Trends in Higher Education

Council of Graduate Schools
March 17, 2016

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National Science Foundation
National Center for Science and Engineering Statistics
www.nsf.gov/statistics
Agenda: Recent Trends in S&E Higher Education

• Introduction: Higher education institutions and S&E
  
  A few words about the taxonomy of fields and the definition of underrepresented minorities (URM).

• Trends in S&E bachelor’s, master’s, and doctoral degrees

• Financial support patterns for graduate education

• International comparisons: First university degrees and doctoral degrees

• Trends in academic employment of doctorate holders

• Expenditures for academic research and development

• How to access NSF reports and datasets
The U.S. higher education system

S&E degrees

- 4,700 postsecondary degree-granting institutions in the U.S. in the 2013-2014 academic year. Of these, 64% offered bachelor’s or higher degrees.

- 52% of the 3,000 institutions offering bachelor’s degrees or higher are private nonprofit, 23% are public, and 25% are private-for-profit.

- Doctorate-granting institutions with very high research activity, although few in number, are the leading producers of S&E degrees at the bachelor’s, master’s, and doctoral levels.

- Other important institutions in educating S&E graduates: high Hispanic enrollment institutions (HHEs), historically black colleges and universities, and community colleges.
S&E bachelor’s degrees, by field: 2000–13

NOTE: Physical sciences include earth, atmospheric, and ocean sciences.

International undergraduate students: 2014 (N=408,000)

S&E  Non S&E

International graduate students: 2014 (N=343,000)

S&E  Non S&E

SOURCE: U.S. Department of Homeland Security, U.S. Immigration and Customs Enforcement, special tabulations (2014) of the Student and Exchange Visitor Information System database. Data include active national students on F-1 visas and exclude those in optional practical training. Undergraduate includes associate's and bachelor's degrees; graduate includes master's and doctoral degrees.
S&E master's degrees, by field: 2000–13

NOTE: Physical sciences include earth, atmospheric, and ocean sciences.

S&E doctoral degrees earned in U.S. universities, by field: 2000–13

NOTES: Physical sciences include earth, atmospheric, and ocean sciences. Data differ from doctoral degree data in other tables and figures in this report that are based on the National Science Foundation Survey of Earned Doctorates and that refer to research doctorates only. Greatest differences are in psychology and medical sciences.

S&E doctoral degrees, by sex, race, ethnicity, and citizenship: 2000–13

NOTES: Minority includes American Indian or Alaska Native, Asian or Pacific Islander, black or African American, and Hispanic. Data differ from doctoral degree data in other tables and figures in this report that are based on the National Science Foundation Survey of Earned Doctorates and that refer to research doctorates only. Greatest differences are in psychology and medical/other health sciences. S&E excludes other health sciences.

NOTES: Self-support includes any loans (including federal) and support from personal or family financial contributions

<table>
<thead>
<tr>
<th>Mechanism</th>
<th>All institutions</th>
<th>Research universities—very high research activity</th>
<th>Research universities—high research activity</th>
<th>Doctoral/research universities</th>
<th>Medical schools and medical centers</th>
<th>Other/not classified</th>
</tr>
</thead>
<tbody>
<tr>
<td>Doctorate recipients (number)</td>
<td>39,334</td>
<td>29,415</td>
<td>6,409</td>
<td>1,468</td>
<td>1,250</td>
<td>792</td>
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<td>All mechanisms</td>
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<td>Fellowship or traineeship</td>
<td>19.8</td>
<td>21.5</td>
<td>12.7</td>
<td>10.7</td>
<td>32.6</td>
<td>11.5</td>
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<td>Grant</td>
<td>6.5</td>
<td>6.9</td>
<td>3.3</td>
<td>3.1</td>
<td>19.1</td>
<td>4.5</td>
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<tr>
<td>Teaching assistantship</td>
<td>16.5</td>
<td>16.7</td>
<td>21.8</td>
<td>8.0</td>
<td>1.0</td>
<td>8.0</td>
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<td>Research assistantship</td>
<td>33.8</td>
<td>36.8</td>
<td>30.7</td>
<td>12.2</td>
<td>19.0</td>
<td>11.0</td>
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<td>Personal</td>
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<td>14.3</td>
<td>41.5</td>
<td>9.1</td>
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<td>Other</td>
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<td>5.3</td>
<td>7.1</td>
<td>5.4</td>
<td>4.8</td>
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<td>10.5</td>
<td>9.2</td>
<td>11.9</td>
<td>17.4</td>
<td>13.8</td>
<td>32.1</td>
</tr>
</tbody>
</table>

**NOTES:** Personal support mechanisms include personal savings, other personal earnings, other family earnings or savings, and loans. Research assistantships include research assistantships and other assistantships. Traineeships include internships and residencies. Other support mechanisms include employer reimbursement or assistance, foreign support, and other sources. Percentages may not add to total because of rounding.

S&E first university degrees, by location: 2000–12

NOTE: Data are not available for all locations in all years.


NOTE: Data are not available for all regions/countries/economies in all years.

Trends in academic doctorate employment and spending on academic R&D

Trends in the academic employment of doctoral scientists and engineers
- by position type and tenure status
- by age
- by gender
- by race and ethnicity

Funding for research and development at universities and colleges
- by source of funds
- by fields
- by institution type (public or private)
Academically-employed doctorate workforce in science and engineering

- 2013 academic workforce with research doctorates: 370,000 (309,000 U.S.-trained; 60,000 foreign-trained). Focus will be on U.S.-trained.

- Postdoctoral researchers (postdocs): 43,000 with S&E research doctorates, about one-half with a doctorate from abroad.

- How have the structure of academic employment and the demographic composition of academically-employed doctorate holders changed?
  - Position types available
  - Age composition
  - Women’s progress
  - Underrepresented minorities’ progress
S&E doctorate holders employed in academia, by S&E field: Selected years, 1973–2013

NOTES: Data for computer sciences are not available for 1973. Academic employment is limited to U.S. doctorate holders employed at 2- or 4-year colleges or universities, excluding those employed part time who are students or retired. Physical sciences include earth, atmospheric, and ocean sciences; life sciences include biological, agricultural, environmental, and health sciences.

The Survey of Doctorate Recipients (SDR)

Longitudinal survey providing data on U.S.-trained research doctorates in science, engineering, or health. Provides sample data – I will point out meaningful trends.

Universities and colleges are major employers of doctorate women (46%) and underrepresented minorities (50%).

Older cohorts of doctorate holders are largely white (82%) and male (73%); younger cohorts are more diverse.

- Doctorate before 1995:
  - 27% female
  - 6% underrepresented minority
  - 10% Asians

- Doctorate after 1995:
  - 44% female
  - 11% underrepresented minority
  - 22% Asians
S&E doctorate holders employed in academia, by type of position: 1973–2013

NOTES: Academic employment is limited to U.S. doctorate holders employed at 2- or 4-year colleges or universities, medical schools, and university research institutes. Full-time faculty includes full, associate, assistant professors, and instructors (from 1973 to 1995), and full, associate, and assistant professors from 1997 to 2013. Other full-time positions includes positions such as research associates, adjunct appointments, instructors (from 1997 to 2013), lecturers, and administrative positions. Part-time positions excludes those held by students or retired persons. SOURCE: National Science Foundation, National Center for Science and Engineering Statistics, special tabulations (2014) of the 1973–2013 Survey of Doctorate Recipients.
Changes in tenure patterns since 1993

Over the past 20 years, a decrease in the percentage of doctorate holders with tenured positions even as the academic doctoral workforce has aged.

1993: 54% (114,200) of STEM PhDs were tenured
2013: 47% (144,600) were tenured.

The share of those tenured has decreased due to an increase in the number and share of positions for which tenure is not an option, such as postdoctoral positions and adjunct faculty.

Changes in age distribution since 1995

Meanwhile, the academic doctoral workforce has aged substantially, particularly since 1995, when the Age Discrimination in Employment Act of 1967 (ADEA) became fully applicable to universities and colleges.

ADEA prohibits forced retirement of faculty at any age.
S&E doctorate holders at universities and colleges by age group: 1993 and 2013

1993 – 212,600 doctorate holders

2013 – 309,000 doctorate holders
Full-time faculty ages 65–75 at research universities and other higher education institutions: 1973–2013

NOTE: Faculty positions include full, associate, and assistant professors and instructors from 1973 to 1995; from 1997 to 2013, faculty positions include full, associate, and assistant professors.

Women as a percentage of S&E doctorate holders employed full time in academia, by academic rank: 
Selected years, 1973–2013

NOTES: Academic employment is limited to U.S. doctorate holders employed at 2- or 4-year colleges or universities, medical schools, and university research institutes, excluding those employed part time who are students or retired. Junior faculty includes assistant professors and instructors in 1973, 1983, and 1993; in 2003 and 2013, junior faculty includes assistant professors.
Women as a percentage of full-time, assistant professors at 4-year institutions with S&E doctorates, by field: 1993–2013

Percent

1993

2013

Computer sciences and mathematics
Health
Life sciences
Physical sciences
Psychology
Social sciences
Engineering

Women as a percentage of full-time, full professors at 4-year institutions with S&E doctorates, by field: 1993–2013

Percent

- Computer sciences and mathematics
- Health
- Life sciences
- Physical sciences
- Psychology
- Social sciences
- Engineering

1993
2013
Underrepresented minorities in S&E doctoral employment

Underrepresented minorities (blacks, Hispanics, and American Indian or Alaska Natives) have increased presence in higher education but continue to hold a small percentage of doctorate positions.

Underrepresented minorities constituted 9% of total academic S&E doctoral employment in 2013, up from 7% in 2003 and about 2% in 1973.

Progress among younger cohorts: 11% for those with a doctorate earned since 1995.

Underrepresented minorities held slightly lower shares of full-time faculty positions than other positions.

Like women, underrepresented minorities hold somewhat higher shares of junior faculty positions than of positions as full professors.
Underrepresented minorities as a percentage of full-time, assistant and full professors at 4-year institutions: 1993-2013

Percent

- Assistant Professors
- Full Professors

1993
- Assistant: 8%
- Full: 3%

2003
- Assistant: 9%
- Full: 5%

2013
- Assistant: 10%
- Full: 6%
S&E postdocs in academia

2013: 43,000 postdocs with doctorate in S&E
  - Just over one-half earned doctorate overseas
Postdocs more prevalent in life sciences, physical sciences, engineering than in other fields
S&E doctorate holders with academic employment in a postdoc position, by degree field: Selected years, 1973–2013

NOTES: Academic employment is limited to U.S. doctorate holders employed at 2- or 4-year colleges or universities, medical schools, and university research institutes, excluding those employed part time who are students or retired. Physical sciences include earth, atmospheric, and ocean sciences; life sciences include biological, agricultural, environmental, and health sciences.
Higher education R&D expenditures, by source of funds: 1972-2014

Billions of constant 2009 dollars
Sources of S&E R&D funding for public and private academic institutions: FY 2014

* Academic institutions' funds exclude research funds spent from multipurpose accounts.


Federally financed academic R&D expenditures, by agency and S&E field: FY 2014

DOD = Department of Defense; DOE = Department of Energy; HHS = Department of Health and Human Services; NASA = National Aeronautics and Space Administration; NSF = National Science Foundation; USDA = U.S. Department of Agriculture.


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<tr>
<th>S&amp;E field</th>
<th>Constant average growth rate</th>
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<td>Computer sciences</td>
<td>6.3</td>
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<tr>
<td>Environmental sciences</td>
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<tr>
<td>Life sciences</td>
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<td>Mathematical sciences</td>
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<td>Physical sciences</td>
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<td>Psychology</td>
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<tr>
<td>Social sciences</td>
<td>3.7</td>
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<td>Engineering</td>
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Availability of Data Referenced in this Presentation

**GSS**
- Data available in the WebCASPAR data tool

**SED**
- Data available in the WebCASPAR and SED Tabulation Engine data tools

**SDR**
- Data available in the SESTAT Data Tool

**IPEDS**
- Data available in the WebCASPAR data tool
Data and Tools:  https://ncsesdata.nsf.gov/webcaspar/
## Select Survey Data

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<td>International Survey of Doctorate Recipients, ISDR PUBLIC</td>
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<td>Recent College Graduates, NSRCG PUBLIC</td>
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See SESTAT Metadata Explorer for more details
NCSES Publications and Products

Congressionally mandated biennial reports:

- *Science and Engineering Indicators* (even numbered years)  
- *Women, Minorities, and Persons With Disabilities in Science and Engineering* (odd numbered years)  

Survey of Earned Doctorates annual report  

InfoBriefs - highlight results from recent surveys and analyses  

Detailed Statistical Tables – tabular data and technical material, usually for a particular survey and survey year  
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www.nsf.gov/statistics