.26
1993	2.52	2.68	2.42	2.45	2.15	1.14	1.98	2.65	2.34	2.10	1.85	1.09
1994	2.43	2.63	2.32	2.38	2.11	1.06	1.94	2.60	2.25	2.05	1.84	1.01
1995	2.52	2.77	2.30	2.34	2.02	1.01	2.05	2.73	2.22	2.04	1.77	0.98
1996	2.57	(NA)	2.28	2.32	1.94	1.03	2.11	(NA)	2.20	(NA)	1.71	(NA)
1997	2.54	(NA)	2.26	(NA)	(NA)	1.06	2.10	(NA)	(NA)	(NA)	(NA)	(NA)

NA Not available. [1] Estimated.

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

No. 994. R&D Expenditures in Science and Engineering at Universities and Colleges: 1981 to 1997

[**In millions of dollars, (6,846 represents $6,846,000,000)**]

Characteristic	1981	1990	1997	Characteristic	1981	1990	1997
CURRENT DOLLARS				CONSTANT (1992) DOLLARS [1]			
Total	**6,846**	**16,285**	**24,348**	**Total**	**10,513**	**17,483**	**21,597**
Basic research	4,593	10,641	16,678	Basic research	7,053	11,424	14,793
Applied R&D	2,253	5,644	7,670	Applied R&D	3,460	6,059	6,803
Source of funds:				Source of funds:			
All governments	5,115	10,960	16,379	All governments	7,855	11,766	14,528
Institutions' own funds	1,004	3,006	4,544	Institutions' own funds	1,542	3,227	4,031
Industry	292	1,128	1,713	Industry	448	1,211	1,519
Other	435	1,191	1,712	Other	668	1,279	1,519
Fields:				Fields:			
Physical sciences	765	1,807	2,364	Physical sciences	1,175	1,940	2,097
Environmental sciences	550	1,068	1,539	Environmental sciences	845	1,147	1,365
Mathematical sciences	87	222	293	Mathematical sciences	134	238	260
Computer sciences	144	515	719	Computer sciences	221	553	638
Life sciences	3,695	8,726	13,608	Life sciences	5,674	9,368	12,070
Psychology	127	253	387	Psychology	195	272	343
Social sciences	366	703	1,117	Social sciences	562	755	991
Other sciences	145	336	504	Other sciences	223	361	447
Engineering	967	2,656	3,818	Engineering	1,485	2,851	3,387

[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.

No. 995. Federal Obligations to Universities and Colleges: 1970 to 1996

[**In millions of dollars, (3,237 represents $3,237,000,000) except percent. For fiscal years ending in year shown;** see text, Section 9, State and Local Government. Minus sign (-) indicates decrease]

Item	1970	1980	1985	1990	1993	1994	1995	1996
CURRENT DOLLARS								
Federal obligations, total	**3,237**	**8,299**	**10,972**	**15,218**	**(NA)**	**(NA)**	**(NA)**	**(NA)**
Annual percent change [1]	-6.5	9.1	9.3	-1.9	(NA)	(NA)	(NA)	(NA)
Academic science/engineering obligations	2,188	4,791	7,258	10,463	12,833	13,863	14,445	14,429
Percent of total	67.6	57.7	66.2	68.8	(NA)	(NA)	(NA)	(NA)
Research and development	1,447	4,161	6,246	9,009	11,024	11,894	12,165	12,323
Research and development plant	45	38	114	142	259	217	341	248
Other science/engineering activities	696	593	898	1,312	1,550	1,752	1,939	1,857
Nonscience/engineering activities	1,049	3,508	3,714	4,755	(NA)	(NA)	(NA)	(NA)
CONSTANT (1992) DOLLARS [2]								
Federal obligations, total	**10,814**	**13,999**	**14,000**	**16,337**	**(NA)**	**(NA)**	**(NA)**	**(NA)**
Annual percent change [1]	-11.2	0.2	5.6	-5.8	(NA)	(NA)	(NA)	(NA)
Academic science/engineering obligations	7,309	8,082	9,261	11,233	12,503	13,188	13,397	13,080
Percent of total	67.6	57.7	66.2	68.8	(NA)	(NA)	(NA)	(NA)
Research and development	4,833	7,018	7,970	9,672	10,740	11,315	11,282	11,171
Research and development plant	150	64	145	152	253	206	317	225
Other science/engineering activities	2,326	1,000	1,146	1,409	1,510	1,667	1,798	1,684
Nonscience/engineering activities	3,505	5,917	4,739	5,104	(NA)	(NA)	(NA)	(NA)

NA Not available. [1] Percent change from immediate prior year. [2] 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.

No. 996. Federal R&D Obligations to Selected Universities and Colleges: 1981 to 1996

[**In thousands of dollars, (4,410,931 represents $4,410,931,000). For fiscal years ending in year shown;** see text, Section 9, State and Local Government. For the top 45 institutions receiving Federal R&D funds in 1996. 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 **1995** Federal R&D obligations	Obligations ($1,000)			Rank		
	1981	**1985**	**1996**	**1981**	**1985**	**1996**
Total, all institutions [1]	**4,410,931**	**6,246,181**	**12,323,165**	**(X)**	**(X)**	**(X)**
45 institutions, percent of total	62.1	60.8	59.1	(X)	(X)	(X)
Johns Hopkins University	363,429	297,374	611,683	1	1	1
University of Washington	99,965	146,179	309,853	4	4	2
Massachusetts Institute of Technology	146,035	189,558	229,174	2	2	5
Stanford University	106,073	174,961	294,859	3	3	3
University of Michigan	73,999	108,035	261,284	11	11	4
University of California—San Diego	91,403	103,633	226,260	6	13	6
University of California—Los Angeles	94,945	128,211	208,356	5	5	9
University of Wisconsin—Madison	86,918	124,604	208,300	8	7	10
University of Minnesota	72,001	103,272	192,556	14	14	13
Cornell University	72,671	119,966	178,194	13	8	16
University of California—San Francisco	64,814	98,536	218,935	15	16	7
University of Pennsylvania	76,136	103,119	216,699	10	15	8
Harvard University	87,830	109,414	205,360	7	9	11
Columbia University—Main Division	83,659	127,331	190,230	9	6	14
Yale University	73,526	109,227	197,042	12	10	12
University of Pittsburgh	38,512	58,620	154,120	29	28	22
Washington University	54,170	71,978	186,572	17	22	15
University of Colorado	46,146	71,424	168,953	22	23	17
University of North Carolina at Chapel Hill	38,447	63,105	164,603	30	27	19
Duke University	44,287	69,169	164,886	23	26	18
Pennsylvania State University	47,099	76,726	155,468	21	19	21
University Southern California	49,221	89,706	164,049	20	17	20
University of California—Berkeley	64,065	106,710	138,973	16	12	23
University of Arizona	36,308	49,740	120,770	33	37	26
Case Western Reserve University	33,744	47,994	136,514	38	40	24
University of Alabama—Birmingham	29,970	44,093	134,107	44	46	25
University of Texas at Austin	43,756	72,379	104,489	24	21	32
University of Illinois—Urbana Champaign	53,583	83,122	116,740	19	18	28
California Institute of Technology	32,959	55,083	112,221	40	32	29
University of Rochester	42,983	70,379	110,951	25	25	30
University of Chicago	53,992	71,194	118,110	18	24	27
Northwestern University	32,446	48,260	109,279	47	39	31
University of California—Davis	31,757	43,156	95,994	42	47	34
Ohio State University	42,899	56,065	90,923	26	30	39
Vanderbilt University	27,426	39,909	92,050	49	48	38
University of Iowa	35,300	55,117	93,542	34	31	35
University of Utah	38,163	50,938	88,622	31	36	41
University of Maryland—College Park	27,313	51,073	88,507	50	35	42
Indiana University	29,276	39,118	90,158	45	49	40
Georgetown University	10,327	18,194	73,604	103	91	50
Boston University	27,019	46,152	92,900	51	43	36
New York University	40,636	74,577	84,169	28	20	44
Baylor College of Medicine	35,062	45,837	92,211	35	45	37
University of Florida	30,845	47,716	81,495	43	41	46
University of Miami	28,956	33,709	76,826	46	59	48

X Not applicable. [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. 997. Funds for Performance of Industrial R&D, by Source of Funds and Selected Industries: 1980 to 1997

[**In millions of dollars, (44,505 represents $44,505,000,000). For calendar years.** Covers basic research, applied research, and development]

Industry	1987 SIC [1] code	1980	1985	1990	1995	1996	1997
CURRENT DOLLARS							
Total funds	(X)	44,505	84,239	109,727	132,103	144,667	157,539
Chemicals and allied products	28	4,636	8,540	13,291	17,547	(D)	(D)
Petroleum refining and extraction	13,29	1,552	(D)	2,306	1,760	1,654	(D)
Machinery	35	5,901	12,216	14,446	(D)	13,455	18,499
Electrical equipment	36	9,175	14,432	13,400	18,751	22,498	24,585
Motor vehicles and motor vehicles equipment	371	4,955	6,984	(D)	(D)	(D)	(D)
Aircraft and missiles	372,376	9,198	22,231	20,635	16,951	16,224	16,296
Professional and scientific instruments	38	3,029	5,013	7,055	11,976	12,149	13,458
All other [2]	(X)	6,059	(D)	(D)	(D)	(D)	(D)
Company funds	(X)	30,476	57,043	81,602	108,652	121,015	133,611
Chemicals and allied products	28	4,264	8,310	13,168	17,337	17,520	18,628
Petroleum refining and extraction	13,29	1,401	2,194	2,289	1,754	1,630	1,612
Machinery	35	5,254	10,721	13,575	9,676	13,338	18,393
Electrical equipment	36	5,431	9,271	9,267	17,060	20,356	22,747
Motor vehicles and motor vehicles equipment	371	4,300	6,164	8,594	13,590	14,528	13,758
Aircraft and missiles	372,376	2,570	5,649	5,387	5,489	5,710	5,677
Professional and scientific instruments	38	2,456	4,622	6,318	8,516	8,207	8,958
All other [2]	(X)	4,800	10,112	23,004	35,230	39,726	43,838
CONSTANT (1992) DOLLARS [3]							
Total funds	(X)	73,769	107,270	117,230	122,590	131,277	140,159
Chemicals and allied products	28	7,684	10,875	14,200	16,283	(D)	(D)
Petroleum refining and extraction	13,29	2,573	(D)	2,464	1,633	1,501	(D)
Machinery	35	9,781	15,556	15,434	(D)	12,210	16,458
Electrical equipment	36	15,208	18,378	14,316	17,401	20,416	21,873
Motor vehicles and motor vehicles equipment	371	8,213	8,893	(D)	(D)	(D)	(D)
Aircraft and missiles	372,376	15,246	28,309	22,046	15,730	14,722	14,498
Professional and scientific instruments	38	5,021	6,384	7,537	11,114	11,025	11,973
All other [2]	(X)	10,043	(D)	(D)	(D)	(D)	(D)
Company funds	(X)	50,515	72,638	87,182	100,828	109,814	118,871
Chemicals and allied products	28	7,068	10,582	14,068	16,089	15,898	16,573
Petroleum refining and extraction	13,29	2,322	2,794	2,446	1,628	1,479	1,434
Machinery	35	8,709	13,652	14,503	8,979	12,103	16,364
Electrical equipment	36	9,002	11,806	9,901	15,831	18,472	20,238
Motor vehicles and motor vehicles equipment	371	7,127	7,849	9,182	12,611	13,183	12,240
Aircraft and missiles	372,376	4,260	7,193	5,755	5,094	5,181	5,051
Professional and scientific instruments	38	4,071	5,886	6,750	7,903	7,447	7,970
All other [2]	(X)	7,956	12,877	24,577	32,693	36,049	39,002

D Figure withheld to avoid disclosure of information pertaining to a specific organization or individual. X Not applicable. [1] Prior to 1993, 1972 Standard Industrial Classification; beginning 1993, 1987 Standard Industrial Classification; see text, Section 17, Business. [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. 998. R&D Funds in R&D-Performing Manufacturing Companies, by Industry: 1980 to 1997

Industry	1987 SIC [1] code	Total R&D funds as a percent of net sales					Company R&D funds as a percent of net sales				
		1980	1990	1995	1996	1997	1980	1990	1995	1996	1997
Total [2]	(X)	3.0	4.2	3.6	3.5	3.4	2.1	3.1	2.9	3.0	2.9
Food and kindred products [3]	20	0.4	(D)	0.5	0.4	0.5	(D)	0.5	0.5	0.4	0.5
Paper and allied products	26	1.0	1.0	(D)	(D)	(D)	1.0	1.0	1.0	1.2	1.1
Chemicals and allied products	28	3.6	5.3	4.7	(D)	(D)	3.3	5.3	4.7	5.3	5.3
Petroleum refining and extraction	13,29	0.6	0.9	0.7	0.7	(D)	0.5	0.9	0.7	0.7	0.6
Rubber products	30	2.2	(D)	(D)	(D)	(D)	(D)	2.1	1.6	1.8	1.4
Stone, clay, and glass products	32	1.4	(D)	1.5	1.3	1.8	1.3	1.7	1.5	1.2	1.8
Primary metals	33	0.7	0.8	0.5	(D)	0.7	0.5	0.8	0.5	0.6	0.6
Fabricated metal products	34	1.4	1.4	1.1	(D)	1.6	1.2	1.1	1.1	1.4	1.5
Machinery	35	5.0	7.7	(D)	5.2	5.6	4.5	7.2	3.6	5.1	5.6
Electrical equipment	36	6.6	6.5	6.0	6.7	6.2	3.9	4.5	5.4	6.1	5.7
Motor vehicles and motor vehicle equipment	371	4.9	(D)	(D)	(D)	(D)	4.2	3.7	3.6	4.2	3.8
Aircraft and missiles	372,376	13.7	11.8	12.9	12.9	11.2	3.8	3.1	4.2	4.5	3.9
Professional and scientific instruments	38	7.5	8.0	10.3	11.5	11.6	6.1	7.1	7.3	7.7	7.7

D Figure withheld to avoid disclosure of information pertaining to a specific organization or individual. X Not applicable. [1] Prior to 1994, 1972 Standard Industrial Classification; beginning 1994, 1987 Standard Industrial Classification; see text, Section 17, Business. [2] Includes all manufacturing industries. [3] Includes tobacco products (SIC 21) beginning 1985.

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

No. 999. Federal Obligations for Research, by Field of Science: 1980 to 1999

[**In millions of dollars, (11,597 represents $11,597,000,000). For fiscal years ending in year shown;** see text, Section 9, State and Local Government. Excludes R&D plant]

Field	1980	1985	1990	1994	1995	1996	1997	1998, prel.	1999, prel.
CURRENT DOLLARS									
Research, total	**11,597**	**16,133**	**21,622**	**27,433**	**28,570**	**28,265**	**29,366**	**31,471**	**32,992**
Basic	4,674	7,819	11,286	13,545	13,893	14,462	14,942	15,862	16,914
Applied	6,923	8,315	10,337	13,888	14,677	13,803	14,423	15,609	16,079
Life sciences	4,192	6,363	8,830	11,291	11,869	12,100	12,661	13,621	14,366
Psychology	199	327	449	550	621	513	545	578	612
Physical sciences	2,001	3,046	3,809	4,258	4,282	3,964	4,149	4,335	4,578
Environmental sciences	1,261	1,404	2,174	2,828	2,947	2,997	3,046	3,288	3,261
Mathematics and computer sciences	241	575	841	1,292	1,531	1,554	1,672	1,831	2,255
Engineering	2,830	3,618	4,227	5,509	5,740	5,680	5,690	6,090	6,023
Social sciences	524	460	630	647	679	674	696	824	883
Other sciences, n.e.c. [1]	350	342	664	1,058	902	783	906	904	994
CONSTANT (1992) DOLLARS [2]									
Research, total	**19,564**	**20,586**	**23,212**	**26,097**	**26,498**	**25,623**	**26,047**	**27,394**	**28,155**
Basic	7,885	9,977	12,116	12,885	12,885	13,111	13,254	13,807	14,434
Applied	11,679	10,610	11,097	13,211	13,613	12,513	12,794	13,587	13,721
Life sciences	7,072	8,119	9,479	10,741	11,008	10,969	11,231	11,857	12,260
Psychology	336	417	482	523	576	465	484	503	523
Physical sciences	3,375	3,887	4,089	4,051	3,971	3,594	3,680	3,774	3,907
Environmental sciences	2,127	1,791	2,334	2,690	2,734	2,717	2,701	2,862	2,783
Mathematics and computer sciences	406	734	903	1,229	1,420	1,409	1,483	1,594	1,924
Engineering	4,774	4,616	4,537	5,241	5,324	5,149	5,047	5,301	5,140
Social sciences	884	587	676	616	629	611	618	717	754
Other sciences, n.e.c. [1]	590	436	713	1,007	836	710	804	787	848

[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.

No. 1000. R&D Scientists and Engineers—Employment and Cost, by Industry: 1980 to 1997

[**469.2 represents 469,200.** Data are estimates; on average full-time-equivalent (FTE) basis]

Industry	1987 SIC [1] code	1980	1985	1990	1992	1993	1994	1995	1996	1997
EMPLOYED SCIENTISTS										
Average FTE of scientists and engineers (1,000) [2] [3]	**(X)**	**469.2**	**646.8**	**758.5**	**772.0**	**766.6**	**766.6**	**757.3**	**789.5**	**859.3**
Chemicals [4]	28	53.1	71.1	80.4	85.6	93.1	89.8	96.4	97.0	91.7
Machinery	35	65.7	81.7	113.3	99.3	97.4	83.9	69.5	78.0	88.0
Electrical equipment [5]	36	100.7	113.2	105.2	91.9	89.2	92.9	99.9	114.6	130.9
Motor vehicles	371	36.7	28.7	49.4	44.5	45.1	48.1	51.1	54.1	60.4
Aircraft and missiles	372,376	90.6	130.2	115.3	92.9	97.9	85.4	68.2	79.5	95.1
CONSTANT (1992) DOLLARS [6]										
Cost per scientist or engineer ($1,000) [3] [7]	**(X)**	**164.8**	**164.7**	**154.9**	**155.6**	**151.5**	**147.9**	**150.7**	**152.3**	**151.2**
Chemicals [4]	28	152.5	148.6	174.5	91.8	(D)	(D)	84.0	82.1	(D)
Machinery	35	152.3	90.7	152.9	126.7	106.9	47.9	(D)	69.4	150.0
Electrical equipment [5]	36	154.5	156.4	154.9	147.4	144.5	141.5	146.7	152.2	147.6
Motor vehicles	371	234.2	142.0	(D)	(D)	(D)	(D)	(D)	(D)	(D)
Aircraft and missiles	372,376	190.6	198.3	208.7	178.5	191.8	172.9	185.7	174.2	160.5

D Withheld to avoid disclosure. X Not applicable. [1] Prior to 1992, 1972 Standard Industrial Classification; beginning 1992, 1987 Standard Industrial Classification; see text, Section 17, Business. [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] Includes allied products. [5] Includes communication. [6] Based on gross domestic product implicit price deflator. [7] 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. 1001. Civilian Employment of Scientists, Engineers, and Technicians, by Occupation and Industry: 1996

[**In thousands, (4,885.5 represents 4,885,500).** Based on sample and subject to sampling error. For details, see source]

Occupation	Wage and salary workers									Self employed
	Total [1]	Mining [2]	Construction	Manufacturing	Transportation [3]	Trade	Fire [4]	Services	Government	
Scientists, engineers, and technicians	4,885.5	54.6	67.2	1,394.5	208.9	236.5	192.1	1,792.2	694.2	235.9
Scientists	665.7	11.4	0.4	79.9	5.4	3.8	11.8	258.9	197.9	92.5
Physical scientists	206.7	9.9	0.4	51.3	3.0	2.4	0.8	81.6	47.2	10.2
Life scientists	180.0	0.2	0.1	27.1	1.2	1.4	0.4	62.9	74.7	8.3
Mathematical scientists	15.6	(NA)	(NA)	1.5	0.4	(NA)	3.1	4.5	4.8	1.3
Social scientists	263.5	1.3	(NA)	(NA)	0.8	(NA)	7.6	109.9	71.2	72.7
Computer systems analysts, engineers and scientists	932.8	3.7	2.1	196.6	42.2	60.8	86.5	375.0	107.4	58.4
Engineers [5]	1,382.4	18.9	31.0	620.4	68.7	39.1	10.5	370.0	177.9	45.8
Civil engineers	196.1	0.6	10.9	7.5	5.3	0.5	0.4	86.6	71.3	13.0
Electrical/electronics	367.2	0.6	9.4	163.6	34.6	13.5	1.3	96.1	34.9	13.1
Mechanical engineers	227.9	1.6	5.1	131.2	4.2	7.2	(NA)	61.6	11.8	4.0
Engineering and science technicians	1,235.8	15.7	29.4	432.8	66.9	91.7	4.3	423.0	154.9	11.8
Electrical/electronics technicians	297.4	1.0	7.9	104.3	21.4	69.5	1.4	70.0	20.3	1.7
Engineering technicians	400.2	4.9	4.2	150.9	25.5	11.4	0.3	105.9	92.9	3.2
Drafters	309.9	1.9	16.9	96.5	16.7	7.1	1.3	152.2	10.2	4.6
Science technicians	228.3	8.0	0.4	81.1	3.3	3.7	1.2	94.9	31.5	2.3
Surveyors	100.7	2.4	2.6	0.1	2.8	(NA)	0.7	62.5	22.0	7.5
Computer programmers	568.0	2.4	1.5	64.8	22.8	41.0	78.3	302.9	34.0	20.0

NA Not available. [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 kinds of engineers and technicians not shown separately.

Source: U.S. Bureau of Labor Statistics, *Monthly Labor Review*, November 1997; and unpublished data. (Data collected biennially.)

No. 1002. Graduate Science/Engineering Students in Doctorate-Granting Colleges: 1985 to 1997

[**355.8 represents 355,800.** As of **fall.** Includes outlying areas]

Field of science or engineering	Total (1,000)			Percent—							
				Female			Foreign		Part-time		
	1985	1990	1997	1985	1990	1997	1990	1997	1985	1990	1997
Total, all surveyed fields	**355.8**	**398.8**	**424.6**	**34.5**	**37.6**	**43.8**	**25.4**	**23.3**	**32.4**	**31.1**	**29.0**
Science/engineering	317.2	351.7	359.5	29.5	32.4	38.2	27.7	26.3	30.7	28.9	27.1
Engineering, total	90.2	99.8	94.5	11.5	13.6	18.5	36.6	37.3	39.7	35.9	32.4
Sciences, total	226.9	251.9	265.0	36.6	39.8	45.2	24.1	22.3	27.2	26.1	25.2
Physical sciences	29.4	32.5	29.7	20.5	23.4	28.0	37.0	35.8	11.9	11.3	11.4
Environmental	14.1	12.9	13.0	25.3	29.1	36.2	20.1	18.9	23.8	23.6	23.5
Mathematical sciences	15.4	17.5	14.9	29.0	30.6	33.7	35.5	35.4	27.6	24.5	22.4
Computer sciences	24.2	28.1	30.1	25.2	23.2	26.7	32.7	37.8	48.6	47.2	45.2
Agricultural sciences	10.9	10.6	11.1	25.8	29.3	38.0	28.8	24.2	18.4	17.9	21.7
Biological sciences	42.2	46.4	52.9	42.5	45.5	49.5	24.2	20.7	16.1	14.8	14.8
Psychology	30.8	35.9	39.1	59.7	65.6	69.4	4.6	4.6	30.6	29.0	26.5
Social sciences	59.9	68.0	74.3	39.8	42.8	48.8	21.7	18.9	34.4	32.9	30.6
Health fields, total	38.7	47.2	65.2	75.7	76.9	74.8	8.6	7.1	46.2	47.4	39.5

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

No. 1003. Science and Engineering Degree Recipients in 1995 and 1996:

[In thousands, (708.9 represents 708,900). Based on survey a and subject to sampling error; see source for details]

Degree and field	Graduates 1995 and 1996 (1,000)	1996 [1] Percent distribution				Median salary [4] ($1,000)
			Employed		Not employed or not FT students	
		In school [2]	In S&E [3]	In other		
Bachelor's recipients	**708.9**	**21**	**21**	**53**	**5**	**28.2**
All science fields	593.8	23	12	60	5	26.0
Computer and information sciences	41.0	6	57	34	3	37.7
Mathematical sciences	26.8	19	15	63	3	29.8
Life and related sciences	139.0	31	11	53	5	22.8
Physical and related sciences	36.6	38	26	33	3	27.3
Psychology	138.0	24	6	65	5	22.3
Social and related sciences	212.4	18	6	70	6	26.4
All engineering fields	115.1	13	65	18	3	37.7
Aerospace and related engineering	3.0	22	48	27	2	34.0
Chemical engineering	11.6	17	65	14	4	39.3
Civil and architectural engineering	20.7	14	63	20	3	34.4
Electrical, electronics, computer and communications engineering	32.9	10	70	16	4	40.5
Industrial engineering	5.8	8	66	24	2	37.6
Mechanical engineering	27.9	11	71	15	3	38.2
Other engineering	13.2	21	52	25	3	34.1
Master's recipients	**149.5**	**21**	**49**	**27**	**3**	**41.5**
All science fields	102.5	23	36	36	4	37.2
Computer and mathematical sciences	18.2	6	74	18	2	51.2
Mathematical sciences	7.9	27	37	32	3	39.7
Life and related sciences	15.3	32	37	27	4	32.4
Physical and related sciences	9.7	37	42	18	3	33.6
Social and related sciences	25.1	26	15	54	5	35.0
All engineering fields	47.0	15	75	9	2	49.9
Aerospace and related engineering	1.5	31	54	15	1	48.8
Chemical engineering	2.0	33	61	4	2	47.6
Civil and architectural engineering	6.5	11	76	11	1	41.9
Electrical, electronics, computer and communications engineering	16.2	15	77	7	1	55.0
Industrial engineering	3.2	13	70	16	1	49.9
Mechanical engineering	7.2	16	72	10	2	47.7
Other engineering	10.4	10	78	9	4	49.0

[1] As of April. [2] Full-time students. [3] In science and engineering. [4] For the principal job. Excludes full-time students, the self-employed, and persons whose principal job is less than 35 hours per week.

Source: National Science Foundation/SRS, *National Survey of Recent College Graduates: 1996.*

No. 1004. Doctorates Conferred, by Recipients' Characteristics: 1990 and 1997

[In percent, except as indicated]

Characteristic	1990, total	1997										
		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**	**42,705**	**6,052**	**3,711**	**862**	**1,112**	**889**	**5,717**	**966**	**4,049**	**3,489**
Male	63.7	59	87	78	76	77	83	57	74	61	33
Female	36.3	41	12	22	24	23	16	43	26	39	67
Median age [5]	33.9	34	31	30	33	31	32	31	34	35	33
CITIZENSHIP [6]											
Total conferred (number)	**34,697**	**39,058**	**5,677**	**3,488**	**799**	**1,032**	**820**	**5,415**	**893**	**3,726**	**3,103**
U.S. citizen	71.8	71	47	61	65	50	51	67	52	68	93
Foreign citizen	28.2	29	53	39	35	50	49	33	48	32	7
RACE/ETHNICITY [7]											
Total conferred (number)	**26,604**	**30,601**	**3,281**	**2,473**	**587**	**616**	**506**	**4,203**	**546**	**2,817**	**2,976**
White [8]	86.5	78	69	76	80	76	71	74	75	78	83
Black [8]	3.8	5	3	2	2	1	1	3	4	6	5
Asian/Pacific [8]	4.9	10	22	16	12	16	21	17	12	8	4
Indian/Alaskan [8]	0.4	1	-	-	-	-	-	-	1	1	1
Hispanic	3.1	4	3	3	3	3	3	3	5	3	6
Other/unknown	1.4	3	3	3	3	3	4	3	4	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.

Source: U.S. National Science Foundation, Division of Science Resources Studies, Survey of Earned Doctorates, *Selected Data on Science and Engineering Doctorate Awards,* annual.

No. 1005. Space Vehicle Systems—Net Sales and Backlog Orders: 1965 to 1998

[**In millions of dollars, (2,449 represents $2,449,000,000).** Backlog orders as of Dec. 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
1965	2,449	602	1,847	2,203	503	1,700	1988	8,622	6,190	[1]2,432	10,838	7,880	[1]2,958
1970	1,956	1,025	931	1,184	786	398	1989	9,758	6,457	[1]3,301	13,356	9,192	[1]4,164
1975	2,119	1,096	1,023	1,304	1,019	285	1990	9,691	6,556	[1]3,135	12,462	8,130	[1]4,332
1980	3,483	1,461	2,022	1,814	951	863	1991	10,515	6,770	[1]3,745	11,664	6,221	[1]5,443
1981	3,856	1,736	2,120	3,174	2,164	1,010	1992	9,266	5,887	[1]3,379	12,809	7,622	[1]5,187
1982	4,749	2,606	2,143	4,337	2,403	1,934	1993	8,309	4,175	[1]4,133	15,203	8,332	[1]6,871
1983	4,940	2,420	2,520	4,865	2,733	2,132	1994	10,594	5,707	[1]4,887	12,888	6,732	[1]6,156
1984	5,225	3,019	2,206	4,624	3,099	1,525	1995	11,314	4,782	[1]6,532	15,650	5,872	[1]9,778
1985	6,300	4,241	2,059	6,707	4,941	1,766	1996	11,209	4,777	[1]6,432	18,262	5,864	[1]12,398
1986	6,304	4,579	[1]1,725	8,063	6,028	[1]2,035	1997	11,698	5,613	[1]6,085	23,004	9,125	[1]13,879
1987	8,051	5,248	[1]2,803	12,393	9,460	[1]2,933	1998	13,410	4,916	[1]8,494	23,357	8,790	[1]14,567

[1] Includes data for nonmilitary missile systems and parts.

Source: U.S. Census Bureau, *Current Industrial Reports,* MA-37D, *Aerospace Industry (Orders, Sales, and Backlog)* and, beginning 1994, Internet site <http://www.census.gov/cir/www>.

No. 1006. Federal Outlays for General Science, Space, and Other Technology: 1970 to 2004

[**In billions of dollars, (4.5 represents $4,500,000,000). For fiscal years ending in year shown;** see text, Section 9, State and Local Governments]

Year	Current dollars			Constant (1992) 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	16.0	3.4	12.6
1975	4.0	1.0	3.0	10.0	2.6	7.4
1980	5.8	1.4	4.5	10.0	2.4	7.6
1982	7.2	1.6	5.6	10.4	2.3	8.1
1983	7.9	1.6	6.3	10.9	2.3	8.6
1984	8.3	1.8	6.5	11.0	2.4	8.6
1985	8.6	2.0	6.6	11.1	2.6	8.5
1986	9.0	2.2	6.8	11.2	2.8	8.5
1987	9.2	2.2	7.0	11.2	2.7	8.4
1988	10.8	2.4	8.4	12.6	2.8	9.8
1989	12.8	2.6	10.2	14.4	2.9	11.4
1990	14.4	2.8	11.6	15.6	3.1	12.6
1991	16.1	3.1	13.0	16.5	3.2	13.3
1992	16.4	3.5	12.8	16.4	3.5	12.8
1993	17.0	3.9	13.1	16.4	3.8	12.6
1994	16.2	3.8	12.4	15.1	3.6	11.5
1995	16.7	4.1	12.6	15.2	3.7	11.5
1996	16.7	4.0	12.7	14.8	3.5	11.2
1997	17.1	4.1	13.1	15.0	3.6	11.4
1998	18.2	5.3	12.9	15.4	4.5	10.9
1999, est.	18.5	5.7	12.8	15.5	4.8	10.8
2000, est.	18.5	6.2	12.3	15.3	5.2	10.1
2001, est.	18.9	6.5	12.4	15.5	5.4	10.1
2002, est.	19.1	6.7	12.4	15.5	5.4	10.1
2003, est.	19.3	6.7	12.5	15.3	5.3	9.9
2004, est.	19.3	6.7	12.6	14.9	5.2	9.7

Source: U.S. Office of Management and Budget, *Budget of the United States, Historical Tables, Fiscal Year 2000,* annual.

No. 1007. U.S. Commercial Space Revenues, by Type: 1990 to 1995

[**In millions of dollars (3,385 represents $3,385,000,000).** For calendar years]

Industry	1990	1991	1992	1993	1994	1995 [1]
Total	**3,385**	**4,370**	**4,860**	**5,295**	**6,640**	**7,768**
Commercial satellites delivered	1,000	1,300	1,300	1,100	1,400	1,550
Satellite services	800	1,200	1,500	1,850	2,330	2,740
Fixed	735	1,115	1,275	1,600	1,980	2,340
Mobile	65	85	225	250	350	400
Satellite ground equipment	860	1,300	1,400	1,600	1,970	2,570
Mobile-equipment	145	280	350	420	480	510
Commercial launches	570	380	450	465	580	513
Remote sensing data and services	155	190	210	250	300	340
Commercial R&D infrastructure	-	-	-	30	60	55

- Represents zero. [1] Forecast.

Source: U.S. Department of Commerce, International Trade Administration, *U.S. Industrial Outlook,* annual; and unpublished data.

No. 1008. National Aeronautics and Space Administration—Budget Summary: 1998 to 2004

[In millions of dollars, (13,647.7 represents $13,647,700,000)]

Item	1998	1999	2000	2001	2002	2003	2004
Total	**13,647.7**	**13,665.0**	**13,578.4**	**13,752.4**	**13,757.4**	**13,750.4**	**13,750.4**
International space station	2,441.3	2,304.7	2,482.7	2,328.0	2,091.0	1,721.1	1,573.0
Space station	2,331.3	2,304.7	2,482.7	2,328.0	2,091.0	1,721.1	1,573.0
U.S. and Russian cooperative program	110.0	(X)	(X)	(X)	(X)	(X)	(X)
Launch vehicles and payload operations	3,118.2	3,175.3	3,155.3	3,216.0	3,198.5	3,203.7	3,209.2
Space shuttle	2,912.8	2,998.3	2,986.2	3,033.1	3,014.0	2,984.0	2,984.0
Payload utilization and operations	205.4	177.0	169.1	182.9	184.5	219.7	225.2
Science, aeronautics and technology	5,690.0	5,653.9	5,424.7	5,657.3	5,781.3	6,141.0	6,248.6
Space science	2,043.8	2,119.2	2,196.6	2,346.8	2,439.4	2,634.4	2,851.3
Life and microgravity sciences and applications	214.2	263.5	256.2	265.2	263.2	263.2	278.5
Earth science	1,417.3	1,413.8	1,459.1	1,462.8	1,420.5	1,373.0	1,424.4
Aerospace technology	1,483.9	1,338.9	1,006.5	950.4	981.6	1,013.6	998.6
Mission communication services	400.8	380.0	406.3	382.1	296.6	296.8	265.3
Academic programs	130.0	138.5	100.0	100.0	100.1	100.0	100.0
Future planning (space launch)	(NA)	(NA)	(NA)	150.0	280.0	460.0	330.0
Mission support	2,380.0	2,511.1	2,494.9	2,530.3	2,665.8	2,663.8	2,699.8
Safety, mission assurance, engineering and advanced concepts	37.8	35.6	43.0	45.0	49.0	49.0	49.0
Space communication services	194.2	185.8	89.7	109.3	174.2	89.5	35.9
Research and program management	2,025.6	2,121.2	2,181.2	2,195.0	2,261.6	2,344.3	2,432.9
Construction of facilities	122.4	168.5	181.0	181.0	181.0	181.0	181.0
Inspector General	18.2	20.0	20.8	20.8	20.8	20.8	20.8

NA Not available. X Not applicable.

Source: U.S. National Aeronautics and Space Administration, Internet site <http://ifmp.nasa.gov/codeb/budget/2000HTML/MYB.htm>.

No. 1009. NASA Space Shuttle Operations Expenditures: 1996 to 1999

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

Operation	1996	1997	1998	1999
Total	**2,485.4**	**2,464.9**	**2,369.4**	**2,487.4**
Orbiter and integration	521.0	492.6	502.9	573.4
Orbiter	378.5	124.7	126.2	113.9
System integration	142.5	367.9	376.7	459.5
Propulsion	1,061.5	1,124.7	1,061.8	1,093.4
External tank	327.5	352.4	341.3	404.8
Space shuttle main engine	185.0	208.3	204.6	175.6
Reusable solid rocket motor	395.7	412.8	380.4	362.7
Solid rocket booster	153.3	151.2	135.5	150.3
Mission and launch operations	902.9	847.6	804.7	820.6
Launch and landing operations	544.0	801.4	710.1	728.4
Mission and crew operations	358.9	46.2	94.6	92.2

Source: U.S. National Aeronautics and Space Administration, *NASA Pocket Statistics,* annual.

No. 1010. Worldwide Successful Space Launches: 1957 to 1998

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

Country	Total, 1957-98	1957-64	1965-69	1970-74	1975-79	1980-84	1985-89	1990-94	1995	1996	1997	1998
Total	**3,969**	**289**	**586**	**555**	**607**	**605**	**550**	**466**	**75**	**73**	**86**	**77**
Soviet Union/CIS [1]	2,572	82	302	405	461	483	447	283	32	25	28	24
United States	1,158	207	279	139	126	93	61	122	27	33	37	34
Japan	54	-	-	5	10	12	11	9	2	1	2	2
ESA [2]	107	-	-	-	1	8	21	33	11	10	12	11
China	55	-	-	2	6	6	9	15	2	3	6	6
France	10	-	4	3	3	-	-	-	-	-	-	-
India	8	-	-	-	-	3	-	3	-	1	1	-
Israel	3	-	-	-	-	-	1	1	1	-	-	-
Australia	1	-	1	-	-	-	-	-	-	-	-	-
United Kingdom	1	-	-	1	-	-	-	-	-	-	-	-

- Represents zero. [1] Commonwealth of Independent States. [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 1957-1994,* July 31, 1995; and forthcoming report.

No. 1011. Space Shuttle Launches—Summary: 1981 to June 1999

Flight number	Mission date	Orbiter name	Crew size (up/down)	Days/hours duration	Flight number	Mission date	Orbiter name	Crew size (up/down)	Days/hours duration
1	4/12/81	Columbia	2	2	55	4/26/93	Columbia	7	10
2	11/12/81	Columbia	2	2	57	6/21/93	Endeavour	6	10
3	3/22/82	Columbia	2	8	51	9/12/93	Discovery	5	10
4	6/27/82	Columbia	2	7	58	10/18/93	Columbia	7	14
5	11/11/82	Columbia	4	5	61	12/2/93	Endeavour	7	11
6	4/4/83	Challenger	4	5	60	2/3/94	Discovery	6	8
7	6/18/83	Challenger	5	6	62	3/4/94	Columbia	5	14
8	8/30/83	Challenger	5	6	59	4/9/94	Endeavour	6	11
9	11/28/83	Columbia	6	10	65	7/8/94	Columbia	7	15
10	2/3/84	Challenger	5	8	64	9/9/94	Discovery	6	11
11	4/6/84	Challenger	5	7	68	9/30/94	Endeavour	6	11
12	8/30/84	Discovery	6	7	66	11/3/94	Atlantis	6	11
13	10/5/84	Challenger	7	8	63	2/3/95	Discovery	6	8
14	11/8/84	Discovery	5	8	67	3/2/95	Endeavour	7	17
15	1/24/85	Discovery	5	4	71	6/27/95	Atlantis	7/8	10
16	4/12/85	Discovery	7	7	70	7/13/95	Discovery	5	9
17	4/29/85	Challenger	7	7	69	9/7/95	Endeavour	5	11
18	6/17/85	Discovery	7	7	73	10/20/95	Columbia	7	16
19	7/29/85	Challenger	7	8	74	11/8/95	Atlantis	5	8
20	8/27/85	Discovery	5	7	72	1/11/96	Endeavour	6	9
21	10/3/85	Atlantis	5	4	75	2/22/96	Columbia	7	16
22	10/30/85	Challenger	8	7	76	3/22/96	Atlantis	6/5	9
23	11/26/85	Atlantis	7	7	77	5/19/96	Endeavour	6	10
24	1/12/86	Columbia	7	6	78	6/20/96	Columbia	7	17
25	1/28/86	Challenger	7	-	79	9/16/96	Atlantis	6	10
26	9/29/88	Discovery	5	4	80	11/20/96	Columbia	5	18
27	12/2/88	Atlantis	5	4	81	1/12/97	Atlantis	6	10/5
29	3/13/89	Discovery	5	5	82	2/11/97	Discovery	7	10/0
30	5/4/89	Atlantis	5	4	83	4/4/97	Columbia	7	3/23
28	8/8/89	Columbia	5	5	84	5/15/97	Atlantis	7/7	9/5
34	10/18/89	Atlantis	5	5	94	7/1/97	Columbia	7	15/7
33	11/22/89	Discovery	5	5	85	8/7/97	Discovery	5	11/20
32	1/9/90	Columbia	5	11	86	9/25/97	Atlantis	7/7	10/19
36	2/28/90	Atlantis	5	4	87	11/19/97	Columbia	6	15/17
31	4/24/90	Discovery	5	5	89	1/22/98	Endeavor	7/7	8/20
41	10/6/90	Discovery	5	4	90	4/17/98	Columbia	7	15/22
38	11/15/90	Atlantis	5	5	91	6/2/98	Discovery	6/7	9/19
35	12/2/90	Columbia	7	9	95	11/20/98	Discovery	7	8/22
37	4/5/91	Atlantis	5	6	88	12/04/98	Endeavor	6	11/19
39	4/28/91	Discovery	7	8	96	5/27/99	Discovery	7	9/19
40	6/5/91	Columbia	7	9					
43	8/2/91	Atlantis	5	9	Future missions in work				
48	9/12/91	Discovery	5	5					
44	11/24/91	Atlantis	6	7					
42	1/22/92	Discovery	7	8	93	7/20/99	Columbia	5	4/23
45	3/24/92	Atlantis	7	9	99	9/16/99	Endeavor	6	11
49	5/7/92	Endeavour	7	9	103	10/14/99	Atlantis	7	10
50	6/25/92	Columbia	7	14	101	12/2/99	Discovery	7	10/19
46	7/31/92	Atlantis	7	8	92	2/24/2000	Discovery	7	9
47	9/12/92	Endeavour	7	8	97	3/23/2000	Endeavor	5	8
52	10/22/92	Columbia	6	10	98	4/20/2000	Atlantis	5	9
53	12/2/92	Discovery	5	7	102	6/29/2000	Discovery	3	11
54	1/13/93	Endeavour	5	6	100	7/27/2000	Atlantis	8	11
56	4/8/93	Discovery	5	9					

- Represents zero.

Source: U.S. National Aeronautics and Space Administration, Internet site <http://www.ksc.nasa.gov/shuttle/missions/missions.html> (Accessed 28 June 1999).

No. 1012. Nobel Prize Laureates in Selected Sciences: 1901 to 1997

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

Country	1901-1997				1901-1930	1931-1945	1946-1960	1961-1975	1976-1990	1991-1996	1997
	Total	Physics	Chemistry	Physiology/Medicine							
Total	**448**	**154**	**129**	**165**	**93**	**49**	**74**	**92**	**98**	**35**	**7**
United States	190	67	44	79	6	14	38	41	63	24	4
United Kingdom	71	21	26	24	15	11	14	20	9	1	1
Germany [1]	61	17	29	15	27	11	4	8	7	3	-
France	25	11	7	7	13	2	-	5	2	2	1
Soviet Union	10	7	1	2	2	-	4	3	1	-	-
Japan	4	3	1	-	-	-	1	2	1	-	-
Other countries	87	28	21	38	30	11	13	13	15	5	1

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

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