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ABSTRACT

This publication is the third in a series of biennial reports in which academic resources in science and engineering are analyzed. It is based primarily on findings from four National Science Foundation surveys that collect information on academic research and development (R&D) expenditures, federal obligations, employment of scientists and engineers, and the characteristics of graduate students in science and engineering (S/E) programs. The report is designed to integrate these survey results with those of other data sources to provide an overview of the status of academic resources, focusing on the 1970s and early 1980s, with some implications for the immediate future. The report consists of three parts: (1) trends in academic R&D expenditures (including data on the federal role, industrial support expenditures for research equipment, and other areas); (2) trends in academic S/E employment (including data on sex of scientists and engineers, women doctorate-holders, and minority scientists and engineers, and other areas); and (3) trends in graduate S/E enrollment (including data on sources of support and other areas). Also included are three appendices providing technical notes, 19 statistical tables with supporting data for each of the report's three parts, and copies of survey instruments. (JN)

academic science/ engineering: 1972-83

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foreword

This publication is the third in a series of biennial reports in which academic resources devoted to the sciences and engineering are analyzed. It is based primarily on the findings from four National Science Foundation (NSF) surveys that collect information on academic research and development (R&D) expenditures, Federal obligations, employment of scientists and engineers, and the characteristics of graduate students in science and engineering (S/E) programs. The report is designed to integrate these survey results with those of other data sources to provide an overview of the status of academic resources, focusing on the seventies and early eighties, with some implications for the immediate future.

Underlying issues now affecting the research capacity of our universities and colleges are receiving increased attention in the Federal Government, the Congress, the private sector, the [illegible], and in professional associations concerned with the health of the academic enterprise. Among the issues that have created concern are the following: faculty shortages in selected fields, the increasing numbers of foreign students enrolled in U.S. institutions, the degree of representation of women and minorities in the S/E workplace, the changing nature of Federal research needs, and the demands for highly technical skills to accommodate the Nation's economic needs.

It is the objective of this report to provide the statistics and the analyses upon which Federal and State legislators and budget officials, as well as administrators of universities, colleges, and educational organizations, may base their conclusions, policies, and recommendations.

Charles E. Falk
Director, Division of
Science Resources Studies
Directorate for Scientific,
Technological, and International
Affairs

August 1984

notes

- The abbreviation "S/E" as used in this report refers to "science and engineering."
- Data for research and development, equipment, and capital expenditures are given in current dollars unless otherwise specified. Constant dollars represent an adjustment to the 1972 level and are converted to a fiscal-year basis. The gross national product (GNP) implicit price deflator developed by the Department of Commerce is used as the basis for the conversion. These deflators were calculated as of January 1984. (See table A-3 for actual values.)
- Data on research and development (R&D) expenditures and Federal obligations in part 1 are collected on a fiscal-year (FY) basis--October through September; data on science/engineering (S/E) personnel in part 2 are collected as of January in each year; and data on S/E graduate enrollment in part 3 are collected as of fall in each year.
- FY 1978 expenditures data, January 1979 personnel data, and fall 1978 graduate student data were collected from doctorate-granting institutions only, although an estimate was made for total FY 1978 expenditures at nondoctorate-granting institutions.
- Appendix tables provide selected data for each survey. Tabulations based on National Science Foundation (NSF) survey findings have been compiled from the most recent publications, and data are subject to revision in subsequent years.
- "Federal obligations" differ from "expenditures" in that funds of the former category allocated during one fiscal year may be spent by the recipient either partially or entirely during one or more subsequent years. Totals presented herein *exclude* specified types of Federal financial assistance: Loans to individuals, such as those made in Federal guaranteed student loan programs sponsored by the Department of Education; support for Federal employee training and development activities; and funds allocated to State agencies, even though the final recipient of such funds is known to be an academic institution. Tuition support programs such as Basic Educational Opportunity Grants (now called Pell Grants) are *included* in these figures.
- Acronyms and abbreviated references used in this report are as follows:

AID - Agency for International Development
Commerce - Department of Commerce
DOD - Department of Defense
DOT - Department of Transportation
Education - Department of Education
EPA - Environmental Protection Agency
FFRDC's - Federally funded research and development centers
FTE - Full-time-equivalents
FY - Fiscal year
HHS - Department of Health and Human Services
HUD - Department of Housing and Urban Development
Interior - Department of the Interior
Labor - Department of Labor
NASA - National Aeronautics and Space Administration
NCES - National Center for Education Statistics
NIE - National Institute for Education
NIH - National Institutes of Health
Non-S/E - Non-scientific and -engineering or non-science and -engineering
NRC - National Research Council
NSF - National Science Foundation
OE - Office of Education
R&D - Research and development
S/E - Science and engineering
USDA - U.S. Department of Agriculture

acknowledgments

This report was prepared in the Universities and Nonprofit Institutions Studies Group of the Division of Science Resources Studies by Judith F. Coakley, under the direction of Penny D. Foster, Study Director. J. G. Huckenpahler, Richard Bennof, and James Hoehn assisted in the preparation of the report; statistical assistance was provided by Margaret Machen, Deborah Collins, and Esther Gist. William L. Stewart, Head of the R&D Economic Studies Section, and Charles E. Falk, Director, Division of Science Resources Studies, provided general guidance and review. Numerous university and college officials provided the essential annual statistics for the three major NSF surveys of academic science and engineering that form the basis for this analysis.

contents

highlights

This summary report presents trend data from four surveys of academic institutions conducted annually by the National Science Foundation (NSF). Research and development (R&D) expenditures data and Federal obligations data are collected on a fiscal-year basis and are available for the years 1972 through 1982; science/engineering (S/E) personnel data are available as of January for each of the years 1973 through 1983; and data on graduate S/E enrollment are available as of fall of each year from 1975 through 1982.

overall trends

- Consistent growth in university R&D expenditures, S/E employment, and S/E graduate enrollment was maintained throughout the seventies and into the eighties. R&D spending grew at a slower rate in 1981, however, and 1982 expenditures showed no measurable change from 1981 in terms of constant 1972 dollars. This slowdown in spending was largely attributed to a decrease in Federal R&D funds obligated to universities and colleges. The 1983 and 1984 Federal budgets target increases in academic R&D support, however, at 10-percent and 13-percent, respectively, substantially above the projected rates of inflation for this 2-year period. This will most likely produce significant constant-dollar increases in overall academic R&D spending over the 1984-85 period.
- Academic S/E activities during the past decade have been consistently concentrated in the top 100 institutions as ranked in terms of R&D expenditures. These research-intensive institutions accounted for more than $8 of every $10 expended by all academic institutions in 1982 for R&D activities. They also accounted for about 80 percent of federally funded R&D expenditures, academic full-time-equivalent (FTE) scientists and engineers engaged in research and development, graduate research assistants, and postdoctorates.

r&d expenditures

- Academic R&D expenditures increased to $7.3 billion in 1982, which constitutes a slight decline from 1981 levels when considering inflation. This can be compared to the 3-percent yearly growth rate shown between 1972 and 1980 in real dollars. Little measurable real-dollar increase is anticipated for 1983.
- The Federal Government funded $4.7 billion in 1982, or two-thirds of academic R&D expenditures, a 3-percent decline in constant-dollar terms compared to 1981. Funding from non-Federal sources of support increased 4 percent in real dollars over 1981. Industry-supported R&D expenditures increased at the fastest pace—6 percent when adjusted for inflation—but still accounted for only $326 million in 1982, 4 percent of total academic R&D expenditures.
- Nearly one-half the national total of $10 billion devoted to basic research in 1982 was expended in academia, where basic research spending rose 6 percent in 1982. This figure, just below the level needed to keep pace with inflation, was down from the 2-percent average annual real-dollar growth rate between 1972 and 1981. Applied research and development expenditures increased much faster than those of basic research during the 1972-80 period—8 percent per year in constant dollars. Between 1980 and 1982, however, expenditures for applied research and development leveled off, growing just enough to stay even with inflation. Basic research accounted for two-thirds ($4.9 billion) of total academic R&D spending in 1982, compared to three-quarters of the 1972 total. Based on estimates of Federal obligations, real-dollar growth in academic basic research expenditures is expected for the 1983-85 period.
- R&D expenditures among all sciences combined increased during the 1972-82 period at about the same average annual rate reported for engineering disciplines, between 11 percent and 12 percent. The life sciences accounted for almost two-thirds of the 1972-82 net growth in expenditures for all sciences. Mathematical/computer sciences and the life sciences showed the fastest average annual growth rates during this

period (13 percent and 12 percent, respectively.) Spending in the computer sciences alone rose 17 percent in 1981 and a further 12 percent in 1982.

academic s/e personnel

- The 358,800 scientists and engineers employed in academic institutions in January 1983 represented a 3-percent increase over 1982, comparable to the average annual growth rate reported between 1973 and 1982. Growth in part-time S/E employment accelerated during 1980 through 1983 at more than three times the rate for full-timers (7 percent per year versus 2 percent) in constrast to a 3-percent rate for each between 1978 and 1980. Employment of engineers grew at the same average yearly rate as that of scientists between 1973 and 1983—3 percent—and represented about a 10-percent share of total academic S/E personnel.
- Employment of mathematical/computer scientists increased at the fastest rates over the 1973-83 period—6 percent per year—to bring their share of total academic S/E employment to about 13 percent in 1983. The number of computer scientists alone rose on the average of 13 percent annually. In 1983 life scientists continued to represent the largest group of S/E professionals in academia (42 percent), followed by social scientists (15 percent); each of these groups has grown at about 3 percent per year since 1973. The number of academically employed physical scientists has consistently increased at the slowest rate, rising only 1 percent per year on the average.
- There were 60,300 FTE scientists and engineers employed in academic research and development in 1983. Employment of such R&D professionals has averaged an annual increase of less than 2 percent since 1978, one-half the 1973-78 growth rate. By comparison, the national FTE total has grown 5 percent per year since 1978. This slowdown in academic FTE growth has been accompanied by an increasing tendency for universities to utilize graduate research assistants to supplement full-time professional staff in academic R&D efforts.
- The number of women participating in academic S/E programs increased steadily, both in employment and in graduate enrollment. Growth rates of women employed full time have been treble those of men since 1974 when annual data were first collected—6 percent per year compared to 2 percent. In 1983, women represented 19 percent of all academic scientists and engineers employed full time and 26 percent of those employed part time; they accounted for 23 percent of all academic scientists and 4 percent of engineers.
- There were 19,800 postdoctorates working in institutions of higher education during the 1982/83 academic year. This number included an increase of less than 1 percent over the previous year, compared to 3-percent growth of other scientists and engineers. This represents a marked drop from the 4-percent average annual growth in postdoctorates from 1979 to 1981. Two-thirds of postdoctorates were life scientists, with physical scientists accounting for most of the remainder.

s/e graduate enrollment

- There were 400,000 S/E graduate students enrolled in fall 1982, up 2 percent from fall 1981. This is virtually identical to the average annual growth in graduate enrollments between 1975 and 1981. The majority of the growth occurred among engineering disciplines, up 5 percent, while the number of graduate science students grew only 1 percent. During the same period, graduate enrollment in non-S/E fields declined by 3 percent.
- In addition to the notable increase in graduate engineering enrollment, the most significant gain was observed in the mathematical/computer sciences—up 15 percent between 1981 and 1982, with computer sciences accounting for most of this rise. Social sciences enrollment declined by 2 percent, psychology enrollment was down 1 percent, and enrollment in life sciences remained about level.
- The number of women enrolled in graduate S/E programs continued to increase more rapidly than the number of men, 3 percent compared to 1 percent from 1981 to 1982. By contrast, between 1976 and 1981 the number of women enrolled in graduate S/E programs grew by 14 percent per year while the number of men fell by nearly 2 percent per year. Although women remained concentrated among the life and social sciences, their numbers grew very rapidly in engineering and the computer sciences—up 12 percent and 27 percent, respectively.
- Foreign full-time enrollment in doctorate-granting universities and colleges rose by 5 percent from 1981 to 1982, offsetting a slight decline in the number of U.S. citizens enrolled. This marks a slowdown from the 1975-81 average annual growth rate for foreign graduate enrollment of 8 percent. The proportion of foreigners was highest in engineering, 43 percent, and lowest in psychology, 4 percent. Approximately one-half of all engineering doctorates were awarded to foreigners during the 1981/82 school year.

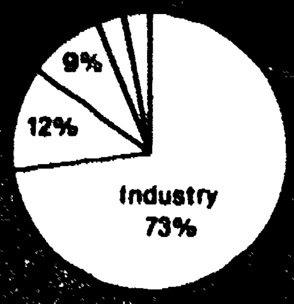
part 1.

trends in academic r&d expenditures

general characteristics, 1972-83

Research and development (R&D) expenditures data analyzed in this report are derived from annual surveys of science and engineering (S/E) spending by all universities and colleges with S/E graduate programs, and by all other institutions with $50,000 or more in separately budgeted R&D expenditures.[1] The survey covered all such institutions in fiscal years (FY's) 1972 through 1982 with the exception of 1978, when only doctorate-granting institutions were surveyed. Data for 1983 represent National Science Foundation (NSF) estimates.[2]

Universities and colleges in 1982 spent $7.3 billion, or 9 percent, of the $80 billion expended nationally for R&D activities (chart 1).[3] The proportion for 1983 is projected to be about the same, $7.7 billion out of $88 billion. Expenditures by university-administered federally funded research and development centers (FFRDC's) accounted for another 3 percent of R&D expenditures in the United States. R&D expenditures by academic institutions have increased at an average annual rate of 10 percent between 1972 and 1983 (2 percent in real dollars) and their share of the national total has remained stable.[4] Estimates for 1984 show real-dollar increases of about 7 percent, attributable mainly to increased Federal obligations, improved



Average annual rates of change			
Performer	1972-77	1977-82	1982-83
Total	8.4%	13.4%	9.2%
Federal Government	5.5	8.7	11.9
Industry	8.8	14.6	9.4
Universities and colleges	9.1	12.3	5.7
FFRDC's	12.9	12.4	4.9
Nonprofit institutions	9.4	10.2	8.2

[1] See survey questionnaire in appendix C for explanation of terms.

[2] National Science Foundation, *National Patterns of Science and Technology Resources, 1984* (NSF 84-311)(Washington, D.C.: Supt. of Documents, U.S. Government Printing Office, 1984).

[3] These amounts understate the total R&D performance of the academic sector within the economy, since data collected in the annual NSF expenditures survey are limited to separately budgeted R&D expenditures. The accounting procedures adopted by most universities and colleges combine the costs of instruction and departmental research because of the inherent difficulty in measuring them separately. Amounts spent on departmental research alone, therefore, cannot be identified by institutions.

[4] In the absence of a reliable R&D cost index, the gross national product (GNP) implicit price deflator was used to convert current dollars into constant 1972 dollars. The GNP deflator can only indicate approximate changes in the costs of R&D performance.

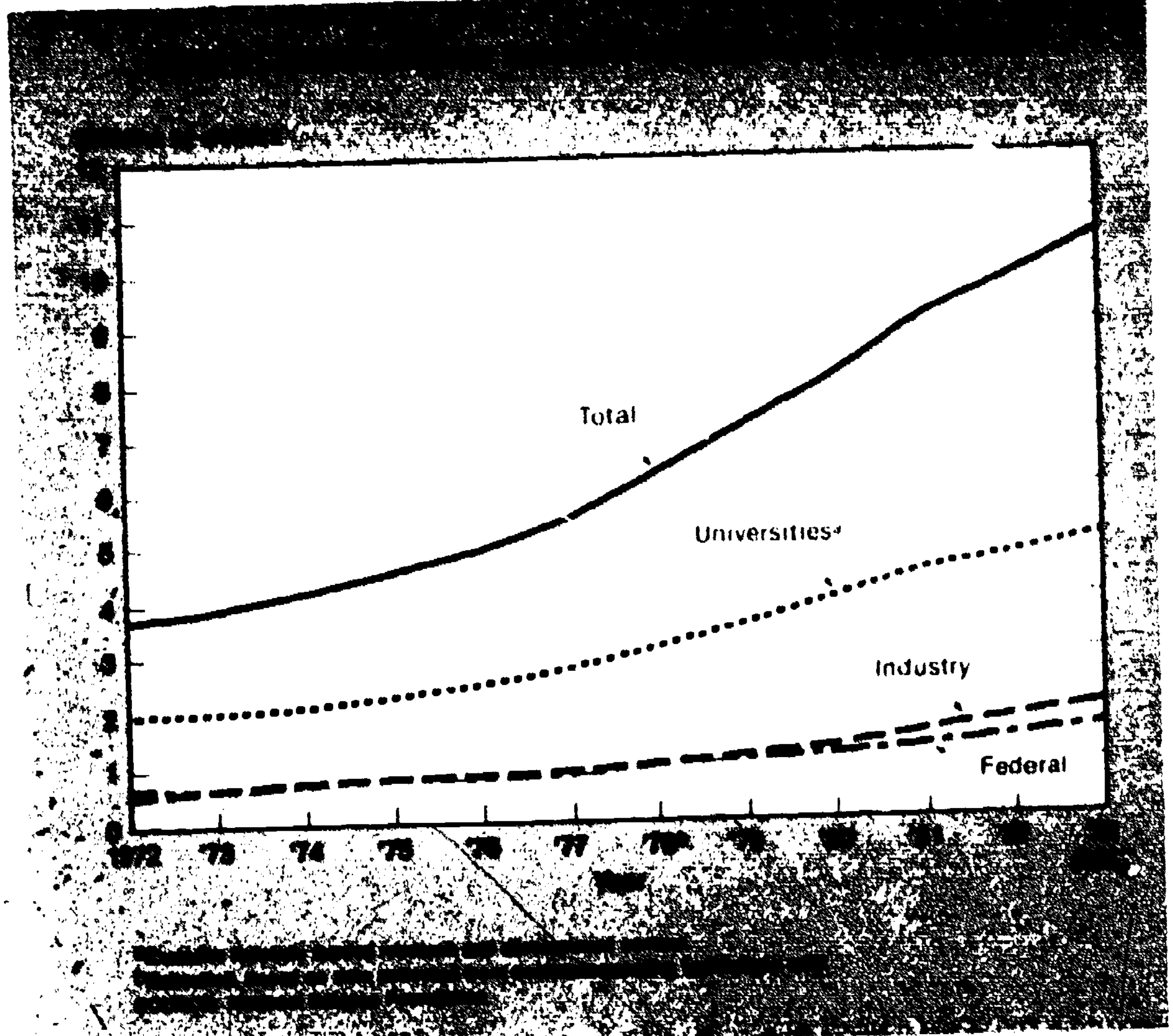
economic conditions, and a slowdown in the inflation rate to less than 5 percent.[5]

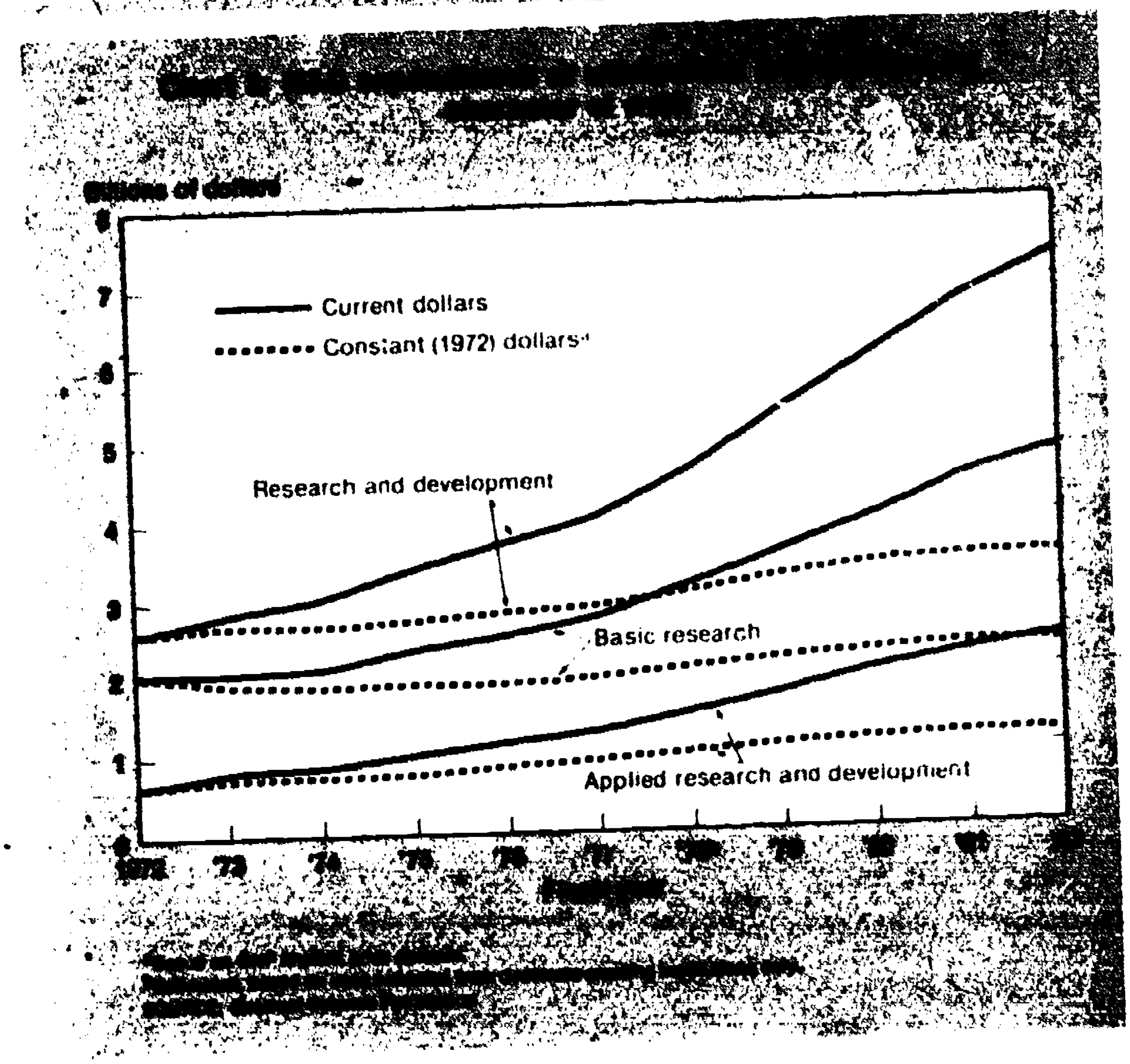
Academic institutions have historically devoted a significant proportion of their R&D funds to the performance of basic research—$4.9 billion in 1982, or about two-thirds of the $7.3 billion total. Industry, by comparison, allocated only 3 percent ($1.9 billion) of 1982 R&D expenditures to basic research (chart 2).[6] The basic research share of total academic R&D expenditures has remained fairly stable since 1976 but is below that reported for 1972 when more than three-quarters of all academic R&D expenditures were devoted to such activities.

Higher education institutions have consistently accounted for approximately one-half the national basic research performance as measured by expenditures; university associated FFRDC's accounted for an additional 9 percent.

Academic basic research expenditures grew at an average annual rate of 9 percent between 1972 and 1982. This rise, however, was about 1 percent per year when inflation was taken into account, slightly less than the 2-percent rate of growth as computed for national basic research expenditures. Although data for 1982 indicate little measurable constant-dollar change in academic basic research spending over 1981 levels, increased Federal funding for 1983-84 basic research activities will result in renewed real-dollar growth through 1985.

Although basic research spending more than doubled between 1972 and 1982, applied research and development performance more than tripled, increasing at an average yearly rate of 15 percent—7 percent in constant dollars—to $2.4 billion in 1982 (chart 3).[7] Little real growth occurred in academic applied research and development, however, between 1980 and 1982. Applied research and development spending accounted





[5] National Science Foundation, "Defense and Economy Major Factors in 7% Real Growth in National R&D Expenditures in 1984," Science Resources Studies Highlights (NSF 83-310) (Washington, D.C., July 22, 1983).

[6] National Science Foundation, "Company and Federal Support Produce 17% Industrial R&D Spending Increase in 1981," Science Resources Studies Highlights (NSF 83-313) (Washington, D.C., August 8, 1983), p. 3.

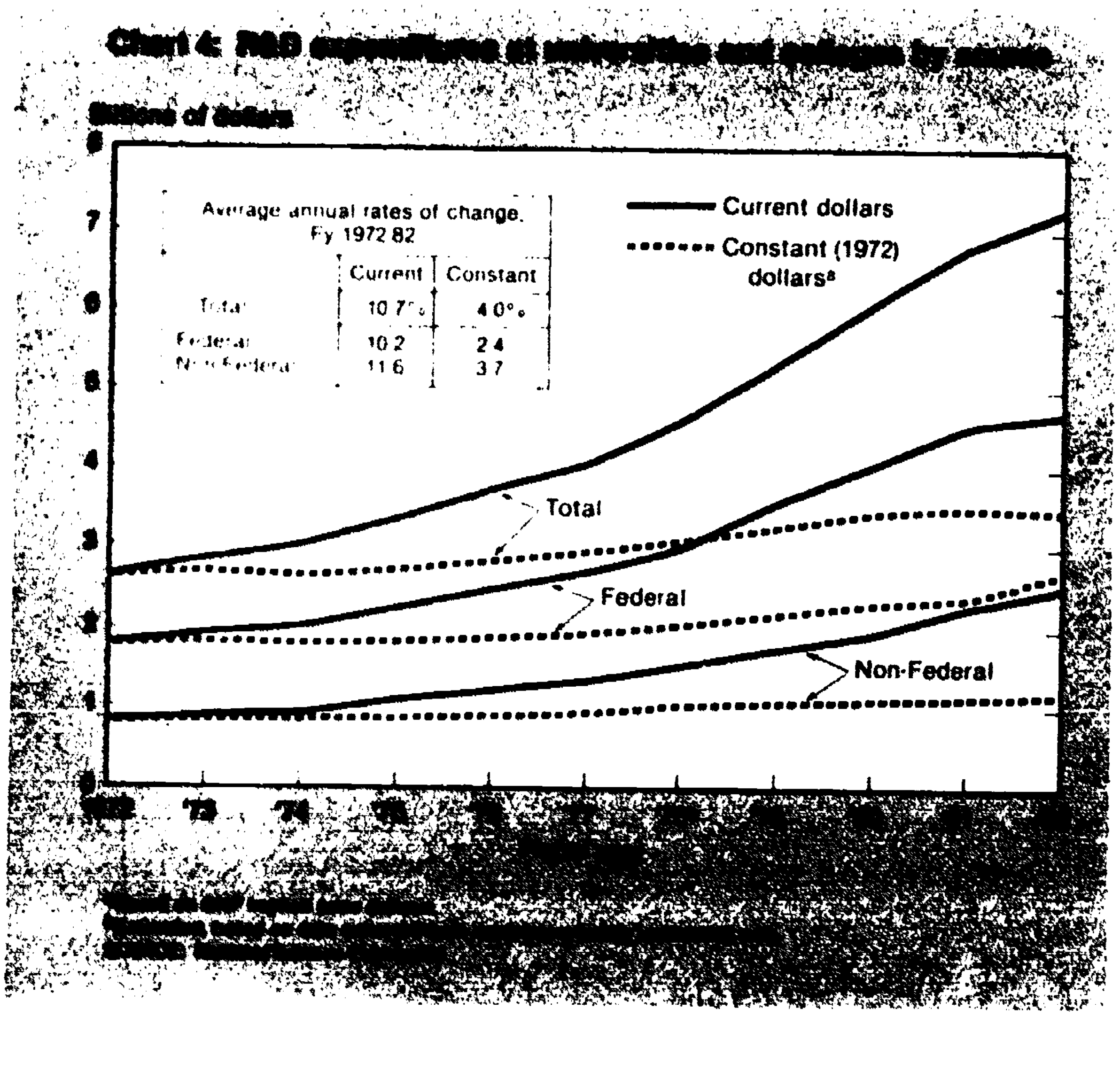
[7] Development expenditures are estimated to constitute less than one-fifth of the applied research and development total.

for a 33-percent share of total academic R&D expenditures in 1982, compared to 23 percent in 1972. Although no major shifts in the mix of university basic research versus applied research and development were anticipated in 1983, the gradual trend toward more applied research and development will probably continue as industry's support for academic research and development climbs.

detailed characteristics, 1972-82

The Federal Government continued to be the largest source of funding for academic R&D activities, providing $4.7 billion, or two-thirds, of the total support in 1982, about the same share as in previous years (chart 4). The rate of growth in Federal funds has slowed in terms of real dollars from an average annual increase of ... percent between 1972 and 1980 to 1 percent from 1980 to 1981; the 1982 spending translated into a decline of 3 percent in constant dollars. Rates of growth for industry and institutions' own funds have outpaced Federal increases, particularly in recent years. The 11-percent rise in non-Federal support from 1981 to 1982 (4 percent in constant dollars) was attributable mainly to increases in funds from these two sources, which have more than tripled since 1972. Support by industry for academic research and development has grown at the fastest average annual rate of all non-Federal sources—16 percent per year since 1972—but still accounts for only 4 percent of total expenditures.

The distribution of R&D expenditures by major field of science/engineering has shifted only slightly over time. Life sciences accounted for the largest share of total R&D expenditures—55 percent in 1982, up 4 percentage points over 1972. Those fields showing a slight decline in share include the physical and social sciences and psychology. Of total R&D expenditures, engineering disciplines accounted for a 14-percent portion in 1982, virtually unchanged since 1972.



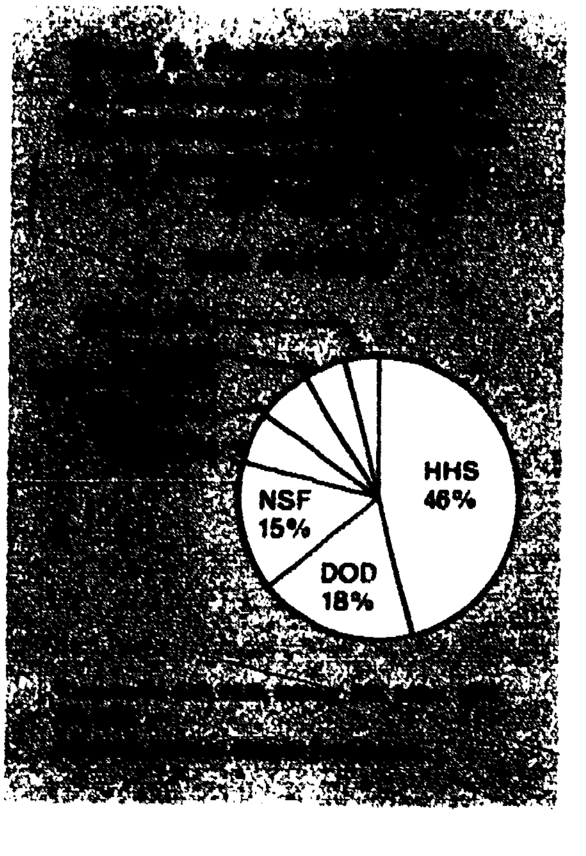
the federal role

During the 1972-82 period, Federal obligations for academic research and development grew from $1.9 billion to $4.6 billion, a 9-percent yearly average growth (2 percent in real terms).[a] The 1981-82 increase, however, was only 3 percent, resulting in a 4-percent constant-dollar decline. A further increase to $5.7 billion had been budgeted by 1984, representing an 11-percent per year increase over the 1983-84 period, or 7 percent in real terms.[b]

Throughout the 1972-82 period, the Department of Health and Human Services (HHS) accounted for about one-half ($2.1 billion in 1982) of all academic R&D funding, largely as the result of National Institutes of Health (NIH) life science programs (chart 5). The Department of Defense (DOD) and NSF supported nearly one-third of all R&D projects at universities and colleges throughout this period. DOD, which surpassed NSF to become the second largest agency in terms of academic R&D obligations ($814 million was funded in 1982), more than tripled its level of R&D support over 1972 levels. DOD reported a 26-percent jump

[a] Note that obligations differ from expenditures in that obligations allocated during one fiscal year can be spent by the recipient institution either partially or entirely during one or more subsequent years.

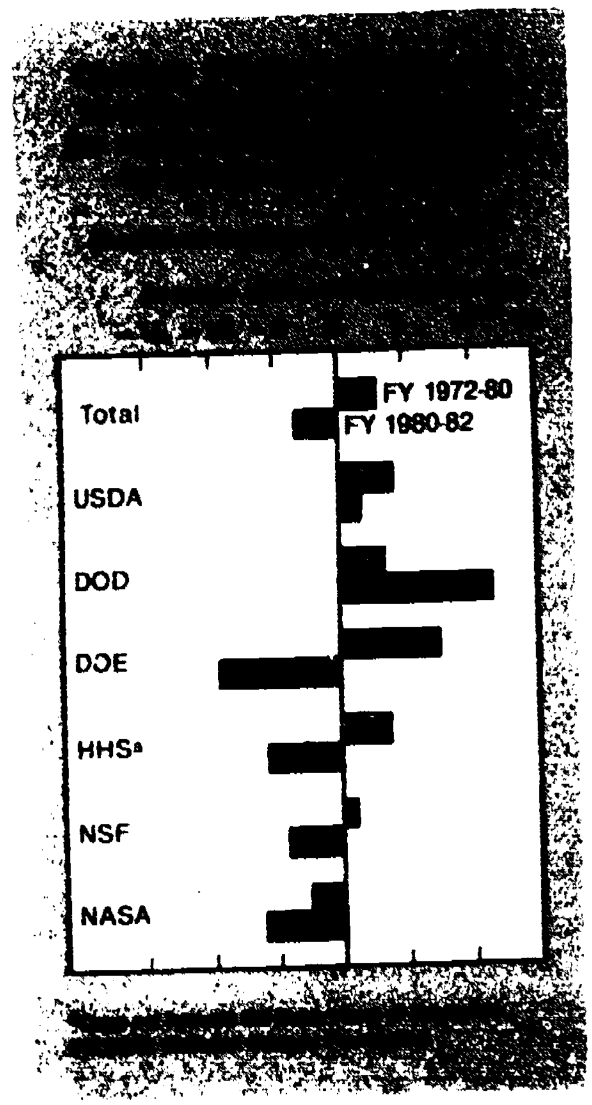
[b] Office of Management and Budget, unpublished data, January 1984.



(15 percent in real dollars) in academic R&D funding from 1980 to 1981, and another 16 percent (8 percent in real terms) in 1982, while the 14 civilian agencies together reported a total rise in their R&D support of less than 1 percent, which was equivalent to a 6-percent decline in real-dollar terms.

DOD's 12-percent average annual constant-dollar growth in academic R&D support between 1980 and 1982 was nearly four times greater than that agency's average annual growth rate in support during the entire 1972-80 period (chart 6). Among the other major R&D Federal agencies, only the U.S. Department of Agriculture (USDA) reported real-dollar growth in R&D support between 1980 and 1982.

The life sciences (mostly the biological and medical sciences) accounted for about one-half of all Federal R&D support throughout the 1972-82 period. According to data compiled from the HHS survey, "Federal Health R&D," over three-fifths of all Federal R&D support for academic programs in the life sciences in 1981 was obligated to medical schools; nearly all life science support to medical schools was concentrated within the leading 100 institutions ranked by life science R&D support. According to the survey, about one-third of total academic R&D funding for research and development went to medical schools in 1981.[10]



Engineering disciplines received nearly one-fifth of all Federal academic R&D support in 1982, almost twice the concentration of funds reported in those disciplines in 1972. Throughout the 1972-82 period, only two fields showed average annual growth rates that exceeded the rate of inflation—engineering (15 percent per year in current dollars) and the life sciences (10 percent per year). From 1980 to 1981, the only major field to show an increase in Federal support that outpaced inflation was engineering, whose R&D obligations grew by 29 percent. In 1982, however, obligations to engineering rose only 1 percent while funds for the physical and mathematical/computer sciences went up 11 percent to 12 percent each. Computer science funding alone increased by 29 percent.

Almost nine-tenths of Federal academic R&D obligations are geared to research; the development component constitutes only about one-eighth of all federally funded university R&D projects.[11] Historically, over one-half of Federal academic R&D funds have been awarded for basic research projects.[12] During the 1972-80 period, Federal academic basic research funding has equaled the growth rate of total Federal academic R&D funds—11 percent per year. From 1980 to 1981, however, basic research obligations grew by only 8 percent, the equivalent of a 2-percent decrease in real-dollar terms. From 1981 to 1982, funding for academic basic research grew by 9 percent (2 percent in real terms) and the 1983 budget targeted an 11-percent rise; another 9-percent increase has been proposed in the President's 1984 budget.

Industrial support

Corporations historically have channeled 70 percent to 75 percent of their educational grants to institutions of higher education.[13] The total amount of corporate contributions to postsecondary education for all activities, $778 million in 1981, was nearly three times the 1972 figure. In terms of real dollars, this represents an average annual increase of about 4 percent in corporate giving. Estimates for 1982 indicate a 25-percent increase to approximately $976 million—a 19-percent rise when discounted for inflation.[14]

Industrial support restricted to academic R&D activities jumped 13 percent from 1981 to 1982, to a total of $326 million. It continued to be the fastest growing source of R&D support, averaging increases of 16 percent per year between 1972 and 1982—or 8 percent in constant-dollar terms.

It should be noted that for a variety of reasons the reported amount for academic R&D expenditures attributed to industrial sources of support somewhat understates the actual level of industrial funding. For example, the information systems of some research-oriented institutions are not calibrated to report their R&D expenditures from such sources; philanthropic gifts restricted to research through corporate foundations may be reported as "all other sources"; and, expenditures for S/E research

[10] Department of Health and Human Services, National Institutes of Health, *Federal Health R&D Survey*, Fiscal Year 1981 (Washington, D.C.: Supt. of Documents, U.S. Government Printing Office), table 56.

[11] National Science Foundation, *Federal Funds for Research and Development, Fiscal Years 1981, 1982, and 1983*, Volume XXXI (Detailed Statistical Tables)(NSF 82-326) (Washington, D.C., 1982), tables C-7 and C-71, pp. 27 and 111.

[12] National Science Foundation, *Federal Funds for Research and Development, Fiscal Years 1967-1983* (Detailed Historical Tables)(Washington, D.C.), tables 11 and 30 (unpublished).

[13] Council for Financial Aid to Education, Inc., *Corporate Support of Higher Education, 1981* (New York, 1982), p. 3.

[14] Council for Financial Aid to Education, Inc., *Corporate Support of Higher Education, 1982* (New York, 1984), p. 3.

equipment from other non-Federal sources and for capital facilities for S/E activities cannot be disaggregated to ascertain the industrially funded portion alone. Taking these factors into consideration, it is possible that current academic R&D support from industry represented a somewhat larger portion of total expenditures in 1982 than was actually reported.

The deceleration of growth in Federal funding has stimulated efforts by institutions to find new sources of support. One such initiative is the university/industry research collaboration effort which has received a great deal of attention in recent years. Although reports of cooperative research agreements are on the rise, no data that reflect or measure their impact are yet separately available.

The opportunities for universities to affiliate with industry are many and the mechanisms include the following: Private consulting between a professor and a company's research unit; direct corporate funding of university R&D projects; cooperative (cost sharing) research programs; donations of equipment and facilities; university/industry research consortia; and, joint industry/university laboratories.[15] Several long-term research collaboration agreements between companies and universities have emerged since 1978. A few examples are Harvard/Monsanto—$23 million for a 10-year program of biological and medical research; Massachusetts Institute of Technology/Exxon—$8 million for research in combustion technology; Washington University/Mallinckrodt, Inc.—$3.4 million for genetic research; and North Carolina State/Agrigenetics Research Associates—about $1 million for improvement of hybrid crops through gene manipulation.

The Federal Government has played an important role in promoting such university/industry relationships over the last decade. For example, recent developments include NSF's University/Industry Cooperative Research Projects Program (established in 1978), whereby NSF provides funds for joint research projects between university and industrial scientists. Since its inception in 1973, NSF's University/Industry Cooperative Research Center Program has also provided start-up funds for several academic research centers based on a one university-multicompany arrangement that focuses on particular scientific areas such as polymers or computer graphics. At the time of origin, these centers are jointly funded by NSF and industry, but it is expected that industry will increase its support for research as NSF support is phased out within a period of five years. These centers operated with a total budget of about $6 million in 1982, of which industry provided about $4 million.

Most of the joint research efforts are concentrated in high technology areas such as robotics, materials research, computer-aided design, biotechnology, etc. According to a recent NSF report, it remains a question whether the spurt in research working agreements in the eighties represents "a permanent jump to a new level of interaction, or whether it is a part of a cyclical upswing driven by temporary shortages of research personnel in certain fields, coupled with ...the attempts of universities to obtain new sources of support."[16]

fields of science and engineering

Current-dollar growth in R&D expenditures took place in all major fields during the 1972-82 period, fueled by increases in Federal funding which consistently accounted for about two-thirds of all academic S/E research support. Total science expenditures grew at an average annual rate of 11 percent per year, similar to the 12-percent annual growth rate for engineering. R&D expenditures in all major fields except psychology and the social sciences increased at rates above the rate of inflation during this 10-year span.

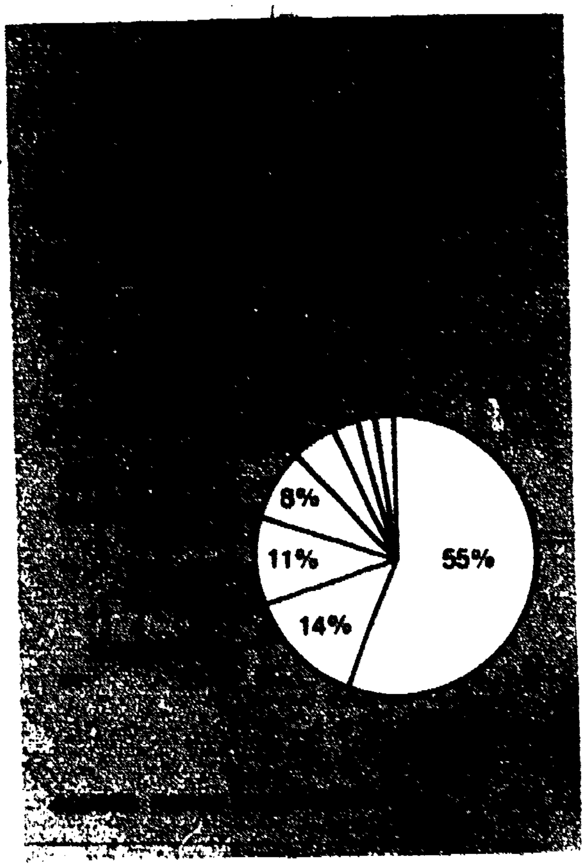
Mathematical/computer sciences showed the fastest growth rates—13 percent per year in current dollars—although these fields accounted for only 3 percent of total academic expenditures in 1982 (chart 7). The ratio of mathematical to computer science expenditures

remained fairly even until the late seventies, when a higher proportion of funding became concentrated in the computer sciences. By 1982, computer sciences claimed a 60-percent portion and had increased at an average annual rate of 18 percent after 1972. These funding shifts corresponded to a consistent rise in academic enrollment and employment in computer sciences in response to a high demand within all economic sectors for computer specialists.

The fairly high growth rates in R&D spending in most S/E fields began to level off from 1980 to 1981 and remained about level in 1982, reflecting Federal budget cutbacks in many nondefense-related fields. For example, the environmental sciences, which had grown at a 13-percent yearly average rate between 1972 and 1980, did not exceed the pace of inflation from 1980 to 1982. Only computer science research spending showed significant gains in 1982, up 12 percent over 1981 levels.

[15] Bruce L. R. Smith and Joseph J. Karlesky, "The University in the Nation's Research Efforts," *The State of Academic Science* (New York: Change Magazine Press, 1977), p. 66.

[16] National Science Board, *University Industry Research Relationships: Myths, Realities and Potentials* (Fourteenth Annual Report of the National Science Board) (NSB 82-1) (Washington, D.C.: Supt. of Documents, U.S. Government Printing Office, 1983), p. 28.



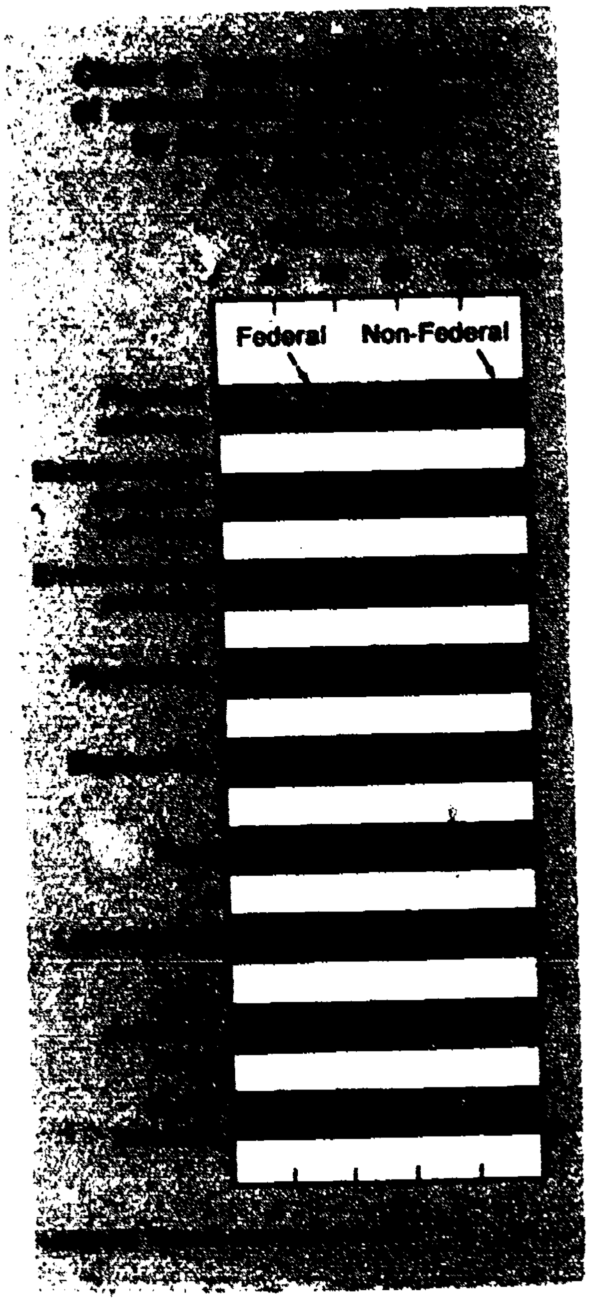
The differences in the growth rates among the major S/E fields over the 1972-82 period altered only slightly their relative standing in terms of R&D expenditures. The life sciences continued to account for over one-half of the total academic R&D spending (chart 8).

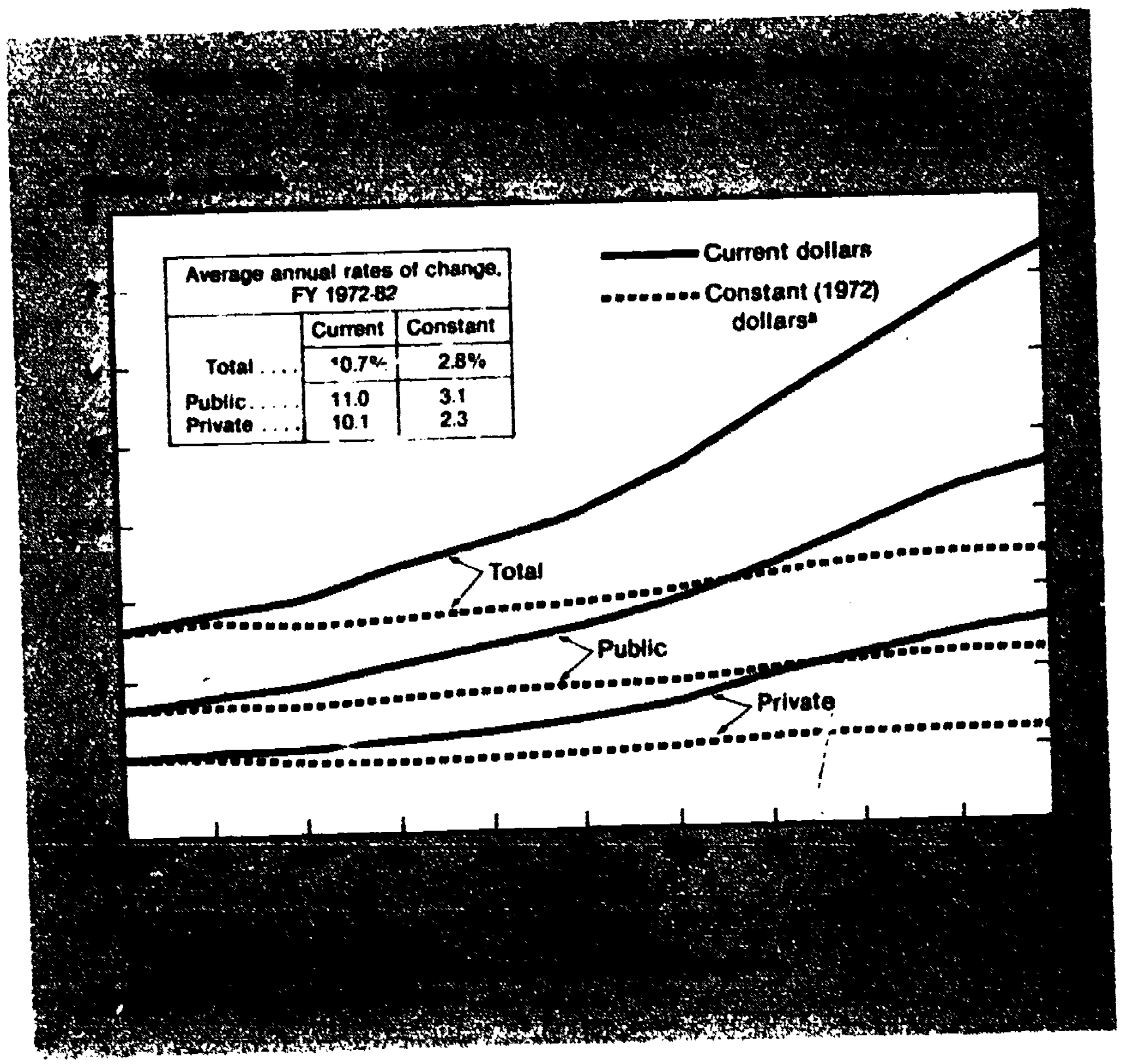
The physical sciences ranked first in terms of the proportion of total expenditures provided by Federal sources (79 percent) (chart 9). The life sciences, which ranked first in both total and Federal funding, ranked sixth in terms of the ratio of Federal-to-total support.

Institutional control

Public institutions accounted for $4.6 billion in 1982, almost 65 percent of the R&D total. These institutions increased their R&D spending at an average annual rate of 11 percent between 1972 and 1982 (3 percent in constant dollars); the comparable rate for private institutions was 10 percent (2 percent in constant dollars) (chart 10). Both groups more than doubled their R&D expenditures over the 1972-82 period.

Federally financed R&D activities constituted a much larger portion of total expenditures at privately controlled institutions than at public universities and colleges in 1982—77 percent compared to 59 percent. This higher level of Federal funding in private institutions was demonstrated across all S/E fields, ranging from a high of 84 percent for the physical sciences to 56 percent for social sciences (chart 11).





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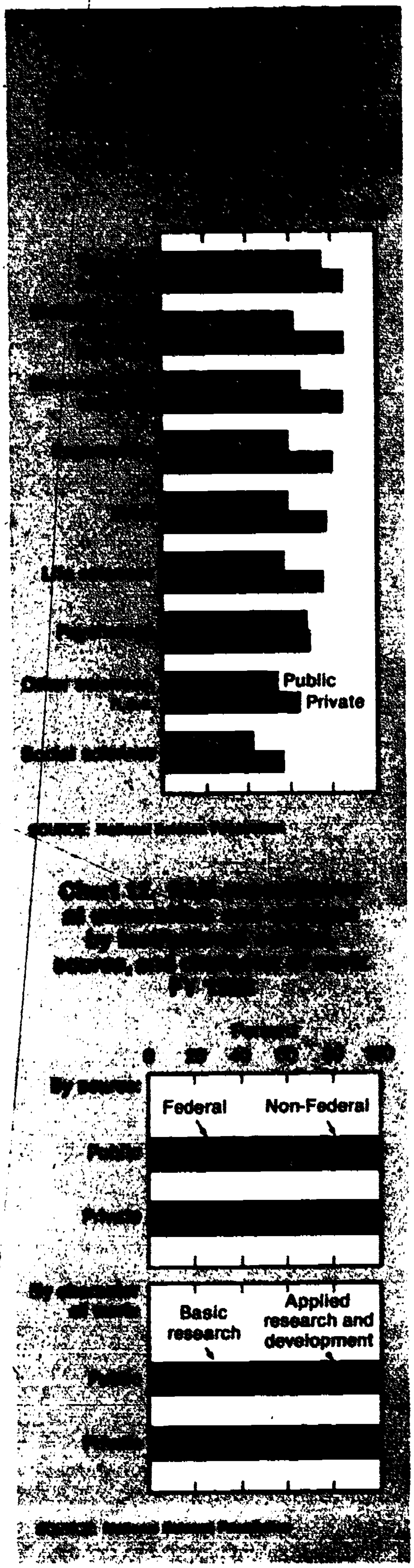


Private institutions allocated three-quarters of their total R&D spending to the performance of basic research while institutions under public control allocated just over three-fifths to basic research efforts (chart 12).

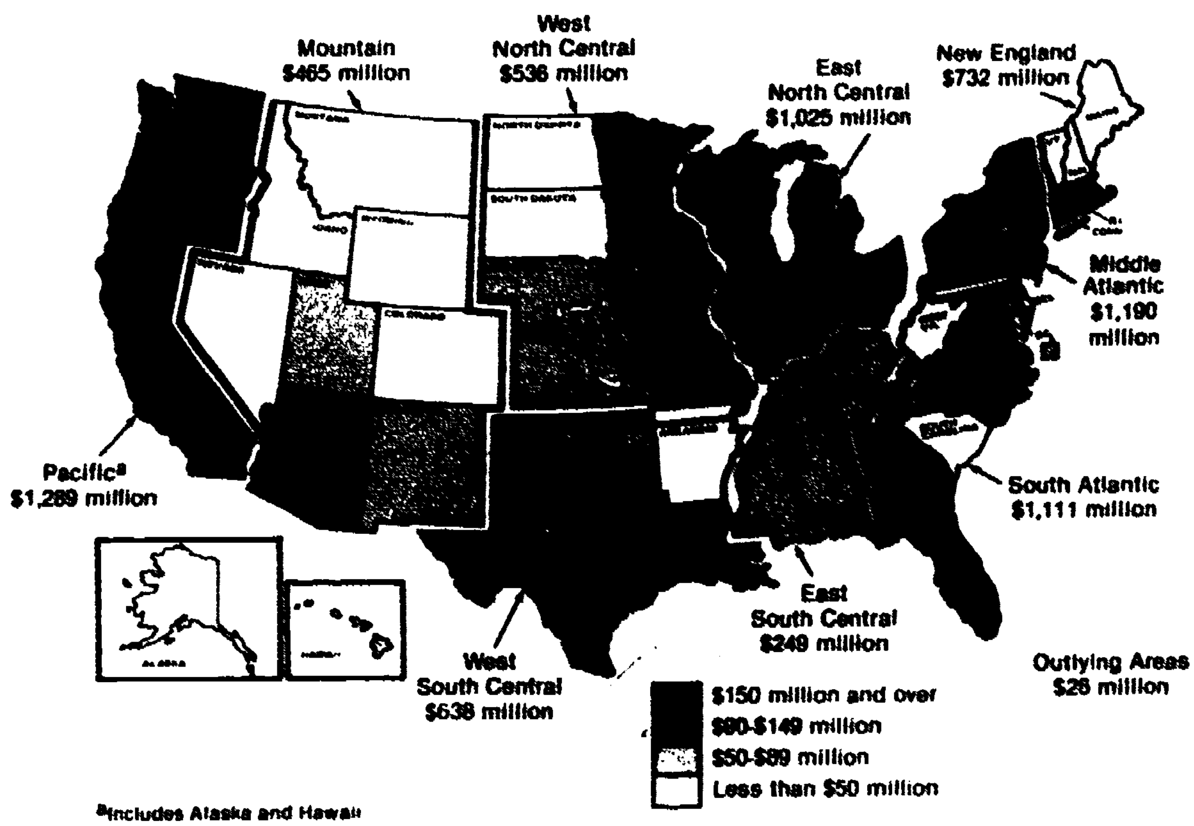
geographic distribution

Academic R&D expenditures grew in all geographic regions between 1972 and 1982. The most rapid rates of growth continued to occur in institutions in the South Atlantic and West South Central regions where spending increases averaged 13 percent per year, or 5 percent in constant-dollar terms. Significant growth rates in academic R&D spending, 11 percent per year, also occurred in States of the Mountain and Pacific regions, with the latter region accounting for almost one-fifth of total expenditures in 1982. The northern States and outlying areas averaged annual growth rates of 9 percent, just enough to keep pace with inflation.

South Atlantic region showed the largest increase in federally financed R&D expenditures, up an average of 14 percent per year (6 percent in real dollars). The West North Central and Middle Atlantic States showed the smallest gains—about 9 percent per year, or 1 percent in constant dollars.

Relative rankings in 1982 on a State-by-State basis indicate that R&D expenditures were heavily concentrated in only a few States (chart 13). California remained the largest spender ($947 million) for academic R&D activities, followed by New York ($740 million), Massachusetts ($470 million), Texas ($433 million), and Maryland ($351 million). Two-fifths of total academic R&D spending was concentrated among these five States, reflecting the large number of leading research institutions located in these States.

Chart 13. R&D expenditures at universities and colleges by State: FY 1982



[a]Includes Alaska and Hawaii
SOURCE: National Science Foundation

the 100 largest r&d performers

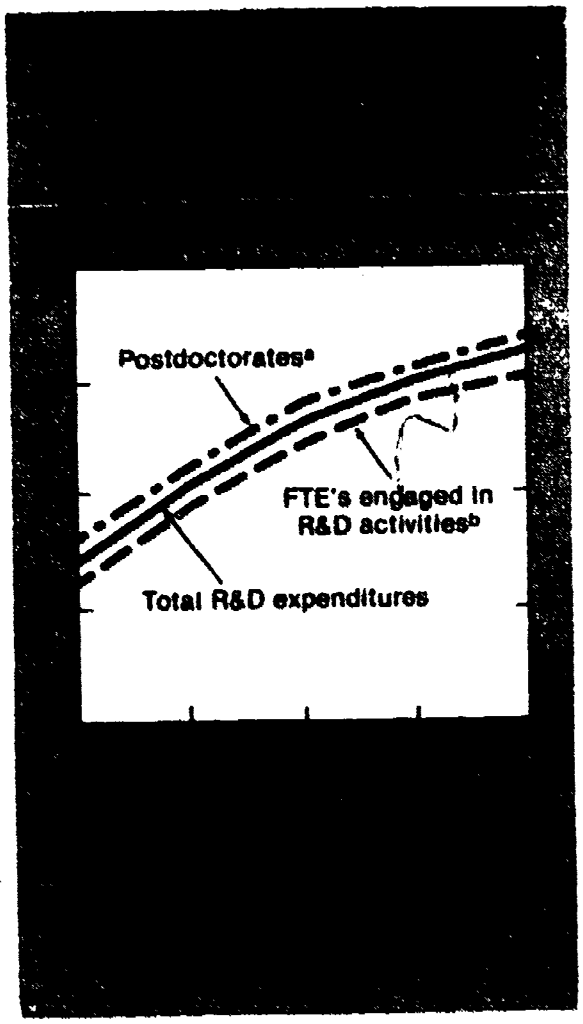
The 100 largest academic R&D performers expended $6 billion in 1982, two-thirds of which was federally funded. These 100 institutions have consistently expended about four-fifths of the R&D total. The distribution of R&D funds among the major S/E disciplines was virtually identical to that for the entire sector.

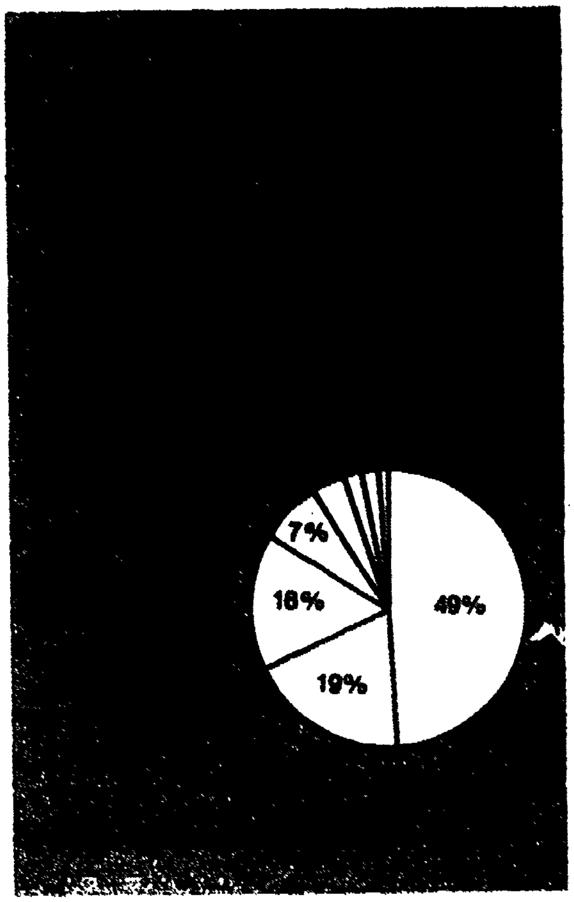
S/E resources were heavily concentrated in these 100 institutions. In 1982, these leading research-intensive institutions were responsible for more than 80 percent of all academic R&D expenditures (both total and federally financed), and also employed nearly 80 percent of all FTE scientists and engineers engaged in R&D activities, 85 percent of all postdoctorates, and enrolled about 80 percent of graduate S/E research assistants (chart 14).[17] The top 20 institutions alone, representing 35 percent of total academic R&D expenditures, employed nearly one-third of total full-time-equivalents in research and development and two-fifths of all postdoctorates, and enrolled one-third of all graduate research assistants.

expenditures for research equipment

Expenditures by academic institutions for S/E research equipment in 1982 totalled approximately $410 million, constituting a 6-percent share of all separately budgeted R&D spending, about the same share reported in 1980 when data were first collected.[18] Of this total, the ratio was two-thirds federally funded equipment expenditures to one-third non-Federal. Although nearly one-half of all academic research equipment spending in 1982 was in the life sciences, the only fields for which gains exceeded inflation were the mathematical and computer sciences (chart 15). The proportion of federally funded equipment expenditures was largest for the physical sciences—about four-fifths of the total—compared to two-thirds for both engineering and the computer sciences.

Although 1982 spending for S/E research equipment declined slightly over 1981 levels, such expenditures are expected to increase considerably over the next several years, largely as a result of rising Federal allocations earmarked for equipment, and increased tax incentives for industry in terms of equipment donations to academic institutions.





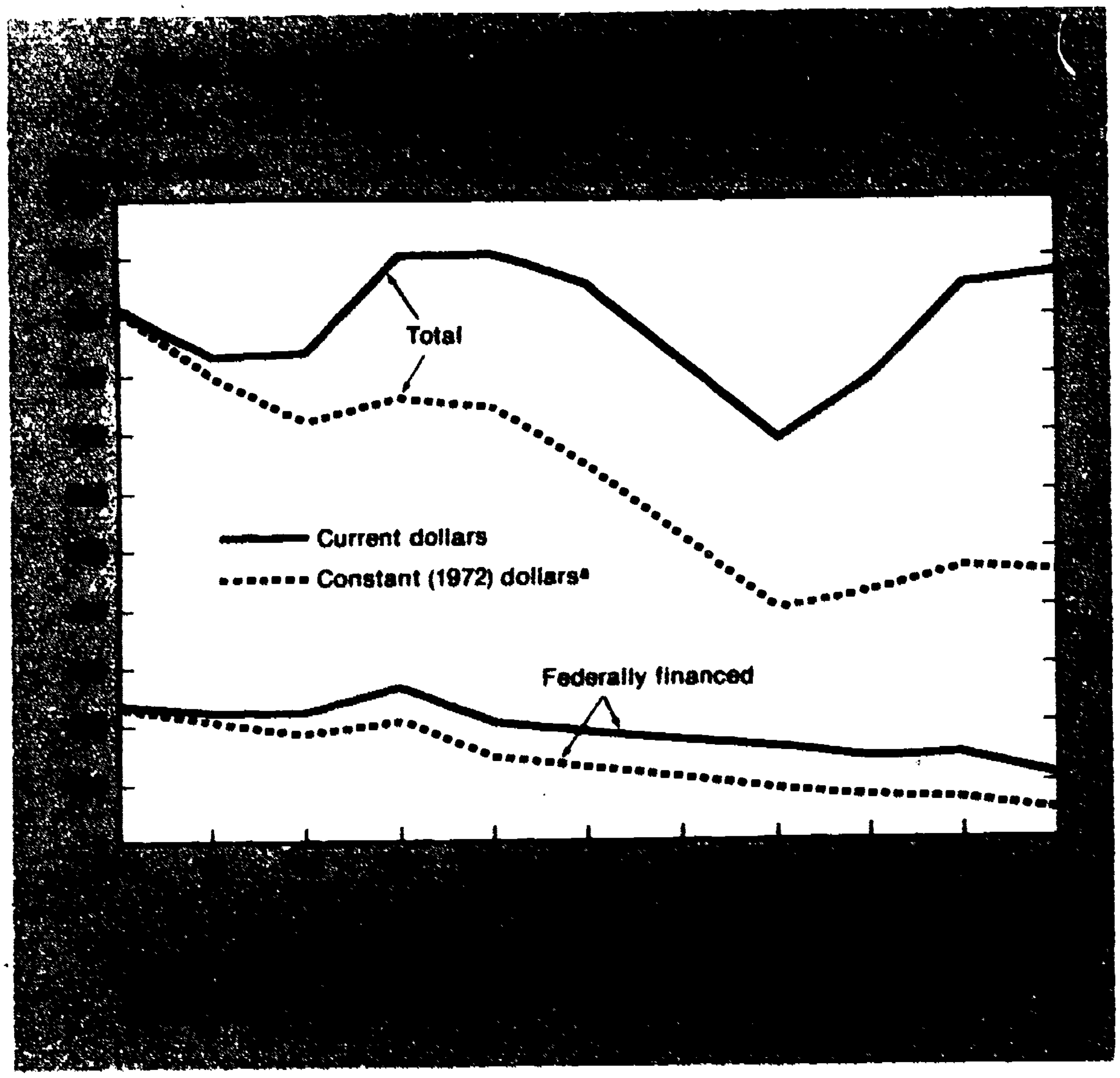
[17] It should be noted that data for nonsponsored R&D activities by professional S/E staff are not included in the FTE totals, and therefore the amount of total R&D activity performed by academically employed scientists and engineers in the top 100 institutions may be understated.

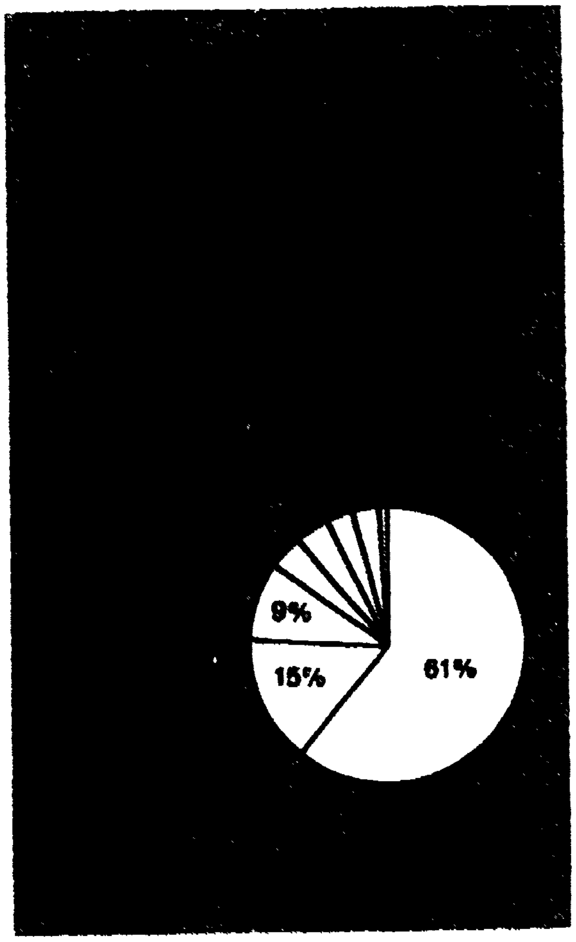
[18] Data collected for separately budgeted R&D expenditures for S/E research equipment in 1980 were requested in an "optional" item which became a standard part of the 1981 questionnaire.

capital expenditures for r&d activities and instruction

In addition to the $7.3 billion expended by universities and colleges for separately budgeted R&D activities in 1982, another $973 million was devoted to capital expenditures for S/E research, development, and instruction. Between 1972 and 1982, capital expenditures climbed to a peak of $1 billion in 1976 and dropped to less than $700 million in 1979. When discounted for the effects of inflation, the 1982 spending level was only about one-half the level reported a decade earlier; federally financed capital expenditures declined in real dollars to only a quarter of the 1972 value (chart 16). The increases since 1979 are attributable mainly to capital expenditures in the life sciences, chiefly for medical school facilities and equipment.

The 1982 distribution of capital expenditures by field parallels that of total current R&D expenditures. Spending for the life sciences comprised 61 percent of the total, up from 57 percent in 1972. Engineering and the physical sciences ranked next, with 15-percent and 9-percent shares, respectively (chart 17).



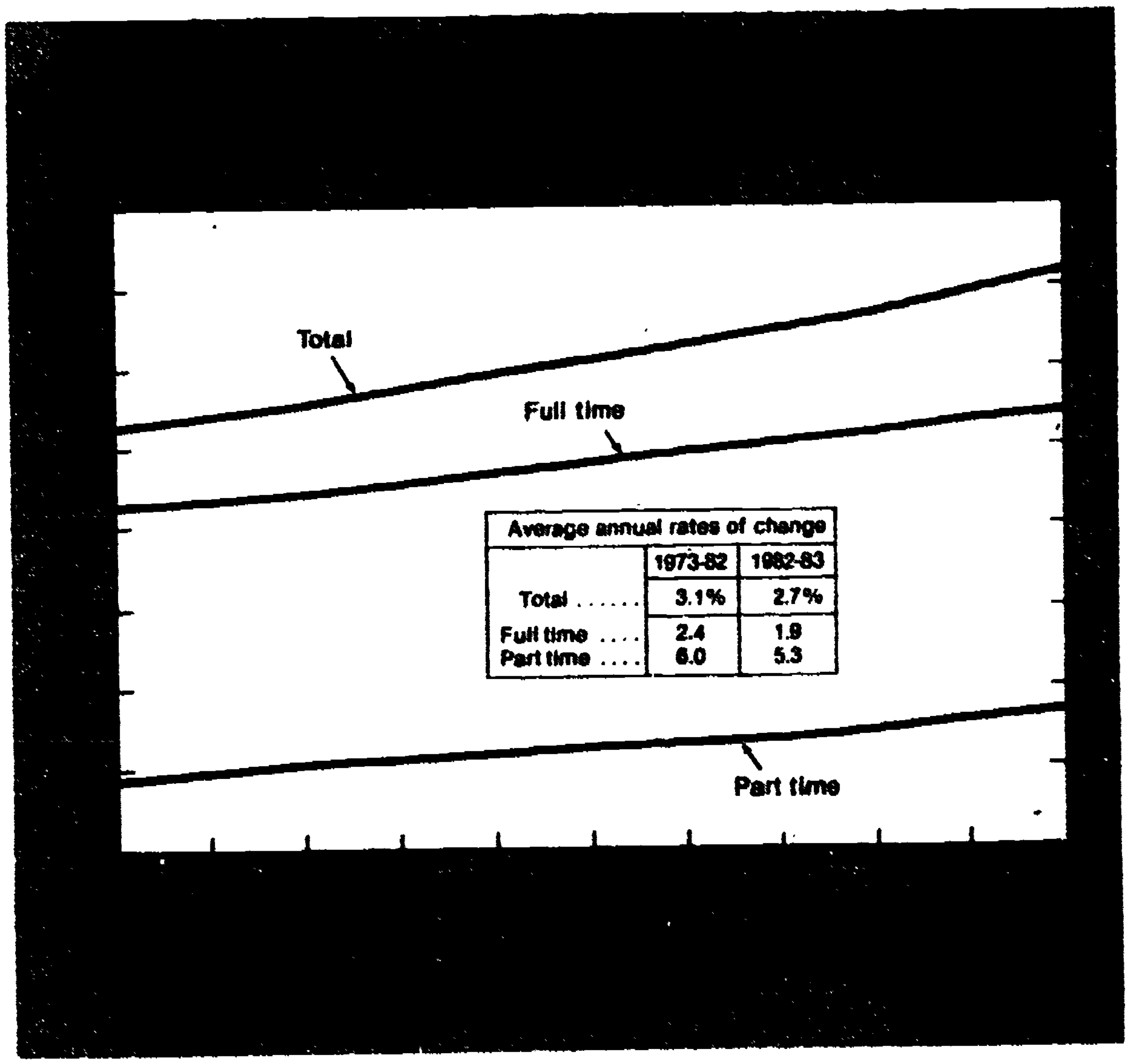


part 2.

trends in academic s/e employment

general characteristics, 1973-83

During the period from January 1973 through January 1983, academic employment of scientists and engineers increased by more than one-third, to a total of approximately 358,800.[19] This number represented a 3-percent rise over 1982 levels, similar to the average annual gains in the preceding 9-year period (chart 18). Employment of full-time S/E personnel between 1973 and 1983 grew at an average annual rate of 2 percent, and the number employed part time grew at treble this rate and accounted for 40 percent of the net increase. Thus, scientists and engineers employed full time



[19] Based on NSF's Survey of Scientific and Engineering (S/E) Personnel Employed at Universities and Colleges, annual series. According to the definition used in NSF's survey, professional employees of academic institutions are those working at a level requiring at least a bachelor's degree. Professional personnel include S/E faculty members, postdoctorates, and all other employees in S/E disciplines holding a bachelor's degree or the equivalent, such as research administrators and systems analysts in computer centers. Note that data for January 1979 were collected from doctorate-granting institutions only.

represented about 76 percent of total academic employment in 1983, dropping from an 82-percent share in 1973.

All S/E disciplines shared in the increase of professional personnel during the past decade, although not at equal rates. The number of engineers rose slightly faster than scientists between 1982 and 1983, up about 4 percent compared to 3 percent, although their average yearly growth rates during the period 1973-82 were the same—3 percent. The most rapid growth during the entire period was in employment of computer scientists, up more than 150 percent, followed by environmental scientists, up 46 percent. The number of physical scientists grew by only 15 percent, corresponding to low growth rates in enrollment in these fields. Graduate enrollment in the physical sciences, for example, was up only 5 percent during the comparable period.

Throughout the 1973-83 period, life scientists have consistently accounted for the largest portion (about two-fifths) of the total number of scientists and engineers, followed by social scientists (16 percent to 17 percent). Even though the number of mathematical/computer scientists grew at the fastest pace, they still constituted only a 13-percent share of the total in 1983 compared to less than 9 percent in 1973. Most of this gain was attributed to rapid growth in numbers of computer scientists—up an average of 13 percent per year over the past decade. Physical scientists and engineers remained at about 10 percent of the total. The high concentration of scientists within the life sciences corresponds to the predominance of this field in R&D funds expended (55 percent of the total), in full-time-equivalents in R&D activities (60 percent of the total), and in postdoctorates (65 percent of total). Of the total growth in numbers of scientists and engineers employed in academia over the period 1973-83, two-fifths was attributed to life scientists, and another one-fifth to mathematical/computer scientists.

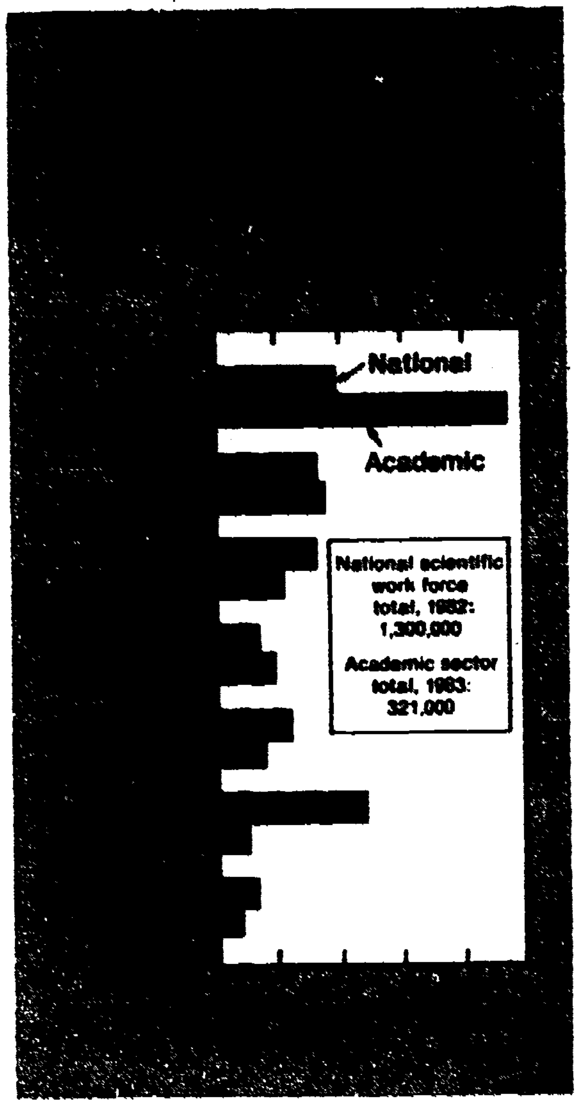
academic s/e employment trends in national perspective

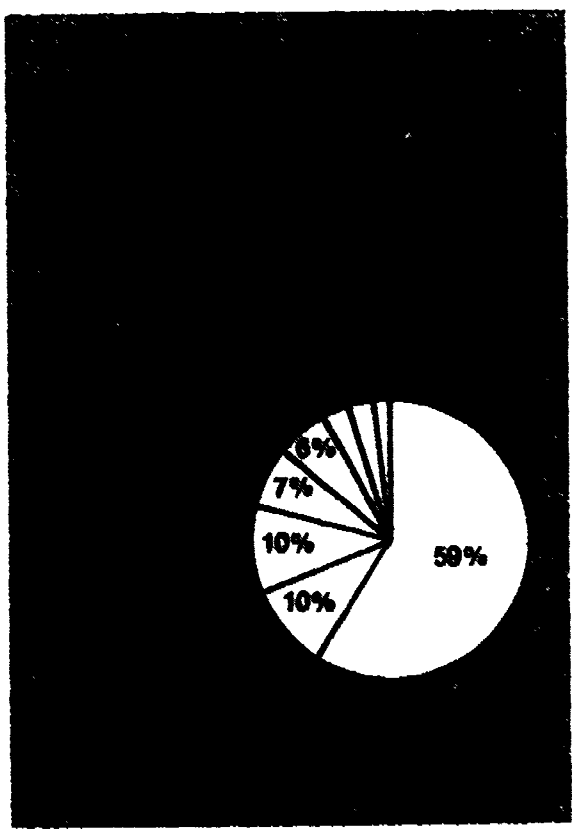
The number of employed scientists and engineers in the United States totaled 3.1 million in 1982. Four-tenths of the total (1.3 million) were employed as scientists and nearly six-tenths (1.8 million) as engineers (chart 19).[20]

The distribution of scientists and engineers in academia by discipline in 1983 differed considerably from that of the national S/E total, primarily because the relative proportion of engineers employed in universities was small—only 11 percent of the total compared to nearly 60 percent for all sectors combined. When engineers are excluded, the dissimilarities in the distribution of the scientific work force are more apparent. Computer specialists comprised nearly one-fourth of the national total, and life scientists one-fifth. At higher education institutions, however, almost one-half of all scientists were employed in the life sciences alone, and only a small fraction—about 4 percent—were employed in the computer sciences (chart 20).

Women employed as scientists and engineers in the United States totaled about 360,000 in 1982, bringing their portion of total S/E employment to about 13 percent, compared to their 45-percent share of all professional and technical workers in the United States.[21] Women accounted for 20 percent of all scientists and 6 percent of all engineers in 1982. Comparable proportions for women employed in institutions of higher education were 23 percent and 4 percent, respectively. Academically employed women and men were concentrated most heavily in the life sciences, but in all economic sectors combined women were employed most frequently in the computer specialties and men in engineering.

The national S/E employment data discussed above refer to findings of the NSF 1982 Postcensal Survey of Natural and Social Scientists and Engineers. Time-series data are available for a portion of the 1972 and 1982 Postcensal samples;





[20] National Science Foundation, "Science and Engineering Jobs Grew Twice as Fast as Overall U.S. Employment with Industry Taking the Lead," *Science Resources Studies Highlights* (NSF 84-319)(Washington, D.C., June 25, 1984).

[21] National Science Foundation, *Women and Minorities in Science and Engineering* (NSF 84-300) (Washington, D.C., 1984), p. 1.

namely, for those individuals who were employed in science, engineering, and related occupations at the time of the 1970 and 1980 Censuses of Population.

Among academic institutions, rates of employment growth for both scientists and engineers were similar over the past decade, increasing about 3 percent per year on the average. At the national level, however, employment of scientists grew at a faster rate than that of engineers—6 percent yearly versus 3 percent.

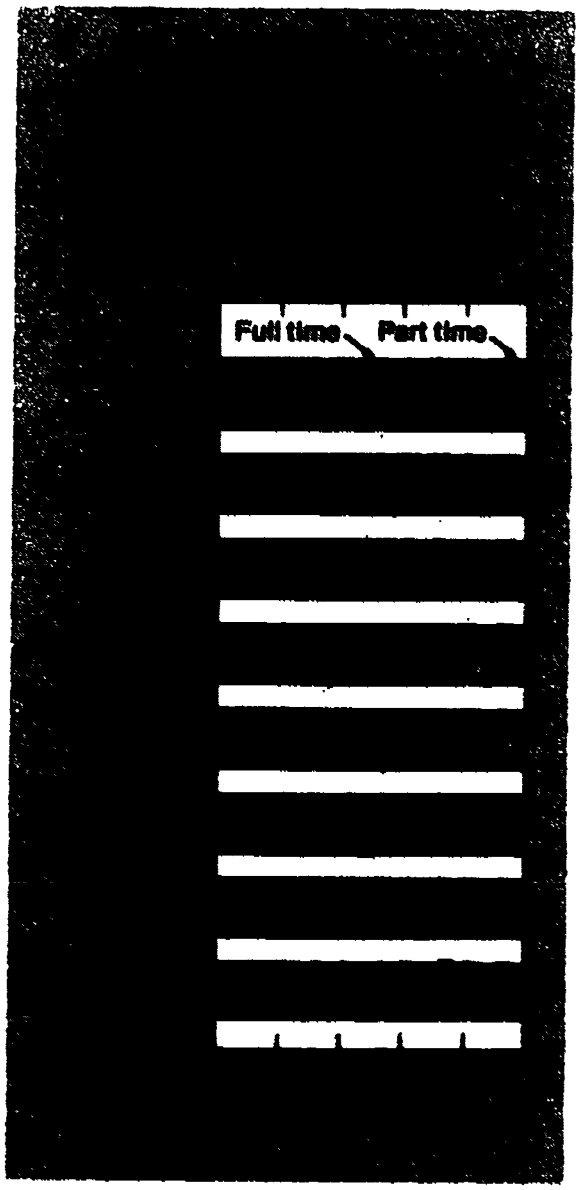
Industrial S/E employment rose at an average annual rate of 6 percent between 1972 and 1982, compared to only 3 percent for universities and colleges and 1 percent for the Federal Government.[22] In 1982, about one-half of all scientists and more than three-quarters of all engineers employed in the United States were working within the business/industry sector.

Growth rates for women employed as scientists and engineers were more rapid than for men in all sectors combined—13 percent per year from 1972 to 1982 compared to 3 percent yearly for men. In academia, annual growth rates for S/E women employed on a full-time basis also exceeded those for men between 1974 (when such data were first collected) and 1983—6 percent versus 2 percent.

employment status

The number of academic S/E personnel employed part time grew by almost 80 percent after 1973 to a total of about 85,900 in 1983, compared to a 26-percent rise for their full-time counterparts. The increased hiring of personnel employed part time is partly attributed to the demand created by continuing gains in S/E enrollment. This trend toward an increased use of part-timers has been somewhat cyclical in nature. From 1973 to 1978, part-time S/E employment was growing at 6 percent per year—three times the full-time growth rate. The rate of increase in part-timers slowed between 1978 and 1980, matching the 3-percent per year rate of full-timers. From 1980 to 1982, part-time employment once again accelerated significantly—up 8 percent to 9 percent each year compared to only 2 percent yearly for full-timers. Data for January 1983 indicate that the growth rate slowed to 5 percent for part-time S/E employment in academia, corresponding to a leveling off in academic research activity, a generally sluggish economy, and high unemployment rates nationally.

The 1973-83 trend toward increasing part-time employment of S/E professionals occurred in almost all fields (chart 21). The most notable part-time growth was among mathematical/computer scientists—an average annual increase of 15 percent—the majority of which was attributed to the rapid rise in computer scientists in response to swelling enrollments and demands by industry for specialists in this field. From 1982 to 1983, employment of computer scientists rose 16 percent, 13 percent for full-timers compared to 21 percent for part-timers.



The 3-percent per year increase in S/E employment at institutions of higher education between 1973 and 1983 matched the overall increase in graduate S/E enrollment during the comparable time period. Employment of scientists and engineers kept pace with, or exceeded, graduate enrollment in almost all S/E fields. In response to strong engineering labor markets, accelerated graduate engineering enrollment was apparent in fall 1982, up 5 percent over 1981, corresponding to a 4-percent rise in academic engineering employment for the same school year.[23]

The number of doctorate-holders employed full time as scientists or engineers in higher education institutions rose by an average of 3 percent per year between 1975 and 1983, compared to a 1-percent per year growth for master's degree-holders and 4 percent for bachelor's degree-holders. Bachelor's degree-holders declined at an average yearly rate of 2 percent from 1975 to 1978, when accelerated growth once again became significant, increasing their numbers by an average of 11 percent per year through 1983. This increase in nondoctorate-holders may correspond to the accelerated growth rate of part-time scientists and engineers employed in academia and those with temporary or short-term appointments.

Institutions under private control employed a much higher proportion of scientists and engineers with doctorate degrees (including first professional degrees)—about 80 percent of the total compared to only 65 percent in public institutions. This ratio has remained fairly stable since 1975 when degree level data were first collected.

type of activity

The number of scientists and engineers performing research and development at universities and colleges on an FTE basis increased 29 percent from 1973 to 1983 to a total of about 60,300, accompanied by a similar growth in the

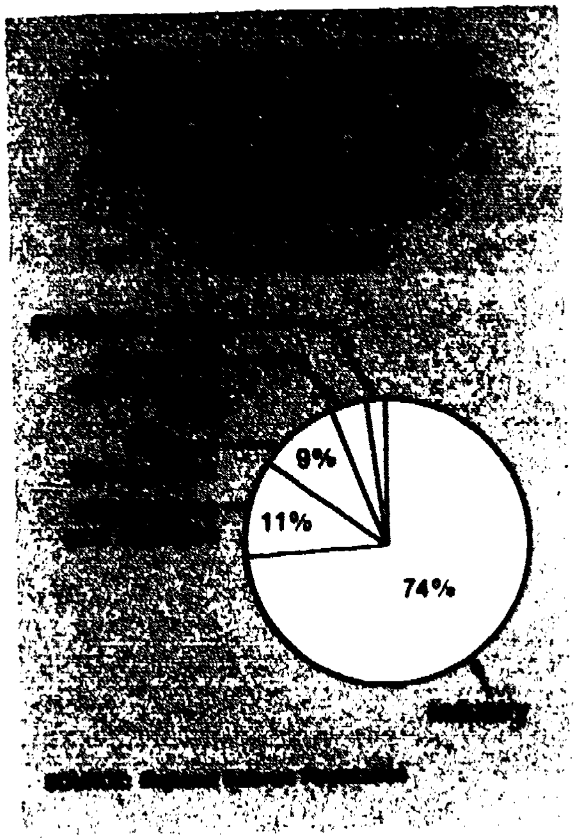
[22] National Science Foundation, "Science and Engineering Jobs Grew Twice as Fast as Overall U.S. Employment with Industry Taking the Lead," *op cit*

[23] National Science Foundation, *Academic Science/Engineering: Graduate Enrollment and Support, Fall 1982* (Detailed Statistical Tables) (NSF 84-306) (Washington, D.C., 1984), table B-1.

number of full-time-equivalents engaged in teaching and other activities.[24] The gain in R&D employment in FTE terms was directly linked to increases in R&D expenditures by academic institutions, up 32 percent in constant dollars between FY's 1972 and 1982.

The average yearly rate of increase in R&D scientists and engineers was greater between 1973 and 1978 (4 percent), however, than between 1978 and 1983, when it slowed to less than 2 percent per year. This declining rate of growth in professional R&D staff accompanied an increasing use of graduate research assistants in the performance of research—up 4 percent per year between fall 1977 and fall 1981.[25] Employment data for 1983 indicate an increase of only 1 percent in the number of full-time-equivalents devoted to R&D activities, paralleling the constant-dollar slowdown in FY 1982 R&D spending at universities and colleges and a leveling off in the number of S/E graduate research assistants in fall 1982.

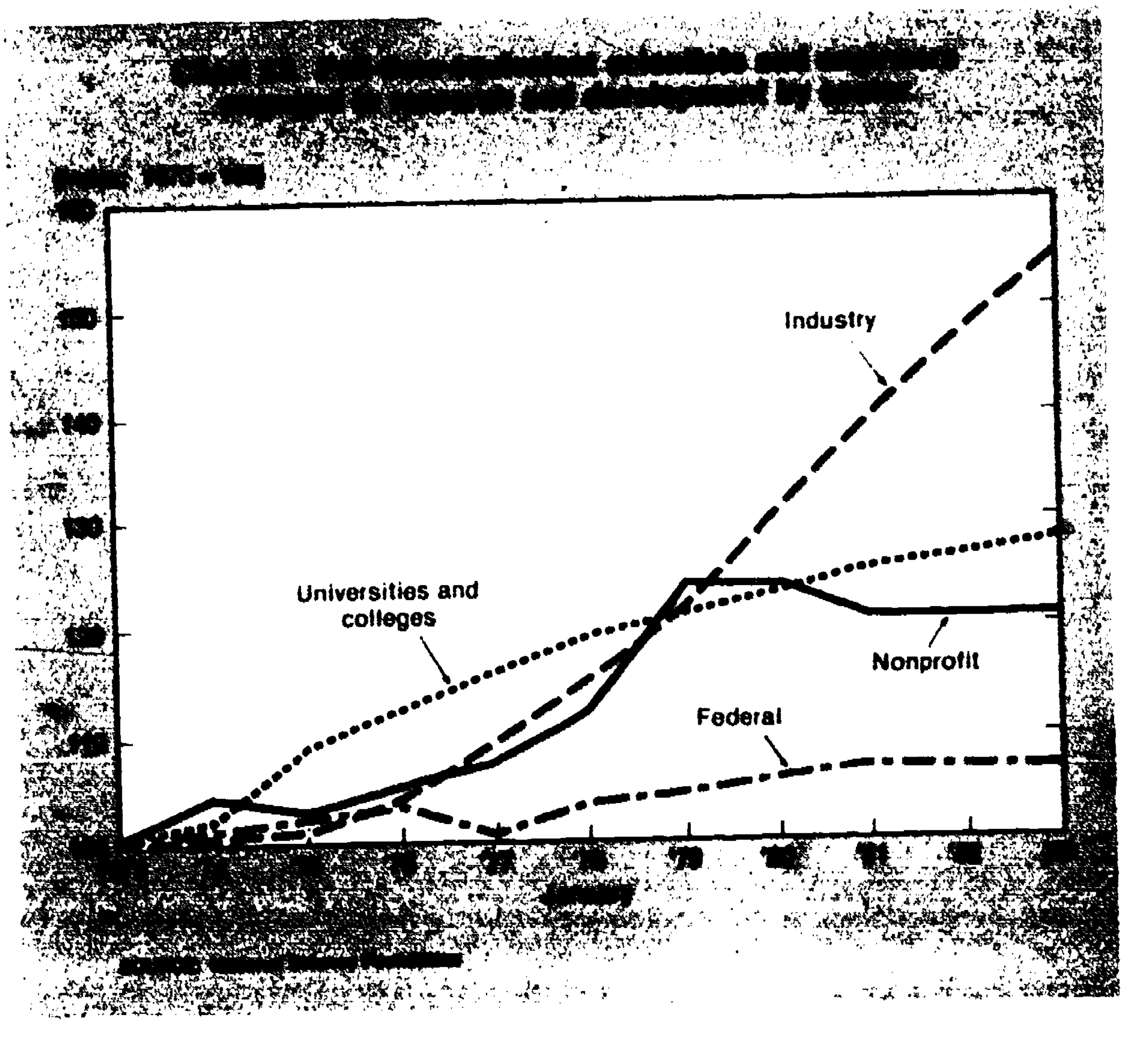
Academia's share of the national total of R&D-engaged full-time-equivalents has changed little in the past decade, but industry, which showed accelerated gains in R&D employment after 1978, increased its portion to three-quarters by 1983, up from about two-thirds in 1973 (chart 22). Full-time-equivalents employed by industry in 1983 show that this sector continued to outpace the academic sector in R&D employment growth (chart 23). In fact, the industrial sector is the only one that showed substantial and consistent gains throughout the past decade—up an average of 4 percent annually. In other sectors, growth rates in employment of full-time-equivalents in R&D activities slowed after 1978—to less than 2 percent per year in academic and nonprofit institutions and less than 1 percent yearly for the Federal sector.[26] The 1982 and 1983 figures show virtually no rise in the level of R&D personnel except in industry and institutions of higher education.



Just over two-fifths of all scientists and engineers in academia were employed in the life sciences, but life scientists accounted for three-fifths of all academic full-time-equivalents engaged in R&D activities in 1983, followed by physical scientists and engineers at about 12 percent each. These proportions did not change after 1978 when FTE data were first collected by discipline.

type of institution

The rates of growth in the academic employment of scientists and engineers differed by type of institution, the fastest pace being set by 2-year institutions—up an average of 5 percent per year from 1973 to 1983—and the slowest pace by



[24] Beginning in 1978, the personnel survey questionnaire requested data on type of activity only in terms of FTE involvement, since this basis of measurement provides a more accurate picture of scientists' or engineers' activities in earlier years. Only data on total and R&D full-time-equivalents were requested; therefore, separate data on teaching and "other activities" are no longer available.

[25] National Science Foundation, *Academic Science/Engineering: Graduate Enrollment and Support, Fall 1982*, op. cit., table C-30.

[26] National Science Foundation, *National Patterns of Science and Technology Resources*, op. cit., table 14.

bachelor's-granting institutions which showed very little overall gain in total S/E employment (chart 24). The number of scientists and engineers employed part time rose at much higher rates in each institutional category except doctorate-granting, thus increasing their portion of overall S/E professionals substantially. The average yearly gain of 11 percent in part-timers employed at 2-year institutions raised their share in 1983 to more than two-fifths of all scientists and engineers employed in these institutions, up from one-fourth in 1973. This corresponds to impressive enrollment gains during a comparable time period, up an average of about 6 percent per year, compared to only 1 percent for universities and other 4-year institutions.[27] Master's-granting institutions also showed substantial gains in numbers of S/E professionals employed part time, averaging increases of 11 percent yearly from 1973-83. Although the portion of total scientists and engineers employed part time at doctorate-granting institutions increased only 1 percentage point to 19 percent in 1983, this institutional group was the *only* one to have consistent and uninterrupted growth in employment of both full- and part-time scientists and engineers over the entire 1973-83 period. Bachelor's-granting institutions showed an actual decline in scientists and engineers employed full time. The small gains seen in total employment by this group were attributable entirely to the hiring of part-timers.

[27] Department of Education, National Center for Education Statistics, *Digest of Education Statistics, 1982* (Washington, D.C.: Supt. of Documents, U.S. Government Printing Office, 1982), table 79, p. 91, and unpublished data.

The mix of full- to part-time scientists and engineers changed considerably between 1973 and 1983 for each type of institution except doctorate-granting (chart 25). As mentioned earlier, 2-year schools (including non-S/E degree-granting institutions) showed the most dramatic shift, followed by master's-granting campuses. This continuing rise in the portion of part-time employment is largely a result of increased hiring of nonpermanent, nontenure track employees.

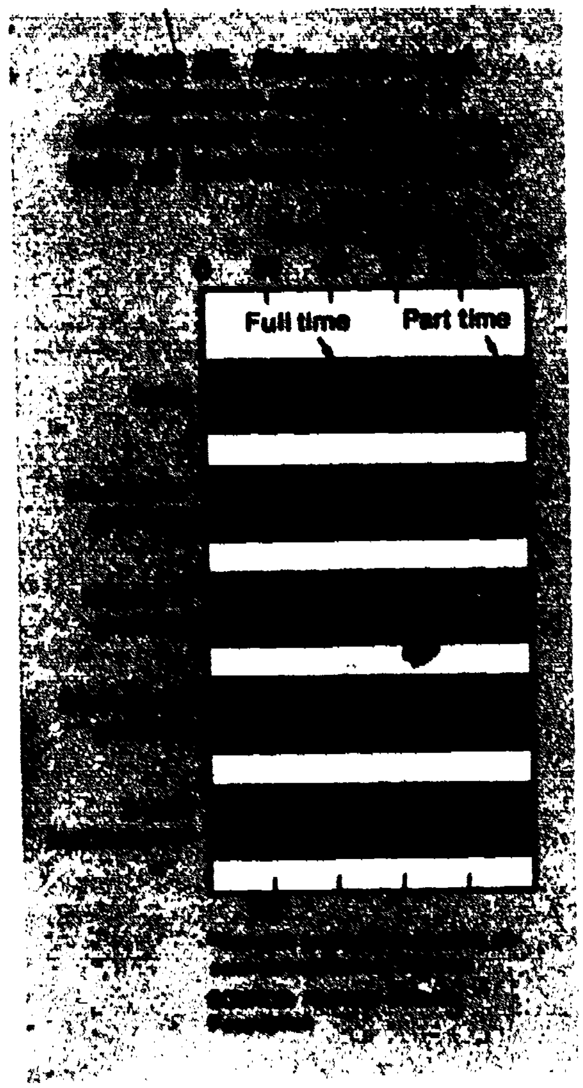
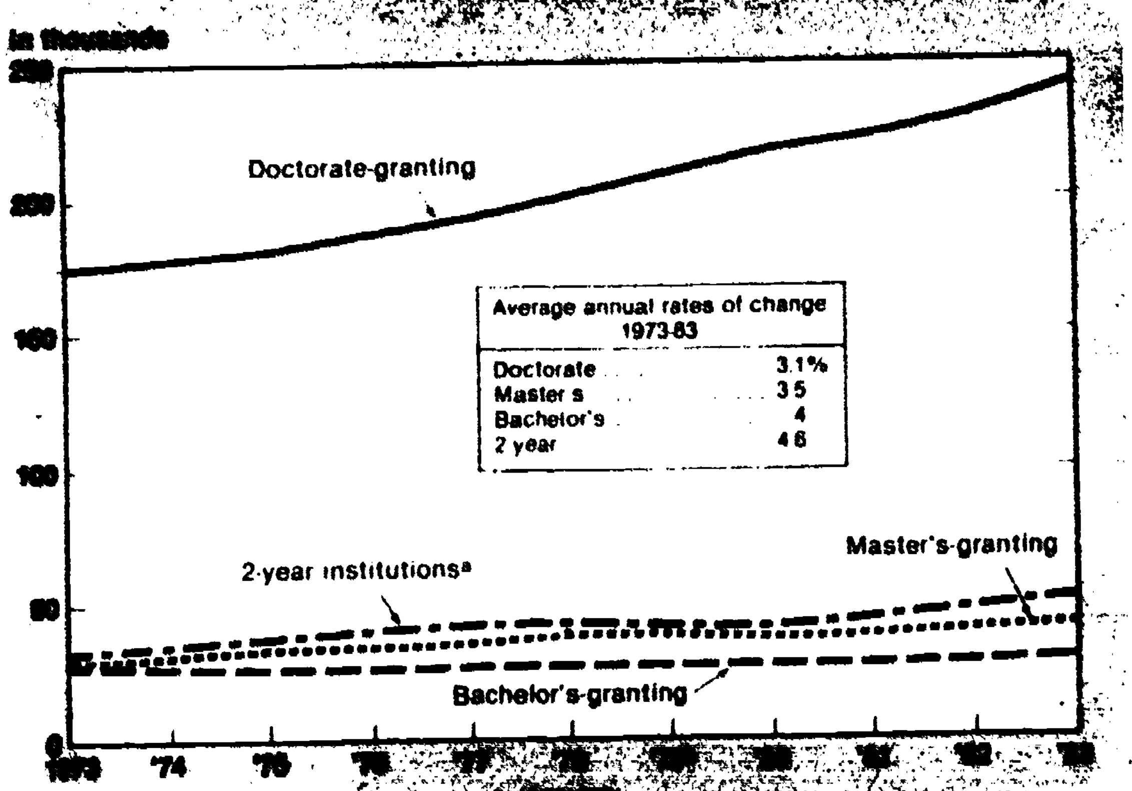


Chart 24.



sex of scientists and engineers, 1974-83

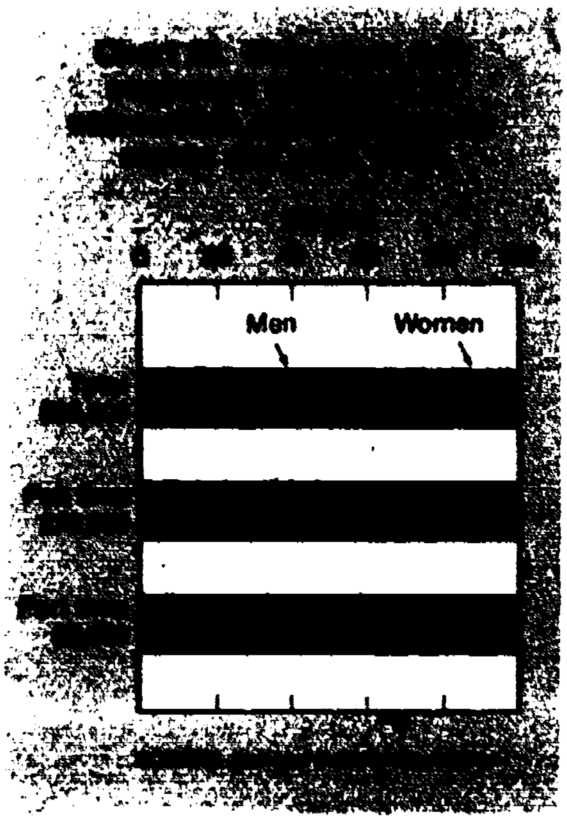
Women steadily increased their representation among professional S/E staff within the academic sector and in 1983 accounted for 21 percent of all academic scientists and engineers, higher than their 13-percent share of the national S/E work force.[28] Growth rates in full-time employment of women consistently exceeded those for men between 1974 (when such data were first collected) and 1983—6 percent per year compared to 2 percent. Gains in numbers of women employed part time have been even faster (at least since 1980 when data by sex *and* status were first gathered), rising 9 percent per year from 1980 to 1983. In the

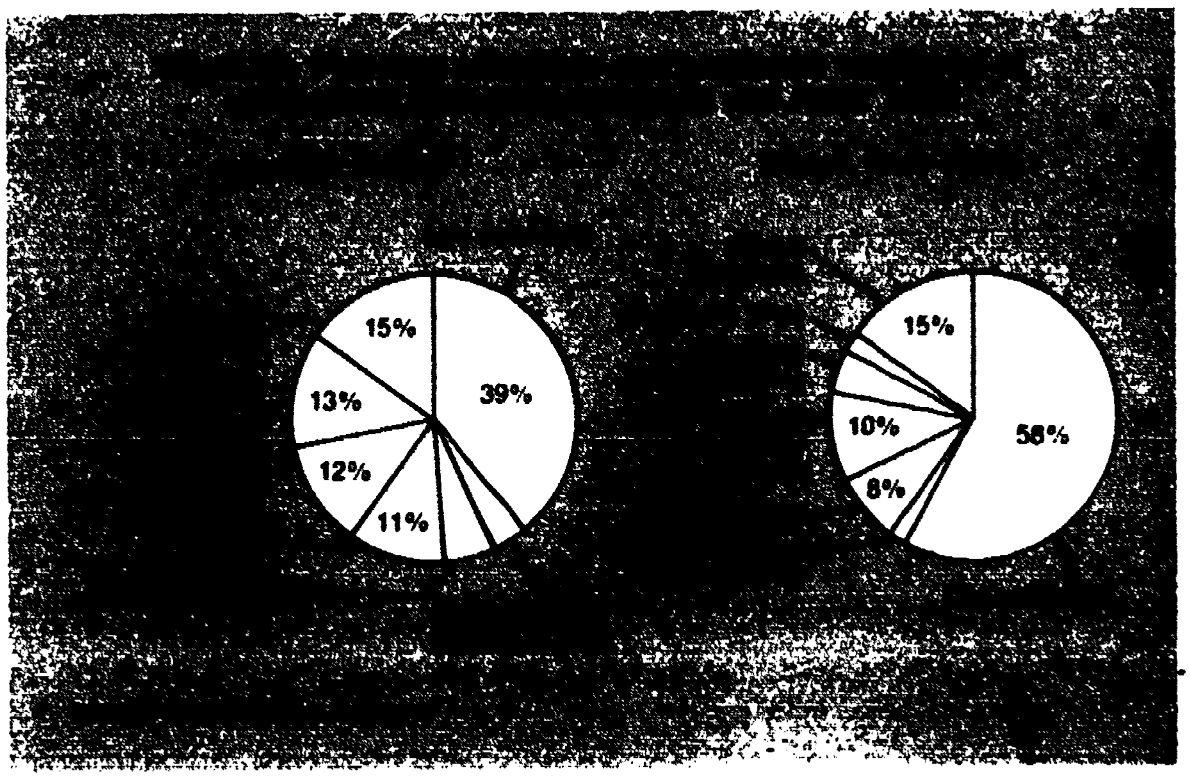
[28] National Science Foundation, *Women and Minorities in Science and Engineering*, op. cit.

latter year, women accc.unted for 26 percent of all academic scientists and engineers employed part time and 19 percent of those employed full time (chart 26).

The number of women employed as full-time scientists and engineers in academia grew 65 percent after 1974 to a total of about 53,100 in 1983. These gains were apparent across *all* major S/E fields, and average yearly growth rates for women exceeded those for men in all cases (chart 27). The highest average annual growth rates during this period occurred among women engineers, up 13 percent, and environmental scientists, up 11 percent. These are fields, however, in which women have historically been underrepresented, and thus gains in absolute numbers do not appear as impressive as the growth rates indicate. The 1974-83 addition of about 675 academic women in the engineering fields brought their total to only 1,000 in 1983 (compared to 27,800 men), or a 4-percent share of the total. Women life scientists and psychologists, up 6 percent and 4 percent per year, respectively, showed the largest proportional gains, each accounting in 1983 for at least one-quarter of total full-time employment in these fields (chart 28).

The field distribution for academic full-time scientists and engineers differs somewhat by sex. Both women and men continued to be most heavily concentrated in the life and social sciences (chart 29). Although engineering ranked third for men (13 percent), it ranked at the bottom along with environmental sciences for women (only 2 percent).





Twelve percent of men were physical scientists compared to only 5 percent of their female colleagues.

women doctorate-holders

The pattern of increased representation of women employed full time as academic scientists and engineers does not in itself reflect the entire picture. It is necessary to look at other significant and relevant factors regarding salaries, tenure status, S/E employment in other economic sectors, etc., in order to assess their present standing. A recent report from the National Research Council (NRC) based on surveys of doctorate scientists and engineers indicates that women in academe have not yet achieved parity with their male colleagues in a number of areas.[29] For example, although women employed as scientists and engineers in higher education institutions continued to gain in numbers, their salaries have not kept pace with those of men at the same degree level. Women doctorate-holders employed as scientists and engineers in educational institutions in 1973 earned a median annual salary that was $2,600 lower or 87 percent of that for men. In 1981, the median annual salary difference was $6,300, with women earning only 80 percent of the median salary for men.[30] A 1981 NRC report on a matched sample of men and women doctorates found that these differences remained even when controlling for education, experience, type of employment, and years since receiving the doctorate degree. Thus, among a matched-pair sample of recent doctorates, the median salary in 1979 for women in full-time academic jobs was lower than that for men in all fields. The largest differentials in pay were in chemistry ($3,300) and the biological sciences ($2,100).[31] The smallest differentials were in mathematics ($400) and psychology ($600). A later study found that even after controlling for academic rank, salary differences for men and women persisted in most fields. At full professor rank, the differentials ranged from a low of $1,000 in physics to a high of $6,200 in the medical sciences (chart 30). The salary deficits in 1981 were of the same order of magnitude as they were in 1977.[32]

This pattern of lower women's salaries occurred not only in academia, but across all S/E fields in all sectors of employment. At the national level, average salaries paid to women doctoral scientists and engineers in 1981 were only 75 percent of those paid to men. After standardizing for field, race, sector of employment, and years of professional experience, the differential narrowed, but almost one-half of the differential remained unexplained.[33]

The distribution of faculty appointments also shows considerable differences between men and women. Women scientists were found to be twice or three times as likely as men to hold nonfaculty (instructor/lecturer) positions, with the disparity increasing in most of the fields studied between 1977 and 1981. Such off-ladder appointments were most common for women in chemistry, physics, and mathematics. When looking at faculty rank, ". . . approximately 50 percent of all males in science and engineering departments were full professors in 1981, with the major research universities more 'top-heavy' than other institutions. And although there were 3,000 doctoral women scientists employed in the leading institutions, only 10 percent of the women were full professors; 43 percent were in off-ladder positions or are postdoctoral appointees." For the 50 leading research institutions (ranked on federally financed R&D expenditures in FY 1980), women in 1981 held 24 percent of the assistant professorships, but only 3 percent of the full professorships.[34]

Since a larger share of S/E women were in temporary, part-time, and off-ladder appointments in 1981, it is not surprising that the proportion of women scientists and engineers who were tenured continued to lag behind that of men—76 percent for women compared to 83 percent for men at the associate professor rank (chart 31). This differential has declined slightly since 1977, however, and at the assistant professor level, the percentage of women holding tenure in 1981 surpassed that of men—10 percent compared to 8 percent.[35]

[29] National Research Council, Committee on Education and Employment of Women in Science and Engineering, *Climbing the Ladder: An Update on the Status of Women Doctoral Scientists and Engineers* (Washington, D.C.: National Academy Press, 1983).

[30] National Science Foundation, *Characteristics of Doctoral Scientists and Engineers in the United States: 1981* (Detailed Statistical Tables) (NSF 82-332) (Washington, D.C., 1982), tables 3 and 4, pp. 1 and 6.

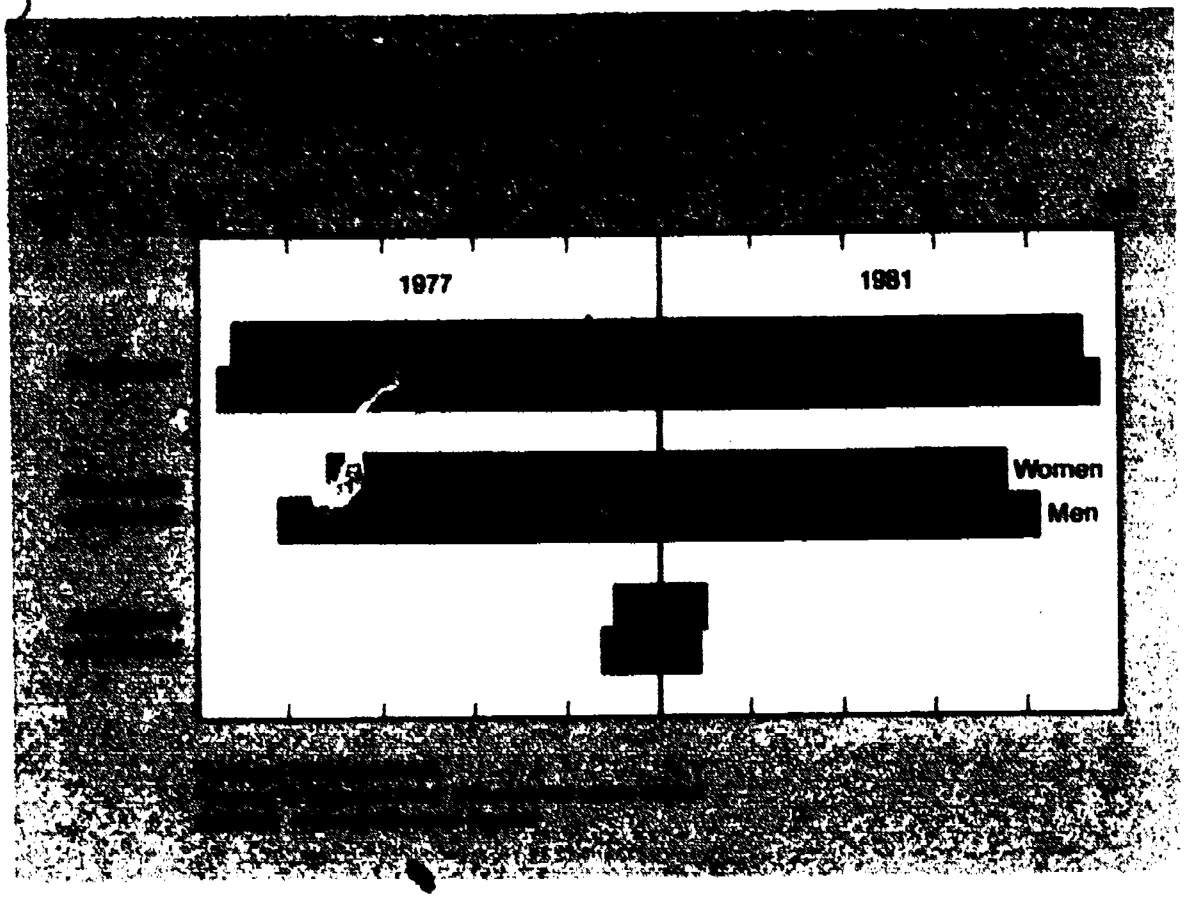
[31] Nancy C. Ahern and Elizabeth L. Scott, *Career Outcomes in a Matched Sample of Men and Women Ph.D.s* (Washington, D.C.: National Research Council, 1981), p. 48.

[32] National Research Council, *Climbing the Ladder*, op. cit., p. 4-21.

[33] National Science Foundation, *Women and Minorities in Science and Engineering*, op. cit., p. 6.

[34] National Research Council, *Climbing the Ladder*, op. cit., p. 48.

[35] *Ibid.*, table 4.7, pp. 4-14-4-16.



minority scientists and engineers

Between 1972 and 1982, employment of both black and Asian scientists and engineers in all sectors grew at an average yearly rate of 11 percent compared to 3 percent for their white counterparts.[*] Thus, about 70,000 blacks and 125,000 Asians were employed as scientists and engineers in 1982, representing over 2 percent and 4 percent, respectively, of total employment. Blacks were most often employed as life or social scientists, and Asians were heavily concentrated in engineering.

The 1981 biennial Survey of Doctorate Recipients provides information on the racial/ethnic distribution of doctoral scientists and engineers and minority employment patterns, both nationally and in the academic sector.[*] Results from this sample survey showed that the number of doctoral scientists and engineers increased 50 percent after 1973 (5 percent per year) to a total of about 363,900 in 1981. Minorities accounted for only 15 percent of the net increase over this 8-year period, although their numbers nearly tripled. A full four-fifths of the net increase in minorities was attributed to Asians—up 14 percent annually between 1973 and 1981.

The academic sector employed one-half of all doctoral scientists and engineers in 1981, 60 percent of the black doctorate-holders, 50 percent of the white, and 43 percent of the Asian.[*]

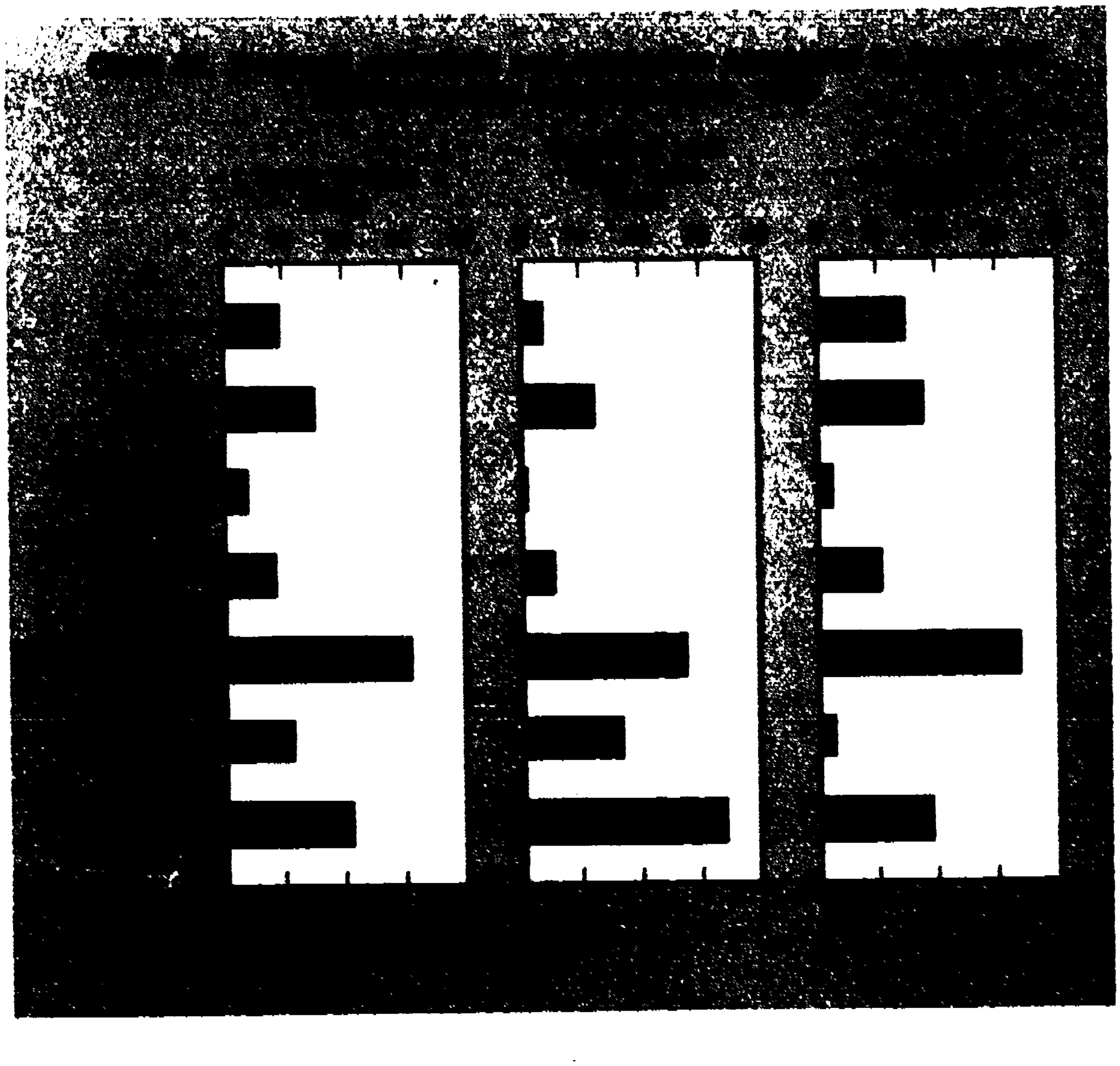
Variation by academic S/E field of employment was apparent across racial groupings. White and Asian doctoral scientists and engineers were most heavily concentrated in the life sciences, 31 percent and 34 percent of the total, respectively (chart 32). The highest proportion of black doctorate degree-holders, on the other hand, were employed

[*] The 1982 national S/E employment data for minority scientists and engineers refer to findings of the 1982 Postcensal Survey of Natural and Social Scientists and Engineers. Time series data are available for a portion of the 1972 and 1982 Postcensal samples, namely for those individuals who were employed in science, engineering, and related occupations at the time of the 1970 and 1980 Censuses of Population.

[*] National Science Foundation, "Science and Engineering Jobs Grew Twice as Fast as Overall U.S. Employment with Industry Taking the Lead," op. cit.

[*] National Science Foundation, *Characteristics of Doctoral Scientists and Engineers in the United States: 1981*, op. cit., table B-6.

[*] *Ibid.*



in the social sciences (34 percent), and the second highest proportion in the life sciences (27 percent).

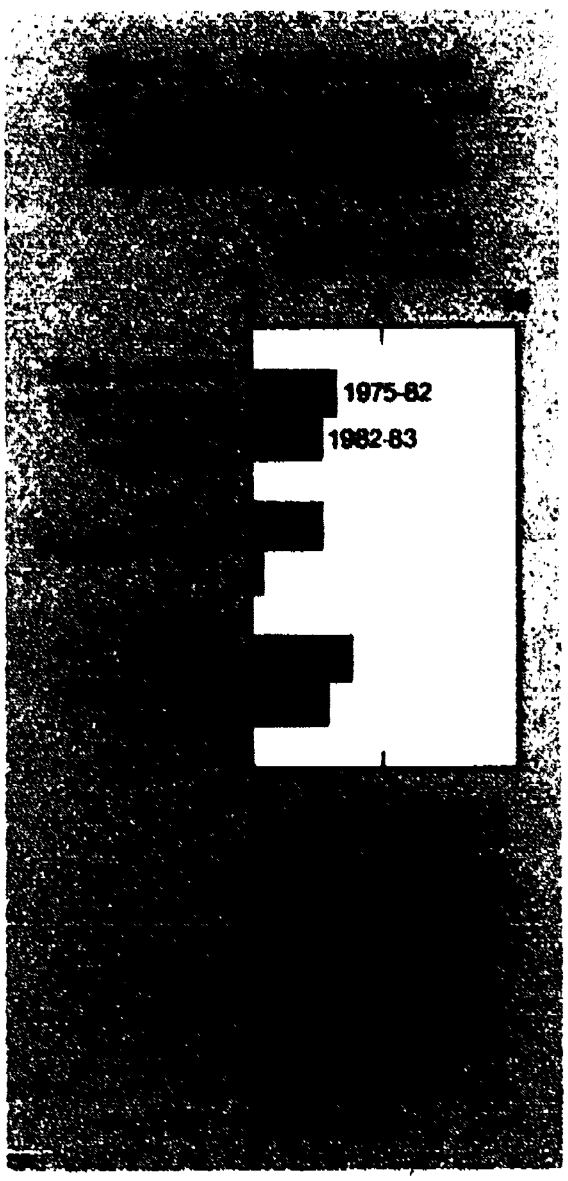
Minority doctoral scientists and engineers employed in the industrial sector accounted for about 13 percent of the total in 1981. The absolute number (11,800) of Asian S/E doctorate-holders employed by industry approached their numbers in academia (12,000), but they represented a larger share of the industrial total—about 12 percent. More than one-half of the Asian S/E doctorate-holders were employed in the engineering fields, compared to only 29 percent of the whites and 20 percent of the blacks.

postdoctorate utilization

The 358,800 scientists and engineers working in academic institutions in January 1983 included about 19,800 postdoctorates, or almost 6 percent of the total, according to the NSF Survey of Graduate Science and Engineering Students and Postdoctorates (GSSP), fall 1982.[40] Another 4,000 staff members—1 percent of the total—were classified as "other nonfaculty doctoral research staff." Postdoctorates are defined as those individuals with S/E Ph.D.'s, M.D.'s, D.D.S.'s, or D.V.M.'s (including foreign degrees that are equivalent to U.S. doctorates) who devote their primary effort to research activities or study in a particular department or program under temporary appointments carrying no academic rank. Such appointments are generally for a specific period and may contribute to the academic program through seminars, lectures, or work with graduate students. Their postdoctoral activities provide additional training for them. Clinical fellows and those with appointments in residency training programs in medical and health professions are excluded, unless research training under the supervision of a senior mentor is the primary purpose of the appointment.

Postdoctorate employment increased by less than 1 percent from fall 1981 to 1982 compared to a 3-percent growth rate for all other scientists and engineers (chart 33). This is in contrast to 1980-81 when the number of postdoctorates increased more rapidly than did the number of other scientists and engineers employed in universities and colleges, 7 percent compared to 4 percent.

Several factors have contributed to the growth in the number of postdoctorates employed by universities in recent years. In the long term, the postdoctorate appointment has become increasingly necessary as a stepping stone to faculty appointments in prestigious research-oriented universities, especially in the life and physical sciences. A 1981 study by the NRC reported that 58 percent of the recent doctorate recipients in the biosciences took postdoctoral appointments; in physics the proportion was 50 percent, and in chemistry, 48 percent.[41]



More significant in the short term is the increasingly tight job market in academe. The aforementioned NRC study found that ". . . In the face of decreasing numbers of appointments to faculty positions in many fields of science, there has been a marked increase in postdoctoral appointments during the past decade."[42] The declining birthrate of the sixties is generally expected to translate into declining college enrollment during the eighties, resulting in decreasing numbers of faculty openings during the same period.[43]

In view of the growing number of postdoctorates and graduate research assistants involved in the performance of academic research and development, a comparison of the utilization patterns of the two groups is worthwhile. In addition, the significant contribution of academic R&D funding to the support of both groups means that the distribution of R&D expenditures is also of interest. Although the discussion that follows refers technically only to those postdoctorates employed in doctorate-granting institutions, it applies for all practical purposes to all postdoctorates employed in universities and colleges, since only 39—or two-tenths of 1 percent—were employed in master's-level institutions in fall 1982.

The ratio of graduate research assistants to postdoctorates for all S/E fields combined was 2.7 to 1 in fall 1982, slightly higher than the 2.3 to 1 ratio in 1977. As indicated earlier, however, there is a wide variation among fields in the utilization of postdoctorate staff. In the life and physical sciences, which have had the heaviest concentration of postdoctorates, the ratios of graduate research assistants to postdoctorates were 1.2 to 1 and 2.0 to 1, respectively, in 1982.

[40] National Science Foundation, *Academic Science/Engineering Graduate Enrollment and Support, Fall 1982*, op. cit.

[41] National Research Council, Commission on Human Resources, *Postdoctoral Appointments and Disappointments* (Washington, D.C.: National Academy Press, 1981), p. 229.

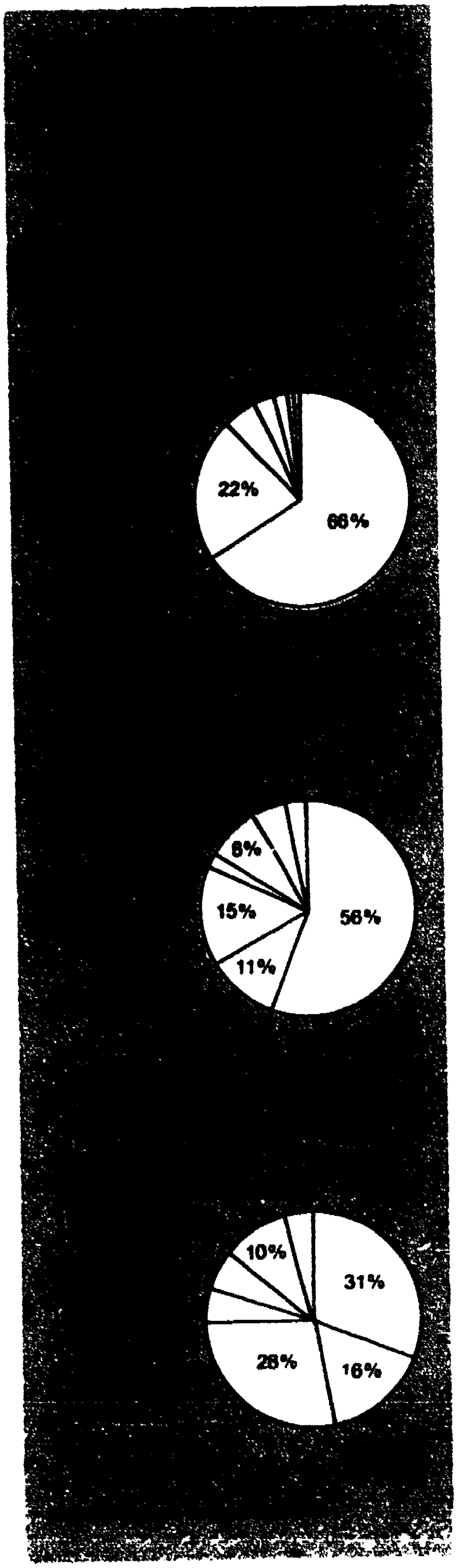
[42] *Ibid.*, p. 53.

[43] For example, see David W. Breneman, *The Coming Enrollment Crisis: What Every Trustee Must Know* (Washington, D.C.: The Association of Governing Boards of Universities and Colleges, 1982), pp. 20-21 and 27.

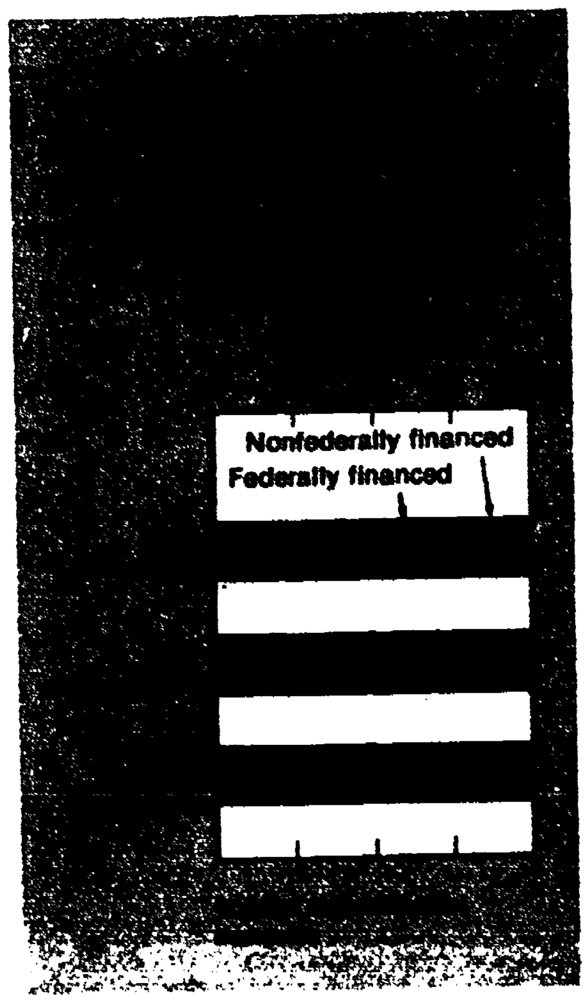
At the opposite extreme, graduate research assistants outnumbered postdoctorates by more than 10 to 1 in the social sciences and engineering.

The field distribution of postdoctorates approached more closely that of R&D expenditures than did that of graduate research assistants; in both data sets the life sciences made up a majority of the total (chart 34). Among graduate research assistants, those in the life sciences, although still the largest single group, comprised only 31 percent of the total. Engineering was a distant third behind the physical sciences in postdoctorate employment, even though it constituted the second largest proportion of both R&D expenditures and graduate research assistants. This may be explained by the ready availability of job openings in industry for new engineering doctorates in recent years, and as indicated earlier, this situation also adversely affected the ability of universities to fill faculty vacancies. If, as some recent studies indicate, the job market for new engineering graduates in industry slackens in the near future, the number of engineering doctorates accepting postdoctoral appointments may increase.[44]

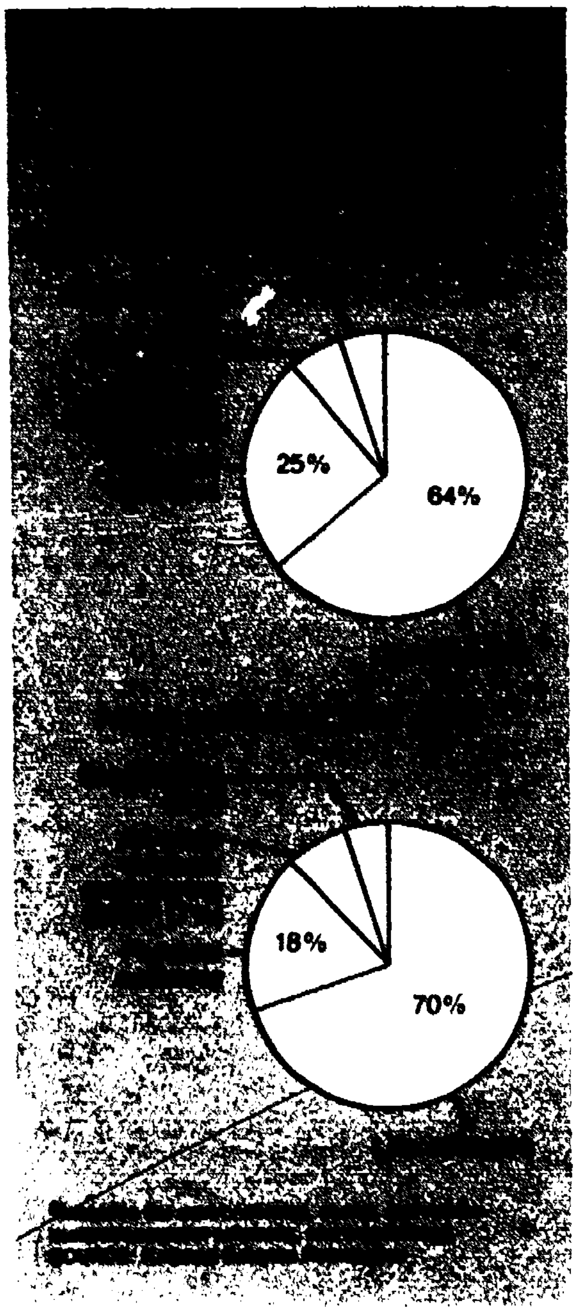
Approximately three-fourths of all S/E postdoctorates were supported by Federal funds in fall 1981, a proportion that had changed little since the early seventies. The proportion of all graduate research assistants who were primarily supported by the Federal Government, nearly three-fifths, and the federally sponsored portion of all academic R&D expenditures, about two-thirds, were also approximately the same as in 1974. In fall 1982, however, the proportions of postdoctorates and graduate research assistants primarily supported by the Federal Government fell to 71 percent and 54 percent, respectively (chart 35).



As might be anticipated on the basis of their higher funding levels, publicly controlled institutions employed the majority of the postdoctorates in academe. Public universities and colleges were responsible for 63 percent of all R&D expenditures, employed 56 percent of the postdoctorates, and enrolled 68 percent of the S/E graduate students. The distribution by S/E field of postdoctorates in the two types of institutions showed that life scientists comprised about two-thirds of all postdoctorates in both public and private institutions. Physical scientists, however, comprised a significantly larger proportion of the postdoctorates employed in public institutions than in private institutions, 25 percent compared to 18 percent. This is largely a reflection of the heavy concentration of



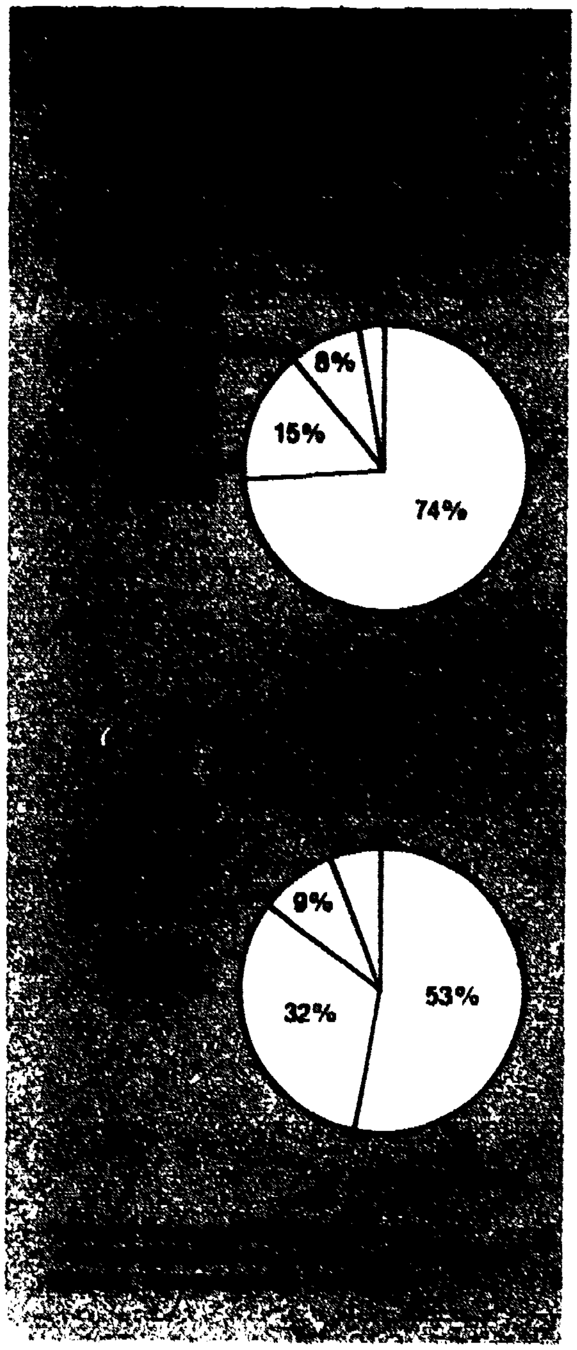
[44] Manpower Comments (Vol. 20, No. 4, May 1983), p. 3, reports that "... both practicing engineers and their employers predominantly foresee steadier employment levels rather than a period of strong growth or decline" "1982-83 Demand Survey" conducted by the Engineering Manpower Commission of the American Association of Engineering Societies.



physical science postdoctorates in a few large public institutions (chart 36).

Women made up slightly more than 20 percent of all S/E postdoctorates in fall 1981, up from 18 percent in fall 1979, when data on sex were added to the survey. The number of women holding postdoctorate appointments grew during this period at an average annual rate of 11 percent, compared to a 3-percent average annual rate in the number of men. Women's share of the postdoctorate total varied widely among the S/E fields, however, from 2 out of 5 in psychology to about 1 in 12 in engineering. By fall 1982, 23 percent of all postdoctorates were women.

The proportion of foreigners among postdoctorates employed in U.S. institutions, 32 percent in 1977, rose to 37 percent by 1982. U.S. citizens were in the minority in three fields—engineering, the physical sciences, and the mathematical/computer sciences. In fact, only one engineering postdoctorate in three was a U.S. citizen. About 74 percent of the postdoctorates with U.S. citizenship were life scientists compared to 53 percent of the foreigners; physical scientists and engineers, however, accounted for much larger proportions of foreign postdoctorates than of U.S. citizens. These proportions were substantially similar in fall 1981 (chart 37).



part 3.

trends in graduate s/e enrollment

general characteristics, 1975-82

NSF's fall 1982 Survey of Graduate Science and Engineering Students and Postdoctorates (GSSP) collected data on full- and part-time enrollment in postbaccalaureate programs at 614 institutions in the United States. These institutions reported that a total of 400,000 graduate S/E students were enrolled in 1982, up 2 percent over fall 1981 totals. More than one-half the increase (51 percent) was in engineering fields. Enrollment in graduate engineering fields grew by 5 percent from 1981 to 1982, compared to a 1-percent increase in the sciences. This pattern was in contrast with the 1975-81 period—3 percent per year in engineering and about 2 percent per year in the sciences. Total graduate S/E enrollment growth during this period averaged 2 percent to 3 percent annually.

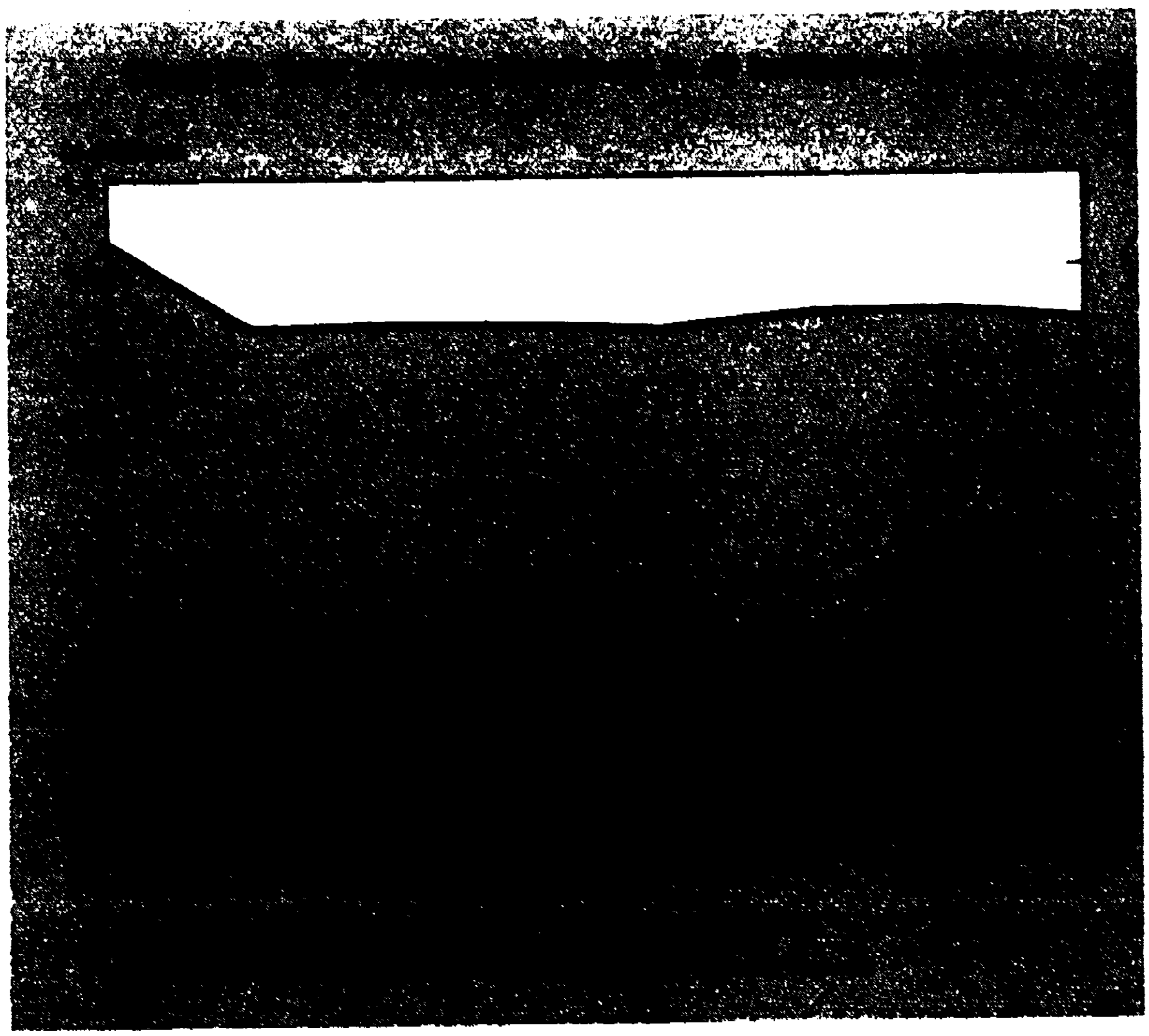
S/E graduate students represented 36 percent of all graduate students in 1982, as reported by the National Center for Education Statistics (NCES), and about 3 percent of all enrollment.

The continuing growth in the overall number of students enrolled for advanced degrees in S/E fields runs counter to the trend in the arts, education, and humanities, where steady declines averaging 1 percent per year have taken place each year from 1976 to 1982, except for 1979-80.[45] The number of non-S/E graduate students declined by nearly 3 percent from 1981 to 1982 (chart 38).

[45] Department of Education, National Center for Education Statistics, *Fall Enrollment in Higher Education, 1982* (Washington, D.C., 1984), pp. 10 and 32.

These patterns reflect the perceptions of individuals considering graduate study as to which fields are likely to be in greatest demand in the eighties and beyond.

The expected decline in enrollment in higher education, which NCES predicted would begin in 1981, has not yet



materialized.[46] Increasing numbers of nontraditional students, including women, minorities, and those older than the traditional 18- to 24-year-old age group, have thus far offset the decrease in the number of 18- to 24-year-old white males entering college at all levels, both graduate and undergraduate. In fall 1982 the two trends virtually offset each other. Allen W. Ostar, in an article in *The Chronicle of Higher Education*, has predicted that by 1990, more than one-half the enrollment at institutions of higher education may consist of older people returning to college to continue or update their education.[47]

Throughout the period in which graduate S/E enrollment data by sex have been collected in the GSSP (since 1974 for full-time graduate students in doctorate-granting institutions and since 1976 for total graduate enrollment), the number of women has continued to grow faster than the number of men—a 12-percent average annual increase compared to a 1-percent average annual decline at the total S/E enrollment level. In fall 1982, men graduate S/E students continued to outnumber women—56 percent of total enrollment in the sciences, 89 percent in engineering. Among all other categories of enrollment, men were in the minority. For example, in 1982 women comprised 54 percent of all graduate students in fields other than science and engineering, 52 percent of all undergraduate enrollment, and 53 percent of the "other enrollment" category, which includes enrollment for first-professional degrees and unclassified students.

Part-time graduate enrollment in S/E fields grew at a more rapid rate between 1975 and 1982 than did full-time enrollment—4 percent per year compared to 2 percent. The distribution of graduate students by enrollment status varied significantly between S/E fields and non-S/E areas. Although full-timers comprised 67 percent of all graduate students in the sciences and 56 percent of those in engineering, only 27 percent of those in other fields were enrolled full time.

[46] Department of Education, National Center for Education Statistics, *The Condition of Education 1984 Edition* (Washington, D.C., 1984), p. 70.

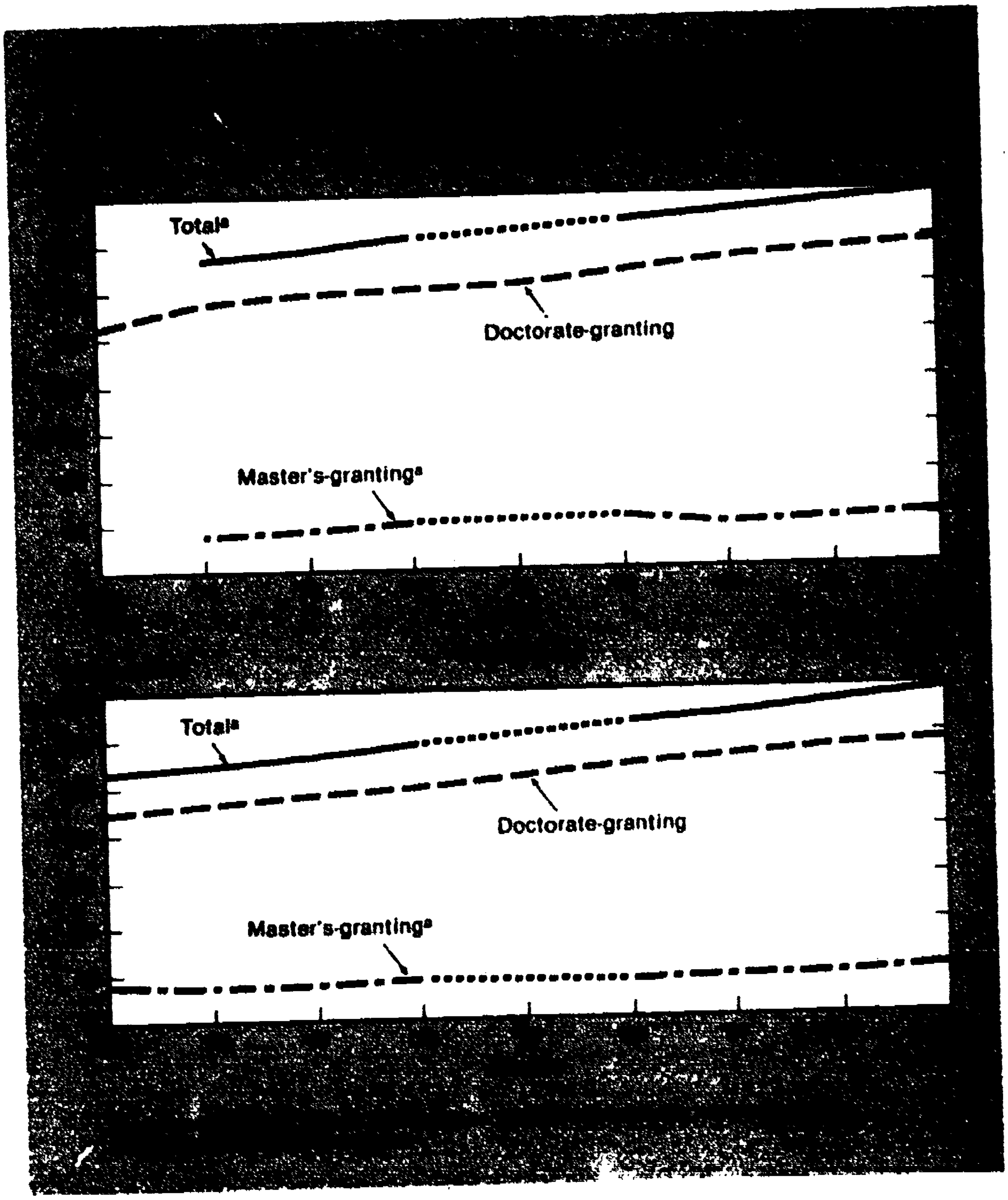
[47] Allan W. Ostar, "Part-Time Students, The New Majority for the 1980s," *The Chronicle of Higher Education*, October 7, 1981, p. 56.

Doctorate-granting institutions, although comprising only about one-half the institutions surveyed (323 out of 614), employed 66 percent of all academic scientists and engineers and enrolled about 87 percent of the graduate S/E students in the 1982/83 academic year. The 347,400 graduate S/E students enrolled in doctorate-granting institutions in fall 1982 represented a 2-percent increase over the number reported in fall 1981, and S/E enrollment at master's-granting institutions rose 3 percent. In the same time period, the growth rate in the number of scientists and engineers employed in doctorate-granting institutions was just under 2 percent; employment growth at master's- granting institutions averaged 4 percent (chart 39). By comparison, graduate S/E enrollment increased 5 percent from 1980 to 1981 in master's institutions and 2 percent in doctorate institutions, while S/E employment rose by 2 percent and 4 percent, respectively.

enrollment and degree patterns

During the 1980/81 academic year, institutions of higher education awarded a total of 32,900 doctorate degrees, up less than 1 percent over the previous year.[48]

[48] Department of Education, National Center for Education Statistics, *Digest of Education Statistics, 1982 Edition* (NCES 82-407)(Washington, D.C.: Supt. of Documents, U.S. Government Printing Office, 1982), p. 116 and unpublished data for 1981.

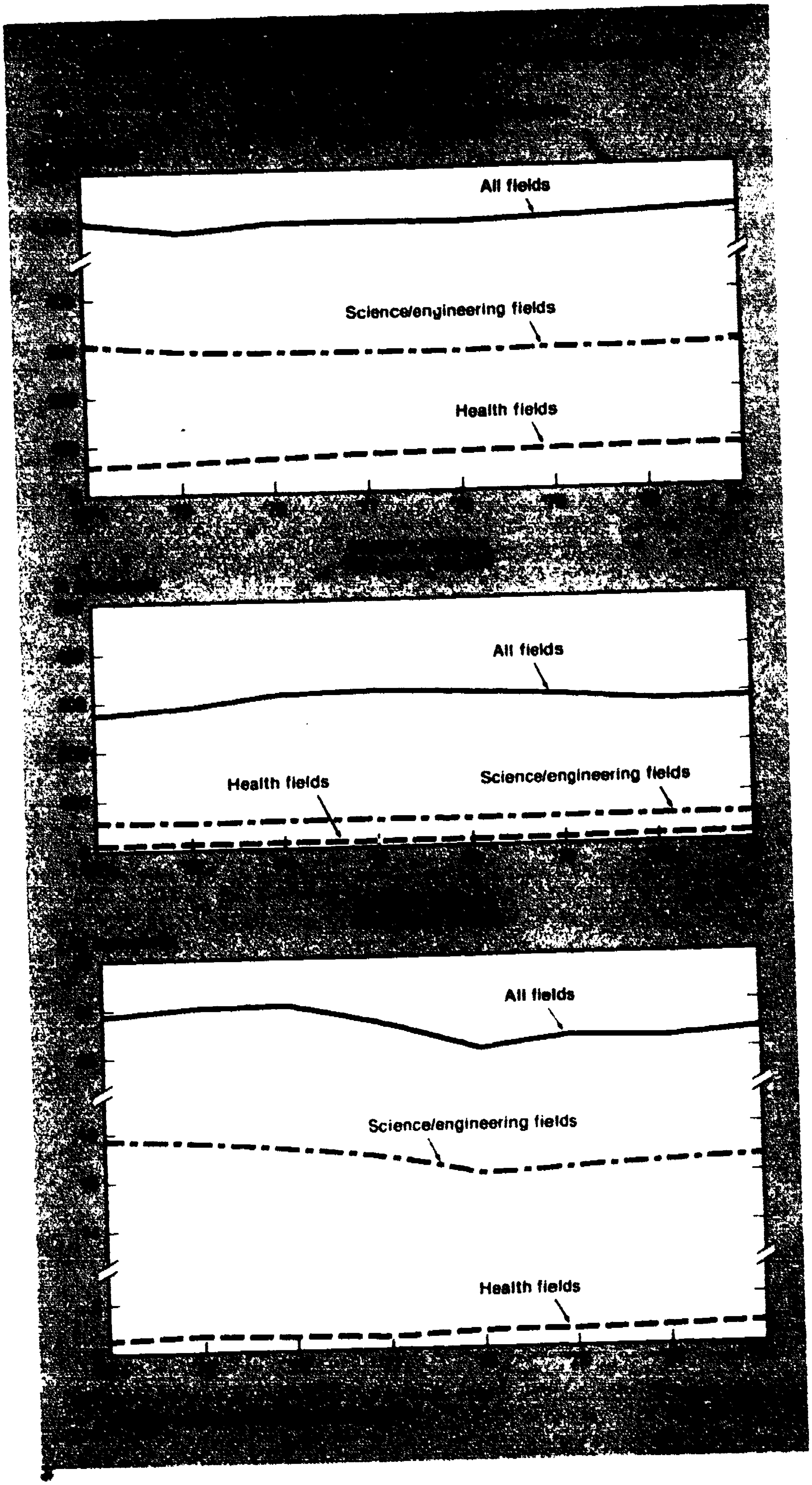


Of these, slightly more than one-half were in the sciences, engineering, and health fields. At the master's-degree level, approximately one-fourth of the degrees were awarded in the S/E and health fields, and among the baccalaureate degrees, just under two-fifths were awarded in these fields. A general enrollment shift away from non-S/E fields and toward the sciences and engineering, however, can be traced in numbers of degrees awarded (chart 40). Only in the health fields did the number of degrees awarded increase consistently at all levels—averaging 6-percent per year growth at the baccalaureate level, 8 percent at the master's level, and just under 6 percent at the doctorate level. During the 1974-81 period, S/E bachelor's and master's degrees awarded remained virtually level and the number of doctorates declined by less than 1 percent. In non-S/E fields, both baccalaureates and doctorate degrees fell slightly; the number of master's degrees awarded rose by less than 1 percent.

doctorate-granting institutions

In 1975 the GSSP survey universe was expanded to include all graduate institutions. Each year since that time approximately seven out of eight graduate S/E students were reported as being in doctorate-granting institutions. Until 1979, the questionnaires sent to master's-granting institutions requested substantially less detailed data than did the doctorate-level questionnaires. The remainder of this section will therefore examine those longer-term trends for which detailed data are available for doctorate-granting institutions only.

In 1982, 68 percent of the graduate S/E students enrolled in doctorate-granting institutions were full-timers, compared to 72 percent in 1975. The growth rates for part-timers during the 1975-81 period averaged about 4 percent per year, or twice the average annual increase in full-timers. Although the number of part-timers continued to grow by 4 percent from 1981 to 1982, the increase in full-timers was just over 1 percent. Fluctuations were much more marked in part-time enrollment than in full-time enrollment. For example, the 1981-82 growth



in full-time enrollment in environmental sciences was 4 percent compared to more than 12 percent for part-timers (chart 41). For both full- and part-time enrollment, growth was concentrated in engineering fields and the computer sciences, reflecting the increasing demand on the part of industry for employees trained in these areas. The rapid growth in graduate engineering enrollment may also be spurred by the availability of both Federal and industrial funding, as both public and private sectors respond to the threat of declining numbers of new doctorates planning to enter academic careers. For example, such organizations as the Exxon Foundation, General Electric Corporation, and American Telephone and Telegraph have announced the creation of programs in recent years aimed at channelling funds into the academic sector, either for the endowment of professional chairs, the replacement of obsolescent facilities and equipment, or the funding of scholarships for promising graduate students in fields where demand is seen as outpacing the predicted supply of new doctorates.

By contrast, psychology and the social sciences showed declines in both full- and part-time enrollment, attributed in part to the discrepancies between starting salaries in those fields and starting salaries in the high-tech fields. Although faculty salaries in 70 public institutions in 1981/82 averaged less than $28,000 in the social sciences, the average salary in engineering was nearly $32,000.**

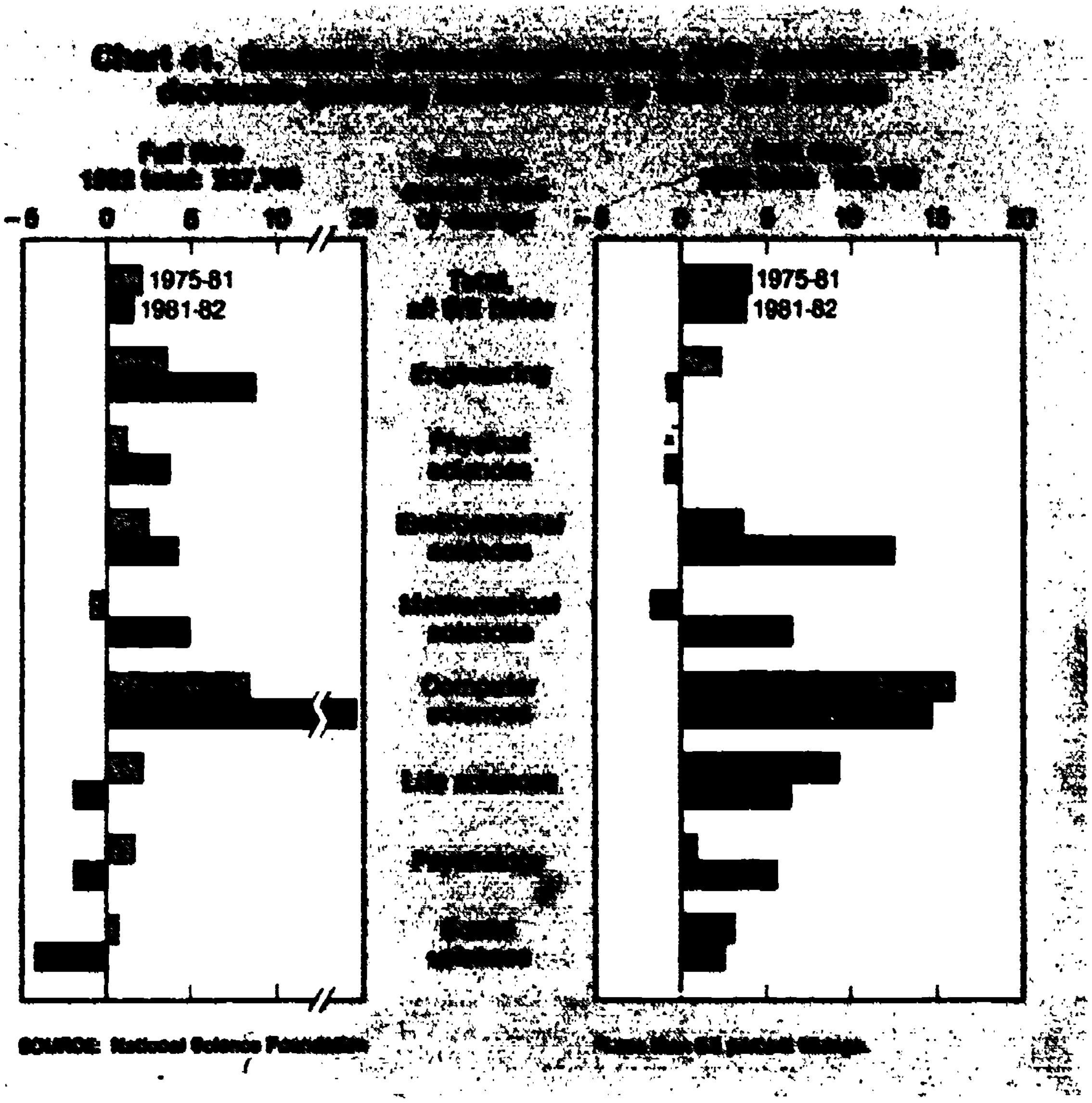
full-time graduate students

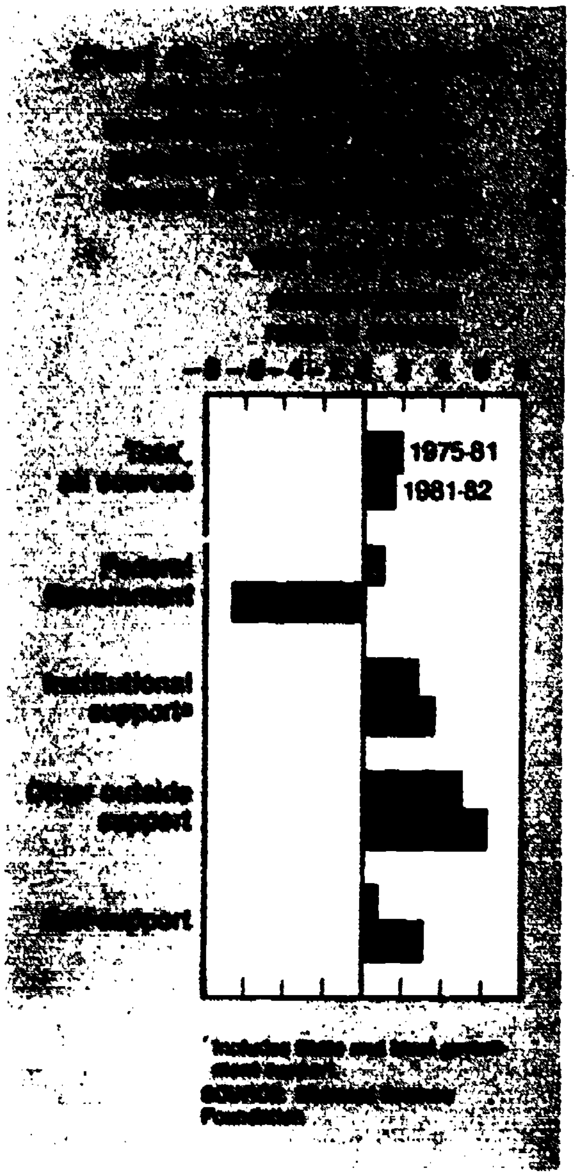
The 237,700 full-time graduate S/E students in doctorate-granting institutions represented about three-fifths of total graduate S/E enrollment in all institutions in fall 1982. Of these, about 33 percent were reported as first-year students, down somewhat from 37 percent in 1977, the peak year. The number enrolled in their first year of graduate study declined markedly from 1977 until 1979 and then rose by 6 percent in 1980, remaining at about 77,000 through 1982.

** Chronicle of Higher Education, June 2, 1982

sources of support

The number of full-time graduate students relying primarily on Federal support peaked in 1980 at nearly 53,000, or 23 percent of the total, and then declined by 4 percent in fall 1981. Fall 1982 data indicate a further decrease of about 7 percent (chart 42). The greatest 1981-82 decline occurred in the number supported by the Department of Health and Human Services (HHS), down 10 percent, but all agencies except DOD and NSF supported fewer students in 1982 than in 1981. The downturn in the number of full-time graduate students receiving primary support from Federal agencies, especially those supported through fellowships and traineeships,



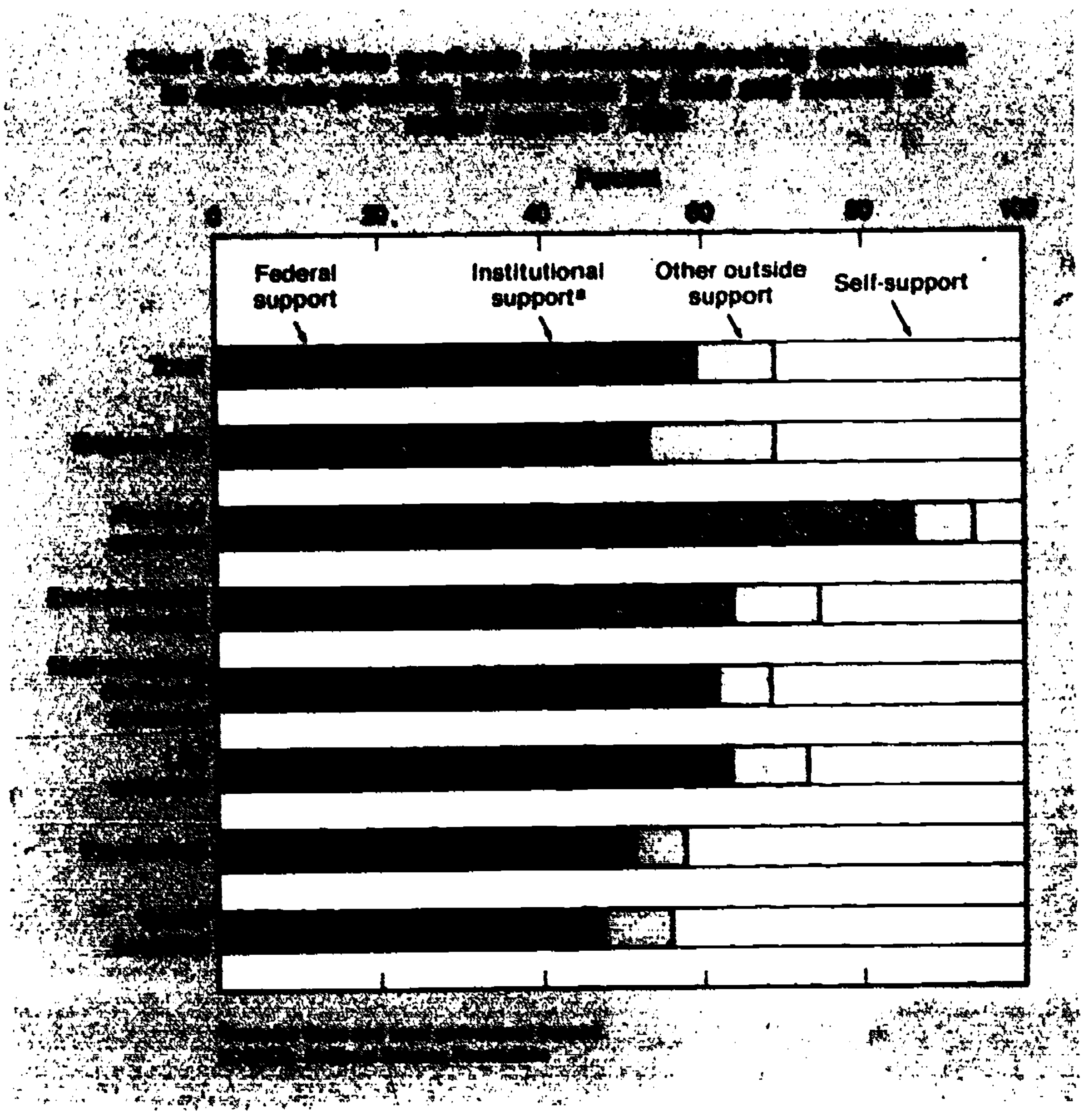


coincides with a 4-percent decrease (12 percent in constant dollars) in Federal obligations for fellowships, traineeships, and training grants from FY 1980 to FY 1981.[50] Data for FY 1982 indicate a slight increase in such obligations—9 percent in current dollars (2 percent in constant dollars). Conversations with agency officials support the conclusion that the funding growth has been used primarily to augment the individual stipends awarded rather than to increase the number of students supported. At NSF, for example, the amount obligated to students rose from $7.3 million in 1981 to $8.6 million in 1982, while the total number of students receiving NSF awards declined from 1,521 to 1,464. This was equivalent to a 23-percent rise (15 percent in constant dollars) in the amount awarded per student. The stipend received amounted to an average of less than $6,000 per student, up from $4,300 per student in 1975.[51]

The effects of the decline in direct Federal support for graduate S/E students have been somewhat offset by increased funding from non-Federal sources. Although the number of students supported primarily by the Federal Government fell by 3,400 from 1981 to 1982, the number relying primarily on institutional sources (including State and local government funds channelled through institutions) rose by 3,200 during the same period. This 4-percent increase was significantly higher than the average annual growth rate of the 1975-81 period. Those supported by other U.S. sources grew by 8 percent in the later period, compared to a 3-percent growth rate from 1975 to 1981. On the basis of supplementary data provided by about 80 institutions during the fall 1982 GSSP survey, it is estimated that approximately 70 percent of those students reported as receiving support from "Other U.S. sources" were primarily supported by industry, the remainder by private foundation grants and other nonprofit organizations. The 1981-82 growth rate among those receiving support from foreign sources was 3 percent, down from 6 percent from 1980 to 1981, paralleling the slowdown in growth in enrollment of foreign graduate S/E students. The number of full-timers relying primarily on self-support (including loans and family) grew 3 percent from 1981 to 1982, compared to the 1975-81 average annual rate of less than 1 percent.

The sources of support relied upon by graduate students varied widely among the S/E fields. In the physical sciences, 33 percent of the full-time graduate students received major support from Federal sources, compared to 8 percent of those in the social sciences. Conversely, only 6 percent of physical science graduate students were primarily dependent on self- or family support while 44 percent of those in the social sciences relied primarily on these sources (chart 43).

The rates of change in Federal agency support for specific S/E fields varied widely. For example, although the total number of full-time graduate students primarily supported by DOD increased by 6 percent from 1981 to 1982, the number in engineering rose by 9 percent and the number in the mathematical/computer sciences grew by 11 percent; the number of DOD-supported graduate students in psychology, however, fell by 18 percent. Of those supported primarily by NIH funds, the number of biological science graduate students declined by 3 percent while the number in the health sciences grew by 16 percent.[52]



[50] National Science Foundation, *Federal Support to Universities, Colleges, and Selected Nonprofit Institutions, Fiscal Year 1981* (NSF 83-315) (Washington, D.C.: Supt. of Documents, U.S. Government Printing Office, 1983), table B-1.

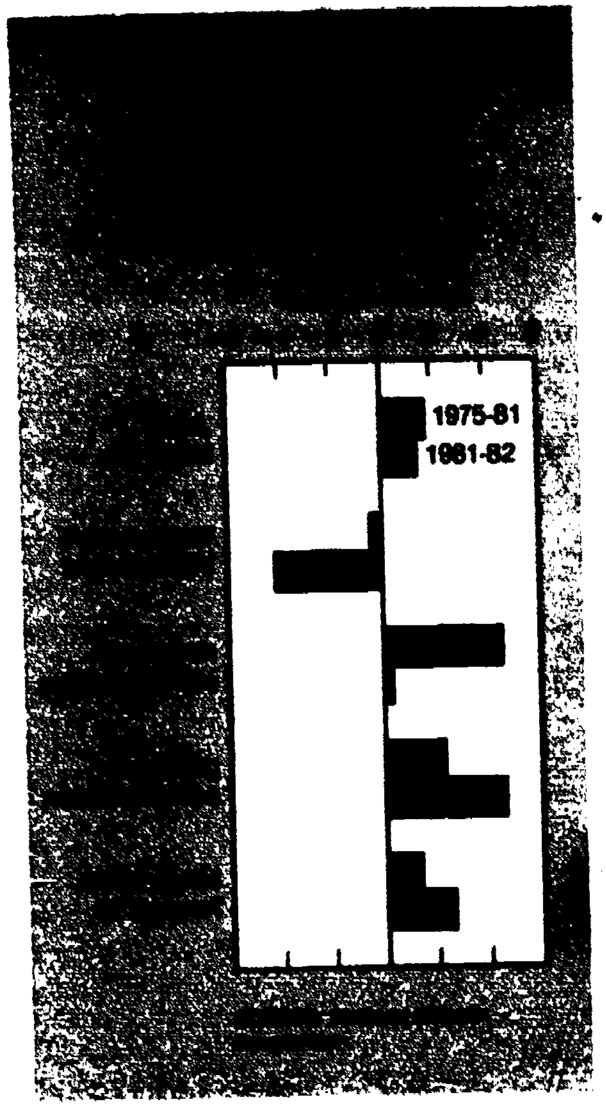
[51] National Science Foundation, *Justification of Estimates of Appropriation, Fiscal Year 1983* (Washington, D.C. (unpublished)), appendix A.

[52] National Science Foundation, *Academic Science/Engineering: Graduate Enrollment and Support, Fall 1982* (Detailed Statistical Tables) (NSF 84-306) (Washington, D.C., 1983), table C-14.

mechanisms of support

The number of full-time graduate students in doctorate institutions who were supported by fellowships and traineeships declined by more than 4 percent from 1981 to 1982, while the number of those supported under research and teaching assistantships continued to rise, up less than 1 percent and 4 percent, respectively. Those supported through all other mechanisms such as tuition grants and self-support grew by more than 2 percent (chart 44). Of the fellows and trainees reported in 1982, 40 percent were supported primarily by Federal agencies, compared to 52 percent in 1975.[53] The number of fellows and trainees declined because Federal obligations for fellowships, traineeships, and training grants decreased annually by an average of 6 percent (13 percent in constant dollars) between 1974 and 1980.[54] Both the institutions themselves and other outside sources increased their fellowship/traineeship support in 1982, but not enough to offset totally the drop in the number supported by Federal sources. Agencies such as the Department of Agriculture that have not supported fellowships in recent years, however, plan to institute such programs in the near future; this action may partially offset the declines in fellowship funding by the Departments of Education, Interior, and Health and Human Services.

Research assistantships also were funded primarily by the Federal Government—56 percent of the total in 1981 and 54 percent in 1982; the total, however, declined by 1 percent from 1980 to 1981 and remained level in 1982. DOD was the only Federal agency that significantly increased the number of research assistants it supported in 1981 and 1982, up nearly 9 percent per year, while the number supported by other Federal agencies dropped sharply. The 2-percent per year overall decline in federally supported research assistants was more than counterbalanced by a 5-percent growth in the number supported through institutional research funds.

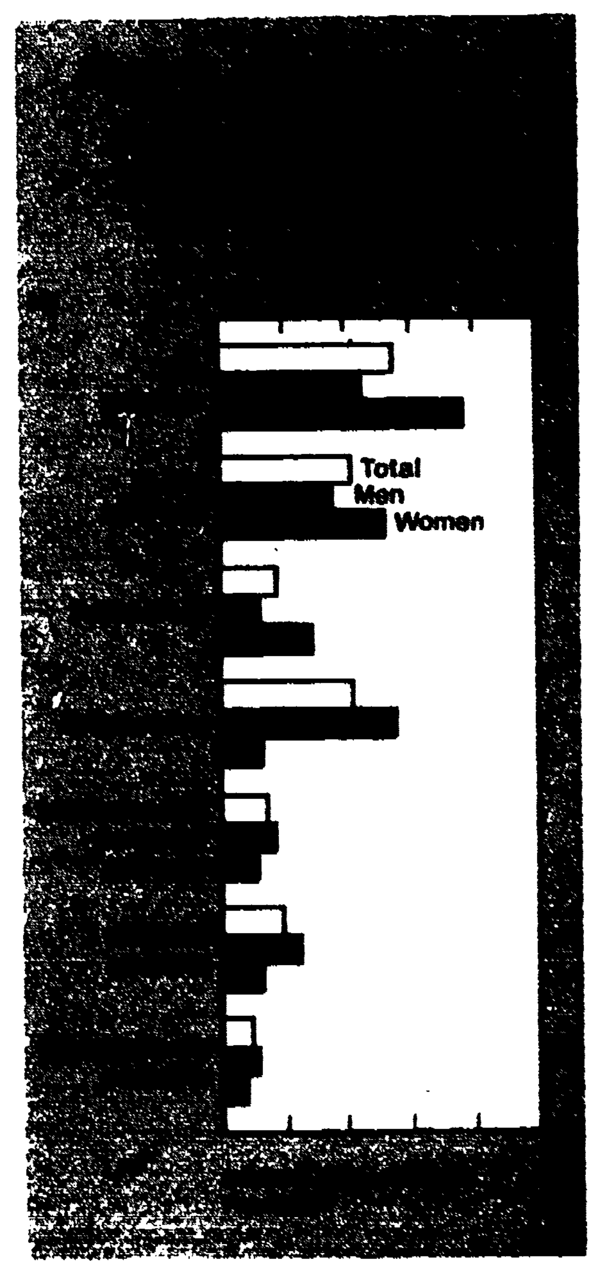


The number of research assistants supported by Federal agencies generally paralleled the pattern of growth or decline in Federal R&D obligations to universities and colleges, although there were notable exceptions. The leveling of Federal R&D support was first apparent in FY 1980 and was followed by a 3-percent real-dollar decline in FY 1981. The decline in the number of federally supported S/E research assistants in 1981 continued in 1982. The impact, however, was not equal across all S/E fields. For example, from 1980 to 1981, Federal R&D obligations to engineering grew by 29 percent, the only major field to show growth exceeding inflation. This resulted in additional support for engineering research assistantships, whereas some other fields decelerated or actually declined in growth. The number of research assistantships in psychology and the social sciences, for example, declined by 5 percent from 1981 to 1982.

women graduate students

The 80,000 women enrolled full time in S/E programs at doctorate-level institutions represented one-third of all full-time S/E graduate enrollment in 1982, a significant increase over 1975 when they constituted a one-fourth share. The number of women rose steadily during the 1975-82 period, while the number of men declined 4 percent from 158,000 in 1975 to a low of 152,000 in 1979, once again reaching the 1975 level in 1981.

The field distribution of full-time scientists and engineers varied significantly by sex. Men were most often enrolled in engineering, 26 percent of the total, compared to only 6 percent for women. Among men, life scientists comprised the second largest group, 25 percent of the total, but made up the largest share, 39 percent, of the women enrolled. In fall 1982, the proportions by field were similar except for a slight decline in the proportion of men enrolled in the life sciences (chart 45). Despite



[53] Ibid., table C-26

[54] National Science Foundation, *Federal Support to Universities, Colleges, and Selected Nonprofit Institutions, Fiscal Year 1981*, op. cit.

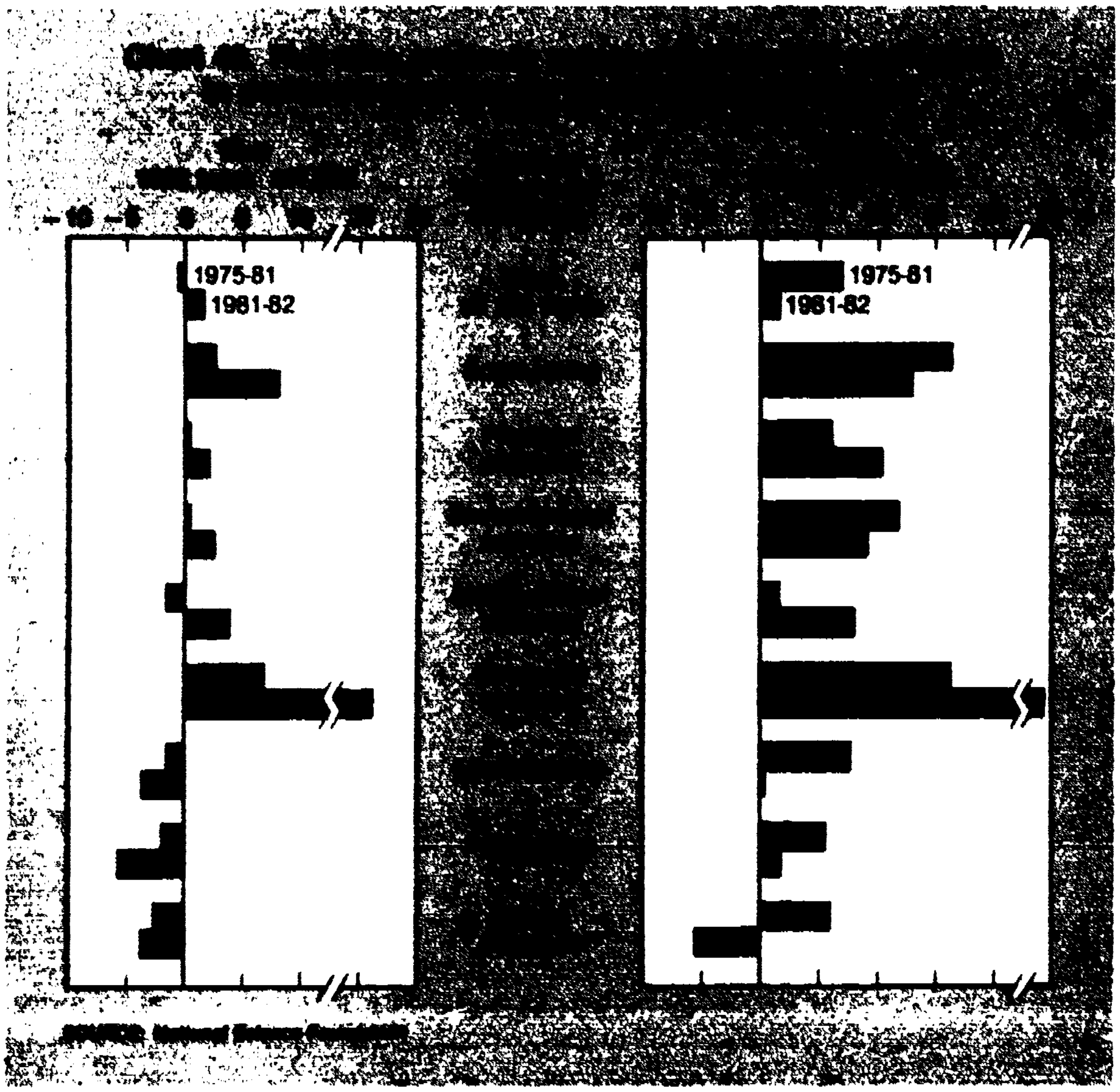
these differences, the field distributions of the sexes seem to be gradually converging as the pattern of women's enrollment begins to approach more closely that of men. Although the 1980-81 rates of increase among women in the life and social sciences and psychology—fields historically chosen by women—were low (1 percent to 3 percent), the number enrolled in high-technology fields of graduate study continued to rise at rates far above the average—20 percent in the computer sciences, 18 percent in engineering, and 9 percent in the physical sciences. At the same time, the number of men enrolled in the life sciences and psychology actually declined, and rose by less than 6 percent in engineering, the fastest growing field These trends were largely continued in 1982, with engineering again showing the largest increase among men (8 percent) and computer sciences increasing most rapidly among women (chart 46).

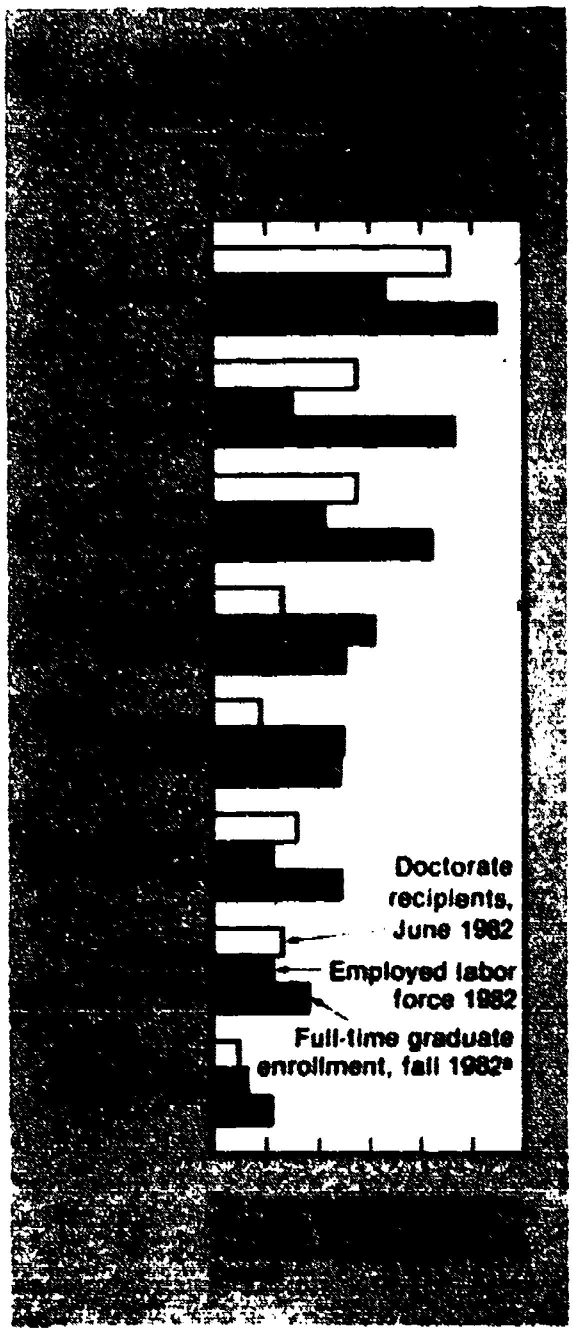
The rapid increase in the number of women enrolled in graduate S/E study is directly related to the growth in the number of baccalaureate degrees they earned. A report by the NRC's Committee on the Education and Employment of Women in Science and Engineering indicated that the proportion of all baccalaureates awarded to women rose from 43 percent in 1970 to nearly 50 percent in 1980, and that the largest growth rates were in engineering and the mathematical/computer sciences.[55] Similarly, as the number of women enrolled increased, the number of doctorates awarded to women also grew steadily in all S/E fields. The number of doctorates earned in S/E fields by men, on the other hand, peaked in 1974, declined steadily through 1980, and increased only slightly in 1981.[56]

The proportion of women in the total S/E labor force followed closely the distribution of women graduate S/E students and S/E doctorates awarded to women. Psychology showed the highest representation of women of any S/E field by all three of these measures, and engineering the lowest (chart 47).

[55] National Research Council, Committee on the Education and Employment of Women in Science. *Climbing the Ladder An Update on the Status of Doctoral Women Scientists and Engineers* (Washington, D.C., National Academy Press, 1983), pp. 1.5-1.7

[56] *Ibid.*, p. 2.5

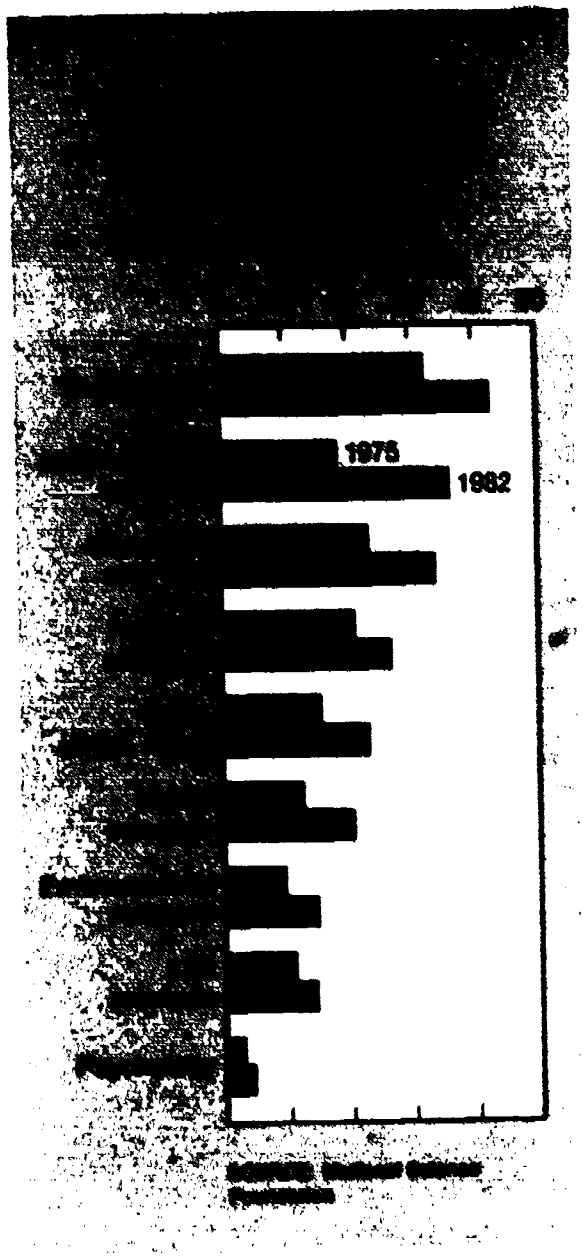




foreign graduate students

Graduate students from abroad represented 22 percent of all full-time graduate S/E students in doctorate-granting institutions in 1981 and about the same share in 1982, up from 16 percent in 1975. The steady growth in the number of foreign graduate students affected all S/E fields, but the most notable effect was in engineering, where the proportion of foreigners rose from 32 percent of the total in 1975 to 43 percent in 1982 (chart 48). The rapid growth that has characterized foreign graduate enrollment in recent years, however, may be slowing. Data for fall 1982 indicate a rise of 5 percent since 1981, compared to 8 percent per year from 1975 through 1981. The slowdown in the rate of foreign student increase has been reported also in the latest edition of the Institution of International Education's annual publication, *Open Doors 1982/83* and was attributed to a sharp cutback in the number of Iranian students studying at U. S. universities.

In terms of the total employment picture, the impact of the continued growth in foreign enrollment in all fields (at both undergraduate and graduate levels) is expected to be negligible, because approximately three-fourths of all foreign students in this country were on temporary student visas and would therefore be expected to return to their own countries upon completion of their studies. Their major impact on the employment situation, therefore, occurs during their graduate student years. Particularly in fields such as engineering, the use of foreign graduate students as teaching assistants is becoming increasingly prevalent. The Council of Graduate Schools has projected continued increases in the number of foreigners at all levels of study and in all fields, but especially in the number enrolled in engineering at the graduate level. According to the June 1982 survey of doctorate recipients, foreigners received 50 percent of the doctorates in engineering, 35 percent of those in economics, and 32 percent of those in both mathematics and computer sciences.



Institute of International Education, *Open Doors 1982/83: Report on International Educational Exchange* (New York, 1984), p. 2

CGS Communicator, March 1982, p. 7

National Research Council, Office of Scientific and Engineering Personnel, *Summary Report 1982: Doctorate Recipients from United States Universities* (Washington, D.C., National Academy Press, 1983), table 2

appendixes

a. technical notes
b. detailed statistical tables
c. reproduction of survey instruments

appendix a

technical notes

survey of scientific and engineering expenditures at universities and colleges, fy 1982

The universe for this survey includes 563 institutions in the United States and outlying areas having academic programs in the sciences and engineering that offer a doctorate or a master's degree in those fields, as well as those schools with $50,000 or more in separately budgeted research and development (R&D) expenditures. In addition, the universe includes 19 federally funded research and development centers (FFRDC's). The institutions surveyed are estimated to have spent about 99 percent of the academic R&D total.

In the continuing effort to provide statistical information of importance to Federal and academic planners, the questionnaire used in the fiscal year (FY) 1981-82 survey was virtually unchanged from that used in prior years except for the addition of a question to the "comments" section requesting the number of person-hours required to complete the form and incorporating all "optional" items as a standard part of the survey. A "crosswalk" was added to assist respondents in matching the science and engineering (S/E) fields requested in the expenditures survey disciplines with the field codes devised by the National Center for Education Statistics (NCES) of the Department of Education and published in *A Classification of Instructional Programs* (NCES 81-323). To complete this survey, most institutions have incorporated the essential information into their recordkeeping systems, thereby ensuring a consistent format from one year to the next. Such consistency yields more useful statistics over time. As a rule, information to complete this instrument is found within the institution's year-end accounting records.

the response rate

The survey questionnaires were mailed in December 1982. By the survey closing date in late June 1983, a total of 456 completed forms were received from universities and/or colleges out of the original universe of 563, or an 81-percent institutional response rate; completed forms were received from all 19 FFRDC's. (Table A-1 shows the distribution of institutional responses by degree level.) The final data tabulations are available in the NSF publication *Academic Science/Engineering: R&D Funds, Fiscal Year 1982* (Detailed Statistical Tables) (NSF 84-308).

Table A-1. R&D expenditures survey response rates by type of institution: FY 1982

Highest degree granted	Number surveyed	Number of respondents	Percent of total
Total	563	456	81.0
Doctorate	325	297	91.4
Master's	173	120	69.4
Bachelor's and no S/E degrees	65	39	60.0

SOURCE: National Science Foundation

imputation for nonresponse

In order to provide national totals of FY 1982 academic R&D expenditures, the National Science Foundation (NSF) developed estimates for the approximately 19 percent of the survey population that did not respond. A computerized process, referred to as "imputation," has been used consistently since 1976. The institutions themselves provide estimates in cases where recordkeeping systems do not provide sufficient detail. The combined imputed and estimated amounts totaled $442 million for academic R&D expenditures, or only 6 percent of the $7.3 billion universe total, as shown in table A-2. This represented a slightly higher imputation rate than the 1981 rate of 5 percent. Even though the overall institutional response rate fell from 86 percent to 81 percent in 1982, R&D expenditures reported by those institutions that did respond represented the vast majority of the R&D expenditures grand total.

Table A-2. R&D expenditures survey imputed and estimated amounts by type of institution: FY 1982

[Dollars in millions]

Type of institution	Separately budgeted R&D expenditures	Amount imputed and/or estimated	Percent of total
Total	$7,261	$442	6.1
Doctorate	7,134	408	5.7
Masters	103	24	23.3
Bachelors and no S/E degrees	24	10	41.7

SOURCE: National Science Foundation

In the absence of a reliable R&D cost index, constant-dollar figures are derived by using the gross national product (GNP) implicit price deflators calculated by the Department of Commerce, as modified by NSF to reflect a fiscal-year basis. These deflators were calculated as of January 1984. Table A-3 shows the factors used in calculating constant 1972 dollars for all years from 1972 through 1983.

Table A-3. Gross national product implicit price deflators used in the calculation of constant 1972 dollars in this report

Year	Factor
1972	1.000
1973	1.044
1974	1.121
1975	1.233
1976	1.319
1977	1.408
1978	1.503
1979	1.635
1980	1.776
1981	1.950
1982	2.088
1983	2.178

SOURCE: Department of Commerce, adjusted to a fiscal-year basis by the National Science Foundation as of January 1984

response analysis and data quality

It should be evident that the quality of the end product, as in all surveys, depends on the viability of the respondents' data. If information is not complete at the time of the survey, the respondent may find it necessary to provide only what is available. In that case, revision of earlier years' data is a strengthening action.

Every effort is made to maintain close contact with repondents in order to preserve the consistency and continuity of the resultant data. NSF carefully examined the completed FY 1982 questionnaires upon receipt. A computerized facsimile of the survey form was then prepared for each institution, depicting a 3-year comparison of its responses to each item, including the current-year's data, and noting substantive disparities, if any. The facsimiles were mailed to all doctorate institutions and to all other institutions requiring corrections so that updating could be accomplished before the final processing and tabulation.

Institutions included in the R&D survey are given the opportunity to correct prior-years' data when necessary. When updated or amended figures covering past records are submitted by a respondent, NSF changes the corresponding trend data. Similarly, if a respondent institution undergoes an organizational change, such as a merger, NSF incorporates the effects of such changes into prior-years' data to preserve the comparability and consistency of the data series.

Response to this survey is entirely voluntary. Requests for additional information concerning the survey findings for the current or prior surveys should be directed to Ms. Judith F. Coakley or Mrs. Marge Machen, Universities and Nonprofit Institutions Studies Group, Division of Science Resources Studies, National Science Foundation, Room L-602, Washington, D.C. 20550, (202) 634-4673.

Tapes showing data for eight years, FY 1975-82, may be purchased from NSF Surveys, Abt Associates, Inc., 33 Wheeler Street, Cambridge, Massachusetts 02138, (617) 492-7100.

federal support to universities, colleges, and selected nonprofit institutions, fy 1982

scope of survey

Data collected in the NSF Survey of Federal Support to Universities, Colleges, and Selected Nonprofit Institutions, Fiscal Year 1982, cover the period October 1, 1981, through September 30, 1982. The reporting system is based on the program established in 1965 by the Committee on Academic Science and Engineering of the Federal Council on Science and Technology.

The FY 1982 data shown in this report were submitted by 15 Federal agencies. Data reported by the Agency for International Development (AID), the Department of Housing and Urban Development (HUD), the Department of Labor (Labor), the Nuclear Regulatory Commission (NRC), and the Department of Transportation (DOT) were combined to constitute the "other" category in tables that show funding by agency.

As of October 1, 1979, the Office of Education (OE), the National Institute of Education (NIE), and the Office of the Assistant Secretary of Education were separated from the Department of Health, Education, and Welfare (HEW) and merged to form the Department of Education; HEW was then renamed the "Department of Health and Human Services" (HHS). These changes took effect beginning with the FY 1980 survey.

It should be noted that some agencies not surveyed, such as the Department of Justice, may account for a significant proportion of the total receipts at some institutions even though those receipts may comprise a small proportion of the total academic R&D funding.

Obligation figures listed for individual institutions reflect direct Federal support, so that amounts subcontracted to other institutions are included. Those received via subcontract arrangement from prime contractors, however, are excluded.

Also excluded from the survey data are specified types of Federal financial assistance: Loans such as those made by Education's Office of Student Financial Assistance; agency support of Federal employee training and development activities; and financial support of an indirect nature, such as obligations designated to State agencies, even though it is known that such funds are destined for an academic institution. Federal obligations to academic institutions exclude funds obligated to federally funded research and development centers (FFRDC's) administered by universities.

Federal obligations to systems offices of institutions are presented on the basis of the individual institutions that comprise the system, but obligations awarded directly to the central administration of a system are listed separately. If the funding agency, however, does not know of the final destination of the funds, the agencies report the funds as obligations to a system's administrative office, or "central system," from which the funds are distributed to the system's individual institutions. The 15 agencies in 1982 reported obligations to 2,763 universities and colleges and to 40 system offices.

Obligations reported were rounded to the nearest thousand dollars. Obligations differ from expenditures in that funds allocated during one fiscal year may be spent by the recipient either in part or in whole during one or more later years.

Data shown in this report are in current dollars unless otherwise specified. When constant-dollar figures are discussed, they are adjusted to 1972 levels and are based on the GNP implicit price deflator prepared by the Department of Commerce, which measures the impact of economic conditions on the dollar amounts at the time the awards are made by granting agencies. When there is a time lag between the obligation of the funds by the agency and the actual expenditure of the money by the recipient institution, economic conditions in the interval also have an impact on the real value of goods and services.

Requests for additional information concerning the Survey of Federal Support to Universities, Colleges, and Selected Nonprofit Institutions should be addressed to Mr. Richard J. Bennof, Universities and Nonprofit Institutions Studies Group, Division of Science Resources Studies, National Science Foundation, Room L-602, Washington, D.C. 20550, (202) 634-4673.

Data tapes showing data for eight years, FY 1975-82, may be purchased from NSF Surveys, Abt Associates, Inc., 55 Wheeler Street, Cambridge, Massachusetts 02138, (617) 492-7100.

survey of scientific and engineering personnel at universities and colleges, january 1983

Survey questionnaires were mailed in January 1983 to more than 2,200 institutions of higher education and their 19 university-administered FFRDC's.

The survey universe included all institutions of higher education, including 2-year institutions, that are identified by NSF as offering S/E degree-credit courses. The survey excluded schools of art, education, music, law, and theology, and all others that do not employ scientists or engineers.

At the time the survey was closed out in August 1983, about 2,200 universities and colleges and 19 university-associated FFRDC's constituted the universe. Of these academic institutions, 1,284 (59 percent) responded, about the same response rate as in 1981. Table A-4 shows the distribution of responses by degree level of the institutions surveyed. Estimates for nonrespondent institutions represented approximately 21 percent of the total number of scientists and engineers employed in higher education institutions.

Table A-4. Science/engineering (S/E) personnel survey response rates by type of institution: January 1983

Type of institution	Number surveyed	Number of respondents	Percent of total
Total	2,190	1,284	58.6
Doctorate	328	269	82.0
Master's	310	207	66.7
Bachelor's and no S/E degrees	1,552	808	52.1

SOURCE: National Science Foundation

The questionnaire used in the January 1983 survey was basically unchanged from that used in 1982. A "crosswalk" was included to assist respondents in matching the S/E fields referred to in this survey with the field codes devised by NCES of the Department of Education and published in *A Classification of Instructional Programs* (NCES 81-323).

The 1983 survey questionnaire consisted of three main items: Item 1 requested headcount data on the number of scientists and engineers by highest earned degree; item 2 collected headcount data by detailed field of science/engineering, sex, and employment status (full- or part-time); item 3 requested information on total full-time-equivalents by detailed field of science/engineering as well as on full-time-equivalents engaged in research and development.

estimates for nonresponse

In order to derive universe estimates of all S/E employment data presented in this report, estimates were made for institutions that failed to respond to the survey. Imputed data for individual institutions were based primarily on key items reported (or estimated) in earlier surveys. Totals for these institutions were increased or decreased according to overall rates of fluctuations for institutions at the same degree level and under the same type of control (public or private). Detailed computer-generated imputations were then made on the basis of distributions computed for similar institutions. This process, referred to as "imputation," has been used consistently since 1977.

The combined imputed and estimated amounts totaled about 76,600 scientists and engineers employed by academic institutions, or 21 percent of the 358,800 universe total, compared to a 22-percent imputation rate in 1982. Table A-5 shows imputed and estimated amounts for the 1983 survey by field, employment status, and type of activity. Imputation rates generally increased across all major fields. The highest imputation rates occurred for psychologists and mathematical/computer scientists, about 31 percent and 28 percent, respectively, each up slightly over 1982 rates. The lowest imputation rate, life scientists at

Table A-5. Science/engineering personnel survey imputed and estimated amounts by field, employment status, and activity: January 1983

Disciplines	Total	Full time	Part time	Total equivalents (FTE's)[1]	FTE's devoted to separately budgeted R&D activities
Scientists and engineers, total	76,643	51,678	25,030	77,937	10,224
Engineers, total	7,160	4,632	2,518	6,941	1,401
Aeronautical and astronautical engineers	208	152	56	216	84
Chemical engineers	311	233	78	326	119
Civil engineers	1,081	733	352	1,108	172
Electrical engineers	2,080	1,303	777	1,913	274
Mechanical engineers	1,498	996	509	1,403	170
Other engineers	2,047	1,261	785	1,975	583
Physical scientists, total	8,524	6,409	2,072	8,328	1,358
Astronomers	162	93	68	161	35
Chemists	4,783	3,585	1,194	4,630	666
Physicists	3,064	2,367	676	3,080	582
Other physical scientists	498	364	134	458	75
Environmental scientists, total	1,635	1,244	387	1,690	333
Atmospheric scientists	108	61	47	89	40
Earth scientists	1,241	964	276	1,284	205
Oceanographers	159	128	30	151	63
Other environmental scientists	170	129	41	166	25
Mathematical/computer scientists, total	12,804	7,167	5,615	10,892	464
Mathematicians	9,481	5,486	3,974	8,160	253
Computer scientists	3,323	1,681	1,641	2,732	211
Life scientists, total	23,119	17,129	5,959	24,555	5,532
Agricultural scientists	1,804	1,394	410	2,859	661
Biological scientists	9,967	7,780	2,185	10,016	2,224
Medical scientists	9,196	6,456	2,726	9,189	2,435
Other life scientists	2,109	1,459	637	2,151	212
Psychologists, total	7,285	4,419	2,859	6,314	396
Social scientists, total	14,326	9,106	5,159	12,954	727
Economists	3,686	2,257	1,411	3,312	229
Political scientists	3,225	2,240	98	3,016	144
Sociologists	4,243	2,720	1,521	3,861	164
Other social scientists	3,171	1,907	1,254	2,858	190

[1]Full-time-equivalents

SOURCE: National Science Foundation

15 percent, was about the same as the 1982 rate.

The imputation rate for total FTE scientists and engineers engaged in separately budgeted R&D activities fell 5 percentage points in 1983, to 17 percent, accounting for 10,000 out of the 60,300 total. This rate, however, represents considerable improvement over rates prior to 1981.

Requests for additional information concerning the survey findings should be directed to Ms. Judith F. Coakley or Ms. Esther Gist, Universities and Nonprofit Institutions Studies Group, Division of Science Resources Studies, National Science Foundation, Room L-602, Washington, D.C. 20550, (202) 634-4673.

Data tapes showing data for eight years, January 1976-January 1983 may be purchased from NSF Surveys, Abt Associates, Inc., 55 Wheeler Street, Cambridge, Massachusetts 02138, (617) 492-7100.

survey of graduate science and engineering students and postdoctorates, fall 1982

Survey packages for the fall 1982 survey were mailed in November 1982 to 443 reporting units at 323 doctorate-granting institutions and to 291 master's-granting institutions. The nonresponse rate at the closing date was significantly higher in 1982 than in earlier years; 25 of the doctorate-granting institutions and 49 master's-granting institutions were unable to provide data. Cuts in funding and personnel were the reasons most often cited by nonrespondent institutions for declining to respond.

Imputation for nonresponse

Data for nonrespondent institutions or departments were estimated in order to determine the universe totals. Imputation factors were derived from the previous responses of nonrespondent departments, increased or decreased to reflect the growth or decline in respondent departments in the same field granting the same highest degree. The response rates for institutions and departments are shown in table A-6.

As indicated earlier, the response rate in the fall 1982 survey was higher than in fall 1981; estimated amounts, however, accounted for only 9 percent of the graduate students and 12 percent of the postdoctorates shown. The proportion of each of the major variables—full-time graduate students, part-time graduate students, and postdoctorates—represented by imputed figures at each level of institution—doctorate-or master's-granting—is shown in table A-7.

Requests for additional information concerning the Survey of Graduate Science and Engineering Students and

Postdoctorates should be addressed to Mr. J. G. Huckenpahler, Universities and Nonprofit Institutions Studies Group, Division of Science Resources Studies, National Science Foundation, Washington, D.C. 20550, (202) 634-4673.

Data tapes showing data for eight years, fall 1975-fall 1982, may be purchased from NSF Surveys, Abt Associates, Inc., 55 Wheeler St., Cambridge, Massachusetts 02138, (617) 492-7100.

Table A-6. Institutional and departmental response rates to the graduate student survey by type of institution: fall 1982

Type of institution	Institutions			Departments		
	Number surveyed	Number of respondents	Percent of total	Number surveyed	Number of respondents	Percent of total
Total	614	540	87.9	9,776	8,848	86.7
Doctorate	323	298	92.3	8,346	7,652	91.7
Master's	291	242	83.2	1,430	1,196	83.6

SOURCE: National Science Foundation

Table A-7. Proportion of totals imputed for the graduate student survey by type of institution: 1982

Type of institution	Total	Science/engineering graduate students									Postdoctorates		
		Total		Full time			Part time						
		Number reported	Percent imputed	Total	Number reported	Percent imputed	Total	Number reported	Percent imputed		Total	Number reported	Percent imputed
Total	399,682	363,104	9.2	255,959	235,624	7.9	143,723	127,479	11.3		19,772	17,445	11.8
Doctorate	347,414	317,547	8.6	237,676	220,184	7.4	109,738	97,363	11.3		19,733	17,410	11.8
Master's	52,268	45,556	12.8	18,283	15,440	15.5	33,985	30,116	11.4		39	35	10.3

SOURCE: National Science Foundation

appendix B

detailed statistical tables

R&D Expenditures

page

Science/Engineering Personnel

page

Graduate Enrollment

page

TABLE B-1. — R&D EXPENDITURES AT UNIVERSITIES AND COLLEGES BY YEAR AND SOURCE OF FUNDS: FISCAL YEARS 1953-82

(DOLLARS IN MILLIONS)

FISCAL YEAR	TOTAL	FEDERAL GOVERNMENT	STATE AND LOCAL GOVERNMENTS	INDUSTRY	INSTITUTIONAL FUNDS	ALL OTHER SOURCES
1953	255	138	37	19	35	26
1954	290	160	42	22	38	28
1955	312	169	47	25	41	30
1956	372	213	53	29	43	34
1957	410	229	60	34	49	38
1958	456	254	68	39	53	42
1959	526	306	76	39	58	47
1960	646	405	85	40	64	52
1961	763	500	95	40	70	58
1962	904	613	106	40	79	66
1963	1,081	760	118	41	89	73
1964	1,275	917	132	40	103	83
1965	1,474	1,073	143	41	124	93
1966	1,715	1,261	196	42	148	108
1967	1,921	1,409	164	48	181	119
1968	2,149	1,572	172	55	218	132
1969	2,225	1,600	197	60	223	145
1970	2,335	1,647	219	61	243	165
1971	2,500	1,724	255	70	274	177
1972	2,630	1,795	269	74	305	187
1973	2,884	1,985	295	84	318	202
1974	3,023	2,032	307	96	370	218
1975	3,409	2,288	332	113	417	259
1976	3,729	2,512	364	123	446	285
1977	4,067	2,726	374	139	514	314
1978 1/............	4,625	3,059	414	170	623	359
1979	5,361	3,595	470	193	730	374
1980	6,060	4,094	494	236	829	409
1981	6,818	4,599	540	288	983	448
1982	7,261	4,749	586	326	1,096	503

1/ ESTIMATED, BASED ON DATA COLLECTED FROM DOCTORATE-GRANTING INSTITUTIONS ONLY.
SOURCE: NATIONAL SCIENCE FOUNDATION

TABLE B-2. — R&D EXPENDITURES AT UNIVERSITIES AND COLLEGES BY YEAR AND CHARACTER OF WORK: FISCAL YEARS 1953-82

(DOLLARS IN MILLIONS)

FISCAL YEAR	TOTAL	BASIC RESEARCH		APPLIED RESEARCH AND DEVELOPMENT	
		AMOUNT	PERCENT OF TOTAL	AMOUNT	PERCENT OF TOTAL
1953	255	110	43.1%	145	56.9%
1954	290	136	46.9	154	53.1
1955	312	159	51.0	153	49.0
1956	372	200	53.8	172	46.2
1957	410	240	58.5	170	41.5
1958	456	281	61.6	175	38.4
1959	526	343	65.2	183	34.8
1960	646	433	67.0	213	33.0
1961	763	536	70.2	227	29.8
1962	904	659	72.9	245	27.1
1963	1,081	814	75.3	267	24.7
1964	1,275	1,003	78.7	272	21.3
1965	1,474	1,138	77.2	336	22.8
1966	1,715	1,303	76.0	412	24.0
1967	1,921	1,457	75.8	464	24.2
1968	2,149	1,650	76.8	499	23.2
1969	2,225	1,711	76.9	514	23.1
1970	2,335	1,796	76.9	539	23.1
1971	2,500	1,914	76.6	586	23.4
1972	2,630	2,022	76.9	608	23.1
1973	2,884	2,053	71.2	831	28.8
1974	3,023	2,154	71.2	869	28.8
1975	3,409	2,410	70.7	999	29.3
1976	3,729	2,549	68.4	1,180	31.6
1977	4,067	2,800	68.8	1,267	31.2
1978 1/............	4,625	-	-	-	-
1979	5,361	3,612	67.4	1,749	32.6
1980	6,060	4,026	66.4	2,034	33.6
1981	6,818	4,576	67.1	2,242	32.9
1982	7,261	4,851	66.8	2,410	33.2

1/ DATA WERE NOT COLLECTED IN 1978.
SOURCE: NATIONAL SCIENCE FOUNDATION

TABLE B-3. — R&D EXPENDITURES AT UNIVERSITIES AND COLLEGES, BY SOURCE OF FUNDS, CHARACTER OF WORK, AND SCIENCE/ENGINEERING FIELD: FISCAL YEARS 1972, 1975-82

(DOLLARS IN THOUSANDS)

SOURCE, CHARACTER, AND FIELD	1972	1975	1976	1977	1978 1/	1979	1980	1981	1982
TOTAL	2,630,442	3,408,691	3,729,007	4,066,953	4,624,673	5,361,408	6,060,118	6,818,343	7,260,637
SOURCE OF FUNDS:									
FEDERAL GOVERNMENT	1,795,045	2,288,070	2,511,867	2,726,126	3,058,734	3,595,271	4,093,586	4,559,049	4,749,264
STATE AND LOCAL GOVERNMENTS	269,582	331,646	363,746	373,943	414,389	470,073	493,649	540,050	585,559
INDUSTRY	74,413	112,952	123,145	138,807	169,623	192,753	235,522	287,850	325,594
INSTITUTIONAL FUNDS	304,789	417,425	445,590	514,275	622,646	729,731	828,774	983,445	1,097,602
ALL OTHER SOURCES	186,613	258,598	284,659	313,802	359,281	373,580	408,587	448,249	502,618
CHARACTER OF WORK: 2/									
BASIC RESEARCH	2,022,150	2,409,777	2,548,820	2,799,649	-	3,612,278	4,026,180	4,576,230	4,850,953
APPLIED RESEARCH AND DEVELOPMENT	608,292	998,914	1,180,187	1,267,304	-	1,749,130	2,033,938	2,242,113	2,409,684
FIELD:									
ENGINEERING 3/	341,362	380,912	431,727	498,473	601,062	768,407	864,040	959,989	1,024,516
AERONAUTICAL AND ASTRONAUTICAL	-	-	-	-	-	-	46,286	45,523	60,645
CHEMICAL	-	-	-	-	-	-	67,559	83,215	83,265
CIVIL	-	-	-	-	-	-	88,604	108,189	108,288
ELECTRICAL	-	-	-	-	-	-	183,727	192,796	224,326
MECHANICAL	-	-	-	-	-	-	145,621	148,585	141,513
OTHER, N.E.C.	-	-	-	-	-	-	332,243	381,681	406,477
PHYSICAL SCIENCES	324,222	350,278	379,379	423,457	496,399	601,904	677,604	766,504	822,844
ASTRONOMY	21,596	26,607	26,294	32,361	36,782	48,459	58,741	67,391	73,296
CHEMISTRY	108,122	120,710	140,142	159,353	183,131	206,421	244,454	285,520	311,452
PHYSICS	159,067	173,510	183,050	201,655	235,099	292,033	322,057	356,944	363,263
OTHER, N.E.C.	35,437	29,451	29,893	30,088	41,387	54,991	52,352	56,649	74,833
ENVIRONMENTAL SCIENCES 3/	189,021	255,060	288,531	319,398	379,391	452,915	509,164	551,881	560,144
ATMOSPHERIC	-	-	-	-	-	-	68,261	78,3[illegible]	85,705
EARTH SCIENCES	-	-	-	-	-	-	186,047	191,854	195,712
OCEANOGRAPHY	-	-	-	-	-	-	173,499	187,398	198,253
OTHER, N.E.C.	-	-	-	-	-	-	81,303	94,278	80,474
MATHEMATICAL/COMPUTER SCIENCES	69,322	85,306	86,994	107,875	126,178	176,398	192,736	222,028	244,466
MATHEMATICS	-	39,713	42,491	52,312	58,756	78,477	78,585	89,008	96,121
COMPUTER SCIENCES	-	45,593	44,503	55,563	67,422	97,921	114,151	133,020	148,345
LIFE SCIENCES	1,329,320	1,900,837	2,101,695	2,258,806	2,538,004	2,832,923	3,217,773	3,672,257	3,969,808
AGRICULTURAL SCIENCES	227,079	383,841	412,867	460,647	521,745	602,485	679,304	771,534	838,355
BIOLOGICAL SCIENCES	443,473	630,166	710,724	772,290	808,500	914,806	1,031,037	1,188,498	1,289,910
MEDICAL SCIENCES	594,574	811,383	897,376	950,907	1,128,652	1,237,956	1,414,356	1,599,409	1,721,004
OTHER, N.E.C.	64,194	75,447	80,728	74,962	79,107	77,676	93,076	112,816	120,539
PSYCHOLOGY	69,188	80,327	77,888	85,130	89,664	100,531	111,177	128,560	131,856
SOCIAL SCIENCES	202,792	256,116	262,261	268,087	277,497	295,128	341,551	372,195	354,035
ECONOMICS	45,784	55,949	65,447	72,124	79,129	83,089	90,162	99,711	94,735
POLITICAL SCIENCE	21,396	29,282	28,355	32,314	36,571	45,431	55,450	56,695	60,782
SOCIOLOGY	58,451	68,758	66,246	61,939	66,900	74,641	88,548	94,986	79,512
OTHER, N.E.C.	77,161	102,027	102,213	101,710	94,897	91,977	107,391	120,803	119,006
OTHER SCIENCES, N.E.C.	105,215	99,855	100,532	105,724	116,478	133,592	146,071	144,929	152,970

1/ ESTIMATED, BASED ON DATA COLLECTED FROM DOCTORATE-GRANTING INSTITUTIONS ONLY.
2/ DATA WERE NOT COLLECTED IN 1978.
3/ DETAIL NOT SEPARATELY AVAILABLE PRIOR TO 1980.
SOURCE: NATIONAL SCIENCE FOUNDATION

TABLE 8-4. — FEDERALLY FINANCED R&D EXPENDITURES AT UNIVERSITIES AND COLLEGES BY CHARACTER OF WORK AND SCIENCE/ENGINEERING FIELD: FISCAL YEARS 1972, 1975-82

(DOLLARS IN THOUSANDS)

CHARACTER AND FIELD	1972	1975	1976	1977	1978 1/	1979	1980	1981	1982
TOTAL	1,795,045	2,288,070	2,511,867	2,726,126	3,058,734	3,595,271	4,093,586	4,559,049	4,749,264
CHARACTER OF WORK: 2/									
BASIC RESEARCH	1,420,164	1,695,022	1,841,223	2,006,589	-	2,571,744	2,850,670	3,247,660	3,393,157
APPLIED RESEARCH AND DEVELOPMENT	374,881	593,048	670,644	719,537	-	1,023,527	1,242,916	1,311,389	1,356,107
FIELD:									
ENGINEERING 3/	252,876	259,353	290,518	336,725	407,487	526,364	594,851	661,578	697,182
AERONAUTICAL AND ASTRONAUTICAL	-	-	-	-	-	-	35,610	35,302	48,097
CHEMICAL	-	-	-	-	-	-	46,057	55,168	49,616
CIVIL	-	-	-	-	-	-	58,879	67,907	59,013
ELECTRICAL	-	-	-	-	-	-	139,302	145,122	173,503
MECHANICAL	-	-	-	-	-	-	99,239	102,460	96,973
OTHER, N.E.C.	-	-	-	-	-	-	215,464	255,619	269,990
PHYSICAL SCIENCES	261,010	284,992	305,407	338,782	392,346	490,680	554,485	618,612	649,670
ASTRONOMY	16,452	19,522	18,351	23,230	26,349	36,245	44,441	47,876	51,728
CHEMISTRY	82,564	92,716	107,867	121,453	138,001	156,516	189,287	216,630	221,627
PHYSICS	136,296	149,862	156,102	171,910	199,161	252,518	279,666	308,481	305,906
OTHER, N.E.C.	25,698	22,892	23,087	22,189	28,835	45,401	41,061	45,625	60,409
ENVIRONMENTAL SCIENCES 3/	128,719	180,643	211,822	228,591	275,080	329,154	371,862	392,342	391,510
ATMOSPHERIC	-	-	-	-	-	-	56,125	58,698	68,446
EARTH SCIENCES	-	-	-	-	-	-	129,660	128,490	126,309
OCEANOGRAPHY	-	-	-	-	-	-	133,509	145,586	153,715
OTHER, N.E.C.	-	-	-	-	-	-	52,568	59,568	43,040
MATHEMATICAL/COMPUTER SCIENCES	51,938	65,099	65,807	78,184	85,344	129,623	137,945	161,282	179,398
MATHEMATICS	-	31,224	32,882	40,638	44,130	60,431	61,028	67,839	72,030
COMPUTER SCIENCES	-	33,875	32,925	37,546	41,214	69,192	76,917	93,443	107,368
LIFE SCIENCES	863,109	1,237,878	1,380,846	1,473,984	1,636,413	1,818,779	2,093,749	2,363,543	2,493,092
AGRICULTURAL SCIENCES	78,312	112,864	122,538	132,772	155,349	184,676	211,285	233,613	254,691
BIOLOGICAL SCIENCES	311,997	457,093	522,172	575,129	590,560	664,675	762,897	866,297	921,875
MEDICAL SCIENCES	438,093	613,716	677,509	712,327	824,808	914,905	1,056,525	1,187,297	1,238,805
OTHER, N.E.C.	34,706	54,205	58,627	53,756	55,696	54,523	63,042	76,236	77,721
PSYCHOLOGY	53,555	61,686	59,367	63,648	63,996	72,257	81,053	92,461	89,108
SOCIAL SCIENCES	111,215	141,333	138,295	138,205	140,445	155,074	181,627	187,954	162,696
ECONOMICS	20,440	26,968	29,132	31,995	37,103	40,026	43,420	44,532	41,376
POLITICAL SCIENCE	8,287	12,280	11,966	14,926	15,888	20,561	22,676	23,398	22,602
SOCIOLOGY	34,842	45,041	41,115	37,854	40,597	47,144	57,140	56,500	46,151
OTHER, N.E.C.	47,546	57,044	56,042	53,830	46,857	47,343	57,381	63,124	52,527
OTHER SCIENCES, N.E.C.	62,623	57,086	59,845	58,007	67,623	73,240	78,344	81,687	86,681

1/ ESTIMATED, BASED ON DATA COLLECTED FROM DOCTORATE-GRANTING INSTITUTIONS ONLY.
2/ DATA WERE NOT COLLECTED IN 1978.
3/ DETAIL NOT SEPARATELY AVAILABLE PRIOR TO 1980.
SOURCE: NATIONAL SCIENCE FOUNDATION

TABLE B-5. — FEDERAL OBLIGATIONS TO UNIVERSITIES AND COLLEGES FOR RESEARCH AND DEVELOPMENT, BY DETAILED FIELD AND AGENCY: FY 1982

(DOLLARS IN THOUSANDS)

FIELD OF SCIENCE/ENGINEERING	TOTAL	USDA	COM	DOD	ED	DOE	EPA	HHS	INT	NASA	NSF	OTHER 1/
TOTAL, ALL FIELDS	4,882,543	256,535	29,132	813,673	34,379	265,155	78,027	2,110,633	21,545	167,744	689,692	76,028
PHYSICAL SCIENCES, TOTAL	561,506	12,995	2,275	72,986	0	144,051	2,606	52,642	1,600	62,710	209,686	795
ASTRONOMY	54,001	0	812	1,615	0	0	0	0	0	34,728	16,846	0
CHEMISTRY	181,297	12,995	357	24,783	0	16,854	2,077	50,868	1,508	5,658	66,473	164
PHYSICS	284,711	0	1,106	43,023	0	127,157	433	1,774	92	17,083	93,412	631
PHYSICAL SCIENCES, NEC	41,497	0	0	3,165	0	40	96	0	0	5,241	32,995	0
MATHEMATICAL/COMPUTER SCIENCES, TOTAL	101,266	883	367	34,014	0	4,483	133	3,463	37	4,146	52,122	1,618
MATHEMATICS	54,733	871	73	19,349	0	3,187	133	3,463	0	937	26,653	67
COMPUTER SCIENCES	44,844	12	264	13,869	0	1,276	0	0	37	2,366	25,469	1,551
MATHEMATICAL/COMPUTER, NEC	1,689	0	30	796	0	20	0	0	0	843	0	0
ENVIRONMENTAL SCIENCES, TOTAL	344,313	1,537	21,314	64,693	0	18,952	22,091	0	8,604	45,327	149,633	2,162
ATMOSPHERIC SCIENCES	94,463	1,006	2,652	24,282	0	3,454	530	0	2,004	25,992	34,866	77
GEOLOGICAL SCIENCES	101,005	531	893	5,486	0	7,429	6,765	0	6,311	10,652	61,001	2,037
OCEANOGRAPHY	102,340	0	27,769	33,297	0	6,314	85	0	68	2,759	22,048	0
ENVIRONMENTAL SCIENCES, NEC	46,505	0	0	1,628	0	1,795	14,711	0	221	6,224	21,718	48
ENGINEERING, TOTAL	798,364	8,559	1,370	541,654	1,027	57,119	7,267	30,659	4,779	39,305	99,744	6,981
AERONAUTICAL	25,530	0	0	19,054	0	100	581	0	0	15,554	241	0
ASTRONAUTICAL	8,569	0	0	6,291	0	143	0	0	0	1,898	237	0
CHEMICAL	30,274	0	91	2,727	0	9,530	143	2,037	0	393	15,353	0
CIVIL	38,745	150	319	7,289	0	3,037	5,578	0	258	320	20,783	911
ELECTRICAL	139,442	2	214	110,472	0	955	0	0	0	4,682	23,117	0
MECHANICAL	37,836	4	254	14,819	0	3,935	0	163	0	5,183	12,983	975
METALLURGY & MATERIALS	63,998	0	345	21,262	0	12,318	0	260	4,409	6,186	19,171	47
ENGINEERING, NEC	443,970	8,403	147	359,740	1,027	27,101	965	28,199	12	4,909	7,939	5,440
LIFE SCIENCES, TOTAL	2,286,309	196,095	401	73,300	4,686	39,089	29,828	1,756,116	5,952	13,121	116,706	48,915
BIOLOGICAL (EXC.ENV.BIO)	1,190,226	55,539	44	8,053	0	28,674	20,868	975,156	15	6,220	93,352	2,305
ENVIRONMENTAL BIOLOGY	6,448	1,046	357	2,097	0	0	268	398	1,825	457	0	0
AGRICULTURAL	162,192	123,142	0	965	0	498	0	189	4,112	927	0	32,359
MEDICAL	887,632	16,368	0	60,992	3,720	6,228	5,647	775,664	0	2,190	622	14,201
LIFE SCIENCES, NEC	39,711	0	0	1,193	966	3,689	3,045	4,709	0	3,327	22,732	50
PSYCHOLOGY, TOTAL	83,892	15	0	10,983	15	0	0	65,039	208	1,203	6,429	0
BIOLOGICAL ASPECTS	24,856	15	0	89	0	0	0	20,094	0	226	4,432	0
SOCIAL ASPECTS	25,164	0	0	10,811	0	0	0	12,293	208	210	1,644	0
PSYCHOLOGY, NEC	33,870	0	0	83	15	0	0	32,652	0	767	353	0
SOCIAL SCIENCES, TOTAL	132,261	34,891	3,405	1,211	4,581	6	1,319	36,897	320	63	40,445	9,123
ANTHROPOLOGY	11,994	0	0	0	0	0	0	640	99	0	11,259	0
ECONOMICS	52,382	29,512	3,405	0	0	0	738	2,616	71	0	7,358	8,682
HISTORY	3,300	0	0	0	0	0	0	0	0	90	3,150	0
LINGUISTICS	3,629	0	0	0	0	0	0	407	1	0	3,221	0
POLITICAL SCIENCE	10,713	0	0	585	0	0	581	743	93	0	8,711	0
SOCIOLOGY	21,389	5,379	0	26	0	6	0	13,137	17	0	2,576	238
SOCIAL SCIENCES, NEC	28,954	0	0	590	4,581	0	0	19,354	39	13	4,174	203
OTHER SCIENCES, NEC	244,732	0	0	15,232	24,070	1,455	14,783	165,817	45	1,969	14,927	6,434

1/ INCLUDES DOT, AID, HUD, LABOR, AND NRC.

SOURCE: NATIONAL SCIENCE FOUNDATION

TABLE B-6. — R&D EXPENDITURES AT UNIVERSITIES AND COLLEGES
BY GEOGRAPHIC DISTRIBUTION: FISCAL YEARS 1972, 1975-82

(DOLLARS IN THOUSANDS)

DIVISION AND STATE	1972	1975	1976	1977	1978 1/	1979	1980	1981	1982
TOTAL, ALL INSTITUTIONS ...	2,630,442	3,408,691	3,729,007	4,066,953	4,540,256	5,361,408	6,060,118	6,818,343	7,260,637
NEW ENGLAND	280,799	329,736	361,316	403,153	452,420	525,155	590,176	690,962	732,073
CONNECTICUT	54,010	62,673	71,595	79,348	89,078	105,428	118,198	140,045	152,201
MAINE	5,985	8,759	9,632	9,937	11,022	12,593	14,902	17,874	19,221
MASSACHUSETTS	188,985	221,922	239,793	265,490	296,231	344,984	386,509	445,596	469,712
NEW HAMPSHIRE	7,659	10,063	11,963	13,705	16,332	17,890	19,690	27,451	27,687
RHODE ISLAND	17,647	15,730	16,166	21,543	24,121	30,229	34,897	41,240	44,349
VERMONT	6,469	10,589	12,167	13,130	13,636	14,031	15,980	18,756	18,903
MIDDLE ATLANTIC	485,200	608,774	650,778	704,531	790,382	872,943	979,391	1,086,375	1,189,613
NEW JERSEY	46,475	55,805	54,321	59,040	68,387	76,955	85,500	96,387	105,077
NEW YORK	309,110	389,842	409,314	443,450	482,103	546,851	613,234	671,638	739,904
PENNSYLVANIA	129,615	163,127	187,143	202,041	239,892	249,437	280,657	318,350	344,632
EAST NORTH CENTRAL	428,537	546,280	586,745	628,790	712,355	815,364	904,885	1,006,623	1,025,479
ILLINOIS	123,525	150,071	162,512	174,328	198,715	218,253	238,817	268,251	282,523
INDIANA	51,160	64,022	68,632	69,735	79,991	89,789	101,532	121,741	123,427
MICHIGAN	97,837	127,939	137,823	146,973	171,295	200,295	217,297	236,236	226,445
OHIO	72,734	93,963	108,391	121,230	136,891	162,108	183,369	202,383	204,106
WISCONSIN	83,281	110,285	109,387	116,524	125,463	144,919	163,870	178,022	188,978
WEST NORTH CENTRAL	219,686	263,966	292,440	321,789	354,444	401,641	448,895	494,634	535,735
IOWA	30,690	47,069	52,374	60,830	67,257	81,264	94,987	103,409	111,011
KANSAS	28,043	30,687	34,334	36,939	38,169	43,215	49,474	55,429	56,449
MINNESOTA	49,768	70,256	75,536	83,088	94,706	106,547	119,471	133,430	146,885
MISSOURI	78,493	74,226	81,309	88,176	96,747	104,831	113,375	123,835	130,182
NEBRASKA	19,830	24,882	28,305	30,820	34,706	40,746	42,893	47,806	53,096
NORTH DAKOTA	5,884	10,111	12,790	13,526	14,070	15,434	17,963	20,715	26,433
SOUTH DAKOTA	6,978	6,735	7,792	8,410	8,789	9,614	10,732	10,010	11,679
SOUTH ATLANTIC	322,263	448,017	491,284	536,098	576,871	836,425	940,638	1,043,889	1,111,453
DELAWARE	4,984	6,982	7,520	9,925	11,575	14,363	16,744	17,202	17,875
DISTRICT OF COLUMBIA	25,985	35,028	37,248	41,147	45,906	48,938	56,576	54,928	62,709
FLORIDA	65,468	87,990	98,401	105,002	107,629	120,447	140,151	162,244	167,905
GEORGIA	49,596	68,626	77,691	84,106	100,308	119,855	136,651	154,686	170,495
MARYLAND	63,392	89,935	95,242	104,490	112,697	289,748	318,213	340,572	350,944
NORTH CAROLINA	64,119	89,188	92,330	99,380	101,864	122,674	133,638	158,297	165,723
SOUTH CAROLINA	9,792	18,316	19,939	21,813	23,452	30,490	34,346	36,781	47,910
VIRGINIA	30,470	44,825	51,012	58,951	62,765	74,453	86,706	99,281	106,073
WEST VIRGINIA	8,957	7,537	11,901	11,684	11,075	15,457	17,621	19,898	21,817
EAST SOUTH CENTRAL	82,214	123,385	130,820	141,414	160,508	188,644	203,521	240,152	248,513
ALABAMA	22,116	37,918	37,870	42,340	45,734	55,913	60,534	67,811	70,778
KENTUCKY	14,236	21,414	22,938	27,620	33,148	37,994	38,512	43,894	48,104
MISSISSIPPI	16,646	23,909	26,195	25,445	29,563	35,119	40,302	46,990	50,203
TENNESSEE	29,216	40,144	43,817	46,009	52,063	59,618	64,173	81,457	79,428
WEST SOUTH CENTRAL	179,837	251,131	288,372	320,340	375,359	441,680	504,460	584,158	637,753
ARKANSAS	11,414	13,817	16,000	16,789	20,605	28,247	30,283	30,316	35,948
LOUISIANA	30,267	39,218	43,053	45,279	57,230	63,354	74,152	88,839	97,505
OKLAHOMA	19,247	21,513	23,156	26,289	30,579	35,081	48,167	67,876	70,984
TEXAS	118,909	176,583	206,163	231,983	266,945	314,998	351,858	397,127	433,316
MOUNTAIN	162,871	196,941	221,211	243,022	277,067	334,962	382,014	437,118	465,261
ARIZONA	23,911	33,539	37,198	41,827	49,805	67,125	77,163	91,600	101,075
COLORADO	59,399	65,897	73,308	77,519	86,832	104,564	123,008	135,502	136,939
IDAHO	8,084	11,877	13,704	15,215	13,442	13,985	14,434	21,607	17,865
MONTANA	6,756	10,831	13,254	14,168	15,548	17,993	18,309	20,505	20,272
NEVADA	6,085	7,834	9,404	9,043	10,500	12,616	13,932	11,917	18,440
NEW MEXICO	20,971	21,745	24,437	29,386	38,501	51,614	58,320	67,286	74,086
UTAH	32,005	37,500	40,789	44,792	52,279	57,297	65,788	75,232	81,962
WYOMING	5,660	7,728	9,117	11,072	10,160	9,768	11,049	13,469	14,622
PACIFIC	457,944	627,145	691,839	752,459	835,466	926,323	1,085,111	1,209,770	1,288,737
ALASKA	15,534	21,139	28,740	35,175	39,367	36,947	42,154	36,652	38,218
CALIFORNIA	373,834	458,436	500,756	537,838	585,822	662,485	754,851	890,909	946,762
HAWAII	23,520	24,996	28,049	28,900	31,971	35,703	40,593	42,997	43,439
OREGON	32,204	39,699	47,081	51,530	56,129	62,884	72,307	80,030	89,975
WASHINGTON	62,862	83,275	87,195	99,016	112,177	128,304	146,006	159,192	170,343
OUTLYING AREAS	11,035	13,316	14,212	15,357	15,384	18,271	21,037	24,652	26,020

1/ DATA WERE COLLECTED ONLY FROM DOCTORATE-GRANTING INSTITUTIONS.
SOURCE: NATIONAL SCIENCE FOUNDATION

TABLE B-7. — SCIENTISTS AND ENGINEERS EMPLOYED AT UNIVERSITIES AND COLLEGES
BY FIELD AND STATUS: SELECTED YEARS

FIELD AND STATUS	1967	1969	1971	1973	1975	1977	1978	1980	1981	1982	1983
ALL FIELDS	212,855	231,756	257,904	264,887	278,919	297,856	307,757	324,249	334,487	349,310	358,824
FULL TIME	170,557	187,082	209,416	216,424	223,336	236,278	242,170	254,990	259,696	267,771	272,955
PART TIME	42,298	44,674	48,488	48,463	55,583	61,578	65,587	69,259	74,791	81,539	85,869
ENGINEERS	25,253	25,387	27,130	27,530	27,919	30,083	30,997	33,737	34,840	36,335	37,696
FULL TIME	20,983	21,431	23,039	23,485	22,580	24,105	24,666	26,472	27,017	27,950	28,816
PART TIME	4,270	3,956	4,091	4,045	5,339	5,978	6,331	7,265	7,823	8,385	8,880
PHYSICAL SCIENTISTS	26,243	28,149	29,443	30,210	30,836	32,120	32,839	33,554	34,069	34,463	34,660
FULL TIME	23,361	25,040	26,346	26,666	26,662	27,553	27,902	27,993	28,178	28,538	28,376
PART TIME	2,882	3,109	3,097	3,544	4,174	4,567	4,937	5,561	5,891	5,925	6,284
ENVIRONMENTAL SCIENTISTS	5,111	5,549	6,500	6,934	7,855	9,337	9,618	9,960	10,183	10,195	10,144
FULL TIME	4,294	4,935	5,752	6,091	6,787	8,075	8,285	8,453	8,678	8,668	8,688
PART TIME	817	614	748	843	1,068	1,262	1,333	1,507	1,505	1,527	1,456
MATHEMATICAL AND COMPUTER SCIENTISTS	17,776	22,495	24,548	24,770	28,475	31,996	33,034	35,957	38,986	42,297	45,639
FULL TIME	14,397	18,390	20,282	20,794	22,404	23,870	24,349	26,030	27,127	28,380	29,893
PART TIME	3,379	4,105	4,266	3,976	6,071	8,126	8,685	9,927	11,859	13,917	15,746
LIFE SCIENTISTS	87,347	97,206	110,274	112,352	113,466	117,441	122,956	133,702	137,773	146,337	151,524
FULL TIME	66,620	74,882	85,907	88,418	90,684	94,306	97,726	108,155	110,567	115,711	118,868
PART TIME	20,727	22,324	24,367	23,934	22,782	23,135	25,230	25,547	27,206	30,626	32,656
PSYCHOLOGISTS	11,358	14,780	16,806	18,876	21,649	23,699	23,752	23,257	23,386	23,697	23,695
FULL TIME	8,554	11,536	12,994	14,777	15,973	17,307	17,406	16,733	16,859	16,796	16,788
PART TIME	2,804	3,244	3,812	4,099	5,676	6,392	6,346	6,524	6,527	6,901	6,907
SOCIAL SCIENTISTS	39,767	38,190	43,203	44,215	48,719	53,180	54,561	54,082	55,250	55,986	55,466
FULL TIME	32,348	30,868	35,096	36,193	38,246	41,062	41,836	41,154	41,270	41,728	41,526
PART TIME	7,419	7,322	8,107	8,022	10,473	12,118	12,725	12,928	13,980	14,258	13,940

SOURCE: NATIONAL SCIENCE FOUNDATION

TABLE B-8. — SCIENTISTS AND ENGINEERS EMPLOYED AT UNIVERSITIES AND COLLEGES
BY TYPE OF INSTITUTION AND STATUS: SELECTED YEARS

TYPE OF INSTITUTION AND STATUS	1967	1969	1971	1973	1975	1977	1978	1980	1981	1982	1983
ALL INSTITUTIONS	212,855	231,756	257,904	264,887	278,919	297,856	307,757	324,249	334,487	349,310	358,824
FULL TIME	170,557	187,082	209,416	216,424	223,336	236,278	242,170	254,990	259,696	267,771	272,955
PART TIME	42,298	44,674	48,488	48,463	55,583	61,578	65,587	69,259	74,791	81,539	85,869
INSTITUTIONS GRANTING:											
DOCTORATE IN S&E	142,676	154,424	171,238	174,474	180,330	193,204	200,366	218,021	223,832	232,043	236,560
FULL TIME	114,446	124,604	140,339	143,393	148,096	159,848	164,732	179,775	183,160	188,742	191,731
PART TIME	28,230	29,820	30,899	31,081	32,234	33,356	35,634	38,246	40,672	43,301	44,829
MASTER'S IN S&E	24,729	29,441	30,080	28,703	34,075	34,790	38,628	37,362	37,856	38,918	40,545
FULL TIME	20,748	25,212	25,597	24,851	27,511	27,118	29,395	27,915	27,940	28,620	29,618
PART TIME	3,981	4,229	4,483	3,852	6,564	7,672	9,233	9,447	9,916	10,298	10,927
BACHELOR'S IN S&E	23,025	21,690	23,198	28,363	27,113	27,411	26,222	26,830	27,608	28,815	29,469
FULL TIME	19,328	17,927	19,623	23,620	22,406	22,437	21,165	20,784	21,229	21,646	22,219
PART TIME	3,697	3,763	3,575	4,743	4,707	4,974	5,057	6,046	6,379	7,169	7,250
NONSCIENCE DEGREES 1/	22,425	26,201	33,388	1,348	1,345	607	858	842	916	687	610
FULL TIME	16,035	19,339	23,857	812	828	467	705	680	708	579	489
PART TIME	6,390	6,862	9,531	536	517	140	153	162	208	108	121
2-YEAR INSTITUTIONS	-	-	-	31,999	36,056	41,844	41,683	41,194	44,275	48,847	51,640
FULL TIME	-	-	-	23,748	24,495	26,408	26,173	25,836	26,659	28,184	28,898
PART TIME	-	-	-	8,251	11,561	15,436	15,510	15,358	17,616	20,663	22,742

1/ DATA FOR 1967 THROUGH 1971 INCLUDE 2-YEAR INSTITUTIONS
AS WELL AS INSTITUTIONS AWARDING DEGREES IN NONSCIENCE FIELDS.
SOURCE: NATIONAL SCIENCE FOUNDATION

TABLE B-9. -- FULL-TIME-EQUIVALENT SCIENTISTS AND ENGINEERS EMPLOYED AT UNIVERSITIES AND COLLEGES BY INSTITUTIONAL CONTROL AND TYPE OF ACTIVITY: SELECTED YEARS

TYPE OF ACTIVITY AND CONTROL	1969	1971	1973	1975	1977	1978	1982	1983
TOTAL FTE'S	203,937	228,216	235,050	243,071	258,041	271,656	299,705	305,447
RESEARCH AND DEVELOPMENT	50,146	49,499	46,896	50,926	54,243	55,962	59,473	60,265
OTHER ACTIVITIES	153,791	178,717	188,154	192,145	203,798	215,694	240,232	245,182
TYPE OF CONTROL:								
PUBLIC INSTITUTIONS								
TOTAL FTE'S	-	-	157,510	168,900	179,933	187,868	207,856	211,610
RESEARCH AND DEVELOPMENT	-	-	27,512	31,186	34,255	34,991	37,595	38,862
OTHER ACTIVITIES	-	-	129,998	137,714	145,678	152,877	170,261	172,748
PRIVATE INSTITUTIONS								
TOTAL FTE'S	-	-	77,540	74,171	78,108	83,788	91,849	93,837
RESEARCH AND DEVELOPMENT	-	-	19,384	19,740	19,988	20,971	21,878	21,403
OTHER ACTIVITIES	-	-	58,156	54,431	58,120	62,817	69,971	72,434

SOURCE: NATIONAL SCIENCE FOUNDATION

TABLE B-10. -- FULL-TIME SCIENTISTS AND ENGINEERS EMPLOYED AT UNIVERSITIES AND COLLEGES BY FIELD: JANUARY 1973 AND JANUARY 1976 - JANUARY 1983 1/

FIELD	1973	1976	1977	1978	1980	1981	1982	1983
TOTAL	216,424	229,886	236,278	242,170	254,990	259,696	267,771	272,995
ENGINEERS	23,485	22,924	24,105	24,666	26,472	27,017	27,950	28,816
AERONAUTICAL AND ASTRONAUTICAL ENGINEERS	1,334	966	968	964	1,144	1,057	1,084	1,091
CHEMICAL ENGINEERS	1,529	1,638	1,684	1,725	1,886	1,902	1,910	1,952
CIVIL ENGINEERS	3,730	4,015	4,111	4,240	4,325	4,446	4,739	4,989
ELECTRICAL ENGINEERS	5,916	5,405	5,463	5,593	6,374	6,518	6,789	7,171
MECHANICAL ENGINEERS	4,455	4,346	4,467	4,532	4,817	4,932	5,038	5,117
OTHER ENGINEERS	6,521	6,954	7,412	7,612	7,926	8,162	8,390	8,496
PHYSICAL SCIENTISTS	26,666	27,086	27,553	27,902	27,993	28,178	28,538	28,376
ASTRONOMERS 2/	-	-	-	-	818	900	1,006	858
CHEMISTS	13,397	14,140	14,471	14,736	14,330	14,765	14,635	14,748
PHYSICISTS	11,077	10,822	11,056	11,254	11,323	11,010	11,425	11,387
OTHER PHYSICAL SCIENTISTS	2,192	2,124	2,026	1,912	1,522	1,503	1,482	1,383
ENVIRONMENTAL SCIENTISTS	6,091	7,357	8,075	8,285	8,453	8,678	8,668	8,688
ATMOSPHERIC SCIENTISTS	560	602	692	821	793	763	762	887
EARTH SCIENTISTS	4,826	5,527	5,914	5,963	5,554	5,638	5,664	5,574
OCEANOGRAPHERS	705	1,228	1,469	1,501	1,488	1,565	1,484	1,520
OTHER ENVIRONMENTAL SCIENTISTS 2/	-	-	-	-	618	712	758	707
MATHEMATICAL AND COMPUTER SCIENTISTS	20,794	23,125	23,870	24,349	26,030	27,127	28,380	29,893
MATHEMATICIANS	-	18,993	19,287	19,564	19,914	20,232	20,566	21,038
COMPUTER SCIENTISTS	-	4,132	4,583	4,785	6,116	6,895	7,814	8,855
LIFE SCIENTISTS	88,418	91,857	94,306	97,726	108,195	110,567	115,711	118,868
AGRICULTURAL SCIENTISTS	13,906	12,941	13,065	13,704	14,440	14,567	14,663	15,037
BIOLOGICAL SCIENTISTS	29,493	34,891	36,875	37,661	38,714	39,914	40,159	40,903
MEDICAL SCIENTISTS	45,019	44,025	44,366	46,361	50,316	50,836	53,085	53,646
OTHER LIFE SCIENTISTS 2/	-	-	-	-	4,625	5,250	7,804	9,282
PSYCHOLOGISTS	14,777	16,787	17,307	17,406	16,733	16,859	16,796	16,788
SOCIAL SCIENTISTS	36,193	40,790	41,062	41,836	41,154	41,270	41,728	41,526
ECONOMISTS	9,947	10,269	10,695	10,854	11,092	11,230	11,453	11,554
POLITICAL SCIENTISTS	8,187	9,065	9,004	9,088	8,767	8,999	9,172	9,151
SOCIOLOGISTS	9,686	11,435	11,674	11,502	10,860	10,747	10,762	10,458
OTHER SOCIAL SCIENTISTS	8,773	9,891	9,689	10,435	10,435	10,294	10,340	10,363

1/ DATA WERE NOT COLLECTED IN 1979.
2/ DATA NOT AVAILABLE PRIOR TO 1980.
SOURCE: NATIONAL SCIENCE FOUNDATION

TABLE 8-11. — MALE SCIENTISTS AND ENGINEERS EMPLOYED AT UNIVERSITIES AND COLLEGES BY STATUS: JANUARY 1980 AND JANUARY 1982-83

FIELD	TOTAL			FULL TIME			PART TIME		
	1980	1982	1983	1980	1982	1983	1980	1982	1983
TOTAL	262,591	277,535	283,292	210,775	217,094	219,875	51,816	60,441	63,417
ENGINEERS	32,746	35,117	36,234	25,759	27,090	27,803	6,987	8,027	8,431
AERONAUTICAL AND ASTRONAUTICAL ENGINEERS	1,365	1,293	1,294	1,117	1,064	1,068	248	229	[illegible]
CHEMICAL ENGINEERS	2,272	2,147	2,281	1,827	1,820	1,856	445	327	425
CIVIL ENGINEERS	5,374	5,859	6,090	4,207	4,572	4,779	1,167	1,287	1,311
ELECTRICAL ENGINEERS	8,011	8,843	9,356	6,260	6,657	7,004	1,751	2,186	2,352
MECHANICAL ENGINEERS	5,953	6,496	6,980	4,725	4,948	5,019	1,228	1,548	1,961
OTHER ENGINEERS	9,771	10,479	10,633	7,623	8,029	8,077	2,148	2,450	2,556
PHYSICAL SCIENTISTS	29,739	30,491	30,608	25,502	25,889	25,692	4,237	4,602	4,916
ASTRONOMERS	867	1,098	976	750	932	792	117	166	184
CHEMISTS	14,796	15,146	15,249	12,551	12,728	12,798	2,245	2,418	2,451
PHYSICISTS	12,355	12,566	12,810	10,831	10,915	10,863	1,524	1,651	1,947
OTHER PHYSICAL SCIENTISTS	1,721	1,681	1,573	1,370	1,314	1,239	351	367	334
ENVIRONMENTAL SCIENTISTS	8,985	9,045	9,017	7,775	7,853	7,867	1,210	1,192	1,150
ATMOSPHERIC SCIENTISTS	885	826	971	749	712	817	136	114	154
EARTH SCIENTISTS	5,988	6,012	5,869	5,156	5,214	5,113	832	798	756
OCEANOGRAPHERS	1,468	1,392	1,436	1,343	1,273	1,317	125	119	118
OTHER ENVIRONMENTAL SCIENTISTS	644	815	742	527	654	620	117	161	122
MATHEMATICAL AND COMPUTER SCIENTISTS	29,065	33,633	36,040	21,945	23,503	24,590	7,120	10,130	11,450
MATHEMATICIANS	21,463	23,346	24,272	16,738	17,044	17,343	4,725	6,302	6,929
COMPUTER SCIENTISTS	7,602	10,287	11,768	5,207	6,459	7,247	2,395	3,828	4,521
LIFE SCIENTISTS	103,072	108,828	111,122	84,054	86,780	87,971	19,018	22,048	23,151
AGRICULTURAL SCIENTISTS	14,285	14,599	14,660	13,113	13,197	13,468	1,172	1,402	1,192
BIOLOGICAL SCIENTISTS	34,301	35,126	35,675	30,497	31,049	31,414	3,804	4,077	4,261
MEDICAL SCIENTISTS	52,084	55,560	57,028	38,601	39,926	40,338	13,483	15,634	16,690
OTHER LIFE SCIENTISTS	2,402	3,543	3,759	1,843	2,608	2,751	559	935	1,008
PSYCHOLOGISTS	16,259	16,473	16,493	12,415	12,348	12,337	3,844	4,125	4,156
SOCIAL SCIENTISTS	42,725	43,948	43,778	33,325	33,631	33,615	9,400	10,317	10,163
ECONOMISTS	13,031	13,703	13,800	9,982	10,254	10,341	3,049	3,449	3,459
POLITICAL SCIENTISTS	9,589	10,006	10,020	7,655	7,894	7,903	1,934	2,112	2,117
SOCIOLOGISTS	10,141	10,067	9,833	7,920	7,734	7,598	2,221	2,333	2,235
OTHER SOCIAL SCIENTISTS	9,964	10,172	10,125	7,768	7,749	7,773	2,196	2,423	2,352

SOURCE: NATIONAL SCIENCE FOUNDATION

TABLE 8-12. — FEMALE SCIENTISTS AND ENGINEERS EMPLOYED AT UNIVERSITIES AND COLLEGES BY STATUS: JANUARY 1980 AND JANUARY 1982-83

FIELD	TOTAL			FULL TIME			PART TIME		
	1980	1982	1983	1980	1982	1983	1980	1982	1983
TOTAL	61,658	71,775	75,532	44,215	50,677	53,080	17,443	21,098	22,452
ENGINEERS	991	1,218	1,462	713	860	1,013	278	358	449
AERONAUTICAL AND ASTRONAUTICAL ENGINEERS	42	30	36	27	20	23	15	10	13
CHEMICAL ENGINEERS	80	116	136	59	90	96	21	26	40
CIVIL ENGINEERS	155	232	285	118	167	210	37	65	75
ELECTRICAL ENGINEERS	143	193	242	114	132	167	29	61	75
MECHANICAL ENGINEERS	121	141	151	92	90	98	29	51	53
OTHER ENGINEERS	450	506	612	303	361	419	147	145	193
PHYSICAL SCIENTISTS	3,815	3,972	4,052	2,491	2,649	2,684	1,324	1,323	1,368
ASTRONOMERS	88	105	95	68	74	66	20	31	29
CHEMISTS	2,818	2,882	2,993	1,779	1,897	1,980	1,039	985	1,043
PHYSICISTS	652	702	741	492	510	524	160	192	217
OTHER PHYSICAL SCIENTISTS	257	283	223	152	168	144	105	115	79
ENVIRONMENTAL SCIENTISTS	975	1,150	1,127	678	815	821	297	335	306
ATMOSPHERIC SCIENTISTS	58	60	93	44	50	70	14	10	23
EARTH SCIENTISTS	581	666	642	398	450	461	183	216	201
OCEANOGRAPHERS	195	248	244	145	211	203	50	37	41
OTHER ENVIRONMENTAL SCIENTISTS	141	176	128	91	104	87	50	72	41
MATHEMATICAL AND COMPUTER SCIENTISTS	6,892	8,664	9,899	4,085	4,877	5,303	2,807	3,787	4,296
MATHEMATICIANS	5,616	6,597	7,031	3,176	3,522	3,695	2,440	3,075	3,336
COMPUTER SCIENTISTS	1,276	2,067	2,868	909	1,355	1,608	367	712	960
LIFE SCIENTISTS	30,630	37,509	40,402	24,101	28,931	30,897	6,529	8,578	9,505
AGRICULTURAL SCIENTISTS	1,614	1,846	1,939	1,327	1,466	1,569	287	380	370
BIOLOGICAL SCIENTISTS	10,502	11,613	12,206	8,217	9,110	9,489	2,285	2,503	2,717
MEDICAL SCIENTISTS	15,032	17,427	17,887	11,715	13,159	13,308	3,317	4,268	4,579
OTHER LIFE SCIENTISTS	3,482	6,623	8,370	2,842	5,196	6,531	640	1,427	1,839
PSYCHOLOGISTS	6,998	7,224	7,202	4,318	4,448	4,451	2,680	2,776	2,751
SOCIAL SCIENTISTS	11,357	12,038	11,688	7,829	8,097	7,911	3,528	3,941	3,777
ECONOMISTS	1,641	1,752	1,750	1,110	1,199	1,213	531	553	537
POLITICAL SCIENTISTS	1,605	1,826	1,783	1,112	1,279	1,248	493	547	535
SOCIOLOGISTS	4,360	4,571	4,347	2,940	3,028	2,860	1,420	1,543	1,487
OTHER SOCIAL SCIENTISTS	3,751	3,889	3,808	2,667	2,591	2,590	1,084	1,298	1,218

SOURCE: NATIONAL SCIENCE FOUNDATION

TABLE B-13. — SCIENCE/ENGINEERING POSTDOCTORATES AND OTHER NON-FACULTY DOCTORAL RESEARCH STAFF IN ALL GRADUATE INSTITUTIONS BY FIELD AND HIGHEST DEGREE GRANTED: 1982

FIELD	POSTDOCTORATES			OTHER NON-FACULTY DOCTORAL RESEARCH STAFF		
	ALL INSTITUTIONS	DOCTORATE-GRANTING	MASTER'S-GRANTING	ALL INSTITUTIONS	DOCTORATE-GRANTING	MASTER'S-GRANTING
TOTAL, ALL FIELDS	19,772	19,733	39	4,048	4,040	8
ENGINEERING	983	979	4	671	671	0
AEROSPACE	25	25	0	26	26	0
AGRICULTURAL	6	6	0	3	3	0
BIOMEDICAL	30	30	0	10	10	0
CHEMICAL	175	175	0	96	96	0
CIVIL	108	108	0	115	115	0
ELECTRICAL	178	176	2	74	74	0
ENGINEERING SCIENCE	77	77	0	33	33	0
INDUSTRIAL	9	9	0	27	27	0
MECHANICAL	131	131	0	149	149	0
METALLURGICAL/MATERIALS	168	166	2	89	89	0
MINING	10	10	0	9	9	0
NUCLEAR	18	18	0	19	19	0
PETROLEUM	4	4	0	0	0	0
ENGINEERING, N.E.C.	44	44	0	21	21	0
PHYSICAL SCIENCES	4,297	4,280	17	810	805	5
ASTRONOMY	148	148	0	71	71	0
CHEMISTRY	2,819	2,806	13	348	347	1
PHYSICS	1,328	1,324	4	390	386	4
PHYSICAL SCIENCES, N.E.C.	2	2	0	1	1	0
ENVIRONMENTAL SCIENCES	339	334	5	238	238	0
ATMOSPHERIC SCIENCES	33	32	1	29	29	0
GEOSCIENCES	218	216	2	100	100	0
OCEANOGRAPHY	79	78	1	99	99	0
ENVIRONMENTAL SCIENCES, N.E.C.	9	8	1	10	10	0
MATHEMATICAL/COMPUTER SCIENCES	241	240	1	129	129	0
COMPUTER SCIENCE	58	57	1	80	80	0
MATHEMATICS AND APPLIED MATHEMATICS	169	169	0	29	29	0
STATISTICS	14	14	0	20	20	0
LIFE SCIENCES	13,101	13,090	11	1,913	1,911	2
AGRICULTURAL SCIENCES	283	283	0	70	70	0
BIOLOGICAL SCIENCES	7,784	7,775	9	1,298	1,296	2
ANATOMY	280	280	0	43	43	0
BIOCHEMISTRY	1,645	1,645	0	218	218	0
BIOLOGY	961	952	9	298	296	2
BIOMETRY/EPIDEMIOLOGY	53	53	0	15	15	0
BIOPHYSICS	131	131	0	54	54	0
BOTANY	298	298	0	76	76	0
CELL BIOLOGY	487	487	0	38	38	0
ECOLOGY	28	28	0	5	5	0
ENTOMOLOGY/PARASITOLOGY	119	119	0	47	47	0
GENETICS	311	311	0	20	20	0
MICROBIOLOGY	1,043	1,043	0	103	103	0
NUTRITION	138	138	0	38	38	0
PATHOLOGY	544	544	0	43	43	0
PHARMACOLOGY	796	796	0	90	90	0
PHYSIOLOGY	674	674	0	160	160	0
ZOOLOGY	223	223	0	29	29	0
BIOSCIENCES, N.E.C.	53	53	0	21	21	0
HEALTH SCIENCES	5,034	5,032	2	545	545	0
ANESTHESIOLOGY	72	72	0	1	1	0
CANCER/ONCOLOGY	98	98	0	21	21	0
CARDIOLOGY	384	384	0	36	36	0
DENTISTRY	251	251	0	2	2	0
ENDOCRINOLOGY	142	142	0	7	7	0
GASTROENTEROLOGY	124	124	0	10	10	0
HEMATOLOGY	153	153	0	1	1	0
NEUROLOGY	323	323	0	36	36	0
NURSING	0	0	0	8	8	0
OBSTETRICS/GYNECOLOGY	105	105	0	9	9	0
OPHTHALMOLOGY	151	151	0	14	14	0
OTORHINOLARYNGOLOGY	35	35	0	6	6	0
PEDIATRICS	551	551	0	43	43	0
PHARMACEUTICAL SCIENCES	238	238	0	24	24	0
PREVENTIVE MEDICINE/COMMUNITY HEALTH	152	152	0	33	33	0
PSYCHIATRY	292	292	0	142	142	0
PULMONARY DISEASE	143	143	0	9	9	0
RADIOLOGY	185	185	0	31	31	0
SPEECH PATHOLOGY/AUDIOLOGY	7	7	0	10	10	0
SURGERY	340	340	0	43	43	0
VETERINARY SCIENCES	51	49	2	3	3	0
CLINICAL MEDICINE, N.E.C.	1,132	1,132	0	55	55	0
HEALTH RELATED, N.E.C.	105	105	0	1	1	0
PSYCHOLOGY	523	523	0	150	150	0
SOCIAL SCIENCES	288	287	1	137	136	1
AGRICULTURAL ECONOMICS	10	10	0	18	18	0
ANTHROPOLOGY	35	34	1	20	19	1
ECONOMICS (EXCEPT AGRICULTURAL)	13	13	0	49	49	0
GEOGRAPHY	5	5	0	3	3	0
HISTORY AND PHILOSOPHY OF SCIENCE	14	14	0	2	2	0
LINGUISTICS	47	47	0	3	3	0
POLITICAL SCIENCE	44	44	0	6	6	0
SOCIOLOGY	89	89	0	23	23	0
SOCIOLOGY/ANTHROPOLOGY	2	2	0	0	0	0
SOCIAL SCIENCES, N.E.C.	29	29	0	13	13	0

SOURCE: NATIONAL SCIENCE FOUNDATION

TABLE B-14. — SCIENCE/ENGINEERING GRADUATE STUDENTS IN ALL INSTITUTIONS BY FIELD: 1975-77 AND 1979-82 1/

FIELD	NUMBER							AVERAGE ANNUAL PERCENT CHANGE		
	1975	1976	1977	1979	1980	1981	1982	1975-81	1981-82	1975-82
TOTAL, ALL FIELDS	337,526	344,119	358,323	373,198	383,100	391,660	399,682	2.5	2.0	2.4
ENGINEERING	68,260	67,951	70,283	73,783	76,914	82,694	86,789	3.2	5.0	3.5
AEROSPACE	1,670	1,477	1,518	1,481	1,737	1,883	1,941	2.0	3.1	2.2
AGRICULTURAL	588	639	709	740	742	802	875	5.3	9.1	5.8
BIOMEDICAL	926	946	900	1,051	1,011	1,057	1,116	2.2	5.6	2.7
CHEMICAL	5,034	5,205	5,201	5,605	6,015	6,496	7,189	4.3	10.7	5.2
CIVIL	12,560	11,867	12,751	13,340	13,651	14,616	14,680	2.6	.4	2.3
ELECTRICAL	16,320	15,926	17,406	17,789	19,227	20,193	22,017	3.6	9.0	4.4
ENGINEERING SCIENCE	1,744	1,809	1,824	1,784	1,919	2,080	2,286	3.0	9.9	3.9
INDUSTRIAL	11,663	11,739	11,478	11,984	11,403	12,037	11,764	.5	-2.3	.1
MECHANICAL	8,601	8,374	8,783	9,337	9,975	10,713	11,968	3.7	8.0	4.3
METALLURGICAL/MATERIALS	2,352	2,375	2,859	2,756	2,910	3,125	3,124	4.9	*	4.1
MINING	412	515	452	389	413	462	449	1.9	-2.8	1.2
NUCLEAR	1,636	1,600	1,491	1,318	1,241	1,283	1,301	-4.0	1.4	-3.2
PETROLEUM	302	376	379	424	503	521	586	9.5	12.5	9.9
ENGINEERING, N.E.C.	4,550	5,103	4,932	5,785	6,167	7,436	7,893	8.5	6.3	8.2
PHYSICAL SCIENCES	26,310	26,628	26,857	26,689	26,949	27,380	28,205	.7	3.0	1.0
ASTRONOMY	711	681	644	638	628	597	632	-2.9	5.9	-1.7
CHEMISTRY	15,287	15,651	16,020	16,101	16,222	16,347	17,019	1.1	4.1	1.5
PHYSICS	10,068	10,067	9,931	9,696	9,895	10,145	10,306	.1	1.6	.3
PHYSICAL SCIENCES, N.E.C.	244	229	262	254	204	291	248	3.0	-14.8	.2
ENVIRONMENTAL SCIENCES	12,289	12,809	13,387	13,585	13,894	14,194	14,916	2.4	5.1	2.8
ATMOSPHERIC SCIENCES	937	930	929	892	923	914	934	-.4	2.2	*
GEOSCIENCES	7,204	7,634	7,961	8,431	8,566	8,709	9,526	3.2	9.4	4.1
OCEANOGRAPHY	1,737	1,775	1,957	1,867	1,992	2,082	2,091	3.1	.4	2.7
ENVIRONMENTAL SCIENCES, N.E.C.	2,411	2,470	2,540	2,395	2,413	2,489	2,365	.5	-5.0	-.3
MATHEMATICAL/COMPUTER SCIENCES	25,333	25,668	25,122	26,707	28,889	32,306	37,021	4.1	14.6	5.6
COMPUTER SCIENCE	8,415	8,981	9,461	12,110	13,925	16,852	20,266	12.3	20.3	13.4
MATHEMATICS AND APPLIED MATHEMATICS	14,934	14,655	13,657	12,648	12,929	13,477	14,707	-1.7	9.1	-.2
STATISTICS	1,984	2,032	2,004	1,949	2,035	1,977	2,048	-.1	3.6	.5
LIFE SCIENCES	83,224	88,033	95,712	99,977	102,612	103,237	103,518	3.7	.3	3.2
AGRICULTURAL SCIENCES	10,578	11,164	11,528	12,125	12,326	12,152	12,517	2.3	3.0	2.4
BIOLOGICAL SCIENCES	46,577	48,047	49,648	48,624	47,986	46,946	46,552	.1	-.8	*
ANATOMY	1,120	1,163	1,198	1,166	1,112	1,102	1,113	-.3	1.0	-.1
BIOCHEMISTRY	3,856	3,884	3,941	4,029	3,977	3,992	4,099	.6	2.7	.9
BIOLOGY	16,336	17,123	17,219	16,021	15,231	14,435	13,648	-2.0	-5.5	-2.5
BIOMETRY/EPIDEMIOLOGY	871	884	1,070	1,133	1,265	1,188	1,172	5.3	-1.3	4.3
BIOPHYSICS	698	594	570	525	485	463	442	-6.6	-4.5	-6.3
BOTANY	3,501	3,779	3,838	3,570	3,551	3,450	3,593	-.2	4.1	.4
CELL BIOLOGY	651	611	671	748	841	903	1,055	5.6	16.8	7.1
ECOLOGY	789	885	1,020	1,017	1,131	1,056	1,003	5.0	-5.0	3.5
ENTOMOLOGY/PARASITOLOGY	1,574	1,595	1,602	1,697	1,722	1,664	1,540	.9	-7.5	-.3
GENETICS	867	883	1,006	950	948	922	971	1.0	5.3	1.6
MICROBIOLOGY	4,166	4,324	4,535	4,190	4,224	4,113	4,287	-.2	4.2	.4
NUTRITION	2,842	3,137	3,816	3,920	4,091	4,327	4,337	7.3	.2	6.2
PATHOLOGY	1,542	1,612	1,674	1,850	1,889	1,732	1,706	2.0	-1.5	1.5
PHARMACOLOGY	1,602	1,705	1,793	2,004	2,015	2,021	2,090	3.9	3.4	3.9
PHYSIOLOGY	2,301	2,210	2,109	2,186	2,097	2,136	2,061	-1.2	-3.5	-1.6
ZOOLOGY	3,543	3,303	3,071	2,900	2,686	2,645	2,522	-4.8	-4.7	-4.7
BIOSCIENCES, N.E.C.	318	355	515	718	721	797	913	16.5	14.6	16.3
HEALTH SCIENCES	26,069	28,822	34,536	39,228	42,300	44,139	44,449	9.2	.7	7.9
ANESTHESIOLOGY	55	5	5	20	17	20	41	-15.5	105.0	-4.1
CANCER/ONCOLOGY	59	47	51	47	46	46	57	-4.1	23.9	-.5
CARDIOLOGY	23	2	5	3	38	36	59	7.8	63.9	14.4
DENTISTRY	1,098	1,054	1,147	1,186	1,133	1,072	930	-.4	-13.2	-2.3
ENDOCRINOLOGY	42	36	37	49	53	51	54	3.3	5.9	3.7
GASTROENTEROLOGY	15	8	8	0	0	4	7	-19.8	75.0	-10.3
HEMATOLOGY	3	4	18	20	16	9	7	20.1	-22.2	12.9
NEUROLOGY	322	300	316	362	365	304	332	-1.0	9.2	.4
NURSING	5,307	7,255	10,943	12,796	13,877	15,703	16,425	19.8	4.6	17.5
OBSTETRICS/GYNECOLOGY	53	59	27	36	6	13	24	-20.9	84.6	-10.7
OPHTHALMOLOGY	30	13	16	6	16	22	22	-5.0	.0	-4.3
OTORHINOLARYNGOLOGY	84	68	57	26	18	15	17	-19.2	13.3	-15.2
PEDIATRICS	183	215	152	131	138	149	154	-3.4	3.4	-2.4
PHARMACEUTICAL SCIENCES	2,245	2,217	2,515	2,487	2,496	2,616	2,951	2.6	-2.5	1.8
PREVENTIVE MEDICINE/ COMMUNITY HEALTH	3,832	4,473	4,642	6,428	7,103	7,195	6,757	11.1	-6.1	8.4
PSYCHIATRY	176	147	150	133	63	106	129	-8.1	21.7	-4.3
PULMONARY DISEASE	7	0	3	1	15	9	14	4.3	55.6	10.4
RADIOLOGY	377	285	310	283	283	277	295	-5.0	6.5	-3.4
SPEECH PATHOLOGY/AUDIOLOGY	7,539	7,725	8,263	8,398	8,735	8,696	8,69[illegible]	2.4	*	2.1
SURGERY	153	153	129	79	103	108	115	-5.6	6.5	-4.0
VETERINARY SCIENCES	482	531	562	576	511	485	483	.1	-.4	*
CLINICAL MEDICINE, N.E.C.	279	302	491	893	802	741	794	17.7	7.2	16.1
HEALTH RELATED, N.E.C.	3,735	3,923	4,689	5,868	6,466	6,462	6,488	9.6	.4	8.2
PSYCHOLOGY	36,201	37,427	38,997	39,763	40,615	40,669	40,205	2.0	-1.1	1.5
SOCIAL SCIENCES	85,809	85,603	88,265	92,694	93,227	91,180	89,028	1.0	-2.4	.5
AGRICULTURAL ECONOMICS	2,105	2,152	2,198	2,199	2,337	2,258	2,227	1.2	-1.4	.8
ANTHROPOLOGY	6,632	6,622	6,738	6,343	6,322	6,118	5,948	-1.3	-2.8	-1.5
ECONOMICS (EXCEPT AGRICULTURAL)	12,093	11,923	12,086	12,157	13,171	13,344	13,832	1.7	3.7	1.9
GEOGRAPHY	3,609	3,803	3,476	3,112	3,272	3,251	3,241	-1.7	-.3	-1.5
HISTORY AND PHILOSOPHY OF SCIENCE	303	322	300	265	280	248	256	-3.3	3.2	-2.4
LINGUISTICS	2,653	2,744	2,855	2,948	2,883	3,035	2,782	2.2	-8.3	.7
POLITICAL SCIENCE	26,374	26,402	27,703	31,095	31,532	31,017	29,613	2.7	-4.5	1.7
SOCIOLOGY	9,872	9,686	9,259	8,583	8,412	8,147	7,634	-3.2	-6.3	-3.6
SOCIOLOGY/ANTHROPOLOGY	1,556	1,239	1,209	1,100	1,078	1,028	1,065	-6.7	3.6	-5.3
SOCIAL SCIENCES, N.E.C.	20,612	20,700	22,751	24,892	23,940	22,734	22,430	1.6	-1.3	1.2

1/ DATA FOR 1978 ARE AVAILABLE FOR DOCTORATE-GRANTING INSTITUTIONS ONLY.
* LESS THAN 0.05 PERCENT CHANGE
SOURCE: NATIONAL SCIENCE FOUNDATION

TABLE B-15. — SCIENCE/ENGINEERING GRADUATE STUDENTS
IN DOCTORATE-GRANTING INSTITUTIONS BY FIELD: 1975-82

FIELD	NUMBER								AVERAGE ANNUAL PERCENT CHANGE		
	1975	1976	1977	1978	1979	1980	1981	1982	1975-81	1981-82	1975-82
TOTAL, ALL FIELDS	293,754	298,159	306,569	309,835	320,580	333,881	340,180	347,414	2.5	2.1	2.4
ENGINEERING	64,579	64,091	65,664	65,692	68,673	72,038	76,746	80,462	2.9	4.8	3.2
AEROSPACE	1,636	1,449	1,496	1,450	1,476	1,730	1,876	1,933	2.3	3.0	2.4
AGRICULTURAL	588	639	709	742	740	742	802	875	5.3	9.1	5.8
BIOMEDICAL	904	928	870	936	1,006	963	1,012	1,064	1.9	5.1	2.4
CHEMICAL	4,916	5,070	5,071	5,184	5,420	5,888	6,292	6,952	4.2	10.5	5.1
CIVIL	11,924	11,172	11,839	11,991	12,404	12,728	13,494	13,735	2.1	1.8	2.0
ELECTRICAL	15,607	15,211	16,356	16,478	16,818	18,162	18,938	20,609	3.3	8.8	4.1
ENGINEERING SCIENCE	1,700	1,770	1,707	1,815	1,619	1,756	1,868	1,996	1.6	6.9	2.3
INDUSTRIAL	10,963	11,077	10,690	10,143	11,384	10,729	11,199	10,901	.4	-2.7	-.1
MECHANICAL	8,093	7,929	8,193	8,181	8,640	9,242	10,008	10,861	3.6	8.5	4.3
METALLURGICAL/MATERIALS	2,312	2,332	2,490	2,487	2,656	2,839	3,047	3,030	4.7	-.6	3.9
MINING	403	504	445	410	383	406	444	424	1.6	-4.5	.7
NUCLEAR	1,611	1,588	1,472	1,391	1,314	1,241	1,283	1,301	-3.7	1.4	-3.0
PETROLEUM	302	376	379	427	423	500	518	580	9.4	12.0	9.8
ENGINEERING, N.E.C.	3,620	4,046	3,947	4,057	4,390	5,112	5,965	6,201	8.7	4.0	8.0
PHYSICAL SCIENCES	24,529	24,813	24,809	24,703	24,907	25,398	25,783	26,518	.8	2.9	1.1
ASTRONOMY	711	681	644	618	638	628	597	632	-2.9	5.9	-1.7
CHEMISTRY	14,060	14,404	14,603	14,802	14,886	15,110	15,250	15,794	1.4	3.6	1.7
PHYSICS	9,644	9,639	9,471	9,195	9,316	9,579	9,861	10,021	.4	1.6	.5
PHYSICAL SCIENCES, N.E.C.	114	89	91	88	67	81	75	71	-6.7	-5.3	-6.5
ENVIRONMENTAL SCIENCES	10,961	11,522	12,039	11,972	12,312	12,481	12,751	13,469	2.6	5.6	3.0
ATMOSPHERIC SCIENCES	937	930	919	907	880	904	905	922	-.6	1.9	-.2
GEOSCIENCES	6,754	7,150	7,414	7,540	7,878	8,023	8,191	8,948	3.3	9.2	4.1
OCEANOGRAPHY	1,710	1,738	1,913	1,833	1,829	1,847	1,933	1,934	2.1	.1	1.8
ENVIRONMENTAL SCIENCES, N.E.C.	1,560	1,704	1,793	1,692	1,725	1,707	1,722	1,665	1.7	-3.3	.9
MATHEMATICAL/COMPUTER SCIENCES	21,343	21,667	21,071	21,474	22,622	24,981	27,108	30,428	4.1	12.2	5.2
COMPUTER SCIENCE	6,952	7,321	7,585	8,628	9,914	11,772	13,575	16,171	11.8	19.1	12.8
MATHEMATICS AND APPLIED MATHEMATICS	12,595	12,513	11,690	11,111	10,960	11,331	11,685	12,352	-1.2	5.7	-.3
STATISTICS	1,796	1,833	1,796	1,735	1,748	1,878	1,848	1,905	.5	3.1	.8
LIFE SCIENCES	73,601	77,338	83,584	86,064	87,612	90,831	91,087	91,344	3.6	.3	3.1
AGRICULTURAL SCIENCES	10,072	10,611	10,955	11,088	11,293	11,665	11,431	11,794	2.1	3.2	2.3
BIOLOGICAL SCIENCES	40,940	41,845	43,031	42,990	42,465	42,519	41,848	41,985	.4	.3	.4
ANATOMY	1,120	1,163	1,198	1,171	1,164	1,112	1,102	1,113	-.3	1.0	-.1
BIOCHEMISTRY	3,719	3,741	3,824	3,980	3,919	[illegible]	3,953	4,065	1.0	2.8	1.3
BIOLOGY	11,699	11,982	11,841	11,325	11,065	10,994	10,365	10,042	-2.0	-3.1	-2.2
BIOMETRY/EPIDEMIOLOGY	871	884	1,070	1,147	1,133	1,265	1,188	1,172	5.3	-1.3	4.3
BIOPHYSICS	698	594	570	525	525	485	463	442	-6.6	-4.5	-6.3
BOTANY	3,428	3,682	3,794	3,716	3,544	3,529	3,428	3,569	.0	4.1	.6
CELL BIOLOGY	651	611	671	700	748	841	903	1,055	5.6	16.8	7.1
ECOLOGY	789	885	1,020	1,090	954	1,080	1,003	970	4.1	-3.3	3.0
ENTOMOLOGY/PARASITOLOGY	1,574	1,595	1,602	1,683	1,697	1,722	1,664	1,540	.9	-7.5	-.3
GENETICS	814	832	954	939	902	896	872	921	1.2	5.6	1.8
MICROBIOLOGY	3,987	4,106	4,250	4,134	4,003	4,022	3,927	4,142	-.3	5.5	.5
NUTRITION	2,726	3,014	3,595	3,730	3,676	3,819	4,093	4,081	7.0	-.3	5.9
PATHOLOGY	1,268	1,349	1,415	1,448	1,520	1,494	1,494	1,496	2.8	.1	2.4
PHARMACOLOGY	1,602	1,705	1,790	1,896	1,996	2,005	2,010	2,079	3.9	3.4	3.8
PHYSIOLOGY	2,238	2,152	2,045	2,158	2,186	2,097	2,136	2,061	-.8	-3.5	-1.2
ZOOLOGY	3,493	3,244	3,025	2,981	2,863	2,650	2,604	2,490	-4.8	-4.4	-4.7
BIOSCIENCES, N.E.C.	263	306	367	267	568	593	643	747	16.1	16.2	16.1
HEALTH SCIENCES	22,589	24,882	29,598	31,986	33,854	36,647	37,808	37,565	9.0	-.6	7.5
ANESTHESIOLOGY	55	8	5	10	20	17	20	41	-15.5	105.0	-4.1
CANCER/ONCOLOGY	59	47	51	49	47	46	46	57	-4.1	23.9	-.5
CARDIOLOGY	23	2	5	3	3	17	3	3	-28.8	.0	-25.2
DENTISTRY	1,074	1,033	1,121	1,146	1,186	1,133	1,072	930	*	-13.2	-2.0
ENDOCRINOLOGY	42	36	37	34	49	53	51	54	3.3	5.9	3.7
GASTROENTEROLOGY	15	8	8	5	0	0	4	7	-19.8	75.0	-10.3
HEMATOLOGY	3	4	18	17	20	16	9	7	20.1	-22.2	12.9
NEUROLOGY	322	300	316	337	333	336	290	318	-1.7	9.7	-.2
NURSING	4,769	6,622	9,987	10,844	11,601	12,790	14,071	14,468	19.8	2.8	17.2
OBSTETRICS/GYNECOLOGY	53	59	27	36	36	6	13	24	-20.9	84.6	-10.7
OPHTHALMOLOGY	30	13	16	3	6	16	22	22	-5.0	.0	-4.3
OTORHINOLARYNGOLOGY	54	68	57	46	26	18	15	17	-19.2	13.3	-15.2
PEDIATRICS	183	215	152	137	131	138	149	154	-3.4	3.4	-2.4
PHARMACEUTICAL SCIENCES	2,245	2,217	2,487	2,509	2,458	2,470	2,590	2,528	2.4	-2.4	1.7
PREVENTIVE MEDICINE/ COMMUNITY HEALTH	3,774	4,412	4,543	5,510	6,299	7,013	7,099	6,656	11.1	-6.2	8.4
PSYCHIATRY	176	147	150	140	133	63	106	129	-8.1	21.7	-4.3
PULMONARY DISEASE	7	0	3	10	1	15	9	14	4.3	55.6	10.4
RADIOLOGY	377	285	310	246	283	283	277	295	-5.0	6.5	-3.4
SPEECH PATHOLOGY/AUDIOLOGY	6,313	6,294	6,522	6,812	6,563	6,868	6,645	6,775	.9	2.0	1.0
SURGERY	153	153	129	121	79	103	102	115	-6.6	6.5	-4.0
VETERINARY SCIENCES	460	803	541	531	561	496	462	458	.1	-.9	-.1
CLINICAL MEDICINE, N.E.C.	272	240	314	294	253	406	380	424	5.7	11.6	6.5
HEALTH RELATED, N.E.C.	2,120	2,359	2,799	3,156	3,666	4,304	4,367	4,069	12.7	-6.8	9.7
PSYCHOLOGY	26,923	28,048	28,027	27,891	27,950	29,403	29,053	29,073	1.3	.1	1.1
SOCIAL SCIENCES	71,818	70,680	71,375	72,039	76,504	78,749	77,652	76,120	1.3	-2.0	.8
AGRICULTURAL ECONOMICS	2,090	2,135	2,177	2,204	2,176	2,295	2,231	2,183	1.1	-2.2	.6
ANTHROPOLOGY	6,226	6,206	6,188	5,893	5,911	5,923	5,805	5,688	-1.2	-2.0	-1.3
ECONOMICS (EXCEPT AGRICULTURAL)	11,035	10,996	11,128	11,247	11,313	12,270	12,407	12,744	2.0	2.7	2.1
GEOGRAPHY	2,958	3,086	2,899	2,851	2,650	2,791	2,800	2,773	-.9	-1.0	-.9
HISTORY AND PHILOSOPHY OF SCIENCE	303	322	300	281	265	280	248	256	-3.3	3.2	-2.4
LINGUISTICS	2,363	2,437	2,282	2,197	2,811	2,748	2,906	2,653	3.5	-8.7	1.7
POLITICAL SCIENCE	20,595	20,132	20,290	20,903	23,816	24,646	24,232	23,462	2.7	-3.2	1.9
SOCIOLOGY	8,817	8,635	8,168	7,450	7,626	7,637	7,378	6,969	-2.9	-5.5	-3.3
SOCIOLOGY/ANTHROPOLOGY	1,410	1,107	1,077	1,008	1,002	967	939	974	-6.6	3.7	-5.1
SOCIAL SCIENCES, N.E.C.	16,021	15,624	16,896	18,005	18,924	19,192	18,706	18,418	2.6	-1.5	2.0

* LESS THAN 0.05 PERCENT CHANGE
SOURCE: NATIONAL SCIENCE FOUNDATION

TABLE B-16. — FULL-TIME SCIENCE/ENGINEERING GRADUATE STUDENTS IN DOCTORATE-GRANTING INSTITUTIONS BY AREA AND SOURCE OF MAJOR SUPPORT: 1975-82

AREA AND SOURCE OF MAJOR SUPPORT	NUMBER								AVERAGE ANNUAL PERCENT CHANGE		
	1975	1976	1977	1978	1979	1980	1981	1982	1975-81	1981-82	1975-82
TOTAL, ALL AREAS:											
TOTAL, ALL SOURCES	210,321	214,089	217,453	216,608	223,409	230,686	234,371	237,676	1.8	1.4	1.8
FEDERAL, TOTAL	48,249	48,594	50,378	51,269	52,871	52,955	50,905	47,485	.9	-6.7	-.2
DEPT OF DEFENSE	5,084	4,798	4,993	0	4,998	5,239	5,647	5,954	1.8	5.4	2.3
DEPT OF HHS, TOTAL	20,869	20,366	21,081	21,756	22,649	19,389	18,025	16,178	-2.4	-10.2	-3.6
NIH	12,214	11,360	10,928	10,876	11,660	11,572	11,290	10,994	-1.3	-2.6	-1.5
OTHER HHS	8,655	9,006	10,153	10,880	10,989	7,817	6,735	5,184	-4.1	-23.0	-7.1
NSF	8,796	8,962	9,023	9,009	9,275	9,245	9,085	9,219	.5	1.5	.7
ALL OTHER FEDERAL	13,500	14,468	15,281	20,504	15,949	19,082	18,148	16,134	5.1	-11.1	2.6
INSTITUTIONAL SUPPORT	77,083	79,217	80,404	79,727	82,813	86,742	90,294	93,478	2.7	3.5	2.8
OTHER OUTSIDE SUPPORT, TOTAL	16,852	17,680	18,229	19,265	20,039	21,114	22,434	23,796	4.9	6.1	5.1
ALL OTHER U.S.	11,440	11,373	11,323	19,265	12,493	13,084	13,866	14,959	3.3	7.9	3.9
FOREIGN	5,412	6,307	6,906	0	7,546	8,030	8,568	8,837	8.0	3.1	7.3
SELF-SUPPORT	68,137	68,598	68,442	66,347	67,686	69,875	70,738	72,917	.6	3.1	1.0
ENGINEERING:											
TOTAL, ALL SOURCES	37,083	36,434	37,008	37,390	39,700	42,300	45,203	49,106	3.4	8.6	4.1
FEDERAL, TOTAL	10,258	10,536	10,701	10,611	10,871	11,219	11,037	11,100	1.2	.6	1.1
DEPT OF DEFENSE	2,869	2,664	2,804	0	2,665	2,934	3,149	3,429	1.6	8.9	2.6
DEPT OF HHS, TOTAL	994	1,011	942	1,005	1,044	662	546	501	-9.5	-8.2	-9.3
NIH	717	686	553	548	513	508	447	403	-7.6	-9.8	-7.9
OTHER HHS	277	325	389	457	531	154	99	98	-15.8	-1.0	-13.8
NSF	2,575	2,566	2,509	2,342	2,413	2,411	2,369	2,571	-1.4	8.5	*
ALL OTHER FEDERAL	3,820	4,295	4,446	7,264	4,749	5,212	4,973	4,599	4.5	-7.5	2.7
INSTITUTIONAL SUPPORT	10,265	10,465	10,568	10,648	11,581	12,691	14,158	15,196	5.5	7.3	5.8
OTHER OUTSIDE SUPPORT, TOTAL	4,520	4,868	5,171	5,360	5,657	6,223	6,957	7,714	7.5	10.9	7.9
ALL OTHER U.S.	3,034	3,141	3,242	5,360	3,724	4,197	4,788	5,279	7.9	10.3	8.2
FOREIGN	1,486	1,727	1,929	0	1,933	2,026	2,169	2,435	6.5	12.3	7.3
SELF-SUPPORT	12,040	10,565	10,568	10,771	11,591	12,167	13,051	15,096	1.4	15.7	3.3
PHYSICAL SCIENCES:											
TOTAL, ALL SOURCES	21,274	21,582	21,741	21,485	21,781	22,259	22,603	23,365	1.0	3.4	1.3
FEDERAL, TOTAL	6,208	6,363	6,572	6,939	7,411	7,655	7,898	7,656	4.1	-3.1	3.0
DEPT OF DEFENSE	537	492	550	0	640	661	753	707	5.8	-6.1	4.0
DEPT OF HHS, TOTAL	1,276	1,354	1,329	1,407	1,584	1,627	1,515	1,490	2.9	-1.7	2.2
NIH	1,206	1,243	1,187	1,276	1,413	1,536	1,408	1,408	2.6	.0	2.2
OTHER HHS	70	111	142	131	171	91	107	82	7.3	-23.4	2.3
NSF	2,604	2,756	2,761	2,817	2,956	2,878	3,029	3,107	2.6	2.6	2.6
ALL OTHER FEDERAL	1,791	1,761	1,932	2,715	2,231	2,489	2,601	2,352	6.4	-9.6	4.0
INSTITUTIONAL SUPPORT	12,037	12,199	12,219	11,773	11,472	11,930	11,923	12,596	-.2	5.6	.7
OTHER OUTSIDE SUPPORT, TOTAL	1,185	1,327	1,346	1,348	1,478	1,308	1,418	1,744	3.0	23.0	5.7
ALL OTHER U.S.	909	949	953	1,348	1,084	949	1,053	1,299	2.5	23.4	5.2
FOREIGN	276	378	393	0	394	359	365	445	4.8	21.9	7.1
SELF-SUPPORT	1,844	1,693	1,604	1,425	1,420	1,366	1,364	1,369	-4.9	.4	-4.2
ENVIRONMENTAL SCIENCES:											
TOTAL, ALL SOURCES	8,989	9,528	9,847	9,830	10,037	10,112	10,332	10,747	2.3	4.0	2.6
FEDERAL, TOTAL	2,693	2,884	3,025	3,127	3,453	3,360	2,949	2,804	1.5	-4.9	.6
DEPT OF DEFENSE	373	363	330	0	328	296	307	299	-3.2	-2.6	-3.1
DEPT OF HHS, TOTAL	113	161	233	278	283	115	96	73	-2.7	-24.0	-6.1
NIH	30	34	49	31	31	31	17	38	-9.0	123.5	3.4
OTHER HHS	83	127	184	247	252	84	79	35	-.8	-55.7	-11.6
NSF	1,144	1,195	1,198	1,243	1,273	1,242	1,196	1,187	.7	-.8	.5
ALL OTHER FEDERAL	1,063	1,165	1,264	1,606	1,569	1,707	1,350	1,245	4.1	-7.8	2.3
INSTITUTIONAL SUPPORT	3,239	3,447	3,552	3,450	3,463	3,586	3,865	4,070	3.0	5.3	3.3
OTHER OUTSIDE SUPPORT, TOTAL	741	732	750	838	821	996	1,080	1,167	6.5	8.1	6.7
ALL OTHER U.S.	479	423	409	838	507	649	706	794	6.7	12.5	7.5
FOREIGN	262	309	341	0	314	347	374	373	6.1	-.3	5.2
SELF-SUPPORT	2,316	2,465	2,520	2,415	2,300	2,170	2,438	2,706	.9	11.0	2.2
MATHEMATICAL/COMPUTER SCIENCES:											
TOTAL, ALL SOURCES	14,125	14,525	13,975	13,690	14,177	15,253	16,136	18,181	2.2	12.7	3.7
FEDERAL, TOTAL	1,436	1,422	1,434	1,468	1,627	1,717	1,725	1,866	3.1	8.2	3.8
DEPT OF DEFENSE	574	583	516	0	606	621	733	816	4.2	11.3	5.2
DEPT OF HHS, TOTAL	168	151	142	160	141	122	84	85	-10.9	1.2	-9.3
NIH	131	131	122	118	102	100	71	67	-9.7	-5.6	-9.1
OTHER HHS	37	20	20	42	39	22	13	18	-16.0	38.5	-9.8
NSF	498	480	542	537	584	593	603	615	3.2	2.0	3.1
ALL OTHER FEDERAL	196	208	234	771	294	381	305	350	7.6	14.8	8.6
INSTITUTIONAL SUPPORT	8,155	8,300	8,032	7,914	7,937	8,298	8,770	9,424	1.2	7.5	2.1
OTHER OUTSIDE SUPPORT, TOTAL	801	842	822	844	1,041	1,117	1,124	1,206	5.8	7.3	6.0
ALL OTHER U.S.	396	395	419	844	593	647	619	684	7.7	10.5	8.1
FOREIGN	405	447	403	0	448	470	505	522	3.7	3.4	3.7
SELF-SUPPORT	3,733	3,961	3,687	3,464	3,572	4,121	4,517	5,685	3.2	25.9	6.2

CONTINUED ON NEXT PAGE.

TABLE B-16. -- FULL-TIME SCIENCE/ENGINEERING ATE STUDENTS IN DOCTORATE-GRANTING INSTITUTIONS
BY AREA AND SOURCE AJOR SUPPORT: 1975-82

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AREA AND SOURCE OF MAJOR SUPPORT	NUMBER								AVERAGE ANNUAL PERCENT CHANGE		
	1975	1976	1977	1978	1979	1980	1981	1982	1975-81	1981-82	1975-82
AGRICULTURAL SCIENCES: TOTAL, ALL SOURCES	8,512	9,053	9,315	9,259	9,383	9,660	9,696	9,675	2.2	-0.2	1.8
FEDERAL, TOTAL	1,637	1,625	1,670	1,756	1,752	1,786	1,712	1,668	.7	-2.6	.3
DEPT OF DEFENSE	15	22	15	0	16	11	11	9	-5.0	-18.2	-7.0
DEPT OF HHS, TOTAL	103	83	69	85	104	124	59	38	-8.9	-35.6	-13.3
NIH	75	58	50	43	69	110	53	33	-5.6	-37.7	-11.1
OTHER HHS	28	25	19	42	35	14	6	5	-22.6	-16.7	-21.8
NSF	133	105	75	86	74	82	70	71	-10.1	1.4	-8.6
ALL OTHER FEDERAL	1,386	1,415	1,511	1,585	1,558	1,569	1,572	1,550	2.1	-1.4	1.6
INSTITUTIONAL SUPPORT	2,825	3,104	3,166	3,203	3,419	3,380	3,462	3,503	3.4	1.2	3.1
OTHER OUTSIDE SUPPORT, TOTAL	1,618	1,767	1,826	1,796	1,805	2,047	2,143	2,049	4.8	-4.4	3.4
ALL OTHER U.S.	810	799	875	1,796	800	924	948	888	2.7	-6.3	1.3
FOREIGN	808	968	951	0	1,005	1,123	1,195	1,161	6.7	-2.8	5.3
SELF-SUPPORT	2,432	2,557	2,653	2,504	2,407	2,447	2,379	2,455	-.4	3.2	.1
BIOLOGICAL SCIENCES: TOTAL, ALL SOURCES	34,795	35,438	36,021	35,764	35,641	35,620	35,259	35,212	.2	-.1	.2
FEDERAL, TOTAL	9,951	9,771	9,926	10,125	10,780	10,670	10,455	10,094	.8	-3.5	.2
DEPT OF DEFENSE	143	145	133	0	120	161	116	120	-3.4	3.4	-2.5
DEPT OF HHS, TOTAL	7,314	6,779	6,885	7,045	7,546	7,198	7,171	6,987	-.3	-2.6	-.7
NIH	6,716	6,270	6,425	6,524	6,979	6,803	6,787	6,669	.2	-1.7	-.1
OTHER HHS	598	509	460	521	567	395	384	318	-7.1	-17.2	-8.6
NSF	921	1,040	1,130	1,193	1,137	1,167	1,086	1,070	2.8	-1.5	2.2
ALL OTHER FEDERAL	1,573	1,807	1,778	1,887	1,977	2,144	2,082	1,917	4.8	-7.9	2.9
INSTITUTIONAL SUPPORT	13,922	14,525	15,091	14,827	14,959	15,484	15,608	15,768	1.9	1.0	1.8
OTHER OUTSIDE SUPPORT, TOTAL	2,285	2,519	2,518	2,741	2,871	2,725	2,743	3,061	3.1	11.6	4.3
ALL OTHER U.S.	1,651	1,745	1,655	2,741	1,782	1,744	1,677	1,986	.3	18.4	2.7
FOREIGN	634	774	863	0	1,089	981	1,066	1,075	9.0	.8	7.8
SELF-SUPPORT	8,637	8,623	8,486	8,071	7,031	6,741	6,453	6,289	-4.7	-2.5	-4.4
HEALTH SCIENCES: TOTAL, ALL SOURCES	16,328	17,519	19,122	20,288	21,549	22,571	22,397	21,207	5.4	-5.3	3.8
FEDERAL, TOTAL	6,000	6,374	7,375	7,742	8,080	8,245	7,722	6,221	4.3	-19.4	.5
DEPT OF DEFENSE	143	134	195	0	170	165	183	193	4.2	5.5	4.4
DEPT OF HHS, TOTAL	5,270	5,629	6,442	6,742	7,170	6,184	5,622	4,779	1.1	-15.0	-1.4
NIH	1,244	1,096	918	909	935	925	1,103	1,284	-2.0	16.4	.5
OTHER HHS	4,026	4,533	5,524	5,833	6,235	5,259	4,519	3,495	1.9	-22.7	-2.0
NSF	32	44	47	57	50	49	36	41	2.0	13.9	3.6
ALL OTHER FEDERAL	555	567	701	943	690	1,847	1,881	1,208	22.6	-35.8	11.8
INSTITUTIONAL SUPPORT	3,290	3,299	3,511	3,612	4,058	4,533	4,395	4,703	4.9	7.0	5.2
OTHER OUTSIDE SUPPORT, TOTAL	873	922	1,008	1,166	1,242	1,210	1,266	1,298	6.4	2.5	5.8
ALL OTHER U.S.	603	631	650	1,166	759	725	821	848	5.3	3.3	5.0
FOREIGN	270	291	358	0	483	485	445	450	8.7	1.1	7.6
SELF-SUPPORT	6,165	6,924	7,228	7	8,169	8,583	9,014	8,985	6.5	-.3	5.5
PSYCHOLOGY: TOTAL, ALL SOURCES	19,710	21,453	21,239	20,693	20,718	21,572	21,535	21,144	1.5	-1.8	1.0
FEDERAL, TOTAL	4,324	4,073	3,931	3,931	3,436	3,185	2,893	2,289	-6.5	-20.9	-8.7
DEPT OF DEFENSE	134	140	157	0	150	127	139	114	.6	-18.0	-2.3
DEPT OF HHS, TOTAL	3,130	2,973	2,822	2,906	2,481	1,870	1,632	1,305	-10.3	-20.0	-11.7
NIH	1,426	1,267	1,177	1,083	1,075	1,009	898	725	-7.4	-19.3	-9.2
OTHER HHS	1,704	1,706	1,645	1,823	1,406	861	734	580	-13.1	-21.0	-14.3
NSF	270	212	226	222	254	280	243	207	-1.7	-14.8	-3.7
ALL OTHER FEDERAL	790	748	726	803	551	908	879	663	1.8	-24.6	-2.5
INSTITUTIONAL SUPPORT	6,956	7,345	7,501	7,435	7,452	7,853	8,601	8,601	3.6	.0	3.1
OTHER OUTSIDE SUPPORT, TOTAL	1,186	1,274	1,292	1,602	1,351	1,437	1,505	1,379	4.0	-8.4	2.2
ALL OTHER U.S.	1,104	1,190	1,186	1,602	1,238	1,321	1,430	1,306	4.4	-8.7	2.4
FOREIGN	82	84	106	0	113	116	75	73	-1.5	-2.7	-1.6
SELF-SUPPORT	7,244	8,761	8,515	7,725	8,479	9,097	8,536	8,875	2.8	4.0	2.9
SOCIAL SCIENCES: TOTAL, ALL SOURCES	49,505	48,557	49,185	48,209	50,423	51,339	51,210	49,039	.6	-4.2	-.1
FEDERAL, TOTAL	5,742	5,546	5,744	5,570	5,461	5,118	4,514	3,787	-3.9	-16.1	-5.8
DEPT OF DEFENSE	296	255	303	0	301	263	256	267	-2.4	4.3	-1.5
DEPT OF HHS, TOTAL	2,501	2,225	2,217	2,128	2,296	1,487	1,300	920	-10.3	-29.2	-13.3
NIH	669	575	447	344	543	550	506	367	-4.5	-27.5	-8.2
OTHER HHS	1,832	1,650	1,770	1,784	1,753	937	794	553	-13.0	-30.4	-15.7
NSF	619	564	535	512	534	543	453	350	-5.1	-22.7	-7.8
ALL OTHER FEDERAL	2,326	2,502	2,689	2,930	2,330	2,825	2,505	2,250	1.2	-10.2	-.5
INSTITUTIONAL SUPPORT	16,394	16,533	16,764	16,865	18,472	18,987	19,512	19,617	2.9	.5	2.6
OTHER OUTSIDE SUPPORT, TOTAL	3,643	3,429	3,496	3,570	3,773	4,051	4,198	4,178	2.4	-.5	2.0
ALL OTHER U.S.	2,454	2,100	1,934	3,570	2,006	1,928	1,824	1,875	-4.8	2.8	-3.8
FOREIGN	1,189	1,329	1,562	0	1,767	2,123	2,374	2,303	12.2	-3.0	9.9
SELF-SUPPORT	23,726	23,049	23,181	22,204	22,717	23,183	22,986	21,457	-.5	-6.7	-1.4

* LESS THAN 0.05 PERCENT CHANGE
SOURCE: NATIONAL SCIENCE FOUNDATION

TABLE B-17. — FULL-TIME SCIENCE/ENGINEERING GRADUATE STUDENTS IN DOCTORATE-GRANTING INSTITUTIONS BY AREA AND TYPE OF MAJOR SUPPORT: 1975-77 AND 1979-82 1/

AREA AND TYPE OF MAJOR SUPPORT	NUMBER							AVERAGE ANNUAL PERCENT CHANGE		
	1975	1976	1977	1979	1980	1981	1982	1975-81	1981-82	1975-82
TOTAL, ALL AREAS:										
TOTAL, ALL TYPES	210,321	214,089	217,453	223,409	230,686	234,371	237,676	1.8	1.4	1.8
FELLOWSHIPS AND TRAINEESHIPS	38,812	37,485	39,203	39,066	38,909	37,679	36,136	-.5	-4.1	-1.0
RESEARCH ASSISTANTSHIPS	40,136	42,717	43,896	48,410	50,815	51,954	52,094	4.4	.3	3.8
TEACHING ASSISTANTSHIPS	47,348	48,312	48,665	49,588	51,862	53,824	56,221	2.2	4.5	2.5
OTHER TYPES OF SUPPORT	84,025	85,575	85,689	86,345	89,100	90,914	93,225	1.3	2.5	1.5
ENGINEERING:										
TOTAL, ALL TYPES	37,083	36,434	37,008	39,700	42,300	45,203	49,106	3.4	8.6	4.1
FELLOWSHIPS AND TRAINEESHIPS	4,652	4,638	4,693	4,413	4,635	5,057	5,445	1.4	7.7	2.3
RESEARCH ASSISTANTSHIPS	10,987	11,352	11,899	12,868	13,971	14,444	14,626	4.7	1.3	4.2
TEACHING ASSISTANTSHIPS	5,399	5,602	5,768	6,535	7,269	8,186	8,989	7.2	9.8	7.6
OTHER TYPES OF SUPPORT	16,045	14,842	14,648	15,884	16,425	17,516	20,046	1.5	14.4	3.2
PHYSICAL SCIENCES:										
TOTAL, ALL TYPES	21,274	21,582	21,741	21,781	22,259	22,603	23,365	1.0	3.4	1.3
FELLOWSHIPS AND TRAINEESHIPS	2,245	2,301	2,472	2,271	2,183	2,237	2,276	-.1	1.7	.2
RESEARCH ASSISTANTSHIPS	6,441	6,784	6,806	7,710	8,260	8,525	8,695	4.8	2.0	4.4
TEACHING ASSISTANTSHIPS	10,185	10,202	10,129	9,572	9,894	9,975	10,388	-.3	4.1	.3
OTHER TYPES OF SUPPORT	2,403	2,295	2,334	2,228	1,922	1,866	2,006	-4.1	7.5	-2.5
ENVIRONMENTAL SCIENCES:										
TOTAL, ALL TYPES	8,989	9,528	9,847	10,037	10,112	10,332	10,747	2.3	4.0	2.6
FELLOWSHIPS AND TRAINEESHIPS	952	1,000	1,179	1,066	1,075	1,069	1,118	2.0	4.6	2.3
RESEARCH ASSISTANTSHIPS	2,838	3,177	3,219	3,505	3,625	3,360	3,258	2.9	-3.0	2.0
TEACHING ASSISTANTSHIPS	2,172	2,239	2,237	2,471	2,544	2,514	2,705	2.5	7.6	3.2
OTHER TYPES OF SUPPORT	3,027	3,112	3,212	2,995	2,868	3,389	3,666	1.9	8.2	2.8
MATHEMATICAL/COMPUTER SCIENCES:										
TOTAL, ALL TYPES	14,125	14,525	13,975	14,177	15,253	16,136	18,181	2.2	12.7	3.7
FELLOWSHIPS AND TRAINEESHIPS	1,321	1,280	1,271	1,358	1,253	1,265	1,240	-.7	-2.0	-.9
RESEARCH ASSISTANTSHIPS	1,375	1,528	1,504	1,615	1,790	1,797	2,017	4.6	12.2	5.6
TEACHING ASSISTANTSHIPS	6,491	6,575	6,345	6,445	6,786	7,287	7,788	1.9	6.9	2.6
OTHER TYPES OF SUPPORT	4,938	5,142	4,855	4,759	5,424	5,787	7,136	2.7	23.3	5.4
AGRICULTURAL SCIENCES:										
TOTAL, ALL TYPES	8,512	9,053	9,315	9,383	9,660	9,696	9,675	2.2	-.2	1.8
FELLOWSHIPS AND TRAINEESHIPS	891	748	808	704	772	814	804	-1.5	-1.2	-1.5
RESEARCH ASSISTANTSHIPS	3,710	3,964	4,074	4,428	4,523	4,660	4,613	3.9	-1.0	3.2
TEACHING ASSISTANTSHIPS	691	783	836	826	892	807	905	2.6	12.1	3.9
OTHER TYPES OF SUPPORT	3,220	3,558	3,597	3,425	3,473	3,415	3,353	1.0	-1.8	.6
BIOLOGICAL SCIENCES:										
TOTAL, ALL TYPES	34,795	35,438	36,021	35,641	35,620	35,259	35,212	.2	-.1	.2
FELLOWSHIPS AND TRAINEESHIPS	8,675	8,023	8,163	8,165	8,094	7,900	7,831	-1.5	-.9	-1.5
RESEARCH ASSISTANTSHIPS	6,787	7,687	7,992	9,208	9,517	9,775	9,819	6.3	.5	5.4
TEACHING ASSISTANTSHIPS	8,827	9,101	9,159	8,850	9,088	9,008	9,143	.3	1.5	.5
OTHER TYPES OF SUPPORT	10,506	10,627	10,707	9,418	8,921	8,576	8,419	-3.3	-1.8	-3.1
HEALTH SCIENCES:										
TOTAL, ALL TYPES	16,328	17,519	19,122	21,549	22,571	22,397	21,207	5.4	-5.3	3.8
FELLOWSHIPS AND TRAINEESHIPS	6,517	6,597	7,628	8,165	8,113	7,775	6,811	3.0	-12.4	.6
RESEARCH ASSISTANTSHIPS	825	952	1,015	1,391	1,473	1,495	1,546	10.4	3.4	9.4
TEACHING ASSISTANTSHIPS	1,695	1,696	1,880	1,923	2,026	1,997	2,106	2.8	5.5	3.2
OTHER TYPES OF SUPPORT	7,291	8,274	8,599	10,070	10,959	11,130	10,744	7.3	-3.5	5.7
PSYCHOLOGY:										
TOTAL, ALL TYPES	19,710	21,453	21,239	20,718	21,572	21,535	21,144	1.5	-1.8	1.0
FELLOWSHIPS AND TRAINEESHIPS	4,476	4,321	4,183	3,600	3,446	3,166	2,927	-5.6	-7.5	-5.9
RESEARCH ASSISTANTSHIPS	2,213	2,248	2,300	2,335	2,336	2,661	2,521	3.1	-5.3	1.9
TEACHING ASSISTANTSHIPS	4,095	4,116	4,213	4,212	4,411	4,594	4,574	1.9	-.4	1.6
OTHER TYPES OF SUPPORT	8,926	10,768	10,543	10,571	11,379	11,114	11,122	3.7	.1	3.2
SOCIAL SCIENCES:										
TOTAL, ALL TYPES	49,505	48,557	49,185	50,423	51,339	51,210	49,039	.6	-4.2	-.1
FELLOWSHIPS AND TRAINEESHIPS	9,083	8,577	8,806	9,324	9,338	8,396	7,684	-1.3	-8.5	-2.4
RESEARCH ASSISTANTSHIPS	4,960	5,025	5,087	5,350	5,320	5,237	4,999	.9	-4.5	.1
TEACHING ASSISTANTSHIPS	7,793	7,998	8,098	8,754	8,952	9,456	9,623	3.3	1.8	3.1
OTHER TYPES OF SUPPORT	27,669	26,957	27,194	26,995	27,729	28,121	26,733	.3	-4.9	-.5

1/ DISTRIBUTION BY TYPE OF MAJOR SUPPORT WAS NOT REQUESTED IN 1978.
SOURCE: NATIONAL SCIENCE FOUNDATION

TABLE B-18. — FULL-TIME SCIENCE/ENGINEERING GRADUATE STUDENTS IN DOCTORATE-GRANTING INSTITUTIONS BY FIELD, LEVEL OF STUDY, CITIZENSHIP, SEX, AND TYPE OF CONTROL: 1982

FIELD	TOTAL	LEVEL OF STUDY		CITIZENSHIP		SEX		TYPE OF CONTROL	
		FIRST YEAR	BEYOND FIRST YEAR	U.S.	FOREIGN	MEN	WOMEN	PUBLIC	PRIVATE
TOTAL, ALL FIELDS	237,676	76,782	160,894	182,233	55,443	157,711	79,965	170,523	67,153
ENGINEERING	49,106	17,796	31,310	28,148	20,958	43,793	5,313	34,077	15,029
AEROSPACE	1,519	531	988	944	575	1,446	73	1,091	428
AGRICULTURAL	739	248	491	398	341	689	50	686	53
BIOMEDICAL	908	342	566	709	199	734	174	529	379
CHEMICAL	5,546	1,839	3,707	3,224	2,322	4,884	662	3,822	1,724
CIVIL	9,513	3,567	5,946	5,541	3,972	8,149	1,364	6,942	2,571
ELECTRICAL	11,293	4,400	6,893	6,269	5,024	10,489	804	7,396	3,897
ENGINEERING SCIENCE	1,339	393	946	873	466	1,208	131	798	541
INDUSTRIAL	3,816	1,378	2,438	2,217	1,599	3,034	782	2,761	1,055
MECHANICAL	7,224	2,713	4,511	3,769	3,455	6,798	426	5,108	2,116
METALLURGICAL/MATERIALS	2,453	644	1,809	1,280	1,173	2,148	305	1,523	930
MINING	351	107	244	234	117	318	33	287	64
NUCLEAR	1,042	331	711	569	473	969	73	815	227
PETROLEUM	470	171	299	214	256	437	33	279	191
ENGINEERING, N.E.C.	2,893	1,132	1,761	1,907	986	2,490	403	2,040	853
PHYSICAL SCIENCES	23,365	5,906	17,459	17,062	6,303	19,158	4,207	16,756	6,609
ASTRONOMY	590	146	444	488	102	496	94	382	208
CHEMISTRY	13,767	3,533	10,234	10,678	3,089	10,580	3,187	10,165	3,602
PHYSICS	8,955	2,212	6,743	5,848	3,107	8,045	910	6,156	2,799
PHYSICAL SCIENCES, N.E.C.	53	15	38	48	5	37	16	53	0
ENVIRONMENTAL SCIENCES	10,747	3,394	7,353	9,174	1,573	8,111	2,636	8,869	1,878
ATMOSPHERIC SCIENCES	805	238	567	618	187	683	122	714	91
GEOSCIENCES	7,219	2,353	4,866	6,321	898	5,495	1,724	5,794	1,425
OCEANOGRAPHY	1,551	378	1,173	1,213	338	1,130	421	1,295	256
ENVIRONMENTAL SCIENCES, N.E.C.	1,172	425	747	1,022	150	803	369	1,066	106
MATHEMATICAL/COMPUTER SCIENCES	18,181	6,338	11,843	11,699	6,482	13,656	4,525	13,320	4,861
COMPUTER SCIENCE	8,168	3,003	5,165	5,354	2,814	6,162	2,006	5,917	2,251
MATHEMATICS AND APPLIED MATHEMATICS	8,451	2,873	5,578	5,528	2,923	6,379	2,072	6,059	2,392
STATISTICS	1,562	462	1,100	817	745	1,115	447	1,344	218
LIFE SCIENCES	66,094	21,118	44,976	56,747	9,347	35,266	30,828	51,228	14,866
AGRICULTURAL SCIENCES	9,675	2,825	6,850	7,381	2,294	7,270	2,405	9,422	253
BIOLOGICAL SCIENCES	35,212	8,961	26,251	30,373	4,839	21,315	13,897	26,090	9,122
ANATOMY	969	226	743	880	89	599	370	603	366
BIOCHEMISTRY	3,802	930	2,872	3,141	661	2,463	1,339	2,580	1,222
BIOLOGY	7,732	2,105	5,627	6,987	745	4,739	2,993	5,140	2,592
BIOMETRY/EPIDEMIOLOGY	923	272	651	772	151	454	469	485	438
BIOPHYSICS	425	104	321	355	70	318	107	235	190
BOTANY	3,118	780	2,338	2,539	579	1,988	1,130	2,866	252
CELL BIOLOGY	1,029	202	827	934	95	650	379	557	472
ECOLOGY	887	179	708	807	80	584	303	839	48
ENTOMOLOGY/PARASITOLOGY	1,340	283	1,057	1,113	227	1,021	319	1,291	49
GENETICS	860	216	644	749	111	426	434	650	210
MICROBIOLOGY	3,641	919	2,722	3,179	462	2,072	1,569	2,713	928
NUTRITION	3,020	927	2,093	2,231	789	1,123	1,897	2,349	671
PATHOLOGY	1,015	244	771	854	161	635	380	686	329
PHARMACOLOGY	1,945	433	1,512	1,701	244	1,270	675	1,324	621
PHYSIOLOGY	1,808	519	1,289	1,620	188	1,205	603	1,226	582
ZOOLOGY	2,137	476	1,661	2,004	133	1,435	702	2,009	128
BIOSCIENCES, N.E.C.	561	146	415	507	54	333	228	537	24
HEALTH SCIENCES	21,207	9,332	11,875	18,993	2,214	6,681	14,526	15,716	5,491
ANESTHESIOLOGY	21	7	14	19	2	8	13	20	1
CANCER/ONCOLOGY	55	11	44	55	0	39	16	55	0
CARDIOLOGY	3	0	3	3	0	2	1	0	3
DENTISTRY	808	297	511	651	157	657	151	567	241
ENDOCRINOLOGY	51	10	41	44	7	20	31	50	1
GASTROENTEROLOGY	7	4	3	7	0	6	1	1	6
HEMATOLOGY	6	3	3	6	0	1	5	6	0
NEUROLOGY	311	57	254	294	17	207	104	171	140
NURSING	6,232	2,919	3,313	6,035	197	349	5,883	4,625	1,607
OBSTETRICS/GYNECOLOGY	20	9	11	10	10	8	12	7	13
OPHTHALMOLOGY	19	2	17	15	4	16	3	15	4
OTORHINOLARYNGOLOGY	16	8	8	16	0	13	3	13	3
PEDIATRICS	144	58	86	125	19	68	76	97	47
PHARMACEUTICAL SCIENCES	1,696	448	1,248	1,114	582	1,188	508	1,448	248
PREVENTIVE MEDICINE/ COMMUNITY HEALTH	4,023	2,192	1,831	3,328	695	1,835	2,188	2,677	1,346
PSYCHIATRY	72	12	60	66	6	38	34	59	13
PULMONARY DISEASE	12	6	6	11	1	9	3	10	2
RADIOLOGY	211	67	144	172	39	157	54	134	77
SPEECH PATHOLOGY/AUDIOLOGY	4,493	1,957	2,536	4,305	188	737	3,756	3,753	740
SURGERY	90	26	64	71	19	78	12	65	25
VETERINARY SCIENCES	368	97	271	276	92	234	134	316	52
CLINICAL MEDICINE, N.E.C.	298	89	209	252	46	177	121	200	98
HEALTH RELATED, N.E.C.	2,251	1,043	1,208	2,118	133	834	1,417	1,427	824
PSYCHOLOGY	21,144	5,502	15,642	20,246	898	9,580	11,564	12,978	8,166
SOCIAL SCIENCES	49,039	16,728	32,311	39,157	9,882	28,147	20,892	33,295	15,744
AGRICULTURAL ECONOMICS	1,928	603	1,325	1,238	690	1,540	388	1,836	92
ANTHROPOLOGY	4,027	896	3,131	3,648	379	1,861	2,166	2,806	1,221
ECONOMICS (EXCEPT AGRICULTURAL)	9,151	2,925	6,226	5,761	3,390	6,979	2,172	5,918	3,233
GEOGRAPHY	2,035	662	1,373	1,654	381	1,422	613	1,837	198
HISTORY AND PHILOSOPHY OF SCIENCE	223	53	170	188	35	149	74	122	101
LINGUISTICS	2,127	648	1,479	1,419	708	939	1,188	1,495	632
POLITICAL SCIENCE	12,086	4,619	7,467	9,739	2,347	8,093	3,993	6,827	5,259
SOCIOLOGY	4,820	1,203	3,617	3,840	980	2,334	2,486	3,374	1,446
SOCIOLOGY/ANTHROPOLOGY	602	200	402	475	127	298	304	424	178
SOCIAL SCIENCES, N.E.C.	12,040	4,919	7,121	11,195	845	4,532	7,508	8,656	3,384

SOURCE: NATIONAL SCIENCE FOUNDATION

TABLE B-19. — FULL-TIME SCIENCE/ENGINEERING GRADUATE STUDENTS IN DOCTORATE-GRANTING INSTITUTIONS BY FIELD, CITIZENSHIP, AND RACIAL/ETHNIC BACKGROUND: 1982

FIELD	TOTAL	U.S. CITIZENS: BLACK NON-HISPANIC	AMERICAN INDIAN/ ALASKAN NATIVE	ASIAN/ PACIFIC ISLANDER	HISPANIC	WHITE NON-HISPANIC	OTHER OR UNKNOWN	FOREIGN
TOTAL, ALL FIELDS	287,676	5,968	625	5,246	5,062	148,350	16,982	95,443
ENGINEERING	49,106	500	72	1,345	580	21,306	4,345	20,958
AEROSPACE	1,519	9	0	30	19	658	228	575
AGRICULTURAL	739	5	0	11	7	372	3	341
BIOMEDICAL	908	12	1	25	11	656	4	199
CHEMICAL	5,546	60	9	211	61	2,617	266	2,322
CIVIL	9,513	72	5	200	125	4,379	760	3,972
ELECTRICAL	11,293	135	34	342	128	4,543	1,077	5,024
ENGINEERING SCIENCE	1,339	11	1	29	10	999	223	464
INDUSTRIAL	3,816	70	3	110	87	1,703	244	1,099
MECHANICAL	7,224	56	3	171	64	2,502	973	3,495
METALLURGICAL/MATERIALS	2,453	16	1	64	21	1,118	60	1,173
MINING	351	2	0	14	6	184	28	117
NUCLEAR	1,042	12	1	23	10	800	23	473
PETROLEUM	470	4	0	9	1	196	4	256
ENGINEERING, N.E.C.	2,893	36	14	106	30	1,279	452	986
PHYSICAL SCIENCES	22,365	339	29	503	376	14,437	1,378	6,303
ASTRONOMY	990	6	2	1	5	464	20	102
CHEMISTRY	13,767	256	17	345	271	8,879	910	3,089
PHYSICS	8,955	77	10	154	99	5,061	447	3,107
PHYSICAL SCIENCES, N.E.C.	53	0	0	3	1	43	1	5
ENVIRONMENTAL SCIENCES	10,747	97	15	124	110	7,954	914	1,573
ATMOSPHERIC SCIENCES	806	3	0	12	5	587	11	187
GEOSCIENCES	7,219	37	11	76	43	5,484	670	898
OCEANOGRAPHY	1,551	9	1	29	60	1,008	106	338
ENVIRONMENTAL SCIENCES, N.E.C.	1,172	8	3	7	2	875	127	150
MATHEMATICAL/COMPUTER SCIENCES	18,181	253	30	557	290	9,101	1,508	6,482
COMPUTER SCIENCE	8,168	110	16	283	88	3,972	885	2,814
MATHEMATICS AND APPLIED MATHEMATICS	8,451	127	10	253	190	4,374	614	2,923
STATISTICS	1,562	16	4	21	12	755	9	745
LIFE SCIENCES	66,094	1,431	171	1,567	1,253	48,760	3,565	9,347
AGRICULTURAL SCIENCES	9,675	108	11	114	159	6,402	587	2,294
BIOLOGICAL SCIENCES	35,212	636	59	875	580	26,434	1,789	4,839
ANATOMY	969	17	1	17	13	778	64	89
BIOCHEMISTRY	3,802	62	6	114	61	2,802	96	661
BIOLOGY	7,732	171	16	173	242	5,953	432	745
BIOMETRY/EPIDEMIOLOGY	923	37	6	30	7	692	0	151
BIOPHYSICS	425	4	0	13	3	334	1	70
BOTANY	3,118	26	3	50	32	2,256	172	579
CELL BIOLOGY	1,029	10	4	31	8	859	22	95
ECOLOGY	887	4	0	8	8	644	143	80
ENTOMOLOGY/PARASITOLOGY	1,340	12	0	22	18	950	111	227
GENETICS	860	24	1	33	13	669	9	111
MICROBIOLOGY	3,641	61	5	100	49	2,718	246	462
NUTRITION	3,020	54	3	79	39	1,893	163	789
PATHOLOGY	1,015	17	2	35	12	770	18	161
PHARMACOLOGY	1,945	30	4	59	28	1,501	79	244
PHYSIOLOGY	1,808	36	5	41	22	1,485	31	188
ZOOLOGY	2,137	47	3	42	19	1,758	135	133
BIOSCIENCES, N.E.C.	561	24	0	28	6	272	77	54
HEALTH SCIENCES	21,207	687	101	578	514	15,924	1,189	2,214
ANESTHESIOLOGY	21	0	0	0	0	16	3	2
CANCER/ONCOLOGY	55	1	0	1	1	52	0	0
CARDIOLOGY	3	0	0	0	0	0	3	0
DENTISTRY	808	8	4	11	14	587	27	157
ENDOCRINOLOGY	51	4	0	1	1	37	1	7
GASTROENTEROLOGY	7	1	0	1	0	2	3	0
HEMATOLOGY	6	0	0	0	0	6	0	0
NEUROLOGY	311	1	0	12	2	256	23	17
NURSING	6,232	188	19	112	95	5,167	494	157
OBSTETRICS/GYNECOLOGY	20	2	0	1	0	7	0	10
OPHTHALMOLOGY	19	0	0	1	0	4	10	4
OTORHINOLARYNGOLOGY	16	0	0	0	0	16	0	0
PEDIATRICS	144	11	1	5	2	105	1	19
PHARMACEUTICAL SCIENCES	1,696	29	2	66	15	979	23	582
PREVENTIVE MEDICINE/ COMMUNITY HEALTH	4,023	169	39	219	229	2,967	105	695
PSYCHIATRY	72	8	0	3	6	42	7	6
PULMONARY DISEASE	12	1	0	0	0	8	2	1
RADIOLOGY	211	2	1	10	2	156	1	39
SPEECH PATHOLOGY/AUDIOLOGY	4,493	154	20	72	110	3,543	406	188
SURGERY	90	1	0	0	0	70	0	19
VETERINARY SCIENCES	368	7	0	5	1	263	0	92
CLINICAL MEDICINE, N.E.C.	298	6	2	12	4	224	4	46
HEALTH RELATED, N.E.C.	2,251	94	13	46	72	1,817	76	133
PSYCHOLOGY	21,144	801	53	276	944	15,604	2,568	898
SOCIAL SCIENCES	49,039	2,587	295	874	1,549	31,188	2,704	9,882
AGRICULTURAL ECONOMICS	1,928	37	5	20	39	1,122	15	690
ANTHROPOLOGY	4,027	55	21	43	97	3,106	327	379
ECONOMICS (EXCEPT AGRICULTURAL)	9,151	191	17	238	170	4,735	410	3,390
GEOGRAPHY	2,036	28	3	17	34	1,484	86	381
HISTORY AND PHILOSOPHY OF SCIENCE	223	2	1	1	2	180	2	35
LINGUISTICS	2,127	20	9	32	41	1,129	188	708
POLITICAL SCIENCE	12,086	809	81	169	440	7,280	960	2,347
SOCIOLOGY	4,820	304	30	99	198	3,070	139	980
SOCIOLOGY/ANTHROPOLOGY	602	82	3	5	10	367	8	127
SOCIAL SCIENCES, N.E.C.	12,840	1,059	85	251	518	8,713	569	845

SOURCE: NATIONAL SCIENCE FOUNDATION

appendix c

survey instruments

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FORM APPROVED
OMB No. 3145-0015
Expiration Date: 7/31/84

NATIONAL SCIENCE FOUNDATION
Washington, D.C. 20550

SURVEY OF SCIENTIFIC AND ENGINEERING EXPENDITURES AT UNIVERSITIES AND COLLEGES, FY 1982

Organizations are requested to complete and return this form to:

NATIONAL SCIENCE FOUNDATION
1800 G Street, N.W., Room L-602
Washington, D.C. 20550
Attn: UNISG/R&D

This form should be returned by February 1, 1983. Your cooperation in returning the survey questionnaire promptly is very important.

This information is solicited under the authority of the National Science Foundation Act of 1950, as amended. All information you provide will be used for statistical purposes only. Your response is entirely voluntary and your failure to provide some or all of the information will in no way adversely affect your institution.

All financial data requested on this form should be reported in thousands of dollars; for example, an expenditure of $25,342 should be rounded to the nearest thousand dollars and reported as $25.

Where exact data are not available, estimates are acceptable. Your estimates will be better than ours.

Include data for branches and all organizational units of your institution, such as medical schools and agricultural experiment stations. Also include hospitals or clinics owned, operated, or controlled by universities, and integrated operationally with the clinical progams of your medical schools. **Exclude data for federally funded research and development centers (FFRDC's).** A separate questionnaire is included in this package if your institution administers an FFRDC. **If you have any questions please contact Judith Coakley or Marge Machen (202-63[illegible]).**

Please correct if name or address has changed

Financial data are requested for your institution's 1982 fiscal year.

Please circle the month in which your institution's fiscal year begins:											
1	2	3	4	5	6	7	8	9	10	11	12

How many person hours were required to complete this form? ☐

Date Submitted ______________

Scope:

This survey collects data on expenditures by universities and colleges for separately budgeted research and development (R&D) in science and engineering. Definitions used are compatible with OMB Circular A-21, revised July 23, 1982. Items 1 and 2 ask for *current fund expenditures* by source of funds and by field of science/engineering. Item 3 collects data on that *portion* of *current fund expenditures* reported in items 1 and 2 that went for the purchase of scientific and engineering research equipment. Item 4 collects data on capital expenditures for facilities and equipment for research, development, and instruction by source of funds and field of science/engineering.

Definitions:

1. ***Research and Development*** **(R&D).** R&D for purposes of this survey is the same as "organized research" as defined in Section B.1.b. of OMB Circular A-21 (revised). It includes all R&D activities of an institution that are *separately budgeted and accounted for.* R&D includes both "sponsored research" activities (sponsored by Federal and non-Federal agencies and organizations) and "university research" (separately budgeted under an internal application of institutional funds).
   a. *Research* is a systematic study directed toward fuller knowledge or understanding of the subject studied. Research is classified as either basic or applied, according to the objectives of the investigator.
   b. *Development* is systematic use of the knowledge or understanding gained from research, directed toward the production of useful materials, devices, systems, or methods, including design and development of prototypes and processes.
2. ***Current fund expenditures.*** Expenditures of funds available for current operations. Such expenditures include all unrestricted gifts and restricted current funds to the extent that such funds were expended for current operating purposes.
3. ***Capital expenditures*** (for facilities and equipment). A capital expenditure as defined in Section J.13 of OMB Circular A-21 (revised) means the cost of the asset including the cost to put it in place. "Equipment" as a capital expenditure means an article of nonexpendable tangible personal property having a useful life of more than two years and an acquisition cost of $500 or more per unit; lower limits may be established, consistent with institutional policy.

PLEASE TYPE OR PRINT NAME OF PERSON SUBMITTING THIS FORM	TITLE	AREA CODE	EXCH	NO.	EXT
NAME OF PERSON WHO PREPARED THIS SUBMISSION (*if different from above*)	**TITLE**	**AREA CODE**	**EXCH.**	**NO.**	**EXT.**

Instructions for Items 1 and 2

Separately budgeted research and development (R&D) includes all funds expended for activities specifically organized to produce research outcomes and commissioned by an agency either external to the institution or separately budgeted by an organizational unit within the institution. *Include* research equipment purchased under research project awards from "current fund" accounts. Also, *include* research funds subcontracted to outside organizations. *Exclude* training grants, public service grants, demonstration projects, and departmental research expenditures that are not separately budgeted. Also, *exclude* any R&D expenditures in the fields of education, law, humanities, music, the arts, physical education, library science, and all other nonscience fields.

a. *Federal Government*. Report grants and contracts for R&D (including direct and reimbursed indirect costs) by all agencies of the Federal Government.

b. *State and local governments*. Include funds for R&D from State, county, municipal, or other local governments and their agencies. Include here State funds which support R&D at agricultural experiment stations.

c. *Industry*. Include all grants and contracts for R&D from profitmaking organizations, whether engaged in production, distribution, research, service, or other activities. Do not include grants and contracts from nonprofit foundations financed by industry; these should be reported under *All other sources* (line 1175).

d. *Institutional funds*. Report funds, including indirect costs, which your institution spent for R&D activities from the following sources: (1) General-purpose State or local government appropriations; (2) general-purpose grants from industry, foundations, or other outside sources; (3) tuition and fees; (4) endowment income. In addition, estimate your institution's contribution to unreimbursed indirect costs incurred in association with R&D projects financed by outside organizations, and mandatory cost sharing on Federal and other grants. To estimate unreimbursed indirect costs, many institutions use a university-wide negotiated indirect cost rate multiplied by the base (e.g., direct salaries and wages, etc.) minus actual indirect cost recoveries. If your institution now separately budgets what was previously classified as departmental research, these data should be included in line 1161.

e. *All other sources*. Include grants for R&D from nonprofit foundations and voluntary health agencies as well as from all other sources not elsewhere classified. Funds from foundations which are affiliated with, or granted solely to your institution, should be included under line 1160, Institutional funds. Funds for R&D received from a health agency that is a unit of a State or local government should be reported under State and local governments (line 1125). Also include gifts from individuals that are restricted by the donor to research.

ITEM 1. CURRENT FUND EXPENDITURES FOR SEPARATELY BUDGETED RESEARCH AND DEVELOPMENT IN THE SCIENCES AND ENGINEERING, BY SOURCE OF FUNDS, FY 1982 (Include indirect costs)

Source of funds		(1) Total (Dollars in thousands)	(2) Basic research (Percent of column 1)
a. Federal Government	1110	$	______ %
*b. State and local governments	1125		**Basic research** is directed toward an increase of knowledge; it is research where the primary aim of the **investigator** is a fuller knowledge or understanding of the subject under study rather than a specific application thereof.
c. Industry	1150		
d. Institutional funds	1160		
(1) Separately budgeted	1161		
(2) Underrecovery of indirect costs and cost sharing	1162		
*e. All other sources	1175		
f. TOTAL (sum of a through e)	1100	$	______ %

*Combined data cell (See instructions for b and e).

CONFIDENTIALITY

Information received from individual institutions in lines 1161 and 1162, or estimates for basic research expenditures, will not be published or released; only aggregate totals will appear in publications.

Total R&D expenditures reported in line 1100, column (1) and line 1400, column (1) should be the same.

Federally financed R&D expenditures reported in line 1110, column (1) and line 1400, column (2) should be the same.

ITEM 2. CURRENT FUND EXPENDITURES (TOTAL AND FEDERALLY FINANCED) FOR SEPARATELY BUDGETED RESEARCH AND DEVELOPMENT, BY FIELD OF SCIENCE/ENGINEERING: FY 1982 (Include indirect costs)

Field of science/engineering		(Dollars in thousands) (1) Total	(2) Federal
a. ENGINEERING (TOTAL)	1410	$	$
(1) Aeronautical & astronautical	1411		
(2) Chemical	1412		
(3) Civil	1413		
(4) Electrical	1414		
(5) Mechanical	1415		
(6) Other	1416		
b. PHYSICAL SCIENCES (TOTAL)	1420		
(1) Astronomy	1421		
(2) Chemistry	1422		
(3) Physics	1423		
(4) Other	1424		
c. ENVIRONMENTAL SCIENCES (TOTAL)	1430		
(1) Atmospheric	1431		
(2) Earth sciences	1432		
(3) Oceanography	1433		
(4) Other	1434		
d. MATHEMATICAL AND COMPUTER SCIENCES (TOTAL)	1440		
(1) Mathematics	1441		
(2) Computer sciences	1442		
e. LIFE SCIENCES (TOTAL)	1450		
(1) Agricultural	1451		
(2) Biological	1452		
(3) Medical	1453		
(4) Other	1454		
f. PSYCHOLOGY (TOTAL)	1460		
g. SOCIAL SCIENCES (TOTAL)	1470		
(1) Economics	1471		
(2) Political science	1472		
(3) Sociology	1473		
(4) Other	1474		
h. OTHER SCIENCES, not elsewhere classified (TOTAL)	1480		
i. TOTAL (sum of a through h)	1400		

*PLEASE EXCLUDE from your response any R&D expenditures in the fields of education, law, humanities, music, the arts, physical education, library science, and all other nonscience fields

ITEM 3. CURRENT FUND EXPENDITURES FOR RESEARCH EQUIPMENT (TOTAL AND FEDERALLY FINANCED) FOR SEPARATELY BUDGETED RESEARCH AND DEVELOPMENT, BY FIELD OF SCIENCE/ENGINEERING: FY 1982*
(See page 5 for instructions.)

Field of science/engineering		(Dollars in thousands) (1) Total	(2) Federal
a. ENGINEERING (TOTAL)	1810	$	$
(1) Aeronautical & astronautical	1811		
(2) Chemical	1812		
(3) Civil	1813		
(4) Electrical	1814		
(5) Mechanical	1815		
(6) Other	1816		
b. PHYSICAL SCIENCES (TOTAL)	1820		
(1) Astronomy	1821		
(2) Chemistry	1822		
(3) Physics	1823		
(4) Other	1824		
c. ENVIRONMENTAL SCIENCES (TOTAL)	1830		
(1) Atmospheric	1831		
(2) Earth sciences	1832		
(3) Oceanography	1833		
(4) Other	1834		
d. MATHEMATICAL AND COMPUTER SCIENCES (TOTAL)	1840		
(1) Mathematics	1841		
(2) Computer sciences	1842		
e. LIFE SCIENCES (TOTAL)	1850		
(1) Agricultural	1851		
(2) Biological	1852		
(3) Medical	1853		
(4) Other	1854		
f. PSYCHOLOGY (TOTAL)	1860		
g. SOCIAL SCIENCES (TOTAL)	1870		
(1) Economics	1871		
(2) Political science	1872		
(3) Sociology	1873		
(4) Other	1874		
h. OTHER SCIENCES, not elsewhere classified (TOTAL)	1880		
i. TOTAL (sum of a through h)	1800		

*Current fund expenditures in each field for scientific research equipment should be a subset of the "Total" and "Federal" column reported in item 2

Item 3 Instructions

Please report that *portion* of current fund expenditures reported in items 1 and 2 that went for the purchase of research equipment This includes all research equipment purchased under sponsored research project awards from current fund accounts

NOTE: These research equipment expenditures are not to be included under capital expenditures reported in item 4.

For column (1) report current fund expenditures for R&D from all sources: Federal Government, State, county, municipal, or other governments and their agencies (including State funds supporting R&D at agricultural experiment stations); industry; institutional funds, and private foundations and voluntary health agencies, individuals, and associations.

For column (2) include funds from grants and contracts for R&D sponsored by agencies of the Federal Government.

Item 4 Instructions

Please report expenditures for facilities that were in process or completed during FY 1982.

Capital expenditures for facilities and equipment **include** the following: (a) Fixed equipment such as built-in equipment and furnishings; (b) movable scientific equipment such as oscilloscopes and pulse-height analyzers; (c) movable furnishings such as desks; (d) architect's fees, site work, extension of utilities, and the building costs of service functions such as integral cafeterias and bookstores of a facility; (e) facilities constructed to house separate components such as medical schools and teaching hospitals; and (f) special separate facilities used to house scientific apparatus such as accelerators, oceanographic vessels, and computers.

Expenditures for administration buildings, steam plants, residence halls, and other such facilities should be **excluded** unless used principally for research, development, or instruction in the sciences and engineering. Land costs should be **excluded. Also exclude** scientific research equipment purchased under research project awards from current fund accounts that are reported under items 1, 2, and 3.

ITEM 4. CAPITAL EXPENDITURES FOR FACILITIES AND EQUIPMENT FOR RESEARCH, DEVELOPMENT, AND INSTRUCTION, BY FIELD OF SCIENCE/ENGINEERING AND SOURCE OF FUNDS: FY 1982

Field of science/engineering		(Dollars in thousands)		
		Total (1)	Federal (2)	All other sources (3)
a Engineering	1710	$	$	$
b Physical sciences	1720			
c Environmental sciences	1730			
d Mathematical and computer sciences	1740			
e Life sciences	1750			
f Psychology	1760			
g Social sciences	1770			
h. Other sciences, n.e.c	1780			
i Total (sum of a through h)	1700	$	$	$

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ILLUSTRATIVE DISCIPLINES[1]

a Engineering	
(1) Aeronautical & astronautical	Aerodynamics, aerospace, space technology
(2) Chemical	Ceramic, petroleum, petroleum refining process
(3) Civil	Architectural, hydraulic, hydrologic, marine, sanitary and environmental, structural transportation
(4) Electrical	Communication, electronic, power
(5) Mechanical	Engineering mechanics
(6) Other	Agricultural, industrial and management, metallurgical and materials, mining, nuclear, ocean engineering systems, textile, welding
b Physical sciences	
(1) Astronomy	Astrophysics, optical and radio, x-ray, gamma-ray, neutrino
(2) Chemistry	Inorganic, organo-metallic, organic, physical, analytical, pharmaceutical, polymer sciences (exclude biochemistry)
(3) Physics	Acoustics, atomic and molecular, condensed matter, elementary particles, nuclear structure, optics, plasma
(4) Other	Used for multidisciplinary projects within physical sciences and for disciplines not requested separately
c Environmental sciences	
(1) Atmospheric	Aeronomy, solar, weather modification, extraterrestrial atmospheres, meteorology
(2) Earth sciences	Engineering geophysics, general geology, geodesy and gravity, geomagnetism, hydrology, inorganic geochemistry, isotopic geochemistry, organic geochemistry, lab geophysics, paleomagnetism, paleontology, physical geography and cartography, seismology
(3) Oceanography	Biological oceanography, chemical oceanography, geological oceanography, physical oceanography, marine geophysics
(4) Other	Used for multidisciplinary projects within environmental sciences
d Mathematical and computer sciences	
(1) Mathematics	Algebra, analysis, applied mathematics, foundations and logic, geometry, numerical analysis, statistics, topology
(2) Computer sciences	Design, development, and application of computer capabilities to data storage and manipulation, information science
e Life sciences	
(1) Agricultural	Agricultural chemistry, agronomy, animal science, conservation, dairy science, range science, wildlife
(2) Biological	Anatomy, biochemistry, biophysics, biogeography, ecology, embryology, entomology, genetics, immunology, microbiology, nutrition, parasitology, pathology, pharmacology, physical anthropology, physiology, plant science, botany, zoology, veterinary biology
(3) Medical	Anesthesiology, cardiology, endocrinology, gastroenterology, hematology, neurology, obstetrics, ophthalmology, preventive medicine and community health, psychiatry, radiology, surgery, veterinary medicine,[2] dentistry, pharmacy
(4) Other	Used for multidisciplinary projects within life sciences
f Psychology	Animal behavior, clinical, educational, experimental, human development and personality, social
g Social sciences	
(1) Economics	Econometrics, international, industrial, labor, agricultural, public finance and fiscal policy
(2) Political science	Regional studies, comparative government, international relations, legal systems, political theory, public administration
(3) Sociology	Comparative and historical, complex organizations, culture and social structure, demography, group interactions, social problems and welfare, theory
(4) Other	History of science, cultural anthropology, lingistics, socioeconomic geography
h Other sciences, n.e.c.	To be used when the multidisciplinary and interdisciplinary aspects make the classification under one primary field impossible

[1] Also see enclosed "Crosswalk" between NSF field of science/engineering codes and the NCES Classification of Instructional Programs (NCES 81-323)

[2] Institutions with schools of veterinary medicine should distribute R&D expenditures among the appropriate disciplines (agricultural, biological, and medical) rather than only in medical sciences.

NSF FORM 724A (11-82)

OMB No. 3145-0074
Exp. Date: 12/31/83

NATIONAL SCIENCE FOUNDATION
Washington, D.C. 20550

SURVEY OF SCIENTIFIC AND ENGINEERING PERSONNEL EMPLOYED AT UNIVERSITIES AND COLLEGES, JANUARY 1983

Organizations are requested to complete and return this form to:

NATIONAL SCIENCE FOUNDATION
1800 G Street, N.W., Room L-602
Washington, D.C. 20550—Attn: UNISG

This information is solicited under the authority of Section 3 (a) (6) of the National Science Foundation Act of 1950, as amended (42 U.S. Code 1862 (a) (6)). Your response is entirely voluntary and your failure to provide some or all of the information will in no way adversely affect your institution.

Please correct if name or address has changed.

This survey requests scientific and engineering (S/E) employment data according to institutional recordkeeping conventions. **The completed 1983 questionnaire should be returned by March 15, 1983.** Your prompt cooperation will be appreciated. If you determine, however, that you cannot respond by March 15, please notify NSF and request an extension of time.

Please read the enclosed instructions before completing this form. If you have any questions, contact Ms. Judith Coakley or Ms. Esther Gist (202-634-4673). Please complete all columns; estimates by academic officials will be better than NSF estimates.

All entries should be in whole numbers; please do not enter decimals or fractions, except in item 3, columns 2 and 3, where two decimal places are optional.

SURVEY POPULATION

Include data for ALL ORGANIZATIONAL UNITS OF YOUR INSTITUTION THAT EMPLOY SCIENTISTS AND ENGINEERS, such as regional campuses, computer centers, medical schools, agricultural experiment stations, and associated research units. Also include any hospital or clinic owned, operated, or controlled by your university and integrated operationally with the clinical programs of your medical schools.

Federally Funded Research and Development Centers (FFRDC's)

Separate forms have been mailed directly to all FFRDC's administered by academic institutions. A list of these centers appears on page 3 of the Instructions and Definitions.

INSTITUTIONAL CLASSIFICATION

Highest degree granted in the sciences or engineering during 1982-83	Check one	One example of a science or engineering field in which highest degree was awarded	Check primary administrative control of your institution	
Doctor's degree, e.g., Ph.D., D. Eng., or D.E.S.	☐	______	Federal	☐
First-professional degree, e.g., M.D., D.D.S., D.V.M., etc.	☐	______	State	☐
Master's degree	☐	______		
Bachelor's degree	☐	______	Local	☐
Associate or other 2-year award	☐	______		
No degrees granted in the sciences or engineering	☐	______	Private	☐

Item 1. Total number of scientists and engineers by highest earned degree and employment status: January 1983

HIGHEST EARNED DEGREE		HEADCOUNTS TOTAL (1)	FULL TIME (2)	PART TIME (3)
a. Doctor's degree, e.g., Ph. D., D. Eng., or D.E.S.	2210			
b. First-professional degree, e.g., M.D., D.D.S., D.V.M., etc.	2220			
c. Master's degree	2230			
d. Bachelor's degree or the equivalent	2240			
e. Total (sum of a through d)	2200			

NOTE: To ensure proper data comparability between item 1, line 2200, and items 2 and 3:

a) Line 2200, column 1 should equal item 3, line 2700, column 1;
b) Line 2200, column 2 should equal item 2, line 2600, column 1;
c) Line 2200, column 3 should equal item 2, line 2600, column 2.

Item 2.	Total number of scientists and engineers by discipline, sex, and employment status: January 1983							
	S/E DISCIPLINES[1]		HEADCOUNTS					
			TOTAL		MEN		WOMEN	
			Full time	Part time	Full time	Part time	Full time	Part time
			(1)	(2)	(3)	(4)	(5)	(6)
	a. Engineers (total)	2610						
	(1) Aeronautical and astronautical engineers	2611						
	(2) Chemical engineers	2612						
	(3) Civil engineers	2613						
	(4) Electrical engineers	2614						
	(5) Mechanical engineers	2615						
	(6) Other engineers	2616						
	b. Physical scientists (total)	2620						
	(1) Astronomers	2621						
	(2) Chemists	2622						
	(3) Physicists	2623						
	(4) Other physical scientists	2624						
	c. Environ. scientists (total)	2630						
	(1) Atmospheric scientists	2631						
	(2) Earth scientists	2632						
	(3) Oceanographers	2633						
	(4) Other environ. sci.	2634						
	d. Mathematical and computer scientists (total)	2640						
	(1) Mathematicians (exclude computer scientists)	2641						
	(2) Computer scientists (exclude programmers)	2642						
	e. Life scientists (total)	2650						
	(1) Agricultural scientists	2651						
	(2) Biological scientists	2652						
	(3) Medical scientists (see instructions, p. 4)	2653						
	(4) Other life scientists	2654						
	f. Psychologists (total)	2660						
	g. Social scientists (total) (exclude historians)	2670						
	(1) Economists	2671						
	(2) Political scientists	2672						
	(3) Sociologists	2673						
	(4) Other social scientists	2674						
	h. Total (sum of a thru g)	2600						

PLEASE EXCLUDE from your response any employees in the fields of education, law, humanities, music, the arts, physical education, library science, and all other nonscience fields

[1] See enclosed Crosswalk between NSF's S/E disciplines and the codes in the NCES Classification of Instructional Programs

Item 3.	Total number of scientists and engineers by discipline, estimated full-time equivalents, and R&D activity: January 1983					
	S/E Disciplines		Total headcounts[1]	Estimated full-time-equivalents (FTE's): Total FTE's[2]	FTE's devoted to separately budgeted R&D[3]: Number	FTE's devoted to separately budgeted R&D[3]: Percent (optional)[4]
	a. Engineers (total)	2710				%
	(1) Aeronautical and astronautical engineers	2711				%
	(2) Chemical engineers	2712				%
	(3) Civil engineers	2713				%
	(4) Electrical engineers	2714				%
	(5) Mechanical engineers	2715				%
	(6) Other engineers	2716				%
	b. Physical scientists (total)	2620				%
	(1) Astronomers	2821				%
	(2) Chemists	2722				%
	(3) Physicists	2723				%
	(4) Other physical scientists	2724				%
	c. Environmental scientists (total)	2730				%
	(1) Atmospheric scientists	2731				%
	(2) Earth scientists	2732				%
	(3) Oceanographers	2733				%
	(4) Other environmental scientists	2734				%
	d. Mathematical and computer scientists (total)	2740				%
	(1) Mathematicians (exclude computer scientists)	2741				%
	(2) Computer scientists (exclude programmers)	2742				%
	e. Life scientists (total)	2750				%
	(1) Agricultural scientists	2751				%
	(2) Biological scientists	2752				%
	(3) Medical scientists (see instructions, p. 4)	2753				%
	(4) Other life scientists	2754				%
	f. Psychologists (total)	2760				%
	g. Social scientists (total) (exclude historians)	2770				%
	(1) Economists	2771				%
	(2) Political scientists	2772				%
	(3) Sociologists	2773				%
	(4) Other social scientists	2774				%
	h. Total (sum of a thru g)	2700				%

[1]Line 2700, column 1, should equal item 1, line 2200, column 1

[2]Include all activities, e.g., teaching, separately budgeted R&D, etc., of all individuals reported in column 1

[3]See section 8 in Instructions for definition of "separately budgeted R&D expenditures"

[4]Column 4 has been provided for the convenience of those institutions that estimate the number (column 3) of FTE's devoted to separately budgeted R&D activities by use of a percentage (column 4) in each discipline

CHECK LIST

[ ] 1. Are all entries rounded to whole numbers? Please do not enter fractions or decimals, except in columns 2 and 3 where two decimal places are optional.

[ ] 2. Do the data add to subtotals?

[ ] 3. Are all columns completed? YOUR estimates will be better than OURS. An explanation of estimates may be noted on a separate sheet or in the REMARKS.

[ ] 4. Are all branches and components such as medical school, computer center, agricultural experiment station, and associated research units included?

[ ] 5. Have you INCLUDED all postdoctorates?

[ ] 6. Have you EXCLUDED graduate students?

1982-83 DATA CHECK

(For your convenience)

Please compare your January 1982 survey response with your survey response for January 1983, particularly for the totals. Please explain below or on a separate sheet any significant changes. Where possible, indicate any required adjustments in data reported in previous years.

	1982	1983
Total full-time scientists and engineers	Line 2600, column 1.	Line 2600, column 1.
Total part-time scientists and engineers	Line 2600, column 2	Line 2600, column 2.
Total FTE's	Line 2700, column 2.	Line 2700, column 2.
Total FTE's in R&D	Line 2700, column 3.	Line 2700, column 3.

CONFIDENTIALITY

The National Science Foundation recognizes that its ability to gather much of the enclosed information would be severely impaired if it could not be held in confidence. Please indicate below the number of any items that you would not supply unless assured that the source is held confidential. The Foundation will hold in confidence such information to the extent permitted by law.

ITEM:

REMARKS

What methods and source records were used for estimating separately budgeted R&D effort?

Please indicate problems encountered in estimating R&D-related activity.

Please circle the month that your institutional data represent to reflect academic year 1982-83 employment.

1 2 3 4 5 6 7 8 9 10 11 12

Are there any significant changes in data reported in previous years?

How many person-hours were required to complete this form? [ ]

PLEASE TYPE OR PRINT NAME OF PERSON SUBMITTING THIS FORM	TITLE	AREA CODE	EXCH	NO.	EXT.
NAME OF PERSON WHO PREPARED THIS SUBMISSION (If different from above)	TITLE	AREA CODE	EXCH	NO.	EXT.

NAME OF INSTITUTION	DATE	ADDRESS (number, street, city, State, ZIP code)

NATIONAL SCIENCE FOUNDATION
Washington, D.C. 20550

SURVEY OF SCIENTIFIC AND ENGINEERING PERSONNEL EMPLOYED AT UNIVERSITIES AND COLLEGES, JANUARY 1983

INSTRUCTIONS AND DEFINITIONS

Introduction

This information is solicited under the authority of the National Science Foundation Act of 1950, as amended in P.L. 507 (42 U.S.C. 1862) (Section 3(a) (6)), and Executive Order 10521 (March 17, 1954). All information you provide will be used for statistical purposes only. Your response is entirely voluntary and your failure to provide some or all of the information will in no way adversely affect your institution.

The National Science Foundation requests your cooperation in completing the attached questionnaire covering the characteristics of personnel in your institution as they relate to the sciences and engineering. This form requests employment data in 1982-83 according to institutional recordkeeping coventions. The questionnaire should be completed and returned to NSF by March 15, 1983. If you determine, however, that you will not be able to respond by that date, please notify NSF and request an extension of time.

Where data you report in the current survey differ significantly from those reported in the previous survey, please indicate the reasons for the difference, such as "opening of new medical school," etc., at the end of the questionnaire in the "Remarks" section, or on a separate sheet of paper.

The survey procedures are outlined in flow chart format. (See pp. 5-8.)

If you have any questions regarding information requested on this form, write or telephone Ms. Judith Coakley or Ms. Esther Gist at the Universities and Nonprofit Institutions Studies Group, Division of Science Resources Studies, National Science Foundation, 1800 G Street, N.W., Room L-602, Washington, D.C. 20550 (Telephone: (202) 634-4673.) Additional forms, as well as copies of previous responses, may be obtained by writing to the above address.

Survey Instructions

1. Survey Population

This survey, conducted annually, covers professional employment at all academic institutions with a science or engineering (S/E) program. The institutional response to this survey should reflect personnel activity in all branches and other units of the parent institution, including regional campuses, computer centers, medical schools, agricultural experiment stations, and associated research units. If any data for any of these campuses are not included in your response to NSF, please indicate this under "Remarks" when submitting your questionnaire.

Federally funded research and development centers (FFRDC's) are to report their data separately from the administering university; see the listing of FFRDC's administered by academic institutions (p. 3.)

2. Survey Time Period

The January date referenced in this questionnaire reflects the midpoint of the 1982-83 academic year rather than the actual reporting date of data to be compiled for NSF. Data reported on this survey are to reflect a "snapshot" of S/E personnel employed at a fixed time during the 1982-83 academic year. For institutions reporting on the basis of central record systems, data should reflect the date when your files are "frozen" for annual personnel reports. Many institutions, especially those with State affiliation, use their central records compiled in the preceding fall of each year to report to NSF. You may want to report as of the payroll period closest to October 1, 1982, which is the basis for the Equal Employment Opportunity Commission's survey of higher education staff (EEO-6, Form 221). Please indicate the reporting month used by your institution in the space provided in the "Remarks" section.

3. Professional Employment

The term "professional," for purposes of this survey, refers to all persons paid a salary or stipend by the responding institution who work at a level at which the knowledge acquired by academic training equal to a bachelor's degree in science or engineering is essential in the performance of duties. Many institutions with central reporting systems use headcounts of exempt employees, i.e., those employees who are in the exempt category of the Fair Labor Standards Act as amended. Exempt employees are not eligible for overtime payment. Others use EEO-6 concepts.

Include: S/E personnel with faculty status, postdoctorates,[1] and other professional employees such as systems analysts in computer centers.

Exclude: (1) Personnel on sabbatical or other leave status even if these personnel continue to be paid by your institution; (2) personnel employed in branches of your institution located in foreign countries; (3) unpaid voluntary staff; (4) persons "unpaid" by the university but paid by the medical school; (5) student health service personnel; (6) those agricultural extension personnel primarily involved in home economics and 4-H youth programs; (7) administrative officers above the level of department chairpersons with titles such as president, academic dean, dean of faculty, provost, chancellor, etc., even though they may devote part of their time to teaching and/or research; (8) all graduate students.

[1] Some institutions without comprehensive central records on the number of postdoctorates base their response to this survey on data gathered in the office of the graduate dean as part of NSF's Survey of Graduate Science and Engineering Students and Postdoctorates.

4. Assignment of Scientists and Engineers to NSF Disciplines

Determination of whether professional employees should be reported in the NSF personnel survey as "scientists and engineers" and their associated disciplines is done by most respondents on the basis of departmental structures. After particular departments are selected for inclusion in the NSF personnel survey, respondents usually classify headcounts of all professional employees into various S/E disciplines according to their primary or home department of assignment. Where individual assignments are split into two departments on a 50-percent basis, classification into a single NSF discipline should be made according to institutional conventions.

See the classification of Disciplines of Employment in the Sciences and Engineering, for the broad and detailed S/E disciplines of employment corresponding to those shown on the questionnaire, with illustrative categories of each discipline (pages 3 and 4.) Also, for those that use the NCES instructional program categories, see the enclosed "Crosswalk" between NSF's S/E fields and the codes in the NCES Classifications of Instructional Programs (NCES 81-323). Please note that education, law, humanities, music, the arts, physical education, and library science are not considered S/E disciplines for the purpose of this survey. This discipline-oriented taxonomy is used by institutions that compile their own departmental groupings for this NSF survey. While most respondents report S/E headcounts based on departmental structures, NSF recognizes that because of the multidisciplinary nature of many academic activities, degree specialties and departmental assignments may differ (e.g., a Ph.D. in mechanical engineering may be assigned to the department of orthopedics.) To promote ease of reporting and consistency of data among institutions, it is suggested that where these differences are not significant, all professionals in the department be assigned to a single discipline. In other instances, where sizable differences occur, institutional respondents may choose to report professionals employed in a single department into two or more disciplines. For example, an institution may have a single department of electrical engineering and computer science and report individuals into two separate disciplines on the NSF personnel survey according to their degree specialties.

It is important that respondents *include* in the survey scientists and engineers who are appointed to organizational units that are not part of any academic department. For example, scientists and engineers employed at a computer center that is not affiliated with a particular academic department should be *included* in the survey. In a similar manner an economist in a nonscience department should be reported. The most prevalent reporting practice for these nonacademic units is to assign groups of individuals to NSF disciplines according to their degree specialties, especially when multidisciplinary activities are prominent.

5. Medical and Clinical Disciplines

For purposes of this survey, all M.D.'s, D.D.S.'s, etc., *with faculty or academic appointments* are to be reported, including postdoctorates. NSF considers faculty status given to physicians, dentists, public health specialists, pharmacists, etc., to be an indicator of significant involvement in teaching, clinical investigation, or other R&D activities.

Exclude: (1) All medical practitioners, such as nurse anesthetists, occupational therapists, physical therapists, interns; (2) scientists or engineers whose primary employment is at independent hospitals even though they may perform some teaching or research functions for your institution through cooperative agreements; (3) unpaid voluntary staff at medical or dental schools; and (4) medical residents unless research training under the supervision of a senior mentor is the prime purpose of the appointment.

6. Questionnaire Item 1, Highest Earned Degree and Headcounts

a. Highest earned degree information is most commonly available in personnel, payroll, or budget files. Most academic institutions have a computerized system for updating highest earned degree data for professionals. If these files at your institution do not contain degree data, however, these data may be estimated using departmental records.

For purposes of this survey, earned degrees are classified in four categories:

(1) Under "Doctorate Degree" include earned degrees carrying the title of Doctor, e.g., Ph.D., D. Eng., D.E.S., etc; include individuals holding both the Ph.D. degree and any other doctorate degree.

(2) Under "First-Professional Degree" include individuals whose highest earned degrees, e.g., M.D., D.D.S., D.V.M., etc., are first-professional medical degrees that represent the completion of the academic requirements based on programs that require at least 2 academic years of previous college work for entrance and require a total of at least 6 academic years of college work for completion. Specifically include in line 2b first-professional degrees in Medicine (M.D.), Dentistry (D.D.S. or D.M.D.), Veterinary Medicine (D.V.M.), Podiatric Medicine (D.P.M.) and Osteopathic Medicine (D.O.). Individuals holding both the Ph.D. degree and a first-professional degree such as the M.D., should be included in line 2a as mentioned in (1) above.

(3) Under "Master's Degree" include earned degrees carrying the title of Master that are above the bachelor's degree and are other-than-doctorate or first-professional degrees reported in lines 2a and 2b.

(4) Under "Bachelor's degree or the equivalent" include all individuals who have successfully completed a baccalaureate program of studies, usually requiring at least 4 years (or equivalent) of full-time college level study. For the purpose of this survey, 5-year bachelor's degree holders may be included in this category, as well as those who are considered to have the equivalent in experience, even if they have not earned such as degree.

b. *Headcounts*

(1) *Full-time* employees are those individuals available for full-time assignments at the date used for reporting in this survey, or those who are designated as "full time" in an official contract, appointment, or agreement. Determination of "full-time" designation should be based on institutional recordkeeping conventions and standards. Avoid double counting; if, for example, individuals are full-time employees but their assignments involve more than one department or campus, they should be counted as one full-time employee according to their primary or home department of assignment (or campus).

(2) *Part-time* employees are those individuals who work for a length of time in a day, week, etc., defined by your institution as part-time employment.

7. Questionnaire Item 2, Sex of Full- and Part-time Scientists and Engineers

Item 2 collects data on the sex of full- and part-time scientists and engineers, characteristics which are usually available in central records. Computer programs used to respond to other requests for employment data on women may often be modified to provide specialized information on scientists and engineers.

8. *Questionnaire Item 3, Full-Time-Equivalents (FTE's)*

a. The FTE reporting concept should reflect the actual utilization of S/E professionals in various disciplines and their involvement in separately budgeted R&D activities. While headcounts are usually reported on the basis of *primary* department of assignment. FTE reporting in various NSF disciplines should reflect multiple appointments. For example, an individual with a 60-percent appointment in electrical engineering and a 40-percent appointment in computer science would be reported in FTE's in two NSF disciplines according to the 60-40 percent split in departmental assignments. Accordingly, the FTE concept converts the number of persons with part-time or split appointments among various disciplines or activities to an equivalent number of full-time persons, in accordance with institutionally agreed upon conventions. The number of FTE's reported in column 2 of item 3 should be equal to or greater than the number of full-time employees in any given field, using decimals (proportion of 1.00) for part-time employees. Therefore, the number of FTE's would be equal to or less than the total headcount in any field, and equal to or greater than the number of full-time employees.

The procedures used to compile FTE data vary from institution to institution, depending largely on the records available. Generally, there are two categories of records available to institutions—budgeting information describing the allocation of personnel resources and/or data reflecting actual rather than planned utilization of the resources.

In converting S/E headcounts into FTE's, the following method is suggested:

(1) Categorize headcounts of all exempt employees in S/E departments, medical schools, agricultural experiment stations, research institutes, and other institutional organizational units into one of the NSF disciplines according to primary assignment;

(2) Within each discipline, differentiate employees as being either full time or part time (according to institutional practices);

(3) Calculate the full-time equivalents of full-time S/E personnel. Use budgetary or resource utilization records to report S/E employees with split appointments between departments and/or institutional units, and distribute these data according to appropriate NSF disciplines.

(4) Calculate the full-time equivalents of part-time S/E personnel and merge them into appropriate NSF disciplines.

b. *Full-Time-Equivalents in Research and Development (R&D)*

For purposes of this survey, report only the full-time-equivalent involvement of persons engaged in *separately budgeted research and development.*

R&D activities are systematic, intensive studies directed toward fuller knowledge of the subject studied. R&D is the same as "organized research" as defined in OMB Circular A-21 revised, July 23, 1982. It includes all R&D activities of an institution that are *separately budgeted and accounted for.* R&D includes both "sponsored research" activities (sponsored by Federal or non-Federal agencies and organizations) and "university research" (separately budgeted under an internal application of institutional funds).

Exclude: Time spent by professional employees on departmental research that is not separately budgeted, training grants, public service grants, demonstration projects, etc.

Estimating the division of time allocated or spent by individuals in separately budgeted R&D programs is difficult for many institutions. Again, procedures used to supply these data vary among institutions and the extent to which central reporting is feasible depends, by and large, on the degree to which budget/personnel/financial records are mechanized and linked. Among the procedures used by various institutions are the following:

(1) Using some generally held criteria at the institutional or departmental levels (i.e., three-fourths for instruction, one-fourth for research);

(2) Estimating separately budgeted R&D involvement or assignment obtained from payroll records, personnel records, or from employee contracts (i.e., salaries paid from separately budgeted R&D funds may be compared with total academic salaries of individuals);

(3) Asking research administrators, department chairpersons, or heads of other organizational units to furnish estimates of separately budgeted R&D involvement.

(4) Using faculty activity analyses in institutions where these are regularly conducted, and differentiating separately budgeted R&D activity from departmental research activity.

Federally Funded Research and Development Centers (FFRDC's)

For purposes of this survey, FFRDC's are defined as R&D organizations exclusively or substantially financed by the Federal Government and administered on a contractual basis by educational institutions or other organizations. The following is a current list of FFRDC's administered by universities and colleges:

Ames Laboratory
Argonne National Laboratory
Brookhaven National Laboratory
Center for Naval Analyses
Cerro Tololo Inter-American Observatory
E. O. Lawrence Berkeley Laboratory
E. O. Lawrence Livermore Laboratory
Fermi National Accelerator Laboratory
Jet Propulsion Laboratory
Kitt Peak National Observatory
Lincoln Laboratory
Los Alamos Scientific Laboratory
National Astronomy and Ionosphere Center
National Center for Atmospheric Research
National Radio Astronomy Observatory
Oak Ridge Institute of Nuclear Studies
Plasma Physics Laboratory
Sacramento Peak Observatory
Stanford Linear Accelerator Center

Classification of disciplines of Employment in the Sciences and Engineering. Illustrative subfields include:

ENGINEERING

Aeronautical & Astronomical: aerodynamics, aerospace, space technology.

Chemical: ceramic, petroleum, petroleum refining process.

Civil: architectural, hydraulic, hydrologic, marine, sanitary and environmental, structural, transportation.

Electrical: communication, electronic, power.

Mechanical: engineering mechanics.

Other Engineering: agricultural, industrial and management, metallurgical and materials, mining, nuclear, ocean engineering systems, textile, welding.

PHYSICAL SCIENCES

Astronomy: laboratory astrophysics, optical astronomy, radio astronomy, theoretical astrophysics, X-ray, gamma-ray, neutrino astronomy.

Chemistry: analytical, inorganic, organo-metallic, organic, pharmaceutical, physical, polymer science (exclude biochemistry).

Physics: acoustics, atomic and molecular, condensed matter, elementary particles, nuclear structure, optics, plasma.

Other Physical Sciences: used for multidisciplinary fields within physical sciences.

ENVIRONMENTAL SCIENCES (TERRESTRIAL AND EXTRATERRESTRIAL)

Atmospheric Sciences: aeronomy, solar, weather modification, extraterrestrial atmospheres, meteorology.

Earth Sciences: engineering geophysics, general geology, geodesy and gravity, geomagnetism, hydrology, inorganic geochemistry, isotopic geochemistry, organic geochemistry, lab geophysics, paleomagnetism, paleontology, physical geography and cartography, seismology.

Oceanography: biological oceanography, chemical oceanography, geological oceanography, physical oceanography, marine geophysics.

Other Environmental Sciences: used for multidisciplinary fields within environmental sciences.

MATHEMATICAL AND COMPUTER SCIENCES

Mathematics: algebra, analysis, applied mathematics, foundations and logic, geometry, numerical analysis, statistics, topology.

Computer Sciences: computer programming,[2] computer and information sciences (general), design, development, and application of computer capabilities to data storage and manipulation, information sciences and systems, systems analysis.

LIFE SCIENCES

Agricultural Sciences: agronomy, animal science, dairy science, food science and technology, forestry, horticulture, poultry science.

[2]Personnel employed as computer programmers should not be reported as professionals.

Biological Sciences: anatomy, bacteriology, biochemistry, biogeography, biophysics, ecology, embryology, entomology, evolutionary biology, genetics, immunology, microbiology, nutrition and metabolism, parasitology, pathology, pharmacology, physical anthropology, physiology, plant sciences, radiobiology, systematics, zoology, veterinary biology.

Medical Sciences: internal medicine, neurology, ophthalmology, preventive medicine and public health, psychiatry, radiology, surgery, veterinary medicine,[3] dentistry, pharmacy, podiatry, anesthesiology, chemotherapy, dermatology, geriatrics, nuclear medicine, obstetrics, gynecology, oncology, pediatrics, physical medicine and rehabilitation.

Other Life Sciences: all other health-related disciplines.[4]

PSYCHOLOGY

Psychology: animal behavior, clinical psychology, comparative psychology, counseling, and guidance, development and personality, educational, personnel, vocational psychology and testing, experimental psychology, ethology, industrial and engineering psychology, social psychology.

SOCIAL SCIENCES

Economics: econometrics and economics statistics, history of economic thought, international economics, industrial, labor and agricultural economics, macroeconomics, microeconomics, public finance and fiscal policy, theory, economic systems and development.

Political Science: regional studies, comparative government, history of political ideas, international relations and law, national, political and legal systems, political theory, public administration.

Sociology: comparative and historical, complex organizations, culture and social structure, demography, group interactions, social problems and social welfare, sociology theory.

Other Social Sciences: cultural anthropology, criminology, history of science, linguistics, socioeconomic geography, urban studies.

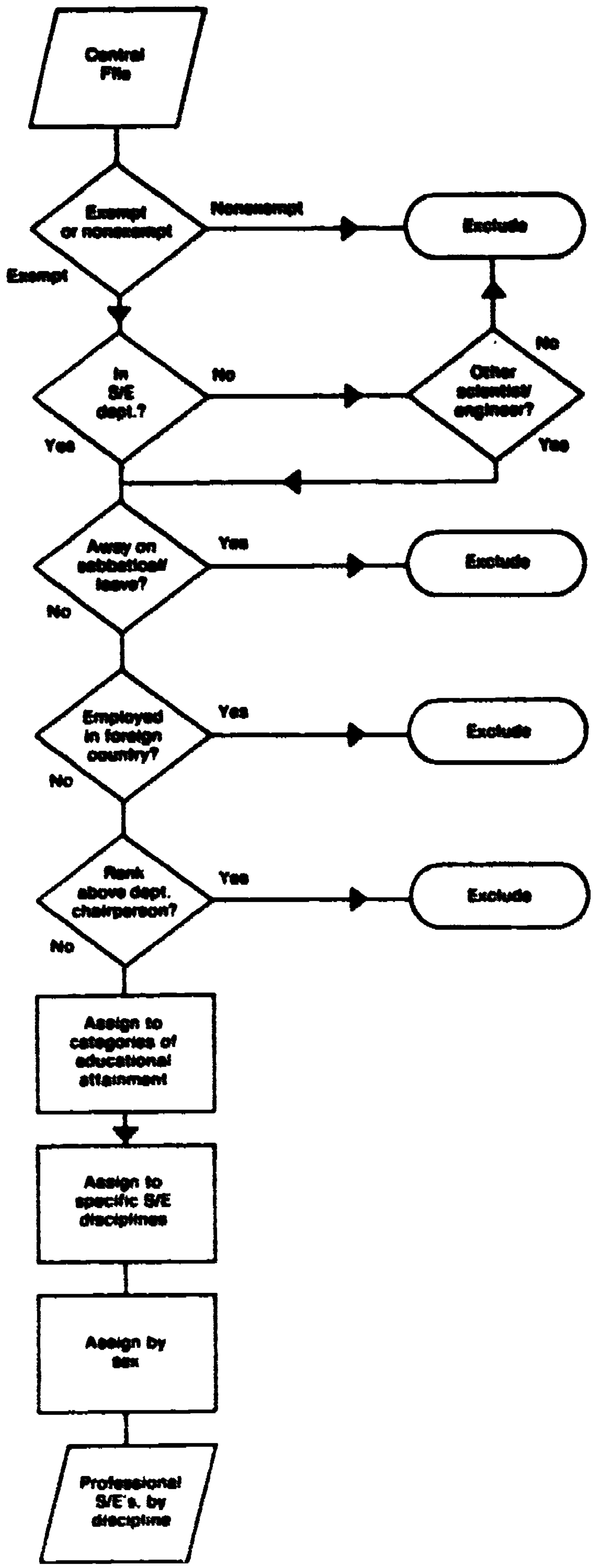
[3]Institutions with schools of veterinary medicine should distribute professionals among the appropriate disciplines (agricultural, biological, and medical) rather than report all personnel as medical scientists.

[4]*Exclude personnel primarily involved in direct patient care.*

NOTE: See enclosed NSF Crosswalk between NSF field of S/E codes and the NCES Classification of Instructional Programs.

Flow Charts

Institutions that automate NSF survey data or plan to—or even engage in manual data processing—may be assisted by these charts.



STEP 1:

Retrieve, sort, and select information from central records of institution.

Central File: Contains centralized records for all paid employees. (*Note*: Some affiliated entities such as medical schools may have their own central files. See below.) Examples: Personnel, payroll, or general financial records.

Select personnel exempt from Fair Labor Standards Act. (See section 3 in Instructions.)

Select scientists and engineers (include postdoctorates) by "home" department. Exception: if "home" department is not science or engineering, and person holds joint appointment in S/E department.

See section 3 in Instructions.

See section 3 in Instructions.

See section 3 in Instructions.

See section 6 in Instructions.

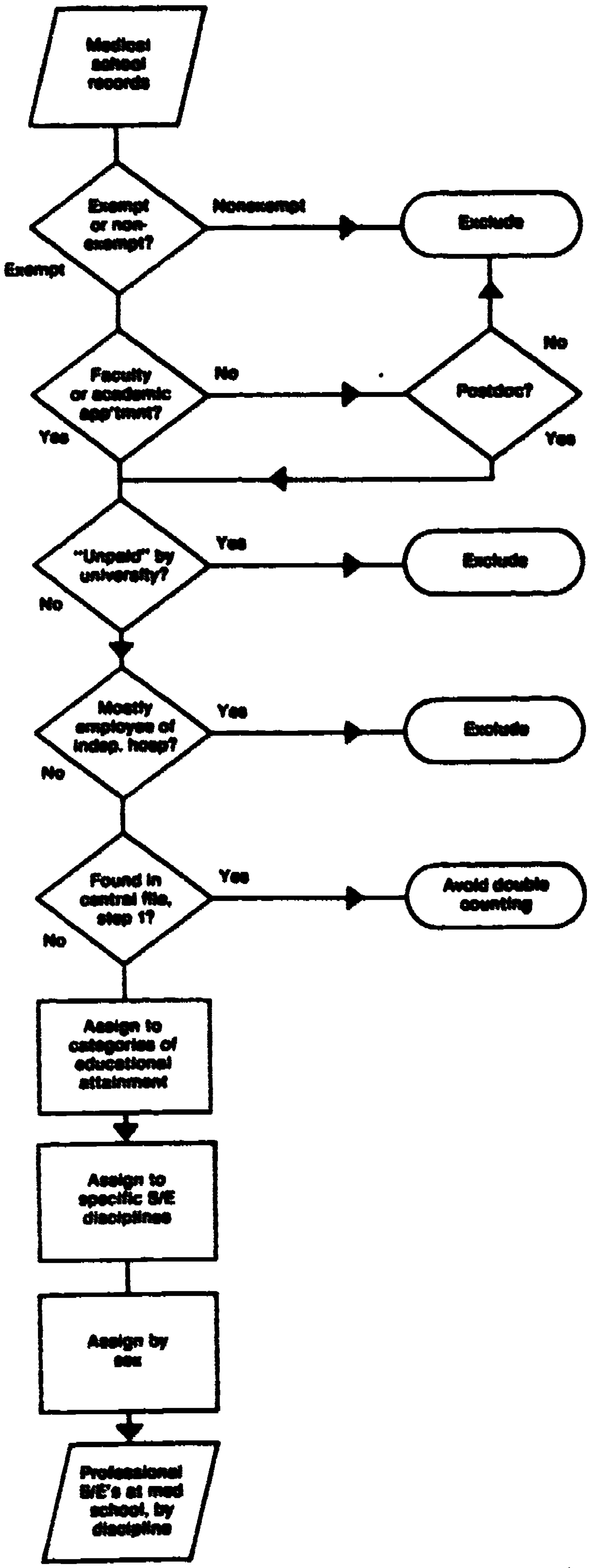
Assign to appropriate disciplines.

See section 7 in Instructions.

At this point you have extracted file containing all professional scientists and engineers covered by central records (but may be limited to those assigned to academic S/E departments in the institution proper).

STEP 2:

Collect information for medical school (if any) if not covered by central file of institution.



Refer to discussion of medical schools (section 5 in Instructions).

Select personnel exempt from Fair Labor Standards Act. (See section 3 in Instructions.)

Do not include medical school personnel unless they have faculty or academic appointments. Exceptions: postdoctorates. (See section 5 in Instructions.)

Exclude personnel "unpaid" by the university even if paid by the medical school. Exclude voluntary staff.

Scientists whose primary employment is at independent hospitals are to be excluded even if they perform teaching/research for your institution through cooperative agreements.

Some individuals may be included in both the institution's central records and the medical school records. Count such, persons only once, but keep track of split assignments for FTE figures, below.

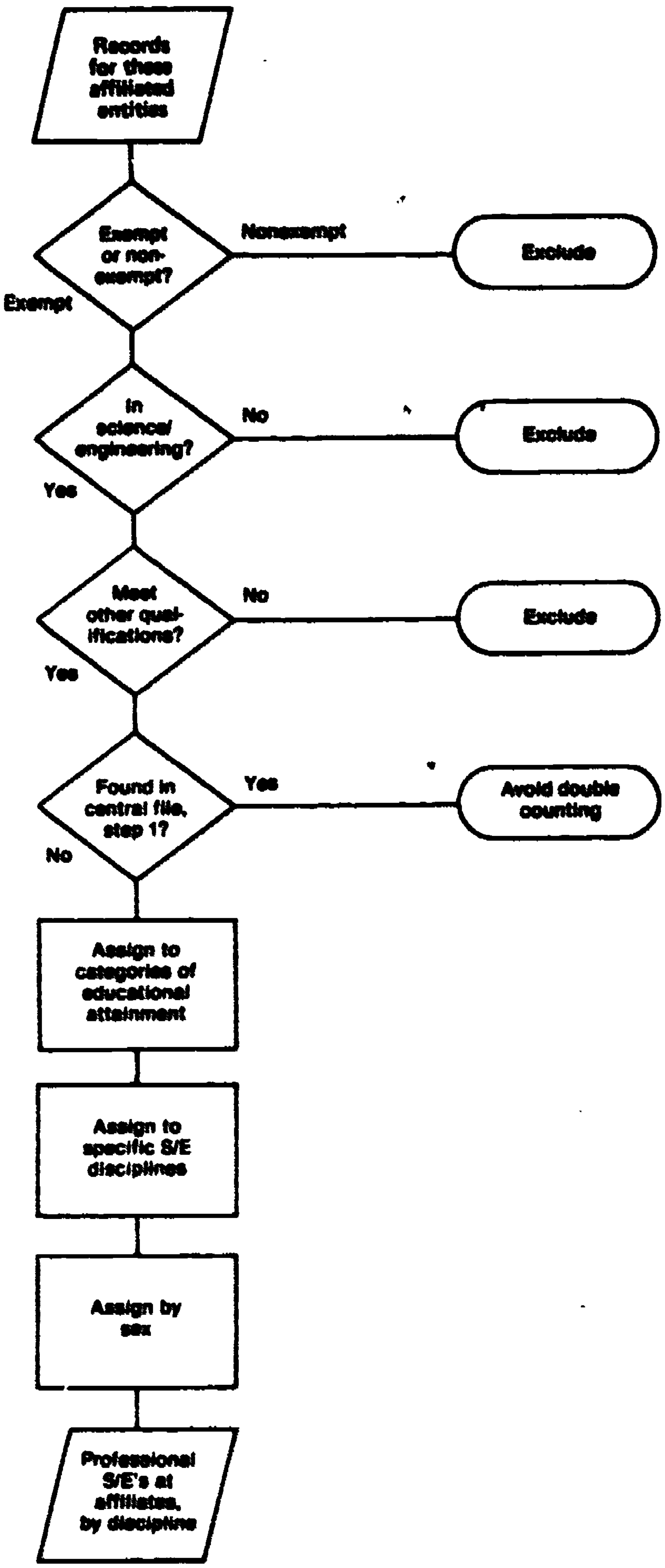
(See section 6 in Instructions.

Assign to appropriate disciplines.

See section 7 in Instructions.

STEP 3:

Collect information on any remaining affiliated entities not covered by files already processed. Such entities might include a regional campus, a computer center, an agricultural experiment station or an associated research unit (except for FFRDC's), etc. Also check for postdoctorates not included in central files (see footnote to section 3 in Instructions.)



See section 1 in Instructions.

Select personnel exempt from Fair Labor Standards Act. (See section 3 in Instructions.)

See discussions in sections 3 and 4 in Instructions.

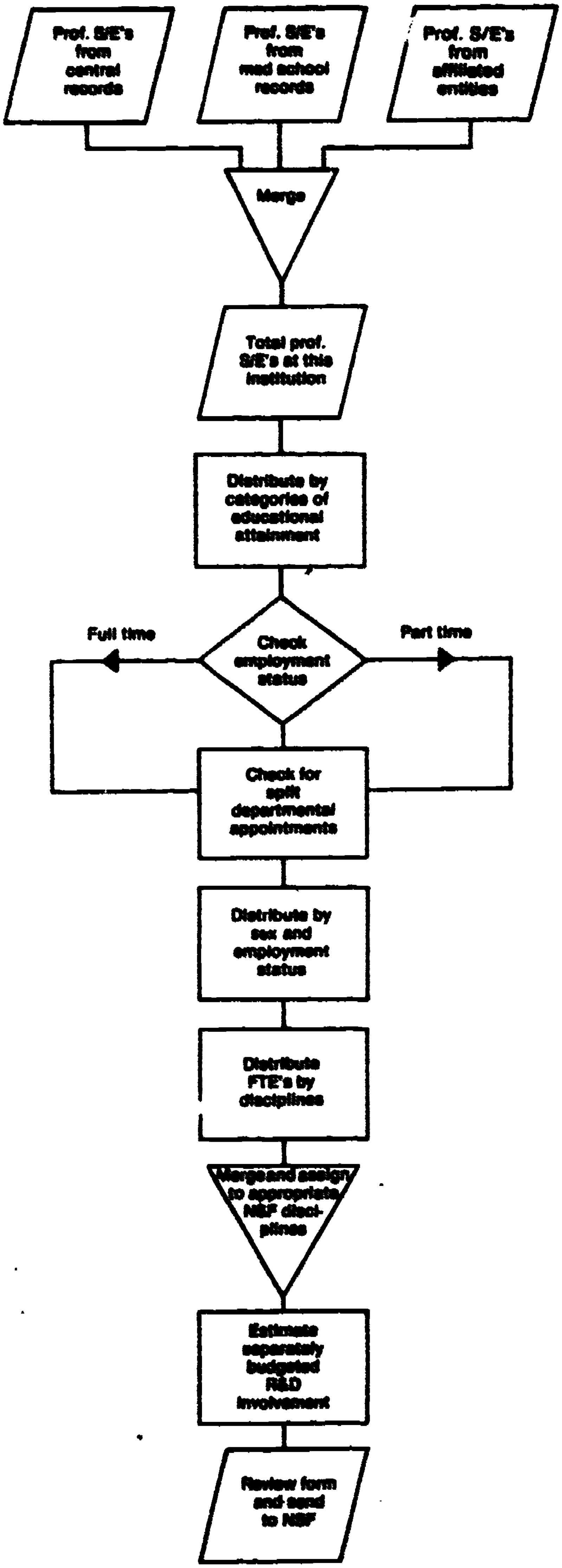
Note exclusions listed in section 3 in Instructions (e.g., exclude personnel away on sabbatical and voluntary staff.)

Some individuals may be included in both the institution's central records and the affiliated entity's files (e.g., a person teaching at both the main and a regional campus). Only count such persons once, but keep track of split assignments for FTE figures, below.

See section 6 in Instructions.

Assign to appropriate disciplines.

See section 7 in Instructions.



STEP 4:

Merge all extracted information, compute full-time-equivalents in each discipline for both full-time and part-time personnel, and determine extent of separately budgeted R&D involvement.

If duplicate entries have not already been eliminated, it may be convenient to do so at this stage.

Data required for item 1 have now been collected.

Use institutional definition for "part-time" employees. (See also discussion of "full time" in section 6 in Instructions.)

FULL TIME: Check for personnel assignments which are split across several disciplines. (See section 8 in Instructions.)

PART TIME: Use institutional conventions or practices to convert numbers of part-time personnel to the equivalent number of full-time individuals in each discipline. (See section 8 in Instructions.)

Data required for item 2 have now been collected.

For all personnel, determine the proportion of time spent in separately budgeted R&D programs. Use institution's conventions or data from faculty activity analyses, salaries paid from research funds, etc. (See section 8 in Instructions.)

Data required for item 3 have now been collected.

INSTRUCTIONS FOR SURVEY OF GRADUATE SCIENCE AND ENGINEERING STUDENTS AND POSTDOCTORATES, FALL 1982

General Definitions

A *graduate science/engineering (S/E) student* is defined as a student enrolled for credit in an advanced-degree program leading to either a master's or Ph.D. degree in fall 1982. M.D., D.V.M., or D.D.S. candidates, interns, and residents should *not* be reported *unless* they are concurrently working for a master's or Ph.D. in a science or engineering field or are enrolled in a joint M.D./Ph.D. program. Individuals who already hold an M.D., D.V.M., or D.D.S., master's or Ph.D. degree but who are working on *another master's or Ph.D. degree are to be counted as graduate students, either full or part time.* Do not report such individuals as postdoctorates in item 8.

Graduate S/E students performing thesis or dissertation research away from the campus at Government and contractor owned facilities in the United States are to be included as long as they are enrolled for credit in an advanced-degree program. Students enrolled at a branch or extension center in a foreign country are to be *excluded*.

A *graduate S/E student, whether full- or part-time, should be reported in only one department.* If any students are in interdisciplinary programs, please be sure that they are counted only once by their "home" department. If a graduate student is enrolled in an inter-institutional program, please report the student only if the degree will be granted by your institution. Please report in terms of headcounts, not in full-time-equivalent (FTE) terms. If data are unavailable or unknown, write "unavailable" or "unknown" in the blank. "N/A" means "not applicable" on this form.

Item Instructions and Definitions

HIGHEST DEGREE OFFERED, item 4: Check the item which refers to the *highest degree* program offered by this science/engineering department in fall 1982. If your department does not offer a graduate degree, but is a department of clinical medicine with or without postdoctorates, check (3).

FULL-TIME GRADUATE STUDENTS, item 5: A full-time graduate student is defined as a student enrolled for credit in an advanced-degree program (not a regular staff member or a postdoctorate) who is engaged full time in training activities in his/her field of science/engineering; these activities may embrace any appropriate combination of study, teaching, and research, depending on your *institution's own policy*. If your department has no full-time graduate students, write "None" in item 3 and move to item 6.

MECHANISMS OF SUPPORT, item 5, lines (1)-(5): Report each full-time graduate S/E student only once according to the source of the largest amount of support received in the fall of 1982. Students receiving *equal* amounts of support from two or more sources should be reported only once, under one of the sources. Students who receive *fellowships* or *traineeships* should be reported on line (1) or (2) respectively, if either of these mechanisms constitute the largest source of his/her support. The Federal Interagency Committee on Education (FICE) differentiates between the two *fellowship and traineeship* stipends as follows: 1) A fellowship is an award made directly to or on behalf of a student selected in a national competition, to enable him to pursue post-baccalaureate training, and 2) a traineeship is an educational award to a student selected by his university. Except for the student selection process, the terms and conditions of the two types of awards are generally identical. A student receiving his/her main support from an assistantship should be classified as a research assistant on line (3) or as a teaching assistant on line (4), depending on how he/she spends the majority of his/her time, e.g., a graduate assistant devoting most of his/her time to teaching should be classified as a graduate teaching assistant. All other full-time graduate students should be reported on line (5).

STUDENTS RECEIVING FINANCIAL ASSISTANCE, item 5, columns (A) through (H): Report the number of full-time graduate S/E students in the appropriate column according to the source of the largest portion of their support. To determine the source, consider only tuition and other academic expenses. If a graduate student receives equal support from more than one source, report student under only one source.

FEDERAL SOURCES, columns (A) through (E): Report the number of full-time graduate S/E students in the appropriate column where they receive the largest portion of their support. Full-time graduate S/E students receiving the largest portion of their support from Federal Government *loans* should be reported as *self-supported*, column (I).

Department of Defense (DOD), column (A): Report full-time graduate S/E students receiving support from the Department of the Army, Navy, or Air Force. Students receiving their main support from the Veterans Administration under the G.I. Bill should be reported under column (E) "Other Federal Sources"; if this form of support does not constitute his/her *main* source, the student should be counted in the appropriate column representing that source.

Department of Health and Human Services (HHS), columns (B) and (C): Report full-time graduate students receiving support from the institutes or divisions of the **National Institutes of Health (NIH)** under column (B); support from all other components of HHS should be reported under column (C), as indicated below:

National Institutes of Health, report in column (B):
- Division of Research Resources
- National Cancer Institute
- National Eye Institute
- National Heart, Lung, and Blood Institute
- National Institute on Aging
- National Institute of Allergy and Infectious Diseases
- National Institute of Arthritis, Diabetes, and Digestive and Kidney Diseases
- National Institute of Child Health and Human Development
- National Institute of Dental Research
- National Institute of Environmental Health Sciences
- National Institute of General Medical Sciences
- National Institute of Neurological and Communicative Disorders and Stroke
- National Library of Medicine

Other HHS, report in column (C):
- Alcohol, Drug Abuse, and Mental Health Administration (including National Institute of Mental Health)
- Center for Disease Control
- Food and Drug Administration
- Health Resources Administration
- Health Services Administration
- Office of Human Development

Other Federal sources, column (E): Report the number of full-time graduate S/E students receiving support from all other Federal agencies, including the Department of Education.

NON-FEDERAL SOURCES, columns (F) through (H):

Institutional support, column (F): Report full-time graduate S/E students receiving support from your own institution and State and local governments. Students supported by funds given to a university by the Federal Government, such as training grant funds, should be reported under the appropriate Federal agency and NOT reported as *institutional support*

Foreign sources, column (G): Include support from any non-U.S. source.

Other U.S. sources, column (H): Include support from nonprofit institutions, private industry, and all other U.S. sources.

SELF-SUPPORTED STUDENTS, column (I): Include full time graduate S/E students whose main source of support is derived from loans from any source and from personal or family financial contributions. Full-time graduate S/E students receiving the largest portion of their support from Federal loans or tuition waivers should be reported here. Note that these students should be included in the total, column (J) Foreign *self-supported* students are to be reported here, also.

Women, line (7): Report all women S/E students by their source of main support. Please note that in each column, data on line (7) should not exceed the total on line (6)

NOTE *Foreign students are now to be reported in item 7, column G*

First-year students, lines (8) and (9). A first-year student is defined as one who will have completed *less than a full year* of graduate study as of the beginning of the fall term in 1982 *in the S/E program in which he/she is enrolled for a degree* All other graduate S/E students should be considered beyond their first year

PART-TIME GRADUATE S/E STUDENTS, item 6. A part-time graduate student is defined as a student who is enrolled in an advanced-degree program who is NOT pursuing graduate work full time as defined in item 5. Report the *total* number of part-time graduate students on line (1); if a department has no part-time graduate students, enter "None" and move to item 7

RACIAL/ETHNIC BACKGROUND, item 7. Racial/ethnic designations as used in this survey do not denote scientific definitions of anthropological origins; a graduate student may thus be included in the group to which he/she appears to belong, identifies with, or is regarded in the community as belonging. No person should be counted in more than one racial/ethnic group, however, and only those with U.S. citizenship should be reported in columns (A) through (E).

On line 1, report the total number of full-time S/E graduate students under the appropriate racial/ethnic category. The total for each line should equal the sum of columns (A) through (G). The total for full-time enrollment shown in item 7 should match the total shown in item 5; similarly, the part-time total shown in item 7 should equal the total in item 6.

The following racial/ethnic designations are those defined by the Office of Civil Rights:

U.S. CITIZENS columns (A) through (E):

Black, non-Hispanic, column (A) Report persons having origins in any of the black racial groups (except those of Hispanic origin)

American Indian or Alaskan Native, column (B). Report persons having origins in any of the original peoples of North America

Asian or Pacific Islander, column (C) Report persons having origins in any of the original peoples of the Far East, Southeast Asia, or the Pacific Islands. These areas include China, Japan, Korea, the Philippine Islands, and Samoa

Hispanic, column (D) Report persons of Mexican, Puerto Rican, Cuban, Central or South American, or other Spanish culture or origin, regardless of race

White, non-Hispanic, column (E) Report persons having origins in any of the original peoples of Europe, North Africa, the Middle East or the Indian subcontinent, except those of Hispanic origin

OTHER AND UNKNOWN, column (F) If department records are not complete as to racial/ethnic origin of some graduate students, please report in column (F) those students with U.S. citizenship whose origins are not listed in item 7, as well as those whose origins are unknown

FOREIGN, column (G): Please report all foreign students, whether nonresident alien or holding a permanent visa, in column (G). A *foreign* graduate student is defined as an individual who has not attained U.S. citizenship. Do not include native residents of a U.S. possession, such as American Samoa. Applicants for U.S. citizenship are to be considered as foreign until the date their citizenship becomes effective.

POSTDOCTORATES AND NONFACULTY DOCTORAL RESEARCH STAFF, item 8: Include as **postdoctorates** those individuals with science or engineering Ph.D.'s, M.D.'s, D.D.S.'s, or D.V.M.'s (including foreign degrees that are equivalent to U.S. doctorates) who devote *their primary effort to research* activities or study in the department under temporary appointments carrying no academic rank. Such appointments are generally for a *specific time period.* They may contribute to the academic program through seminars, lectures, or working with graduate students. Their postdoctoral activities provide additional training for them. **Exclude** clinical fellows and those with appointments in residency training programs in medical and health professions, unless *research training* under the supervision of a *senior mentor* is the *primary purpose* of the appointment

On line (1), under columns (A) and (B), enter the number of fellows and trainees receiving support under Federal fellowships and/or training grants. Under column (C) enter the number of postdoctorates who are receiving federally supported research **grants** Those remaining postdoctoral appointees receiving non-Federal support should be entered under column (D) Of the *total* in column (E), enter in column (F) the number of postdoctorates who are foreign.

Under **other nonfaculty doctoral research staff,** column (G), report all doctoral scientists and engineers who are principally involved in research activities but who are considered *neither* postdoctoral appointees nor members of the *regular* faculty In column (H), report the total of columns (E) and (G)

On line 2, report the number of women in each category On line 3 (optional) report those postdoctorates and nonfaculty doctoral research staff who hold first professional medical degrees (M.D., D.D.S., D.V.M., etc.) Please note that in each column, data on lines 2 and 4 should not exceed the total on line 1

NSF Form 812, Nov 82

Form Approved
OMB No 3145-0062
Appr Exp 12/31/83

NATIONAL SCIENCE FOUNDATION and NATIONAL INSTITUTES OF HEALTH

Survey of Graduate Science and Engineering (S/E) Students and Postdoctorates, Fall 1982

DEPARTMENTAL DATA SHEET

Before filling out, please read the instructions. Upon completion, return form to your survey coordinator.

1 Name and address of institution ____________________

2 Name of science or engineering department (or unit) covered by this data sheet ____________________

3 Person in department (or unit) preparing this form

Name ____________________ Phone ( )

Title ____________________

4 Highest degree offered by department in fall 1982 (CHECK ONE ONLY) Doctorate (1) Master's (2) No graduate degree offered (3)

(LEAVE BLANK)

Response code

Institution and department code

If your department does not enroll graduate students, please move to item 8 below. For identification of S/E fields classification, see enclosed NSF/NCES "Crosswalk." If data are unavailable or unknown, write "unavailable" or unknown" in the blank. "N/A" means "not applicable" on this form.

5 Number of FULL-TIME GRADUATE S/E STUDENTS enrolled for advanced degrees (master's and doctorate) in fall 1982		STUDENTS RECEIVING FINANCIAL ASSISTANCE								SELF-SUPPORTED STUDENTS	TOTAL FOR ALL SOURCES
		FEDERAL SOURCES (excluding loans)					NON-FEDERAL SOURCES				
			HHS								
MECHANISMS OF SUPPORT		Department of Defense (A)	National Institutes of Health (B)	Other HHS (C)	National Science Foundation (D)	Other Federal sources (E)	Institutional support¹ (F)	Foreign sources (G)	Other U S sources² (H)	(Including loans and family sources) (I)	(Sum of (A) thru (I)) (J)
Graduate Fellowships	(1)										
Graduate Traineeships	(2)										
Graduate Research Assistantships	(3)										
Graduate Teaching Assistantships	(4)										
Other Types of Support	(5)										
FULL-TIME TOTAL	(6)										
For each total on line (6) how many are WOMEN?	(7)										

FIRST-YEAR STUDENTS	(8)	Of the full-time graduate students on line (6), column (J), how many are FIRST-YEAR students?	
FIRST-YEAR WOMEN STUDENTS	(9)	Of the full-time FIRST-YEAR graduate students on line (9), how many are WOMEN?	

¹Include support from this university and State and local governments

²Include support from nonprofit institutions, industry, and all other U S sources

6 NUMBER OF PART-TIME GRADUATE STUDENTS, FALL 1981		
PART-TIME TOTAL	(1)	
Of the part-time total on line (1) how many are WOMEN?	(2)	

Check List

[] 1 Do all entries reflect headcounts and **NOT** FTE's?
[] 2 Do the data in items 5, 7, and 8 add to totals?
[] 3 Have you **included** all self-supported full-time graduate S/E students in item 5, column I? Note that self-supported students should also be included in the total (column J)
[] 4 Have you **excluded** M.D., D.D.S., and D.V.M. candidates, interns, and residents (except those enrolled in joint programs with the Ph.D.) from items 5, 6, and 7?
[] 5 Does item 5, line 6, column J equal item 7, line 1, column H?
[] 6 Does item 6, line 1 equal item 7, line 2, column H?

7 RACIAL/ETHNIC BACKGROUND	Of the graduate student totals in items 5 and 6, how many belong to the following racial/ethnic categories?		U.S. CITIZENS ONLY						FOREIGN	TOTAL
			Black non-Hispanic (A)	Amer. Indian/Alaskan Native (B)	Asian/Pacific Islander (C)	Hispanic (D)	White non-Hispanic (E)	Other or unknown (F)	(G)	(sum of (A) thru (G)) (H)
	Full time (column G should equal item 5, line 6, col. J)	(1)								
	Part time (column G should equal item 6, line 1)	(2)								

Is Racial/Ethnic Background data available at department level? If not, where available?

8 Number of POSTDOCTORATES and NON-FACULTY DOCTORAL RESEARCH STAFF (Include those affiliated with this department as well as those employed in associated academic research units. Exclude clinical fellows and residents not involved in research.)		POSTDOCTORATES						OTHER NON-FACULTY DOCTORAL RESEARCH STAFF	TOTAL
		SOURCE OF SUPPORT				TOTAL for all sources (A) thru (D)	Of the total in (E), how many are FOREIGN?		(Sum of (E) and (G))
		Federal			Non-Federal				
		Fellowships (A)	Traineeships (B)	Research grants (C)	(D)	(E)	(F)	(G)	(H)
TOTAL	(1)								
Of the total on line (1), how many are WOMEN?	(2)								
Optional Of the total on line (1) how many also hold the M.D., D.D.S., or D.V.M. degree?	(3)								

Approximately how many personhours were required to complete this form? [ ]

Please provide comments to explain any variances from prior year's data

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NOTE: This information is solicited under the authority of the National Science Foundation Act of 1950, as amended. All information you provide will be used for statistical purposes only. Your response is entirely voluntary and your failure to provide some or all of the information will in no way adversely affect your institution.

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OPTIONAL

SURVEY OF GRADUATE SCIENCE AND ENGINEERING STUDENTS AND POSTDOCTORATES, FALL 1982

INSTRUCTIONS

Please complete items 9, 10, and 11 with regard to FULL-TIME SCIENCE/ENGINEERING (S/E) FACULTY only. Include all full-time S/E faculty in your department regardless of whether they instruct graduate or undergraduate students. Please complete item 12 for FULL-TIME S/E NONFACULTY research doctorates only.

9) *RANK AND TENURE STATUS OF FULL-TIME S/E FACULTY.* What academic ranks are held by the full-time S/E faculty of this department? What is their tenure status?

Full-time S/E faculty. Persons with regular full-time appointments. Include all ranks from instructor to professor. Include full-time members of your department who are on sabbatical leave away from your institution. Persons with joint appointments who work part of their time in another department should be treated as follows: Those working more than one-half their time in this department should be included here; those working less than one-half time in this department should be included in the other department; if they work exactly half time in each, please consult with the chairperson of the other department as to which one will include the appointee. Please DO NOT include the following as full-time faculty: Visiting professors, postdoctorates, research associates, graduate assistants, or others who are not regular FULL-TIME S/E FACULTY in this department.

9 Rank and tenure status of full-time S/E faculty, fall 1982	Academic rank	Total (A)	Tenured (B)	Non-tenured (C)	Of those in column (C) how many are in tenure track? (D)
	(1) Professor				
	(2) Associate professor				
	(3) Assistant professor				
	(4) Other ranks				
[ ] Check here if this department has no full-time S/E faculty	(5) Non-ranked				
	(6) Total full-time S/E faculty				

10) *APPOINTMENTS* How many full-time S/E faculty did your department appoint for service to begin during the academic year 1981/82? How many of these new appointees held full-time faculty or staff appointments in another academic institution immediately prior to their joining your department? What tenure status were they given in your department at the time of their appointments? Note that line (2), columns (B) & (C) refer to the status of these individuals at your institution.

10 Full-time S/E faculty appointments during academic year 1981/82		Appointments	Total full-time S/E faculty appointed (A)	Tenure status as of date of appointment: Tenured (B)	Tenure status as of date of appointment: Non-tenured (C)
	(1)	Total appointments			
	(2)	Of those in line (1) above, how many joined your department from full-time faculty or staff positions in another academic institution? (Do not report transfers within your institution).			

11) *DEPARTURES.* How many members of this department who held full-time S/E faculty appointments in September 1981 left the department between September 1, 1981, and August 31, 1982, for one of the reasons listed below? *Please enter the number for each of the following categories. (Count each person only once; in case of multiple reasons, choose the one in your opinion that was most important.)*

11. Full-time S/E faculty departing during academic year 1981/82		Reason for leaving	Total full-time S/E faculty leaving (A)	Tenure status of full-time S/E faculty leaving: Tenured (B)	Nontenured (C)
	(1)	Retirement, illness, or death			
	(2)	Voluntary resignation for another academic position			
	(3)	Voluntary resignation for a position in business or industry			
	( )	Voluntary resignation for other reasons			
	( )	Failure to receive tenure			
	( )	Involuntary resignation for other reasons			
	( )	Total departures			

12) *NONFACULTY S/E DOCTORAL RESEARCH STAFF* How many full-time, nonfaculty S/E research doctorates are employed in this department? Please enter the number of people in each category shown. Only persons holding full-time appointments are to be included.

Full-time nonfaculty S/E research doctorate Persons employed full time by the department in fall 1982 in a professional capacity specifically for research activities, who hold doctorates on the date this survey form is filled out, who do not have a faculty appointment, and who are not postdoctorates.

12 Full-time nonfaculty S/E doctoral research staff, fall 1982	TOTAL (see item 8, column (G), line 1) (A)	Number receiving doctorates before fall 1975 (B)	Number receiving doctorates in fall 1975 or later (C)

Department name ____________________

Institution name ____________________