Characteristics of Individuals Educated or Employed as Engineers

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Diversity in the Minerals, Metals, and Materials Professions
24 July 2018

National Science Foundation
National Center for Science and Engineering Statistics
www.nsf.gov/statistics
Mission
Responsible for statistical data on:
• Research and development.
• The science and engineering workforce.
• U.S. competitiveness in science and engineering.
• The condition and progress of science, technology, engineering and mathematics (STEM) education in the United States.

Publications and products
• Special analytic reports.
• InfoBriefs.
• Detailed statistical tables.
• Working papers designed to further exploration and discussion of a topic.
Women, Minorities, & Persons with Disabilities in S&E (WMPD)

Comprehensive look at women, minorities, and persons with disabilities in S&E education and employment by field and occupation.

Statistical abstract: no policy or program recommendations.

NCSES and other federal surveys used to explore 4 topical areas:
- Enrollment
- Field of degree
- Occupation
- Employment status

Data are nuanced due to important field and occupation differences.

Bottom lines:
- Women equal to men in S&E degree attainment; a smaller presence in S&E occupations.
- Blacks, Hispanics, and American Indians or Alaska Natives underrepresented in both educational attainment and S&E workforce.
- Persons with disabilities more likely to be unemployed or not in the labor force.
Scope of human resources data

Pre-college education
- Undergraduate enrollments
- IPEDS Fall Enrollment
- IPEDS Completions

Undergraduate degrees
- IPEDS Fall Enrollment
- IPEDS Completions

Graduate degrees
- GSS
- SED
- IPEDS Fall Enrollment
- IPEDS Completions

Workforce
- NSCG
- SDR
- ECDS
- ACS
- CPS
- OES
- Federal S&E

Material produced in a wide variety of governmental and private settings
What is an “underrepresented minority?”

Blacks, Hispanics and Native Americans are underrepresented across science and engineering. Combined, those groups make up 31% of the U.S. population. That share is lower at various levels of S&E.

<table>
<thead>
<tr>
<th>Category</th>
<th>U.S. general population</th>
<th>S&amp;E bachelor’s recipients</th>
<th>S&amp;E doctorate recipients</th>
<th>Employment in S&amp;E occupations</th>
</tr>
</thead>
<tbody>
<tr>
<td>31%</td>
<td>21%</td>
<td>13%</td>
<td>11%</td>
<td></td>
</tr>
</tbody>
</table>

Sources: 2014 American Community Survey (population); National Center for Education Statistics degree completion data (bachelor’s and doctorate recipients); 2015 National Survey of College Graduates (employment)
Graduate School Enrollments
Total number of graduate students enrolled in engineering: 2016

Number of graduate students enrolled in metallurgical & materials engineering, mining engineering, and petroleum engineering: 1975-2016

Sex of graduate students enrolled in engineering: 2007 & 2016

- **Metallurgical and materials engineering**
  - 2007: 3,841 (Female: 1,473) (Male: 2,368)
  - 2016: 5,627 (Female: 2,479) (Male: 3,148)

- **All engineering**
  - 2007: 101,204 (Female: 30,472) (Male: 70,732)
  - 2016: 127,088 (Female: 41,355) (Male: 85,733)

- **Mining engineering**
  - 2007: 37 (Female: 18) (Male: 19)
  - 2016: 74 (Female: 30) (Male: 44)

Race and ethnicity of graduate students enrolled in engineering: 2016

Metallurgical and materials engineering (N=3,842)
- Ethnicity and race unknown
- More than one race
- Native Hawaiian or Other Pacific Islander
- American Indian or Alaska Native
- Hispanic or Latino
- Black or African American
- Asian
- White

Mining engineering (N=198)
- Ethnicity and race unknown
- More than one race
- Native Hawaiian or Other Pacific Islander
- American Indian or Alaska Native
- Hispanic or Latino
- Black or African American
- Asian
- White

Petroleum engineering (N=544)
- Ethnicity and race unknown
- More than one race
- Native Hawaiian or Other Pacific Islander
- American Indian or Alaska Native
- Hispanic or Latino
- Black or African American
- Asian
- White

Note: Temporary visa holders are excluded.

Educational Degrees

Information on Bachelor’s Degrees
## Field of degree: Women

<table>
<thead>
<tr>
<th>2014: High participation</th>
<th>2014: Low participation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Psychology</strong></td>
<td><strong>Economics</strong></td>
</tr>
<tr>
<td>77% of bachelor's degrees</td>
<td>31% of bachelor's degrees</td>
</tr>
<tr>
<td>79% of master's degrees</td>
<td>41% of master's degrees</td>
</tr>
<tr>
<td>73% of doctorate degrees</td>
<td>34% of doctorate degrees</td>
</tr>
<tr>
<td><strong>Biosciences</strong></td>
<td><strong>Computer Sciences</strong></td>
</tr>
<tr>
<td>58% of bachelor's degrees</td>
<td>18% of bachelor's degrees</td>
</tr>
<tr>
<td>57% of master's degrees</td>
<td>29% of master's degrees</td>
</tr>
<tr>
<td>53% of doctorate degrees</td>
<td>21% of doctorate degrees</td>
</tr>
<tr>
<td><strong>Social Sciences</strong></td>
<td><strong>Physics</strong></td>
</tr>
<tr>
<td>55% of bachelor's degrees</td>
<td>19% of bachelor's degrees</td>
</tr>
<tr>
<td>57% of master's degrees</td>
<td>23% of master's degrees</td>
</tr>
<tr>
<td>51% of doctorate degrees</td>
<td>19% of doctorate degrees</td>
</tr>
<tr>
<td><strong>Engineering</strong></td>
<td></td>
</tr>
<tr>
<td>20% of bachelor's degrees</td>
<td></td>
</tr>
<tr>
<td>24% of master's degrees</td>
<td></td>
</tr>
<tr>
<td>23% of doctorate degrees</td>
<td></td>
</tr>
</tbody>
</table>

Source: National Center for Education Statistics degree completion data.
Women’s share of S&E bachelor’s degrees, by field: 2000–2015

Source: Science & Engineering Indicators 2018, Fig 2-11; NCES degree completion data.
Women’s share of engineering bachelor’s degrees, by subfield: 2006–2015

Source: National Center for Education Statistics degree completion data.
Bachelor’s degrees awarded in science, engineering, and non-S&E fields by race and ethnicity: 2016

Source: National Center for Education Statistics degree completion data.
Bachelor’s degrees awarded in materials engineering, by race and ethnicity: 2016

- White: 68%
- Asian: 13%
- Black or African American: 3%
- Hispanic or Latino: 8%
- More than one race: 5%
- Other or unknown: 3%

Note: N=1,669 U.S. citizens and permanent residents; 222 temporary visa holders are excluded.

Source: National Center for Education Statistics degree completion data.
Engineering bachelor’s degrees earned by women, by race and ethnicity: 2004-2014

Source: National Center for Education Statistics degree completion data.
Educational Degrees

*Information on Doctoral Degrees*
Share of doctorates awarded to women, by broad field of study: 1996–2016

Percent of each field

- Education
- Psychology and social sciences
- Life sciences
- Humanities and arts
- Other non-S&E fields
- Physical sciences and earth sciences
- Mathematics and computer sciences
- Engineering

S&E = science and engineering.

NOTE: Percentages are based on the number of doctorate recipients for whom sex was reported.

Fastest growing fields of study for female U.S. doctorate recipients, by broad field of study: 2006–16

- Life sciences
- Physical sciences and earth sciences
- Mathematics and computer sciences
- Psychology and social sciences
- Engineering
- Education
- Humanities and arts
- Other non-S&E fields
- Biological and biomedical sciences
- Agricultural sciences and natural resources
- Geosciences, atmospheric, and ocean sciences
- Physics and astronomy
- Mathematics and statistics
- Computer and information sciences
- Economics
- Other social sciences
- Bioengineering and biomedical engineering
- Aerospace, aeronautical, and astronautical engineering
- Teaching fields
- Other education
- History
- Letters
- Communication
- Business management and administration

Percent change 2006–16

S&E = science and engineering.

### Doctorate recipients in engineering fields, by sex: 2016

<table>
<thead>
<tr>
<th>Field</th>
<th>Female</th>
<th>Male</th>
</tr>
</thead>
<tbody>
<tr>
<td>All engineering fields</td>
<td>23.1%</td>
<td>76.9%</td>
</tr>
<tr>
<td>Aerospace, aeronautical, and astronautical</td>
<td>15.2%</td>
<td>84.8%</td>
</tr>
<tr>
<td>Bioengineering and biomedical engineering</td>
<td>36.9%</td>
<td>63.1%</td>
</tr>
<tr>
<td>Chemical engineering</td>
<td>32.2%</td>
<td>67.8%</td>
</tr>
<tr>
<td>Civil engineering</td>
<td>22.5%</td>
<td>77.5%</td>
</tr>
<tr>
<td>Electrical, electronics, and communications</td>
<td>16.1%</td>
<td>83.9%</td>
</tr>
<tr>
<td>Industrial and manufacturing engineering</td>
<td>27.7%</td>
<td>72.3%</td>
</tr>
<tr>
<td>Materials science engineering</td>
<td>26.6%</td>
<td>73.4%</td>
</tr>
<tr>
<td>Mechanical engineering</td>
<td>15.6%</td>
<td>84.4%</td>
</tr>
<tr>
<td>Other engineering</td>
<td>22.3%</td>
<td>77.7%</td>
</tr>
</tbody>
</table>

Source: Survey of Earned Doctorates 2016, Table 64.
Doctorates awarded to minority U.S. citizens and permanent residents, by ethnicity, race, and broad field of study: 2016

Percent

- Hispanic or Latino
- American Indian or Alaska Native
- Asian
- Black or African American
- More than one race

S&E = science and engineering.
Doctoral degrees awarded in materials engineering, by sex and race and ethnicity: 2015

Note: Temporary visa holders are included.
*Suppressed to avoid disclosure of confidential information.

Source: Survey of Earned Doctorates 2015, Tabulation Engine.
Occupation
Occupation and employment status of scientists and engineers

Scientists and Engineers are…

College graduates with…

• At least one degree in an S&E or S&E-related field

OR

• Working in an S&E or S&E-related occupation
Comparing scientists and engineers in S&E occupations with the U.S. population

S&E Occupations
- 49% total
  - 18% White men
  - 14% White women
  - 7% Asian men
  - 3% Asian women
  - 2% Black men
  - 4% Black women
  - 2% Hispanic men
  - 2% Hispanic women
  - 2% Other men and women

U.S. Population
- 31% total
  - 31% White men
  - 31% White women
  - 3% Asian men
  - 3% Asian women
  - 6% Black men
  - 7% Black women
  - 9% Hispanic men
  - 8% Hispanic women
  - 3% Other men and women

NOTES: Hispanic may be any race. Other includes individuals not of Hispanic ethnicity who reported more than one race or a race not listed separately.

Sources: National Survey of College Graduates 2015 (left), American Community Survey 2014 (right).

- All S&E occupations
- Computer and mathematical scientists
- Biological, agricultural, and environmental life scientists
- Physical scientists
- Social scientists
- Engineers

Source: Science & Engineering Indicators 2018, Fig 3-27; National Survey of College Graduates 2015 data.
Percentage of women in engineering jobs: 2015

Aeronautical/aerospace/astronautical engineers - Male: 100%, Female: 0%
Bioengineers or biomedical engineers - Male: 100%, Female: 0%
Chemical engineers - Male: 100%, Female: 0%
Civil, including architectural/sanitary engineers - Male: 100%, Female: 0%
Computer engineers - hardware - Male: 100%, Female: 0%
Electrical and electronics engineers - Male: 100%, Female: 0%
Environmental engineers - Male: 100%, Female: 0%
Industrial engineers - Male: 100%, Female: 0%
Marine engineers and naval architects - Male: 100%, Female: 0%
Materials and metallurgical engineers - Male: 100%, Female: 15.4%
Mechanical engineers - Male: 100%, Female: 0%
Nuclear engineers - Male: 100%, Female: 0%
Petroleum engineers - Male: 100%, Female: 10.7%
Sales engineers - Male: 100%, Female: 0%
Postsecondary Teachers: Engineering - Male: 100%, Female: 0%

Among doctorate recipients, percentage of females in engineering jobs: 2015

Source: Survey of Doctorate Recipients 2015.

- Aeronautical/aerospace/astronautical engineering
- Agricultural engineers
- Bioengineers or biomedical engineers
- Chemical engineers
- Civil, including architectural/sanitary engineers
- Computer engineers - hardware
- Electrical and electronics engineers
- Environmental engineers
- Industrial engineers
- Marine engineers and naval architects
- Materials and metallurgical engineers
- Mechanical engineers
- Nuclear engineers
- Petroleum engineers
- Sales engineers
- Postsecondary Teachers: Engineering

<table>
<thead>
<tr>
<th></th>
<th>Female</th>
<th>Male</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aeronautical/aerospace/astronautical engineering</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agricultural engineers</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bioengineers or biomedical engineers</td>
<td>18.5%</td>
<td></td>
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<td>Postsecondary Teachers: Engineering</td>
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</tr>
</tbody>
</table>
Race and ethnicity of all engineers: 2015

- 70.5% White
- 16.2% Asian
- 7.0% Black or African American
- 4.3% Hispanic or Latino
- 2.0% Other

Employment sectors of scientists and engineers, by sex, race and ethnicity: 2015

Unemployment rate among scientists and engineers: 2015

- U.S. general population unemployment rate: 5.8%
- Unemployment rate for scientists and engineers: 3.3%

- White women: 2.8%
- White men: 3.0%
- Asian women: 4.0%
- Asian men: 3.0%
- Underrepresented women: 6.0%
- Underrepresented men: 4.2%

Accessing WMPD

Introduction

The representation of certain groups of people in science and engineering (S&E) education and employment differs from their representation in the U.S. population. Women, persons with disabilities, and three racial and ethnic groups—Blacks, Hispanics, and American Indians or Alaska Natives—are underrepresented in S&E. While women have matched parity with men among S&E degree recipients overall, they constitute disproportionately smaller percentages of employed scientists and engineers than do the U.S. population. Blacks, Hispanics, and American Indians or Alaska Natives have gradually increased their share of S&E degrees, but they remain underrepresented in educational attainment and the S&E workforce. By contrast, Asians are overrepresented among S&E degree recipients and employed scientists and engineers.

Underrepresentation and overrepresentation of women and racial or ethnic groups vary by field of study and occupation. Variations in the representation of these groups are rooted in differences in preservice course taking, participation in S&E higher education, and overall educational attainment.

Women and underrepresented minorities constituted a substantial portion of the U.S. population ages 18 to 64 years in 2016. Women were about 50% of this population; Hispanics, 17%; Blacks, 12%; Asians, 5%; and other racial and ethnic groups combined (American Indians or Alaska Natives, Native Hawaiians or Other Pacific Islanders, and individuals who report more than one race and are not Hispanic). 2%, according to the latest Census Bureau projections. Minorities will account for 54% of the U.S. population by 2060. The largest growth is projected in the numbers of Hispanics, Asians, and persons of multiple races. Despite increasing numbers, the proportion of blacks is projected to grow only 1 percentage point by 2060.

Noninstitutionalized resident population of the United States ages 18–64, by race, ethnicity, and sex, 2014

Data Tables

Tables are updated as new information becomes available and are current as of the date shown on the list.

Download All Tables (12 MB)
Accessing NCSES Data

SESTAT Data Tool (https://ncsesdata.nsf.gov/sestat/sestat.html)

WebCASPAR Data Tool (https://ncsesdata.nsf.gov/webcaspar/TableBuilder)
(being phased out)

Accessing NCSES Data (continued)

New Interactive Data Tool
(https://ncsesdata.nsf.gov/ids/?utm_source=Main&utm_medium=Main&utm_campaign=Main)

Microdata: Public-use and restricted-use files
Thank you for your interest

NCSES strives to make data and analysis available to all members of the public.  


• Data tables
• Online data tools
• Microdata files

If you are seeking information about women, minorities, or persons with disabilities, please contact:

• Karen Hamrick, Senior Analyst, khamrick@nsf.gov
• Jaqui Falkenheim, Senior Analyst, jfalkenh@nsf.gov

If you are seeking methodological information about our education or workforce surveys, please contact:

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• John Finamore, HRS Program Director, jfinamor@nsf.gov