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ABSTRACT

Because undergraduate education is the foundation for graduate studies, it is important to know where our Nation's science and engineering (S&E) doctorate recipients are receiving their undergraduate training. Specifically, this report addresses the following broad questions: (1) What are the undergraduate origins of S&E doctorate holders? (2) Which educational institutions contribute most to the undergraduate education of recent S&E doctorate recipients? (3) What proportions of S&E doctorate holders earned their baccalaureate at a doctorate granting institution? (4) What roles do the various baccalaureate-origin institutions play in S&E predoctorate education? (5) What role do two-year colleges play in the undergraduate education of persons who later earn an S&E doctorate? and (6) Are the top-ranking baccalaureate institutions of women and racial/ethnic minorities the same as those of men and whites? (PR)

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Undergraduate Origins of Recent Science and Engineering Doctorate Recipients

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Undergraduate Origins of Recent Science and Engineering Doctorate Recipients

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Division of Science Resources Studies

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Foreword

Baccalaureate institutions are an essential part of the educational process for persons earning science and engineering (S&E) doctorates. This report summarizes data on the baccalaureate institutions reported by persons completing doctorates from 1985 through 1990. It provides an institutional context for examining this aspect of the educational pipeline.

Kenneth M. Brown
Director, Division of
Science Resources Studies

December 1992

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Contents

Section	Page
I. Introduction	
Overview	1
Definitions.....	1
Source of Data.....	2
II. Undergraduate Origins in Foreign Institutions	3
Role of Foreign Institutions by S&E Field	3
Foreign Citizen S&Es Who Earned Both Baccalaureate and Doctorate in the United States	3
III. Undergraduate Origins by Type of U.S. Institution	5
Nationally Prominent Institutions from Which S&E Doctorate Recipients Had Received Baccalaureate Education	5
Carnegie Classification of U.S. Institutions by S&E Field of Study.....	5
Role of Research-Intensive Institutions in the Baccalaureate Education of S&E Doctorate Recipients.....	6
Role of Other Doctorate-Granting Institutions in the Baccalaureate Education of S&E Doctorate Recipients.....	7
Role of Comprehensive Institutions in the Baccalaureate Education of S&E Doctorate Recipients.....	7
Role of Liberal Arts Institutions in the Baccalaureate Education of S&E Doctorate Recipients.....	7
Role of Specialized Institutions in the Baccalaureate Education of S&E Doctorate Recipients.....	8
Role of 2-year Colleges in the Undergraduate Education of S&E Doctorate Recipients.....	8

Section	<i>Page</i>
IV. Baccalaureate Origins of Women and Racial/Ethnic Groups With Doctorates in S&E.....	9
Baccalaureate Origins of Women S&E Doctorate Recipients	9
Baccalaureate Origins by Racial/Ethnic Group of S&E Doctorate Recipients.....	9
Role of Historically Black Colleges and Universities (HBCUs) in the Baccalaureate Education of Black S&E Doctorate Recipients.....	12
Appendix A: Technical Notes.....	15
Appendix B: Detailed Statistical Tables	21
Appendix C: Bibliography	51

I. Introduction

Currently, only about 300 universities in the United States provide doctorate-level education in science and engineering (S&E), but other institutions provide students their foundation in science or engineering:

- Almost 1,400 4-year colleges that offer undergraduate S&E degrees;
- About 1,300 2-year schools that offer S&E instruction and/or training in S&E technologies;
- Over 20,000 high schools that provide mathematics and science courses; and
- Numerous high schools, colleges, and universities in foreign countries that educate the many students who came to the United States for their graduate degrees.¹

Given their significance, these institutions have been studied and reported on for over 50 years (see appendix C, Bibliography).² This report provides additional knowledge, focusing particularly on those institutions that awarded baccalaureates to students who later received doctorates in S&E fields.

Overview

Because undergraduate education is the foundation for graduate studies, it is important to know where our Nation's S&E doctorate recipients are receiving their undergraduate training. Specifically, this report addresses the following broad questions:

¹ Data on numbers of institutions are from the National Center for Education Statistics, *Digest of Education Statistics 1989* (Washington, D. C.: Supt. of Documents, U.S. Government Printing Office, 1990) p. 12.

² Many of the reports cited in the Bibliography focus on the "productivity" of baccalaureate institutions (i.e., the proportion of the total bachelor's degree recipients from that institution, or group of institutions, who go on to earn doctorates within a certain time frame). This approach adjusts for institutional size to some extent.

- What are the undergraduate origins of S&E doctorate holders?
- Which educational institutions contribute most to the undergraduate education of recent S&E doctorate recipients?
- What proportion of S&E doctorate holders had earned their baccalaureate at a doctorate granting institution?
- What roles do the various types of baccalaureate-origin institutions play in S&E predoctorate education?
- What role do 2-year colleges play in the undergraduate education of persons who later earn an S&E doctorate?
- Are the top-ranking baccalaureate institutions of women and racial/ethnic minorities the same as those of men and whites?

These and related questions are explored in this report.

Definitions

Recent doctorate recipients are defined as persons who earned doctorates in S&E fields from U.S. universities in the academic years ending in June 1985 through 1990. Doctorate recipients in these six years were combined into one cohort, or unit of analysis, to minimize the possibility of overemphasizing any unusual circumstances from any single year.

The S&E fields of study, as defined by the National Science Foundation (NSF), include the natural sciences (physical sciences, biological sciences, mathematics, computer sciences), social science/psychology, and engineering. The specific fields are listed in table 1 in Appendix B, Detailed Statistical Tables. Note that engineering technology and medical degrees are not included.

A baccalaureate-origin institution is defined as the college or university from which an S&E doctorate recipient had earned a bachelor's degree. Excluded are any other undergraduate institutions that the student may have attended before receiving a baccalaureate.

The Carnegie Classification of Institutions was used to group types of institutions for this analysis.

The Carnegie Commission on Higher Education has periodically (1970, 1976, and 1987) classified institutions of higher education in the United States by the range of programs and/or degrees offered, enrollment size, and amount of Federal funds received for research. A modified version of the 1987 Carnegie Classification is used in this report to study the baccalaureate origins of scientists and engineers who recently received their doctorate from U.S. institutions. See Appendix A, Technical Notes, for more detailed information.

Source of Data

The source of the data used in this report is the Survey of Earned Doctorates (SED), awarded in the United States. The survey questionnaires are completed by approximately 93 percent of all doctorate recipients as they finish the requirements for their degree. A detailed description of the survey and possible sources of error are provided in appendix A, Technical Notes.

II. Undergraduate Origins in Foreign Institutions

Most recipients of S&E doctorates from U.S. universities also receive their undergraduate education at U.S. institutions. Foreign institutions do, however, play a significant role. Therefore, at the beginning of this section, brief consideration is given to the extent to which foreign institutions have provided the undergraduate education of S&E doctorate recipients. Baccalaureate origins in U.S. institutions are then treated in more detail.

Universities in the United States and other major Western nations house advanced training facilities and employ distinguished scholars. Consequently, many students from foreign countries come to the United States to obtain graduate S&E training. Given the international nature of the scientific and technological community, it is not surprising that over one-quarter of all recipients of S&E doctorates awarded by U.S. universities had received their baccalaureates from foreign institutions.

Impact of Foreign Students

In graduate schools of engineering, faculty often teach students who have been educated outside the United States. What is the impact of large numbers of students from foreign countries in the classroom? A recent report, *Boon or Bane*, determined that faculty "did not to any great extent take the national composition of their graduate students into account in defining the content of the subject matter to be taught." The authors reported that the baccalaureate educational background of foreign students "provides in many instances a high level of theoretical sophistication." In terms of communication, however, almost half of faculty reported they had "made special efforts to accommodate the foreign students' difficulties in oral comprehension."³

³ Robert Morgan and Elinor Barber, *Boon or Bane* (New York: Institute for International Education, 1988).

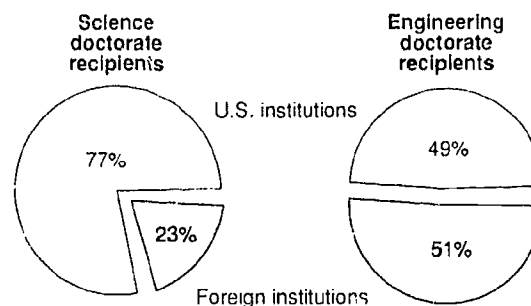
Role of Foreign Institutions by S&E Field

Considerably more engineering doctorate holders received their undergraduate education in foreign institutions than did science doctorate holders: 51 percent versus 23 percent (chart 1). In several science fields, however, the proportion of foreign baccalaureate holders was significantly higher than the average: Mathematics (47 percent), computer science (42 percent), agriculture (37 percent), physics (36 percent), and social science (31 percent) (table 1 in Appendix B).

Foreign Citizen Scientists and Engineers (S&Es) Who Earned Both Baccalaureate and Doctorate in the United States

Most foreign citizens who earned S&E doctorates in the United States completed the lower levels of educa-

Chart 1.
U.S. versus foreign baccalaureate origins of recent science and engineering doctorate recipients



NOTE: See Technical Notes for more information on the Carnegie Classification

SOURCE: National Science Foundation/SRS, Survey of Earned Doctorates for the years 1985-90.

tion in their native countries. Some foreign S&E doctorate holders, however, had received not only their doctorate in the United States, but also their baccalaureate. As would be expected, a higher proportion of foreign S&E doctorate recipients with permanent resident visas than with temporary visas (29 versus 7 percent) had earned their baccalaureate in U.S. institutions.

Among foreign citizens who received their S&E doctorate in the United States, those of certain countries had high proportions who also earned their

baccalaureate in the United States. Colombia, Caribbean Islands, West Germany, Hong Kong, Iran, Lebanon, and Nigeria had high proportions of S&E doctorates who received all of their college education (baccalaureate through doctorate) in the United States (table 2). Reasons for those high proportions vary by country and include foreign government programs promoting mobility as well as the unavailability of comparable programs in the home countries.

III. Undergraduate Origins by Type of U.S. Institution

Recent S&E doctorate recipients cited approximately 1,400 U.S. institutions as the sources of their baccalaureates. These institutions constitute almost three-quarters of the Nation's approximately 2,000 colleges and universities that award bachelor's degrees.

Nationally Prominent Institutions from Which S&E Doctorate Recipients Had Received Baccalaureate Education

Twenty-five U.S. institutions were especially prominent among those that granted baccalaureates to students who eventually earned their S&E doctorate. Together, the 25 institutions accounted for the baccalaureate education of almost one-quarter of those persons who received S&E doctorates in the United States between 1985 and 1990 (table 3). Individually, each of the 25 top-ranked institutions had provided the undergraduate education of at least 500 graduate students who received their S&E doctorate in that period.

The University of California at Berkeley was by far the largest provider of undergraduate education of recent S&E doctorate recipients, followed by Cornell University, University of Illinois at Urbana, and University of Michigan (table 3).

All institutions that provided the baccalaureate education of 10 or more recent S&E doctorates are listed in Appendix B, table 17.

Carnegie Classification of U.S. Institutions by S&E Field of Study

A modified Carnegie Classification system was used in this report whereby the 4-year institutions in the United States that awarded baccalaureates were grouped into the following categories:

- Research-intensive institutions (number=70),
- Other doctorate-granting institutions (number=138),
- Comprehensive institutions (number=568),
- Liberal arts institutions (number=518), and

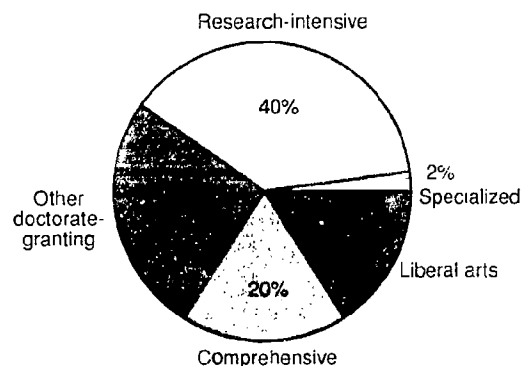
- Specialized institutions (number=177)

Appendix A, Technical Notes, provides detailed information on these Carnegie Classification groups.

Table 4 provides an overview of the role of each type of Carnegie Classification group in the baccalaureate origins of S&E doctorates by field of study.⁴ The 70 research-intensive institutions awarded 40 percent of the bachelor's degrees of S&E doctorate recipients, and the 138 other doctorate-granting institutions awarded another 25 percent (chart 2). Altogether the 208 institutions that offer doctoral S&E programs accounted for 65 percent of the baccalaureate origins

⁴ Note that field of study refers only to the field of the doctorate. Changes in field of study from the baccalaureate to the doctorate do occur; see Susan T. Hill, *Science and Engineering Doctorates: 1960-90* [NSF 91-310 Final] (Washington, D. C.: National Science Foundation, 1991), pp. 165-66.

Chart 2.
Baccalaureate origins in U.S. institutions of recent science and engineering doctorate recipients, by Carnegie Classification of Institutions



NOTE: See Technical Notes for more information on the Carnegie Classification

SOURCE: National Science Foundation/SRS, Survey of Earned Doctorates for the years 1985-90.

of S&E doctorate holders (chart 2). This is somewhat higher than the proportion of S&E bachelor's degrees awarded (56 percent) that doctorate-granting institutions accounted for in 1988.

The role of each Carnegie group in the baccalaureate-origins of recent S&E doctorate holders differed markedly depending on the S&E field of doctorate awarded. For example, research-intensive institutions provided the undergraduate education of over half of the recent doctorate recipients in chemical, electrical, and mechanical engineering and in physics. But these institutions awarded baccalaureates to only 29 percent of recent chemistry doctorate recipients, who tended to have their baccalaureate origins in comprehensive and liberal arts institutions (table 4).

The following sections describe baccalaureate origins for S&E doctorates for each of the five kinds of institutions. A list of the top 25 (or 24, 23, etc. depending on an even break-point for number of degrees) institutions within each Carnegie Classification group is also provided in Appendix B. The role of 2-year institutions is also discussed.

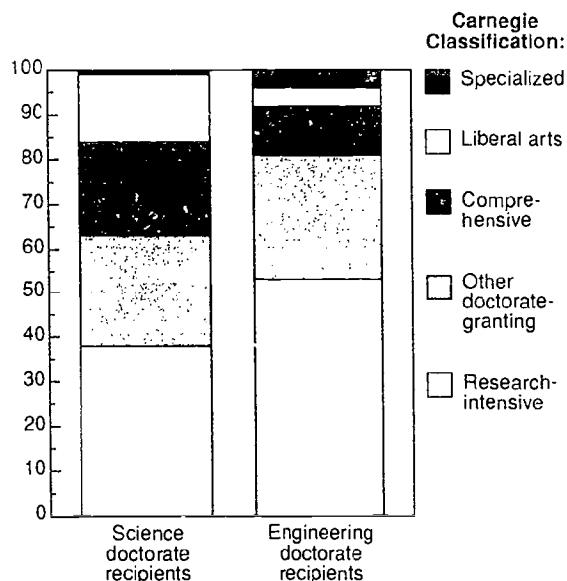
Role of Research-Intensive Institutions in the Baccalaureate Education of S&E Doctorate Recipients

The 70 research-intensive universities led other institutions both in the amount of Federal support received for research and in the range of doctoral programs offered. Research-intensive institutions played a central role in undergraduate S&E education, having provided the baccalaureate education of 40 percent of recent S&E doctorate holders.

Fifty-three percent of recent engineering doctorate recipients had earned their bachelor's degree at research-intensive universities; the comparable figure for science doctorate recipients was 38 percent. Scientists with recently acquired doctorates were more likely than their engineering counterparts to have earned their bachelor's degrees at comprehensive or liberal arts institutions (chart 3). The prominence of research-intensive institutions varied by field, however, as shown in chart 4.

Of the 25 top-ranked baccalaureate institutions from which S&E doctorate holders had earned their baccalaureate (table 3), 24 were classified as research-intensive; the remaining institution, Iowa State University, was the only one classified as an "other" doctorate-granting university. The top 25 research-intensive institutions differ from the general ranking of top 25 baccalaureate institutions nationally only in the substitution of SUNY at Stony Brook for Iowa State University. Table 5 lists the top 25 research-intensive institutions; together, these accounted for

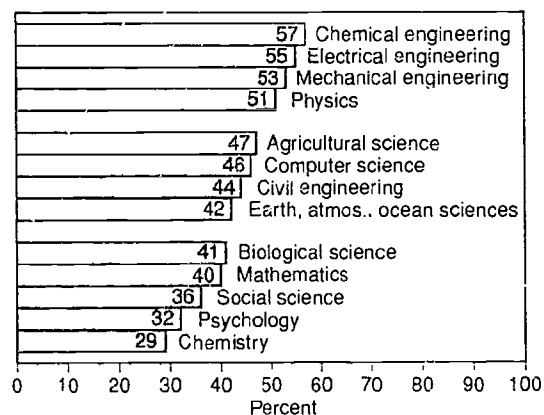
Chart 3.
Baccalaureate origins in U.S. institutions of recent science and engineering doctorate recipients, by Carnegie Classification of Institutions



NOTE: See Technical Notes for more information on the Carnegie Classification

SOURCE: National Science Foundation/SRS, Survey of Earned Doctorates for the years 1985-90.

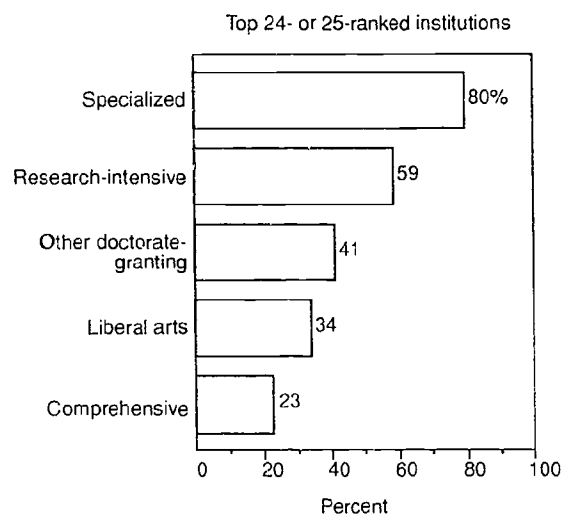
Chart 4.
Percent of recent science and engineering doctorate recipients who earned their bachelor's degree at U.S. research-intensive universities, by field of doctorate



NOTE: See Technical Notes for more information on the Carnegie Classification

SOURCE: National Science Foundation/SRS, Survey of Earned Doctorates for the years 1985-90.

Chart 5.
Concentration of baccalaureate-origin institutions of recent science and engineering doctorate recipients within each Carnegie Classification group



NOTE. See Technical Notes for more information on the Carnegie Classification.

SOURCE: National Science Foundation-SRS, Survey of Earned Doctorates for the years 1985-90.

about 60 percent of the bachelor's degrees earned at the 70 research-intensive institutions by recent S&E doctorate recipients (chart 5).

Role of Other Doctorate-Granting Institutions in the Baccalaureate Education of S&E Doctorate Recipients

The 138 other doctorate-granting institutions have established doctoral programs, but have fewer research programs than research-intensive institutions. Many of the schools categorized as other doctorate-granting institutions are significant in the undergraduate education of recent S&E doctorate recipients, accounting for 25 percent of their baccalaureates.

The top 25 other doctorate-granting institutions awarded 41 percent of the category's total S&E doctorate holders' baccalaureates (table 6).

Role of Comprehensive Institutions in the Baccalaureate Education of S&E Doctorate Recipients

Institutions identified as "comprehensive" are those that offer a liberal arts program, a professional or occupational program, and master's degrees. This category includes 568 institutions that award S&E baccalaureates.

The top 24 comprehensive institutions are dominated by the California State university system and the New York City university system, which together accounted for 13 of the top 24. These 13 institutions awarded over two-thirds of the S&E baccalaureates to those who later became S&E doctorate recipients (table 7). Two institutions from Puerto Rico also rank high among comprehensive baccalaureate institutions of recent S&E doctorate recipients.

Comprehensive institutions had conferred baccalaureates on 2 out of every 10 recent science doctorate recipients, twice the proportion found among recent engineering doctorate recipients (chart 2).

Role of Liberal Arts Institutions in the Baccalaureate Education of S&E Doctorate Recipients

Liberal arts colleges are predominantly bachelor's degree-granting institutions that award more than half their degrees in liberal arts fields.

The top 24 liberal arts colleges cited most often by recent S&E doctorate holders as their baccalaureate-origin institutions (table 8) account for 34 percent of the total number of bachelor's degrees awarded by liberal arts institutions to those who went on to earn a doctorate.

When productivity is taken into account, several liberal arts colleges rank with research-intensive universities for number of bachelor's degree recipients who go on to earn a S&E doctorate. A recent report indicated that 15 of the top 25 institutions—ranked by the proportion of the baccalaureate recipients who earned doctorates in the sciences between 1951 and 1980—were liberal arts colleges.⁵ Similar findings were also presented in the report on "Persistence in Higher S&E Education."⁶

By field, liberal arts institutions provided the baccalaureate education of 15 percent of science doctor-

⁵ Sam Carrier and David Davis-Van Atta, *Maintaining America's Scientific Productivity* (Oberlin, OH: Oberlin College, 1987).

⁶ Betty Maxfield, *Persistence in Higher S/E Education: S/E Baccalaureate to S/E Doctorate Production* (Washington, D.C.: Library of Congress, Office of Technology Assessment, 1988).

ate holders, almost four times the proportion found among engineering doctorate holders (chart 2). These institutions play a significant role in the baccalaureate origins of recent doctorate recipients in chemistry, mathematics, and social sciences, and psychology (table 4).

Role of Specialized Institutions in the Baccalaureate Education of S&E Doctorate Recipients

The Nation's 177 specialized schools cited as baccalaureate origins by S&E doctorate holders are primarily engineering or technical schools. The top 24 of these institutions granted 80 percent of the baccalaureate degrees of S&E doctorate recipients awarded by schools of this type.

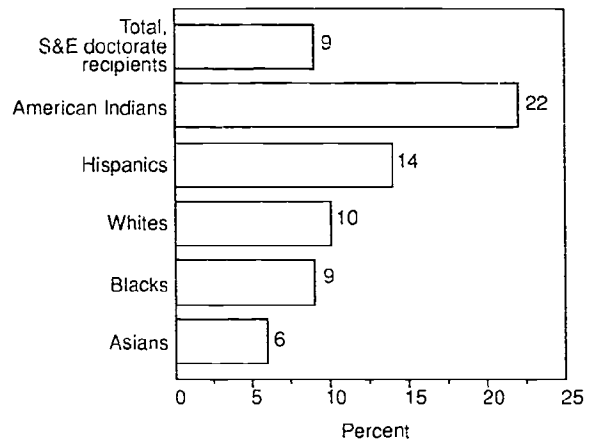
Harvey Mudd College in California headed the list of prominent specialized institutions, followed by three U.S. academies—the U.S. Air Force, U.S. Military, and U.S. Naval Academies—and three New York institutions—Union University, Alfred University, and Cooper Union (table 9). In terms of S&E field, the technical nature of specialized institutions is such that engineering doctorate holders were more likely than science doctorate holders to have attended this type of school for their undergraduate education (chart 2).

Role of 2-year Colleges in the Undergraduate Education of S&E Doctorate Recipients

A key difference between white S&E doctorate holders versus doctorate recipients from underrepresented minority groups is the latter's attendance at 2-year colleges. In general, Hispanics and American Indians are more likely than other groups to begin

⁷ National Center for Education Statistics, *Trends in Minority Enrollment in Higher Education, Fall 1978 - Fall 1988*, (Washington, D. C.: June 1990).

Chart 6.
Percent of science and engineering doctorates who attended a 2-year college, by race/ethnicity



NOTE: Includes doctorates awarded to U.S. citizens only. Data were not coded in 1985-86 for attendance at a 2-year college.

SOURCE: National Science Foundation. SRS. Survey of Earned Doctorates the years 1987-90.

their undergraduate education in 2-year colleges.⁷ Specifically, 22 percent of American Indian S&E doctorate holders had attended a 2-year college as had 14 percent of Hispanics (chart 6). In comparison, around one-tenth of both black and white S&E doctorate holders had attended a 2-year school; only 6 percent of Asians had done so. These figures may indicate that 2-year colleges are a significant part of the educational pipeline leading to an S&E doctorate for American Indians and Hispanics.

Attendance at 2-year colleges was more pronounced in certain fields of study. Recent recipients of doctorates in agriculture and psychology were more likely to have gone to 2-year colleges than were majors in other S&E fields (table 10).

IV. Baccalaureate Origins of Women and Racial/Ethnic Groups with Doctorates in S&E

Women and racial/ethnic minority groups have different patterns of baccalaureate origins than other S&E doctorate holders. In general, the research-intensive institutions play less of a role in their baccalaureate education and the other types of institutions play a greater role.

Baccalaureate Origins of Women S&E Doctorate Recipients

Women—who account for approximately one-third of all recent S&E doctorate holders—were less likely than male S&E doctorate holders to earn their baccalaureates at either research-intensive or other doctorate-granting institutions (chart 7). On the other hand, women were much more likely than men to have earned their baccalaureates at liberal arts institutions. Such institutions were cited as the baccalaureate-origin institution of almost one-fifth of science and one-tenth of engineering doctorate holders who were women (table 11).

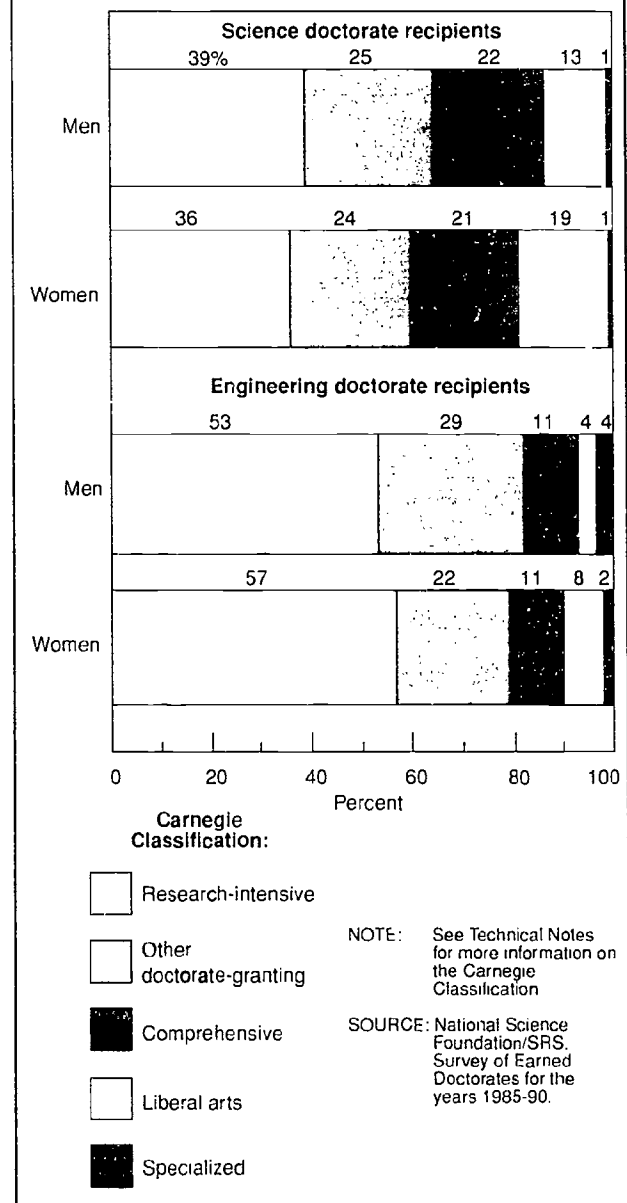
Women's 25 top-ranked baccalaureate institutions differed somewhat from the 25 institutions cited by all S&E doctorates. Specifically, six of the institutions on the women's list were not found on the general ranking: Wellesley College, Brown University, Duke University, Columbia University-Barnard, Smith College, and Boston University (table 12).

The inclusion of two women's colleges (Wellesley and Smith) in the ranking reflected the findings of recent studies of baccalaureate origins of women doctorate holders. Taking the number of baccalaureates awarded at each institution into account, these studies found that women's liberal arts colleges were among the most highly productive institutions of women doctorate recipients,⁸ especially for women whose field was in the natural sciences.⁹

⁸ Carol Fuller, *Undergraduate Origins of Women and Men 1970-1982 Graduates Who Received Doctorates Between 1970-1986* (Ann Arbor, MI: Great Lakes Colleges Association, 1989), pp. 7 and B-24.

⁹ Elizabeth M. Tidball, *Baccalaureate Origins of Recent Natural Science Doctorate*, *Journal of Higher Education*, Vol. 57, No. 6 (November/December 1986), pp. 606-20.

Chart 7.
Baccalaureate origins of recent science and engineering doctorate recipients in U.S. institutions, by sex and Carnegie Classification of Institutions



Baccalaureate Origins by Racial/Ethnic Group of S&E Doctorate Recipients

Striking differences frequently emerge in the patterns of baccalaureate origins of white S&E doctorate holders compared with their counterparts in the various racial/ethnic groups¹⁰ (charts 8 and 9). For example, Asians were much more likely than whites to have received their undergraduate degrees at research-intensive universities, and black S&E doctorate holders were less likely than whites to have attended a research-intensive institution (table 13).

In terms of the types of institutions providing S&E undergraduate education, the pattern for black and Hispanic doctorate holders differed from that of other racial/ethnic groups. Comprehensive institutions played a much greater role than the other types of institutions in the undergraduate education of blacks and Hispanics in both science and engineering.

In comparing the top 25 baccalaureate institutions cited by all S&E doctorate holders with those cited by S&E doctorate holders from **underrepresented**

racial/ethnic groups,¹¹ several interesting differences come to light.

The list of the prominent baccalaureate-origin institutions cited by **Hispanic S&E doctorate holders** differed greatly from the list for all S&E doctorate holders. Almost 40 percent of the Hispanic S&E doctorates received their baccalaureates from three Puerto Rican universities (table 14). Also, significant numbers of institutions cited by the Hispanics were located in California, Florida, New Mexico, and Texas, as would be expected given the geographic concentrations of U.S. Hispanic populations.

Because of the small number of **American Indian S&E doctorate holders**, the list of their prominent baccalaureate-origin institutions includes colleges and universities that produced three or more baccalaureates who went on to earn an S&E doctorate (table 15). Only nine of these institutions were also cited by all S&E doctorate holders. The differences in institutions cited by American Indian versus all S&E doctorate holders reflect to a certain extent the geographic concentrations of American Indian populations.

The top 23 baccalaureate-origin institutions for **black S&E doctorate holders** deviated significantly from the general top 25 list (table 16). Specifically, 14 of the top 23 baccalaureate institutions for black S&E doctorates were historically black colleges and universities (HBCUs).

¹⁰ Carol Fuller, *Baccalaureate Sources of 1975-1986 Doctorates Earned by American Indian, Asian, Black, Hispanic and White Men and Women Adjusted for Institutional Size* (Ann Arbor, MI: Great Lakes Colleges Association, 1989).

¹¹ The following analysis of underrepresented racial/ethnic groups has been limited to U.S. citizen S&E doctorate holders who were Black, Hispanic, or American Indian.

Chart 8.
Baccalaureate origins of recent science doctorate recipients in U.S. institutions, by race/ethnicity and Carnegie Classification of Institutions

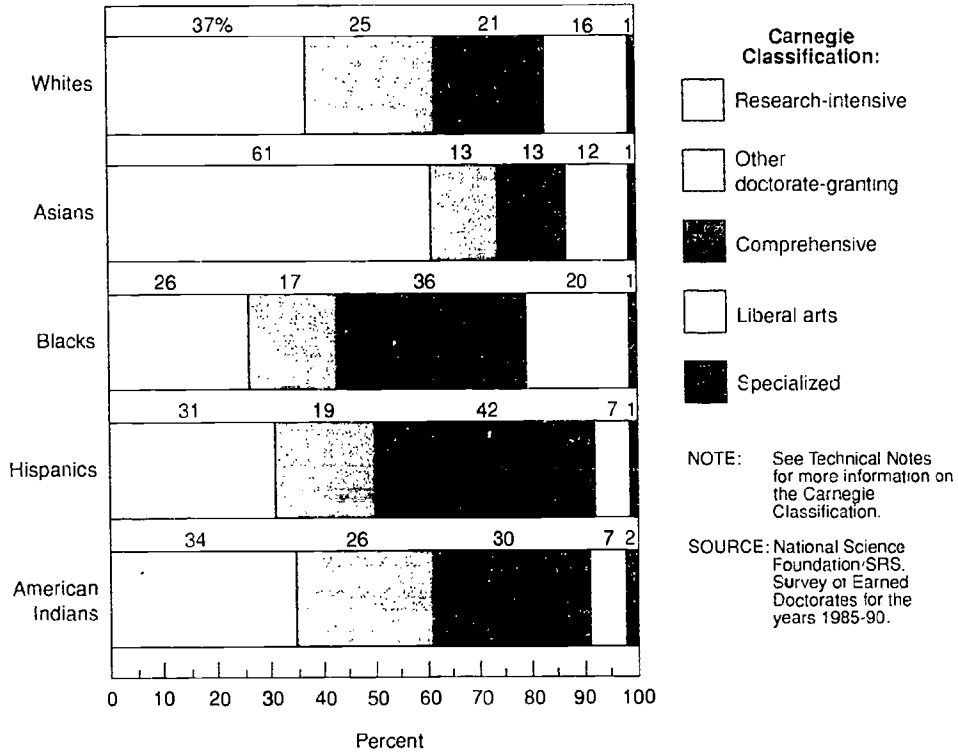
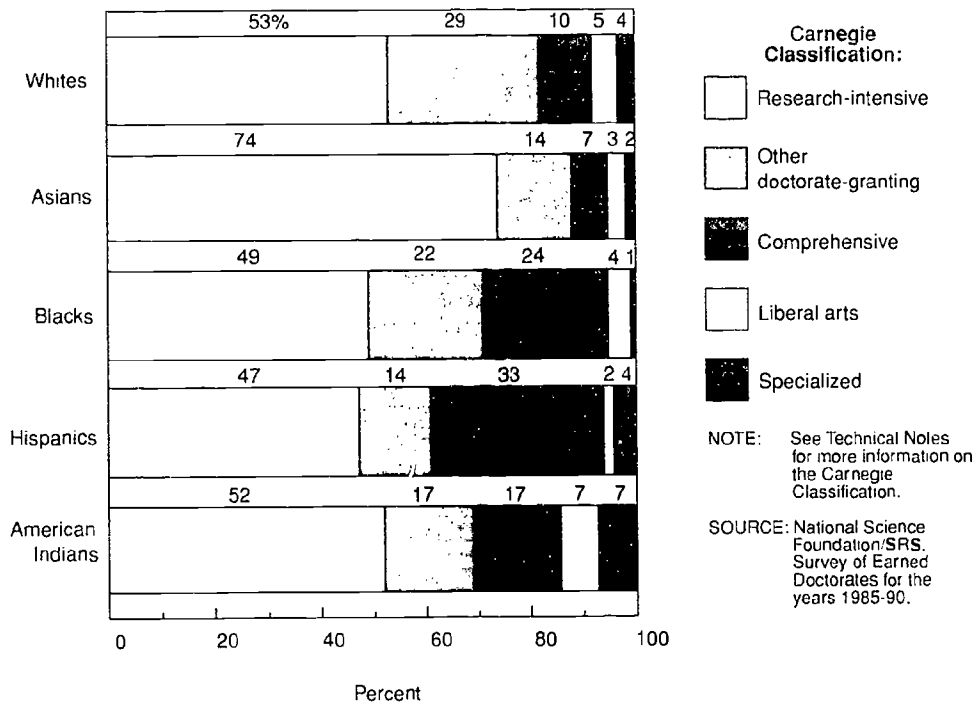


Chart 9.
Baccalaureate origins of recent engineering doctorate recipients in U.S. institutions, by race/ethnicity and Carnegie Classification of Institutions



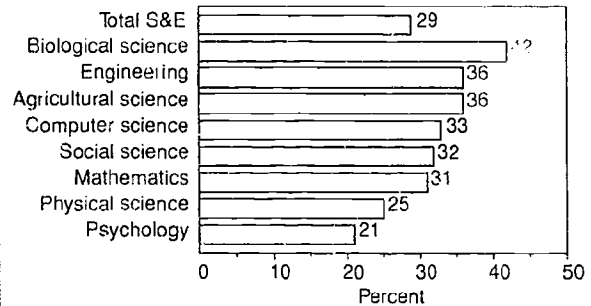
Role of Historically Black Colleges and Universities (HBCUs) in the Baccalaureate Education of Black S&E Doctorate Recipients

The HBCUs were originally established under legal segregation for the purpose of educating blacks. These institutions were significant in the baccalaureate education of black S&E doctorate holders in particular,¹² and all fields in general.¹³ S&E bachelor's degrees are awarded by 81 HBCUs, most of which are classified as comprehensive or liberal arts institutions. In all, HBCUs accounted for almost 30 percent of the baccalaureate origins of recent black S&E doctorate recipients. HBCUs were of particular significance in providing the baccalaureate origins of black doctorate recipients in natural science fields, such as biological science and agricultural science, and in engineering (chart 10).

¹² John T. Hill and Susan T. Hill, *The Role of HBCUs in the Education of Black Scientists and Engineers*, paper presented at the 1991 Conference on Blacks in Higher Education (Washington, D.C., 1991).

¹³ Willie Pearson, Jr. and LaRue Pearson, "Baccalaureate Origins of Black American Doctorates: A Cohort Analysis," *Journal of Negro Education*, Vol. 54, No. 1, (1985) pp. 24-35.

Chart 10.
Black U.S.-citizen S&E doctorate recipients with baccalaureate origins in historically black colleges and universities, by broad science and engineering fields



S&E = science and engineering

NOTE: HBCUs are the 81 historically black colleges and universities that award baccalaureates in S&E fields.

SOURCE: National Science Foundation SRS. Survey of Earned Doctorates for the years 1985-90.

Appendix A.
Technical Notes

Appendix A. Technical Notes

Data Source

This report is based on information collected through the Survey of Earned Doctorates (SED), conducted annually by the National Academy of Sciences for the NSF and other Federal agencies since 1957. Data are collected directly from the individual doctorate recipients, and include a complete enumeration of the individual's educational history. Information from this survey becomes part of the Doctorate Records File, which comprises over 985,000 records for doctorates awarded since 1920 by regionally accredited universities and colleges. Data on doctoral degrees such as the Ph.D or D. Sc. are collected in these surveys, but not on first-professional degrees such as the J.D. or M.D. Approximately 93 percent of the annual cohort of doctorate recipients responded to the questionnaire, which is distributed through the cooperation of the Graduate Deans. Partial data from public sources, such as graduation commencement programs, were added to the file for those doctorate recipients who had not responded. The data for a given year include all doctorates awarded in the 12-month period ending June 30th of the referenced year.

Possible Sources of Survey Error

The SED is a universe survey of all recipients of research doctorates; therefore it is not subject to sampling error. Data obtained from this survey are subject to nonsampling error, however. Nonsampling errors may result from a variety of factors, including nonresponse to the survey or to a particular item; differences in interpreting questions; respondent errors; and errors made in recording the data. It is difficult to quantify the nonsampling error from all possible sources. The following provide known information concerning the three major sources of nonsampling error for the SED: survey nonresponse, item nonresponse, and errors made in recording the data.

Survey Nonresponse

The response rate to the SED is high for a voluntary survey of individuals. The response rate averages 93 percent over the period for which data are presented in this report. For nonrespondents to the survey,

information on field of study, doctorate institution, sex, and baccalaureate is obtained from public sources such as commencement programs, and added to the file. Data are not imputed for the other variables in the survey.

An analysis of the sources of nonresponse indicated that survey nonresponse is related to institutions, not to characteristics of the doctoral recipients. Half of the nonresponse in 1990 was accounted for by 3 percent of the institutions in the survey. In general, these institutions employed methods for collecting the survey data that resulted in low response rates or did not have any residency requirements for their doctoral programs.

To the extent the S&E doctorates are awarded by institutions with low response rates to the SED, the effect of nonresponse could vary by field. As the

Table A-1.
Response rates of science and engineering (S&E) doctorate recipients to the Survey of Earned Doctorates, by major field of study: 1990

Major field of study	Response rate ¹
S&E fields, total	92.9%
Physical	93.4
Physics	93.2
Chemistry	93.5
Earth/atmospheric/ oceanographic	92.7
Mathematics	93.0
Computer	94.5
Agriculture	93.7
Biological	94.8
Social	92.9
Psychology	91.0
Engineering ²	91.9
Chemical	96.8
Civil	93.5
Electrical	92.0
Materials	93.8
Mechanical	91.2
Non-S&E fields	93.8
Total, all fields	93.3

¹ Received with information supplied by doctorate recipient; additional information may have been obtained by the National Research Council from public sources

² Includes other engineering fields not shown separately.

SOURCE: National Science Foundation/SRS. Survey of Earned Doctorates

basic classification variable for the tables in this report, it is important to present response rates by S&E fields. As shown in table A-1, the response rates varied from 91 percent to 97 percent across S&E fields in 1990.

Item Nonresponse

Persons who respond to the survey may choose not to provide the information requested in a particular question or may inadvertently skip an item on the survey form. The public sources already cited (e.g., commencement programs) may provide additional information. The data items reported in the tables in this report are listed in Table A-2 with response rates, showing the extent of information obtainable from any sources for doctorates. For example, the item that concerned baccalaureate-origin institution was available for 96.8 percent of the doctorate recipients in 1990.

Table A-2.
Item response rates: 1990

Item	Response rate
Sex.....	100.0%
Field of study	100.0
Citizenship	93.2
Race/ethnicity	92.2
Baccalaureate-origin institution*	96.8

*The response rate for this item is higher than the overall survey response rate because public records, such as commencement programs, are used to obtain this information for nonrespondents.

SOURCE: National Science Foundation SRS, Survey of Earned Doctorates

Errors Made in Recording Data

The SED forms are processed on a continual basis throughout the year. When the forms are received from the Graduate Schools, they are reviewed for completeness to determine whether there is enough information to be considered a response. If so, they are ready for data entry. Two methods for data entry were used during the time period covered in this report. Completed survey forms between 1960 and 1987 were coded into paper and then keypunched. Beginning in 1988, some survey forms were directly entered on-line into the computer; in 1989, about half of the survey forms were processed using this method.

An evaluation of the two methods of data entry

was conducted in 1990 to determine the undetected error rates for recording data from the SED. The evaluation was conducted after the survey forms had gone through the computer-editing process designed to check for completeness, legitimate range values, and internal consistency.

The results of the evaluation showed that the error rate is less than one percent. Because the SED is a survey of individuals, an error in recording a data item affects only that item for that individual. The evaluation found that the error rate per item was .0037 for the paper coding/keypunch method and .0023 for the on-line data entry method. The SED is currently making a complete conversion to the on-line data entry method.

Carnegie Classification of Institutions of Higher Education

The classification system for institutions used in this study was modified from the 1987 Carnegie Classification of Institutions. Using this classification, five types of institutions were identified, as follows.

Research-Intensive Universities are the 70 leading universities in terms of Federal financial support of research and development in at least two of the three academic years (1982-83, 1983-84, and 1984-85), provided they awarded at least 50 Ph.D.'s in 1983-84. Examples include University of California at Berkeley (CA), University of Texas at Austin (TX), Duke University (NC), and University of Chicago (IL).

Other Doctorate-Granting Universities are the major doctoral-granting institutions, classified by Carnegie in the categories of Research Universities II, Doctorate-Granting I, and Doctorate-Granting II. The established doctoral programs of these institutions have awarded at least 20 Ph.D.'s in any field, or 10 Ph.D.'s in three or more fields, in 1983-84. Examples include Iowa State University (IA), University of South Florida (FL), Howard University (DC), and Rensselaer Polytechnic Institute (NY).

Comprehensive Institutions offered a liberal arts program as well as other programs such as engineering, business administration, and nursing. Many offered master's degrees, but all either lacked a doctoral program or had an extremely limited one. Former teachers colleges that broadened their curricula in the 1960s are included in this category. Examples include Glassboro State College (NJ), Old Dominion University (VA), Creighton University (NE), and Aquinas College (MI).

Liberal Arts Colleges are predominantly bachelor's-degree granting institutions that award more than half their degrees in liberal arts. Institutions such as Oberlin College are included, even though they have master's degree programs. This category also includes a group of colleges that awarded less than half their degrees in liberal arts fields, but were too small (i.e., less than 1,500 students) to be considered "comprehensive." Examples of colleges in this category include Reed (OR), Bryn Mawr (PA), College of Charleston (SC), and Fisk University (TN).

Specialized Institutions focused primarily on technical, professional, or corporate programs in a range of areas such as theology, medicine, engineering, business, art, music, law, and teaching. Examples of specialized institutions include New Jersey Institute of Technology, Princeton Theological Seminary (NJ), University of Oklahoma Health Science Center, and Teacher's College of Columbia (NY).

Requests for additional information concerning the survey methodology and analysis should be directed to Susan T. Hill at the following address:

Division of Science Resources Studies
National Science Foundation (Room L-609)
1800 G Street, N.W.
Washington, D.C. 20550
(202) 634-4787

Table A-3.
1987 Carnegie Classification system modified
for this report

Modified classification	Carnegie class	Number in study	Number cited
Research-incentives universities	1	70	70
Other doctorate granting universities	1.2-1.4	143	138
Comprehensive institutions	2 1 2.2	601	568
Liberal arts colleges	3.1-3.2	564	518
Specialized institutions	5.1-5.9	643	177

NOTE: Excludes institutions that did not award bachelor's degrees

SOURCE: Carnegie Foundation. To determine the classification of any institution, refer to "Carnegie Foundation's Classifications of More than 3,300 Institutions of Higher Education." *The Chronicle of Higher Education*, July 8, 1987, pp. 22-30.

Appendix B.
Detailed Statistical Tables

List of Tables

	<i>Page</i>		<i>Page</i>
1. U.S. vs. foreign baccalaureate-origin institutions of S&E 1985-90 doctorate recipients, by field of doctorate.....	22	10. Science and engineering (S&E) doctorate recipients (U.S. citizens only) who attended a 2-year college, by field of doctorate: 1987-90	31
2. Foreign 1985-90 S&E doctorate recipients who earned baccalaureates at U.S. institutions, by visa type and region/country of citizenship	23	11. U.S. baccalaureate-origin institutions of all 1985-90 science and engineering (S&E) doctorate recipients, by sex and by Carnegie Classification of U.S. institutions	32
3. Top 25 baccalaureate-origin institutions of 1985-90 science and engineering (S&E) doctorate recipients, ranked according to total S&E doctorates, by field of doctorate	24	12. Top 25 baccalaureate-origin institutions of 1985-90 female science and engineering (S&E) doctorate recipients, ranked according to total S&E doctorates, by field of doctorate	33
4. Baccalaureate-origin institutions of 1985-90 science and engineering doctorate recipients, by Carnegie Classification of U.S. institutions and field of doctorate	25	13. U.S. baccalaureate-origin institutions of all 1985-90 science and engineering (S&E) doctorate recipients, by race/ethnicity and by Carnegie Classification.....	34
5. Top 25 research-intensive baccalaureate-origin institutions of 1985-90 science and engineering (S&E) doctorate recipients, ranked according to total S&E doctorates, by field of doctorate.....	26	14. Top 23 baccalaureate-origin institutions of 1985-90 science and engineering (S&E) doctorate recipients who were Hispanic U.S. citizens, by field of doctorate.....	35
6. Top 25 other doctorate-granting baccalaureate-origin institutions of 1985-90 science and engineering (S&E) doctorate recipients, ranked according to total S&E doctorates by field of doctorate	27	15. Top 24 baccalaureate-origin institutions of 1985-90 science and engineering (S&E) doctorate recipients who were American Indian U.S. citizens, by field of doctorate	36
7. Top 24 comprehensive baccalaureate-origin institutions of 1985-90 science and engineering (S&E) doctorate recipients, ranked according to total S&E doctorates, by field of doctorate.....	28	16. Top 23 baccalaureate-origin institutions of 1985-90 science and engineering (S&E) doctorate recipient who were black U.S. citizens, by field of doctorate	37
8. Top 24 liberal arts baccalaureate-origin institutions of 1985-90 science and engineering (S&E) doctorate recipients, ranked according to total S&E doctorate by field of doctorate.....	29	17. Baccalaureate-origin institutions of 10 or more science and engineering doctorates, by major field (1): 1985-90.....	38
9. Top 24 specialized baccalaureate-origin institutions of 1985-90 science and engineering (S&E) doctorate recipients, ranked according to total S&E doctorate by field of doctorate.....	30		

NOTE: Tables which rank the top 100 undergraduate-origin institutions of 1985-90 science and engineering (S&E) doctorate recipients **by field of study** are available upon request to the author.

Table 1. U.S. vs. foreign baccalaureate-origin institutions of
S&E 1985-90 doctorate recipients, by field of doctorate

(Percent distribution)

Field of doctorate	Total	U.S. colleges and universities	Foreign colleges and universities
S&E fields.....	100%	72%	29%
Sciences, total.....	100	77	23
Physical sciences.....	100	71	30
Physics.....	100	64	36
Chemistry.....	100	75	25
Earth, atmos., & ocean..	100	76	24
Mathematics.....	100	53	47
Computer science.....	100	58	42
Agricultural science....	100	63	37
Biological science.....	100	84	16
Psychology.....	100	95	5
Social science.....	100	70	31
Engineering, total.....	100	49	51
Chemical.....	100	59	41
Civil.....	100	42	58
Electrical/electronics..	100	51	49
Mechanical.....	100	44	56
Other engineering.....	100	49	51

S&E = Science and Engineering

SOURCE: National Science Foundation/SRS,
Survey of Earned Doctorates

Table 2. Foreign 1985-90 S&E doctorate recipients who earned baccalaureates at U.S. institutions, by visa type and region/country of citizenship

Region/country of citizenship	Permanent visas		Temporary visas	
	Total number	Percentage who earned baccalaureate in the U.S.	Total number	Percentage who earned baccalaureate in the U.S.
Total, foreign citizenship....	6,410	29%	29,203	7%
Canada.....	277	37	398	5
Mexico & Central America.....	117	38	656	9
Mexico.....	78	37	516	3
Caribbean islands.....	77	75	99	35
South America.....	273	40	1,514	8
Argentina.....	35	21	210	5
Brazil.....	44	28	537	1
Chile.....	42	30	229	3
Colombia.....	45	38	140	14
Europe.....	927	37	2,909	7
Belgium.....	23	32	97	2
England.....	223	29	355	7
France.....	64	26	211	3
East and West Germany.....	153	54	326	9
Greece.....	144	38	525	11
Italy.....	50	37	267	3
East Asia.....	1,585	13	11,856	5
Taiwan.....	875	3	3,983	1
Peoples Republic of China...	140	18	2,565	2
China (unspecified).....	14	23	142	2
Hong Kong.....	92	72	428	47
Japan.....	75	38	563	10
Korea.....	296	8	3,281	1
Thailand.....	40	18	537	7
West Asia.....	1,548	28	6,173	11
India.....	520	4	2,650	1
Iran.....	520	54	720	43
Iraq.....	26	4	170	4
Israel.....	88	17	326	4
Lebanon.....	71	62	158	35
Turkey.....	88	17	429	8
Pakistan.....	43	20	307	6
Australasia.....	136	22	779	4
Australia.....	63	13	176	1
Indonesia.....	20	63	248	8
New Zealand.....	16	19	93	0
Phillippines.....	36	17	256	3
Africa.....	456	47	2,303	12
Egypt.....	81	0	600	1
Nigeria.....	148	82	362	36
Country unknown.....	1,014	31	2,006	8

NOTE: Regions include other countries not specified.

SOURCE: National Science Foundation/SRS, Survey of Earned Doctorates

S&E = Science and Engineering

Table 3. Top 25 baccalaureate-origin institutions of 1985-90 science and engineering (S&E) doctorate recipients, ranked according to total S&E doctorates, by field of doctorate

Baccalaureate-origin institution	Total number of S&E doctorate recipients	Field of science										Total engineering
		Physical science 1/	Mathematics	Computer	Agricultural science	Biological science	Psychology	Social science				
University of California-Berkeley.....	1,526	319	51	33	41	384	191	289	218			
Cornell University.....	1,159	195	18	30	89	367	136	143	181			
University of Illinois-Urbana-Champaign.....	1,108	169	15	26	100	242	135	89	332			
University of Michigan.....	1,105	169	19	30	24	274	194	166	229			
Massachusetts Institute of Technology.....	1,028	327	54	54	1	126	13	53	400			
Pennsylvania State University.....	997	165	14	18	118	252	130	114	186			
University of Wisconsin-Madison.....	938	156	24	16	84	225	146	155	132			
University of California-Los Angeles.....	920	175	22	19	4	197	249	139	115			
Michigan State University.....	760	83	17	13	103	226	111	99	108			
University of Minnesota.....	754	111	18	10	85	167	121	109	133			
Rutgers University (NJ).....	754	145	11	3	54	219	153	73	88			
Harvard University (MA).....	740	698	142	42	6	202	92	166	42			
University of California-Davis.....	734	107	13	7	74	337	62	56	78			
Purdue University (IN).....	715	116	4	17	84	154	46	44	250			
Ohio State University.....	661	83	11	18	81	149	117	87	115			
University of Washington.....	618	139	21	13	29	130	100	94	92			
University of Texas-Austin.....	608	96	21	15	9	97	149	93	128			
University of Maryland.....	597	93	16	12	38	165	100	78	95			
Stanford University (CA).....	588	116	14	17	5	133	104	113	86			
University of Pennsylvania.....	566	497	80	8	2	143	139	112	69			
Princeton University (NJ).....	538	150	47	21	102	93	57	73	96			
Iowa State University.....	525	57	6	13	102	118	37	63	129			
University of Florida.....	520	60	17	6	53	109	120	60	95			
University of Colorado-Boulder.....	518	85	19	7	9	116	96	112	74			
Yale University (CT).....	512	110	15	22	2	137	92	102	32			
Total, top 25.....	19,481	3,448	523	475	1,198	4,762	2,890	2,682	3,503			
Total, all U.S. institutions.....	83,032	15,942	2,282	1,650	3,809	19,284	16,890	12,198	10,977			
Top 25 as a percent of all institutions.....	24%	22%	23%	29%	32%	25%	17%	22%	32%			

1/ Includes earth, atmospheric, and oceanographic sciences.

NOTE: Rankings are based on the number of persons who responded to the Survey of Earned Doctorates.

SOURCE: National Science Foundation/SRS, Survey of Earned Doctorates

Table 4. Baccalaureate-origin institutions of 1985-90 science and engineering doctorate recipients, by Carnegie Classification of U.S. institutions and field of doctorate

[Percent distribution]

Field of doctorate	Total percent	Research-intensive universities	Other doctorate granting universities	Comprehensive institutions	Liberal arts colleges	Specialized institutions
S&E fields.....	100%	40%	25%	20%	14%	2%
Sciences, total.....	100	38	25	21	15	1
Physical sciences.....	100	37	22	24	16	2
Physics.....	100	51	21	15	12	2
Chemistry.....	100	29	22	28	19	2
Earth, atmos., & ocean.....	100	42	27	14	15	1
Mathematics.....	100	40	23	19	16	2
Computer science.....	100	46	25	17	10	3
Agricultural science.....	100	47	29	17	7	0
Biological science.....	100	41	24	20	15	1
Psychology.....	100	32	26	25	16	1
Social science.....	100	36	25	21	17	1
Engineering, total.....	100	53	28	11	4	4
Chemical.....	100	57	31	7	3	2
Civil.....	100	44	34	16	3	3
Electrical.....	100	55	27	11	4	3
Mechanical.....	100	53	30	12	3	3
Other engineering.....	100	53	26	11	5	5

S&E = Science and Engineering

NOTE: Because of rounding, components may not add to totals.

SOURCE: National Science Foundation/SRS, Survey of Earned Doctorates

Table 5. Top 25 research-intensive baccalaureate-origin institutions of 1985-90 science and engineering (S&E) doctorate recipients, ranked according to total S&E doctorates, by field of doctorate

Baccalaureate-origin institution	Total number of S&E doctorate recipients	Total science	Field of science							Total engineering
			Physical science 1/	Mathematics	Computer	Agricultural science	Biological science	Psychology	Social science	
University of California-Berkeley.....	1,526	1,308	319	51	33	41	384	191	289	218
Cornell University.....	1,159	978	195	18	30	89	367	136	143	181
University of Illinois-Urbana-Champaign	1,108	776	169	15	26	100	242	135	89	332
University of Michigan.....	1,105	876	169	19	30	24	274	194	166	229
Massachusetts Institute of Technology..	1,028	628	327	54	54	1	126	13	53	400
Pennsylvania State University.....	997	811	165	14	18	118	252	130	114	186
University of Wisconsin-Madison.....	938	806	156	24	16	84	225	146	155	132
University of California-Los Angeles....	920	805	175	22	19	4	197	249	139	115
Michigan State University.....	760	652	83	17	13	103	226	111	99	108
University of Minnesota-Davis.....	754	621	111	18	10	85	167	121	109	133
Rutgers University (NJ).....	746	658	145	11	3	54	219	153	73	88
Harvard University (MA).....	740	698	142	48	42	6	202	92	166	42
University of California-Davis.....	734	656	107	13	7	74	337	62	56	78
Purdue University (IN).....	715	465	116	4	17	84	154	46	44	250
Ohio State University.....	661	546	83	11	18	81	149	117	87	115
University of Washington.....	618	526	139	21	13	29	130	100	94	92
University of Texas-Austin.....	608	480	96	21	15	9	97	149	93	128
University of Maryland.....	597	502	93	16	12	38	165	100	78	95
Stanford University (CA).....	588	502	116	14	17	5	133	104	113	86
University of Pennsylvania.....	566	497	80	8	13	2	143	139	112	69
Princeton University (NJ).....	538	442	150	47	21	1	93	57	73	96
University of Florida.....	520	425	60	17	6	53	109	120	60	95
University of Colorado-Boulder.....	518	444	85	19	7	9	116	96	112	74
Yale University (CT).....	512	480	110	15	22	2	137	92	102	32
Suny at Stony Brook.....	462	422	78	17	6	4	107	165	45	40
Total, top 25.....	19,418	16,004	3,469	534	468	1,100	4,751	3,018	2,664	3,414
Total, all research-intensive institutions.....	32,766	26,939	5,990	915	753	1,798	7,822	5,306	4,355	5,827
Top 25 as a percent of all research-intensive institutions.....	59%	59%	58%	58%	62%	61%	61%	57%	61%	59%

1/ Includes earth, atmospheric, and oceanographic sciences.

NOTE: Rankings are based on the number of persons who responded to the Survey of Earned Doctorates.

SOURCE: National Science Foundation/SRS, Survey of Earned Doctorates



Table 6. Top 25 other doctorate-granting baccalaureate-origin institutions of 1985-90 science and engineering (S&E) doctorate recipients, ranked according to total S&E doctorates by field of doctorate

Baccalaureate-origin institution	Total number of S&E doctorate recipients	Total science	Field of science							Total engineering
			Physical science 1/	Mathematics	Computer	Agricultural science	Biological science	Psychology	Social science	
Iowa State University.....	525	396	57	6	13	102	118	37	63	129
SUNY at Buffalo.....	508	402	100	9	15	4	95	110	69	106
University of Massachusetts-Amherst.....	505	443	76	8	2	52	146	89	70	62
Brown University (RI).....	486	419	81	24	21	1	110	121	61	67
University of California-Santa Barbara.....	476	430	74	15	5	11	149	87	89	46
Brigham Young University (UT).....	463	373	69	6	5	34	90	95	74	90
University of Delaware.....	426	331	81	6	5	27	105	50	57	95
University of California-Santa Cruz.....	368	362	80	12	4	5	98	77	86	6
Rensselaer Polytechnic (NY).....	367	210	130	12	6	1	39	14	14	157
University of Kansas.....	345	289	68	6	6	4	75	73	57	56
SUNY at Binghamton.....	337	332	50	10	15	1	87	120	49	5
SUNY at Albany.....	317	307	62	8	11	4	84	81	57	10
University of Notre Dame (IN).....	317	242	59	11	3	0	83	47	39	75
University of Nebraska-Lincoln.....	287	254	31	11	8	47	65	47	45	33
Rice University (TX).....	275	204	78	25	22	0	41	20	18	71
Oklahoma State University.....	273	212	22	2	8	35	56	60	29	61
Kansas State University.....	259	206	16	4	2	62	76	21	25	53
Florida State University.....	257	231	58	8	10	6	56	68	45	6
College of William and Mary (VA).....	254	238	78	5	7	2	60	45	41	16
Dartmouth College (NH).....	253	234	75	16	8	0	61	29	45	19
University of California-Riverside.....	252	244	57	7	1	22	67	46	44	8
Miami University (OH).....	249	238	49	5	1	6	78	54	45	11
Arizona State University.....	247	213	40	8	4	10	54	59	38	34
Brandeis University (MA).....	241	233	30	7	6	1	63	74	52	8
Syracuse University (NY).....	240	203	44	4	7	2	51	59	36	37
Total, top 25.....	8,527	7,266	1,565	235	195	439	2,007	1,577	1,248	1,261
Total, all other doctorate-granting institutions.....	20,645	17,567	3,598	514	406	1,096	4,584	4,319	3,050	3,078
Top 25 as a percent of all other doctorate-granting institutions.....	41%	41%	44%	46%	48%	40%	44%	37%	41%	41%

1/ Includes earth, atmospheric, and oceanographic sciences.

NOTE: Rankings are based on the number of persons who responded to the Survey of Earned Doctorates.

SOURCE: National Science Foundation/SRS, Survey of Earned Doctorates

Table 7. Top 24 comprehensive baccalaureate-origin institutions of 1985-90 science and engineering (S&E) doctorate recipients, ranked according to total S&E doctorates, by field of doctorate

Baccalaureate-origin institution	Total number of S&E doctorate recipients	Total science	Field of science						Total engineering	
			Physical science 1/	Mathematic	Computer	Agricultural science	Biological science	Psychology		Social science
CUNY-Queens College.....	264	262	40	5	8	2	28	116	63	2
San Diego State University (CA).....	254	239	39	2	3	3	43	95	52	15
CUNY-City College.....	253	229	32	10	7	5	29	87	48	37
University of Puerto Rico-Rio Piedras..	241	229	73	7	2	7	52	39	49	12
CUNY-Brooklyn College.....	232	231	23	3	10	0	32	123	40	1
California State University-Northridge..	194	187	23	4	1	0	35	95	29	7
California State University-Long Beach..	182	161	17	3	1	7	39	74	20	21
Humboldt State University (CA).....	176	158	36	1	35	7	62	7	12	18
San Francisco State University (CA).....	173	170	21	5	0	1	33	80	32	3
California Polytechnic State University- San Luis Obispo.....	154	115	31	3	2	36	32	4	7	39
CUNY-Hunter College.....	147	146	14	6	4	1	19	70	32	1
San Jose State University (CA).....	144	121	22	2	2	2	28	39	26	23
Michigan Tech University.....	142	57	25	5	8	8	17	0	0	85
California State University-Fullerton..	131	130	22	3	2	0	19	60	24	1
University of Dayton (OH).....	122	15	15	1	4	4	25	32	13	37
California State University-Fresno.....	120	107	20	1	1	11	20	51	19	13
California State University-Los Angeles	118	113	14	3	1	0	12	22	32	5
Western Washington University.....	110	109	32	4	2	0	27	22	20	8
Wake Forest University (NC).....	105	97	20	6	2	0	11	34	20	15
California State University-Sacramento..	104	89	16	4	1	3	11	21	10	14
Oakland University (MI).....	100	86	24	3	1	1	26	1	0	44
Worcester Poly I/MA.....	99	55	39	1	1	1	30	18	15	1
Indiana University (PA).....	98	97	29	3	1	1	12	1	1	1
University of Central Florida (FL).....	95	80	23	7	4	0	16	20	10	15
Total, top 24.....	3,758	3,340	650	94	66	131	670	1,133	596	418
Total, all comprehensive institutions..	16,556	15,359	3,459	442	279	640	3,749	4,256	2,534	1,197
Top 24 as a percent of all comprehensive institutions.....			19%	21%	24%	21%	18%	27%	24%	35%

1/ Includes earth, atmospheric, and oceanographic sciences.

NOTE: Rankings are based on the number of persons who responded to the Survey of Earned Doctorates.

SOURCE: National Science Foundation/SRS, Survey of Earned Doctorates

Table 8. Top 24 liberal arts baccalaureate-origin institutions of 1985-90 science and engineering (S&E) doctorate recipients, ranked according to total S&E doctorate, by field of doctorate

Baccalaureate-origin institution	Total number of S&E doctorate recipients	Total science	Field of science							Total engineering
			Physical science 1/	Mathematics	Computer	Agricultural science	Biological science	Psychology	Social science	
Oberlin College (OR).....	323	314	53	13	9	6	75	82	76	9
Carleton College (MN).....	255	249	95	9	5	6	66	29	39	6
Swarthmore College (PA).....	226	208	50	6	5	1	41	41	64	18
Reed College (OR).....	192	184	60	11	7	2	40	21	43	8
Wellesley College (MA).....	189	185	32	2	1	1	48	54	47	4
Pomona College (CA).....	188	184	41	3	3	0	49	39	43	4
Columbia-Barnard (NY).....	182	178	12	9	3	2	47	73	40	4
Wesleyan University (CT).....	177	172	31	6	7	3	45	39	41	5
Smith College (MA).....	174	172	21	2	1	3	57	42	46	2
Bucknell University (PA).....	168	142	43	3	4	2	36	30	24	26
St. Olaf College (MN).....	147	141	42	12	3	5	35	26	18	2
Williams College (MA).....	145	145	32	4	4	0	33	34	35	2
Kalamazoo College (MI).....	145	139	43	8	2	2	41	24	19	6
Vassar College (NY).....	144	141	14	5	2	2	32	51	35	3
Franklin and Marshall College (PA).....	143	134	50	1	1	0	27	35	20	9
Mt. Holyoke College (MA).....	142	137	28	4	0	1	41	44	19	5
Colgate University (NY).....	131	130	43	3	2	2	33	25	22	1
Amherst College (MA).....	127	122	26	3	3	2	38	18	32	5
Grinnell College (IA).....	126	172	35	6	3	1	34	19	24	7
Haverford College (PA).....	122	115	26	5	2	1	30	26	25	4
Wheaton College (IL).....	116	114	27	5	2	5	20	41	14	2
Bryn Mawr College (PA).....	114	110	24	5	0	2	30	13	37	4
Antioch College (OH).....	114	107	15	2	2	2	26	33	27	7
Hope College (MI).....	110	105	44	0	1	1	31	20	8	5
Total, top 24.....	3,900	3,748	887	128	71	50	955	859	798	152
Total, all liberal arts institutions	11,381	10,940	2,580	365	162	252	2,886	2,678	2,017	441
Top 24 as a percent of all liberal arts institutions.....	34%	34%	34%	35%	44%	20%	33%	32%	40%	35%

1/ Includes earth, atmospheric, and oceanographic sciences.

NOTE: Rankings are based on the number of persons who responded to the Survey of Earned Doctorates.

SOURCE: National Science Foundation/SRS, Survey of Earned Doctorates

Table 9. Top 24 specialized baccalaureate-origin institutions of 1985-90 science and engineering (S&E) doctorate recipients, ranked according to total S&E doctorates, by field of doctorate

Baccalaureate-origin institution	Total number of S&E doctorate recipients	Total Science	Field of doctorate						Total engineering	
			Physical science 1/	Mathematics	Computer	Agricultural science	Biological science	Psychology		Social science
Harvey Mudd College (CA).....	132	112	83	12	4	0	9	1	3	20
US Military Academy.....	117	59	12	5	6	0	3	5	28	58
USAF Academy (CO).....	117	63	24	4	6	0	6	11	12	54
Union University (NY).....	113	100	19	1	4	0	30	34	12	13
Alfred University (NY).....	72	27	5	1	0	1	8	8	4	45
US Naval Academy (MO).....	61	33	14	1	1	2	0	3	12	28
Cooper Union (NY).....	58	24	9	3	4	0	5	2	1	34
Rose-Hulman Tech (IN).....	52	23	17	2	2	0	2	0	0	29
New Mexico Institute of Mining and Technology.....	47	36	22	4	0	0	5	2	3	11
South Dakota State Mining and Technology Philadelphia College Pharmacy & Science (PA).....	34	13	9	0	2	0	2	0	0	21
New Jersey Institute of Technology.....	33	33	11	0	0	0	22	0	0	0
Maryland University School of Medicine..	32	5	2	1	1	0	0	0	1	27
GMI Engineering and Management Institute (MI).....	22	22	2	0	0	0	12	4	4	0
New School Social Research (NY).....	18	2	0	0	0	0	0	1	1	16
CUNY-John Jay College.....	17	17	1	0	0	0	3	5	8	0
Nebraska University Medical Center.....	13	13	0	0	0	0	1	2	10	0
Shimer College (IL).....	10	10	1	0	0	0	6	2	1	0
Indiana Institute of Technology.....	9	3	1	0	1	0	0	0	1	6
St. Marys Seminary and University (MD)...	9	4	1	0	1	0	2	4	3	0
US Coast Guard Academy.....	8	7	0	0	0	0	0	5	2	1
Trinity College (IL).....	7	6	2	0	1	1	0	1	1	1
Milwaukee School of Engineering.....	7	1	4	0	0	0	0	2	1	0
Total, top 24.....	1,003	629	239	34	33	4	116	92	111	374
Total, all specialized institutions.....	1,261	867	264	37	42	12	169	186	157	394
Top 24 as a percent of all specialized institutions.....	80%	73%	91%	92%	79%	33%	69%	50%	71%	95%

S&E = Science and Engineering

1/ Includes earth, atmospheric, and oceanographic sciences.

NOTE: Rankings are based on the number of persons who responded to the Survey of Earned Doctorates.

SOURCE: National Science Foundation/SRS, Survey of Earned Doctorates

Table 10. Science and engineering (S&E) doctorate recipients (U.S. citizens only) who attend a 2-year college, by field of doctorate: 1987-90

Field of S&E doctorate and race/ethnicity	1987-90 doctorate recipients*	Attended 2-year college	
		Number	Percent
Total, sciences and engineering.....	52,966	4,847	9%
Total sciences.....	45,836	4,339	10
Physical sciences.....	8,230	604	8
Physics/astronomy.....	2,816	153	6
Chemistry.....	5,414	451	9
Earth, atmos, & ocean sciences....	1,986	163	8
Biological/agricultural.....	14,686	1,416	10
Agricultural science.....	2,352	343	15
Biological science.....	12,334	1,073	9
Mathematics.....	1,449	106	8
Computer science.....	1,208	84	7
Social science.....	7,389	648	9
Psychology.....	10,888	1,318	13
Total engineering.....	7,130	508	7
Chemical.....	1,273	61	5
Civil.....	634	57	9
Electrical/electronics.....	1,476	108	8
Materials science.....	469	27	6
Mechanical.....	1,052	92	9
Other.....	2,226	163	7
American Indian.....	185	37	22
Asian.....	1,848	107	6
Black.....	1,042	101	10
Hispanic.....	1,318	177	14
White.....	47,533	4,348	9

* This excludes doctorate recipients for whom attendance at a 2-year college, or race/ethnicity was unknown. Data on attendance at a 2-year college were not available for doctorates in 1985 or 1986.

SOURCE: National Science Foundation/SRS, Survey of Earned Doctorates

Table 11. U.S. baccalaureate-origin institutions of all 1985-90 science and engineering (S&E) doctorate recipients, by sex and by Carnegie Classification of U.S. institutions

Carnegie classification of U.S. baccalaureate- origin institutions 1/	S&E doctorate recipients			Science doctorate recipients			Engineering doctorate recipients		
	Total	Men	Women	Total	Men	Women	Total	Men	Women
Total.....	100%	100%	100%	100%	100%	100%	100%	100%	100%
Research-intensive universities.....	40	41	37	38	39	36	53	53	57
Other doctorate-granting universities.....	25	26	23	25	25	24	28	29	22
Comprehensive institutions	20	20	21	21	22	21	11	11	11
Liberal arts colleges.....	14	12	18	15	13	19	4	4	8
Specialized institutions..	2	2	1	1	1	1	4	4	2

1/ Excludes foreign institutions and U.S. institutions that closed or for which classifications could not be determined.

NOTES: Because of rounding, components may not add to totals. See Appendix A, Technical Notes, for information on the Carnegie Classification of higher-education institutions.

SOURCE: National Science Foundation/SRS, Survey of Earned Doctorates

UNDERGRADUATE ORIGINS OF RECENT SCIENCE AND ENGINEERING DOCTORATE RECIPIENTS, ERRATA, PAGE 33.

Table 12. Top 25 baccalaureate-origin institutions of 1985-90 female science and engineering (S&E) doctorate recipients, ranked according to total S&E doctorates, by field of doctorate

Baccalaureate-origin institution	Total number of S&E doctorate recipients	Field of science							Total engineering
		Physical science 1/	Mathematics	Computer	Agricultural science	Biological science	Psychology	Social science	
University of California-Berkeley.....	462	42	12	2	13	146	107	116	24
Cornell University (NY).....	397	36	4	6	30	151	101	52	17
University of Michigan.....	369	30	3	2	3	102	146	83	22
University of California-Los Angeles.....	341	27	5	2	1	66	156	71	13
University of Illinois-Urbana-Champaign.....	309	27	3	3	29	97	74	45	32
University of Wisconsin-Madison.....	283	21	2	3	22	72	91	59	13
Pennsylvania State University.....	274	24	0	4	21	89	67	47	22
Rutgers University (NJ).....	250	29	1	1	11	24	85	34	10
University of California-Davis.....	239	23	5	0	25	125	34	27	2
University of Pennsylvania.....	236	11	3	3	1	48	107	50	13
Michigan State University.....	221	11	2	5	24	72	53	41	13
University of Minnesota-Minneapolis.....	219	14	3	0	16	49	65	55	17
Stanford University (CA).....	211	22	2	2	2	53	68	47	15
Ohio State University.....	205	11	19	2	19	48	66	41	16
University of Texas-Austin.....	196	13	7	4	4	44	80	32	12
Wellesley College (MA)*.....	189	32	2	1	1	47	54	47	4
University of Maryland.....	188	18	4	0	11	67	56	23	9
Brown University (RI).....	183	18	3	4	0	50	73	24	11
Columbia-Barnard (NY)*.....	181	12	3	2	1	46	40	40	4
University of Boston (MA).....	179	7	1	2	0	42	89	37	1
Smith College (MA)*.....	173	21	2	1	3	57	42	45	2
University of Washington.....	172	19	4	2	8	36	52	42	9
Duke University (NC).....	166	21	1	2	3	44	64	21	10
University of Colorado-Boulder.....	164	9	3	2	3	38	50	49	8
Purdue University (IN).....	160	23	1	4	13	51	30	14	24
Total, top 25.....	5,991	520	79	61	264	1,719	1,883	1,142	323
Total, all institutions.....	26,414	2,917	444	299	794	6,959	9,186	4,698	1,117
Top 25 as a percent of all institutions.	23%	22%	18%	20%	33%	25%	21%	24%	29%

* Listed as Women's Colleges in the United States by Women's College Coalition, 1090 Vermont Avenue, NW, Washington, D.C. 20005
 1/ Includes earth, atmospheric, and oceanographic sciences.

NOTE: Rankings are based on the number of persons who responded to the Survey of Earned Doctorates.

SOURCE: National Science Foundation/SRS, Survey of Earned Doctorates

Table 13. U.S. baccalaureate-origin institutions of all 1985-90 science and engineering (S&E) doctorate recipients, by race/ethnicity and by Carnegie Classification

Carnegie classification of U.S. baccalaureate institutions 1/	Race/ethnicity of S&E doctorate recipients 2/				
	White	Asian	Black	Hispanic	American Indian
Total number.....	69,354	1,885	1,523	1,737	273
Total percent.....	100%	100%	100%	100%	100%
Research-intensive universities..	39	64	28	32	36
Other doctorate-granting universities.....	26	13	18	19	25
Comprehensive institutions.....	19	12	35	41	29
Liberal arts colleges.....	14	10	19	7	7
Specialized institutions.....	2	2	1	1	3
	Race/ethnicity of science doctorate recipients				
Total number.....	61,130	1,414	1,411	1,571	244
Total percent.....	100%	100%	100%	100%	100%
Research-intensive universities..	37	61	26	31	34
Other doctorate-granting universities.....	25	13	17	19	26
Comprehensive institutions.....	21	13	36	42	30
Liberal arts colleges.....	16	12	20	7	7
Specialized institutions.....	1	1	1	1	2
	Race/ethnicity of engineering doctorate recipients				
Total number.....	8,224	471	112	166	29
Total percent.....	100%	100%	100%	100%	100%
Research-intensive universities..	53	74	49	47	52
Other doctorate-granting universities.....	29	14	22	14	17
Comprehensive institutions.....	10	7	24	33	17
Liberal arts colleges.....	5	3	4	2	7
Specialized institutions.....	4	2	1	4	7

1/ Excludes institutions that closed and others for which classifications could not be determined.

2/ Excludes recipients for whom race/ethnicity was not known.

NOTES: Because of rounding, components may not add to totals.
See Appendix A, Technical Notes for information on the Carnegie classification of higher education institutions.

SOURCE: National Science Foundation/SRS, Survey of Earned Doctorates

Table 14. Top 23 baccalaureate-origin institutions of 1985-90 science and engineering (S&E) doctorate recipients who were Hispanic U.S. citizens, by field of doctorate

Baccalaureate-origin institution	Total number of S&E doctorate recipients	Total Science	Field of science							Total engineering
			Physical science 1/	Mathematics	Computer	Agricultural science	Biological science	Psychology	Social science	
University of Puerto Rico-Piedras.....	226	214	65	7	2	7	51	35	46	12
University of Puerto Rico-Mayaguez.....	73	50	17	2	0	10	14	2	5	23
University of California-Berkeley.....	30	26	6	0	1	1	6	7	5	4
University of Texas-Austin.....	29	26	6	2	0	0	4	12	2	3
University of Miami (FL).....	28	26	3	0	0	0	10	13	0	2
University of California-Los Angeles.....	27	27	3	0	0	0	10	9	5	0
University of Florida.....	26	21	0	3	0	1	4	6	7	5
University of New Mexico.....	24	19	9	1	0	0	2	5	2	0
University of California-Santa Cruz.....	21	21	1	1	0	0	5	5	5	1
New York University.....	20	19	4	1	2	0	2	1	3	3
Cuny City College.....	18	15	2	0	0	0	1	4	3	2
Rutgers University (NJ).....	18	16	1	0	0	2	5	6	8	1
University of California-Santa Barbara..	18	17	2	0	0	0	5	2	5	5
Texas A&M University.....	17	12	3	0	0	1	1	5	2	2
University of Texas-El Paso.....	17	15	4	1	0	0	2	8	6	5
Stanford University (CA).....	17	15	4	0	0	0	2	2	6	0
Catholic University (P.R.).....	17	17	7	0	0	0	2	6	2	0
Princeton University (NJ).....	16	15	4	1	0	0	1	4	5	1
New Mexico State University.....	16	14	2	0	1	6	4	1	0	2
Massachusetts Institute of Technology...	14	12	9	1	1	0	3	0	0	2
University of Michigan.....	14	12	1	0	1	1	3	4	3	2
University of Arizona.....	14	11	0	0	0	1	5	2	3	3
California State University-Los Angeles..	14	12	3	0	0	0	1	5	3	2
Total, top 23.....	714	629	153	20	8	29	140	154	125	85
Total, all institutions.....	1,752	1,584	301	37	20	63	334	497	332	168
Top 23 as a percent of all institutions..	41%	40%	51%	54%	40%	46%	42%	31%	38%	51%

1/ Includes earth, atmospheric, and oceanographic sciences.

NOTE: Rankings are based on the number of persons who responded to the Survey of Earned Doctorates.

SOURCE: National Science Foundation/SRS, Survey of Earned Doctorates



62 Table 15. Top 24 baccalaureate-origin institutions of 1985-90 science and engineering (S&E) doctorate recipients who were American Indian U.S. citizen, by field of doctorate

Baccalaureate-origin institution	Total number of S&E doctorate recipients	Field of science							Total engineering
		Physical science 1/	Mathematics	Computer science	Agricultural science	Biological science	Psychology	Social science	
University of California-Berkeley.....	9	1	1	1	1	2	0	2	1
University of Wisconsin-Madison.....	6	1	0	0	0	3	1	1	0
University of California-Davis.....	6	1	0	1	2	0	1	0	1
University of Michigan.....	5	1	0	0	0	0	2	1	1
University of Oklahoma.....	5	1	0	1	0	0	1	2	0
University of California-Santa Barbara.....	5	1	0	0	1	1	2	1	0
Iowa State University.....	4	2	0	0	1	1	0	0	0
University of Arizona.....	4	0	0	0	0	1	0	3	0
Western Washington University.....	4	0	1	0	0	0	3	0	0
Harvard University (MA).....	3	1	0	0	0	0	0	1	1
Massachusetts Institute of Technology.....	3	0	0	0	0	1	0	0	2
CUNY-Brooklyn College.....	3	1	0	0	0	0	2	0	0
Cornell University (NY).....	3	2	0	0	1	0	0	0	0
Pennsylvania State University.....	3	0	0	0	0	2	2	1	0
University of Miami (OH).....	3	0	0	0	0	0	0	2	0
Ohio State University.....	3	0	0	0	1	0	0	0	0
Ill. U. Urbana-Champaign.....	3	0	0	0	2	1	1	0	0
Michigan State University.....	3	0	0	0	1	1	1	0	0
University of Nebraska-Lincoln.....	3	1	0	0	0	0	0	2	0
Northeast State University (OK).....	3	0	0	0	0	0	3	0	0
University of New Mexico.....	3	0	0	0	0	1	0	2	0
Oregon State University.....	3	0	0	0	1	1	0	1	0
California State University-Long Beach.....	3	0	0	0	0	0	2	1	0
University of California-Los Angeles.....	3	0	0	0	0	0	0	1	0
Total, top 24.....	93	13	2	3	10	15	23	21	6
Total, all institutions.....	274	46	3	6	17	56	70	47	29
Top 24 as a percent of all institutions.....	34%	28%	67%	50%	59%	27%	33%	45%	21%

1/ Includes earth, atmospheric, and oceanographic sciences.

NOTE: Rankings are based on the number of persons who responded to the Survey of Earned Doctorates.

SOURCE: National Science Foundation/SRS, Survey of Earned Doctorates

Table 16. Top 23 baccalaureate-origin institutions of 1985-90 science and engineering (S&E) doctorate recipient who were black U.S. citizens, by field of doctorate

Baccalaureate-origin institution	Total number of S/E doctorate recipients	Total Science	Field of science							Total engineering
			Physical science 1/	Mathematics	Computer	Agricultural science	Biological science	Psychology	Social science	
*Howard University (DC).....	53	49	4	0	0	1	6	20	18	4
*Spelman College (GA).....	25	25	2	2	0	0	4	10	7	0
*CUNY-City College.....	22	20	3	0	1	0	1	8	7	2
*Tuskegee University (AL).....	22	19	0	0	1	3	11	2	2	3
*Hampton University (VA).....	21	20	0	2	0	0	3	10	5	1
*Fisk University (TN).....	21	21	3	0	0	1	3	10	4	0
*Harvard University (MA).....	20	17	1	0	0	0	1	10	5	3
*North Carolina Agricultural and Technical State University.....	20	18	1	0	0	2	3	6	6	2
*Jackson State University (MS).....	18	18	3	0	0	2	8	2	3	0
*Southern University (LA).....	17	14	2	1	0	0	4	3	4	3
*University of Maryland.....	16	15	0	2	0	0	0	6	7	1
*Morehouse College (GA).....	16	15	3	2	0	0	2	4	4	1
Massachusetts Institute of Technology..	14	7	5	0	0	0	1	1	0	7
*Princeton University (NJ).....	14	13	2	0	0	0	2	9	0	1
*Tennessee State University.....	14	11	1	0	0	1	4	4	1	3
University of California-Berkeley.....	14	14	1	1	0	0	1	5	6	0
*Virginia State University.....	13	12	1	0	0	0	1	4	6	1
*North Carolina Central University.....	13	12	1	0	0	0	2	2	7	1
Brown University (RI).....	12	10	1	0	0	0	3	6	0	2
Yale University (CT).....	12	11	1	0	0	0	0	8	1	1
Cornell University (NY).....	12	12	1	0	0	1	3	5	2	0
*Lincoln University (PA).....	12	11	1	0	0	0	1	7	2	1
University of Michigan.....	12	11	1	0	1	0	0	5	4	1
Total, top 23.....	413	375	38	11	3	11	64	147	101	38
Total, all institutions.....	1534	1420	136	29	7	38	232	586	392	114
Top 23 as a percent of all institutions	27%	26%	28%	38%	43%	29%	28%	25%	26%	33%

1/ Includes earth, atmospheric, and oceanographic sciences.

* Historically black colleges and universities.

NOTE: Rankings are based on the number of persons who responded to the Survey of Earned Doctorates.

SOURCE: National Science Foundation/SRS, Survey of Earned Doctorates

Table 17

Baccalaureate-origin institutions of 10 or more science and engineering doctorates, by major field(1): 1985-90—continued

Page 11 of 11

Institution of baccalaureate	Total sci & eng	Major field of doctorate														Total all fields		
		Physical Sciences				Earth/atmos/ocean	Math	Comp/Info sci	Agric & Biol Sci			Soc sci	Psych	Engineering(2)			Non-sci & eng(3)	
		Sub-total	Phys	Chem	Astr				Sub-total	Agri sci	Biol sci			Sub-total	Chem			Elec
Longwood College/VA	11	2	-	2	-	-	-	6	-	6	1	1	1	1	-	-	21	32
Radford Univ/VA	11	3	-	3	-	-	-	2	1	1	2	4	-	-	-	-	36	47
St Andrews Prby C/NC	11	3	-	3	-	1	1	3	-	3	2	1	-	-	-	-	17	28
Georgetown Coll/KY	11	3	-	3	-	1	1	4	-	4	1	-	-	-	-	-	19	30
Jacksonville St U/AL	11	4	-	4	-	1	-	1	-	1	-	5	-	-	-	-	62	73
Northeastern St U/OK	11	2	-	2	-	-	-	2	-	2	2	5	-	-	-	-	63	74
Oklahoma Bapt Univ	11	1	-	1	-	-	-	5	1	4	2	3	-	-	-	-	69	80
Oklahoma Christian U	11	1	-	1	-	-	-	4	-	4	-	5	1	1	-	-	16	27
Southern Okla St U	11	9	2	7	-	-	-	1	-	1	-	-	1	-	-	-	23	34
Mont C Minnrl Sc&Tech	11	3	-	3	2	-	-	1	-	1	-	-	-	5	-	1	-	11
Calif Lutheran Univ	11	-	-	-	-	-	-	6	1	5	3	2	-	-	-	-	8	19
Pratt Institute/NY	10	1	1	-	-	-	-	3	-	3	3	1	2	-	1	1	12	22
Georgian Court C/NU	10	2	-	2	-	1	-	2	-	2	3	2	-	-	-	-	15	25
Jersey City St C/NU	10	2	-	2	-	-	-	1	-	1	2	5	-	-	-	-	44	54
Allinson C St Fran/PA	10	4	-	4	-	-	-	4	-	4	-	2	-	-	-	-	5	15
Phil C TextileSci/PA	10	5	-	5	-	-	-	1	-	1	-	1	3	-	-	-	6	16
Bluffton College/OH	10	-	-	-	-	-	-	3	1	2	5	2	-	-	-	-	16	26
Central State U/OH	10	1	-	1	-	-	-	2	-	2	5	2	-	-	-	-	26	36
Mt St Jos On Ohio, C	10	2	-	2	1	-	-	3	-	3	3	1	-	-	-	-	14	24
Southern Indiana, U	10	2	-	2	-	-	-	5	-	5	1	2	-	-	-	-	1	11
St Xavier College/IL	10	1	-	1	-	1	-	-	-	-	5	3	-	-	-	-	18	28
Simpson College/IA	10	4	-	4	-	-	-	-	-	-	1	5	-	-	-	-	15	25
Maharishi Intl U/IA	10	3	3	-	-	1	-	4	-	4	-	2	-	-	-	-	4	14
Avila College/MD	10	3	-	3	-	-	-	1	-	1	2	4	-	-	-	-	11	21
Central Meth Coll/MD	10	-	-	-	-	-	-	5	1	4	4	-	1	-	-	-	12	22
Westminster Coll/MD	10	3	1	2	-	-	-	2	-	2	2	3	-	-	-	-	14	24
Minot State Univ/ND	10	3	-	3	-	-	-	2	1	1	3	2	-	-	-	-	16	26
Nebraska, U, Med Ctr	10	1	-	1	-	-	-	6	-	6	1	2	-	-	-	-	8	18
Union College/NE	10	2	2	-	1	-	-	4	-	4	1	2	-	-	-	-	16	26
Bowie State Univ/MD	10	-	-	-	-	-	-	2	-	2	4	4	-	-	-	-	19	29
Mt St Marys Coll/MD	10	1	-	1	-	-	-	6	-	6	2	-	1	-	-	1	13	23
West VA Inst of Tech	10	1	-	1	-	-	-	1	-	1	-	-	8	-	1	1	12	22
Lenoir-Rhyne Coll/NC	10	4	1	3	-	-	1	2	-	2	2	1	-	-	-	-	23	33
Erskine College/SC	10	5	1	4	1	-	-	4	1	3	-	-	-	-	-	-	13	23
Winthrop College/SC	10	-	-	-	-	-	1	2	-	2	7	-	-	-	-	-	44	54
Armstrong State C/GA	10	1	-	1	-	-	-	2	1	1	2	5	-	-	-	-	24	34
Tampa, Univ of/FL	10	2	-	2	-	-	1	4	-	4	-	2	1	-	1	-	14	24
Christn Brothrs C/TN	10	1	-	1	-	2	-	-	-	-	1	2	4	-	2	2	5	15
Sanford Univ/AL	10	1	-	1	-	-	-	1	-	1	1	7	-	-	-	-	81	91
Henderson St U/Ark	10	3	2	1	-	-	-	1	-	1	1	4	1	-	-	-	32	42
Quachita Bapt U/AR	10	3	1	2	1	-	-	5	-	5	-	1	-	-	-	-	46	56
Oklahoma City Univ	10	1	-	1	-	-	-	1	-	1	5	2	1	1	-	-	38	48
Eastern Montana Coll	10	1	-	1	-	2	-	3	1	2	2	2	-	-	-	-	11	21
N Mexico Highlands U	10	1	-	1	-	-	-	-	-	-	2	6	1	-	1	-	18	28

(1) Institutions are ranked according to the number of S/E doctorates who earned a baccalaureate in the U.S. (50 states, D.C., and Puerto Rico) and who provided data on baccalaureate institution. Baccalaureate institution was not known for 5.3 percent of S/E doctorates in 1985-90.

(2) Subtotal includes engineering fields not separately shown.

(3) Non-science/engineering doctorates in this table include doctorates who field of specialization is unclassified.

SOURCE: National Science Foundation/SRS, Survey of Earned Doctorates

Appendix C.
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Appendix C. Bibliography

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