

Collecting and Using Data for Doctoral Education: A Perspective from the United States

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Three Examples



Survey of Earned Doctorates



PhD Career Pathways Project



University Level Data Transparency



SURVEY OF EARNED DOCTORATES

Survey of Earned Doctorates (<https://sedsurvey.org/>)

National Center for Science and Engineering Statistics | NSF 24-309

Figure 1

Doctorates awarded by U.S. colleges and universities: 1958–2022



S&E = science and engineering

Source(s): National Center for Science and Engineering Statistics, Survey of Earned Doctorates, 2022. Related detailed table 1-1.

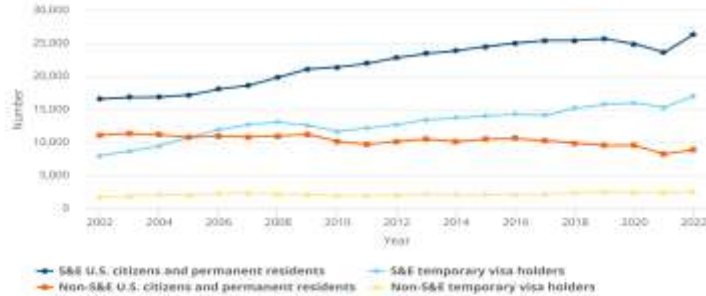
- Annual survey of all research doctorate recipients in the United States since 1958
- 50,000 participants each year
- Conducted by the National Science Foundation in cooperation with the National Institutes of Health, the Department of Education, and the National Endowment for the Humanities
- Each university gets their data with comparisons to similar universities

Trend Data

National Center for Science and Engineering Statistics | NSF 24-300

Figure 2

Doctorates awarded in S&E and non-S&E fields, by citizenship status: 2002–22



S&E = science and engineering.

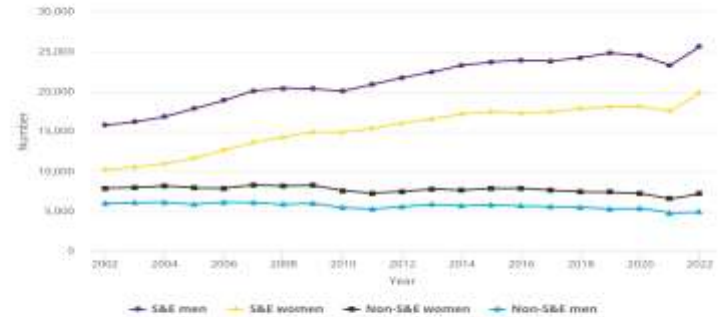
Note(s): Excludes respondents who did not report citizenship. Counts of unreported citizenship fluctuated between 1,995 and 4,144.

Source(s): National Center for Science and Engineering Statistics, Survey of Earned Doctorates, 2022. Related detailed table 1-6 and table 1-7.

National Center for Science and Engineering Statistics | NSF 24-300

Figure 3

Doctorates awarded, by sex and field: 2002–22



S&E = science and engineering.

Note(s): Excludes respondents who did not report sex.

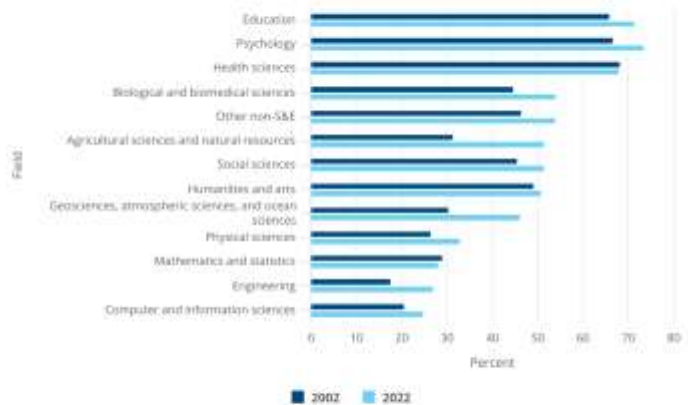
Source(s): National Center for Science and Engineering Statistics, Survey of Earned Doctorates, 2022. Related detailed table 1-4 and table 1-5.

Point in Time Comparisons by Subgroups

National Center for Science and Engineering Statistics | NSF 24-300

Figure 11

Doctorates awarded to women, by trend broad field: 2002 and 2022



S&E = science and engineering.

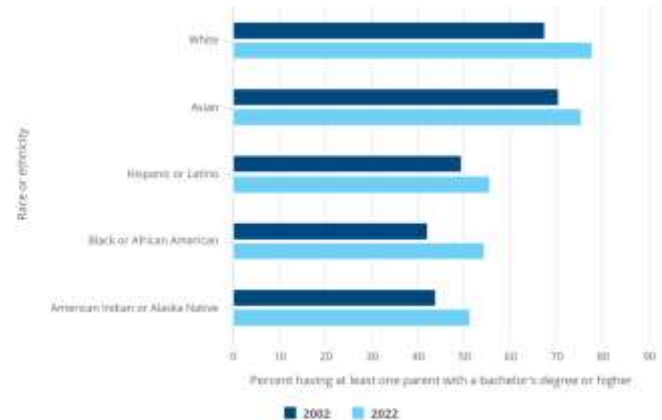
Note(s): The survey data collection for field of study changed in 2021, which may affect the data comparability across years. For more information, see the "Data source" section.

Source(s): National Center for Science and Engineering Statistics, Survey of Earned Doctorates, 2022. Related detailed table 1-4 and table 1-5.

National Center for Science and Engineering Statistics | NSF 24-300

Figure 14

Highest parental educational attainment of U.S. citizen and permanent resident doctorate recipients, by race or ethnicity: 2002 and 2022



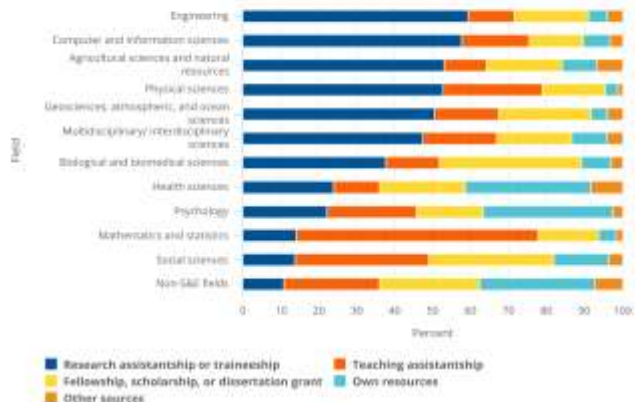
Note(s): Percentages are based on the number of doctorate recipients who are U.S. citizens or permanent residents.

Source(s): National Center for Science and Engineering Statistics, Survey of Earned Doctorates, 2022. Related detailed table 5-5.

Financial Support and Debt

National Center for Science and Engineering Statistics | NSF 24-300

Figure 16
Primary source of financial support for doctorate recipients, by broad field: 2022



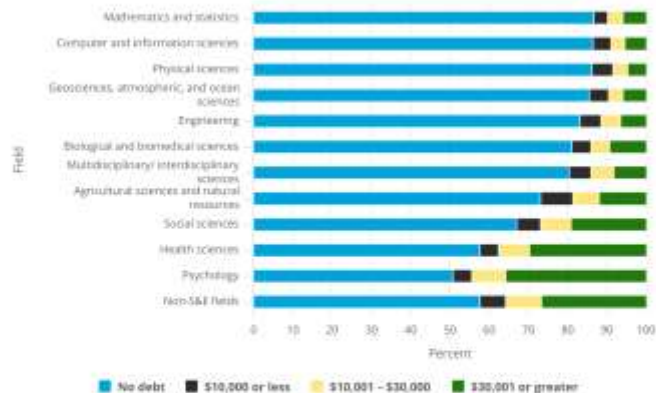
S&E = science and engineering

Note(s): Percentages are based on the number of doctorate recipients who responded to the primary source of financial support item. Research assistantship or traineeship includes other assistantships and internships or clinical residencies. Own resources includes loans, personal savings, personal earnings outside the institution sources listed, and earnings or savings of spouse, partner, or family. Other sources includes employer reimbursement or assistance and foreign support. The survey data collection for field of study changed in 2021, which may affect the data comparability across years. For more information, see the "Data source" section.

Source(s): National Center for Science and Engineering Statistics, Survey of Earned Doctorates, 2022. Related detailed table 4-1 through table 4-3.

National Center for Science and Engineering Statistics | NSF 24-300

Figure 17
Graduate debt of doctorate recipients, by broad field: 2022



S&E = science and engineering

Note(s): Percentages are based on the number of doctorate recipients who responded to the graduate debt item (57,071 respondents). Totals may not add to 100% due to rounding. The survey data collection for field of study changed in 2021, which may affect the data comparability across years. For more information, see the "Data source" section.

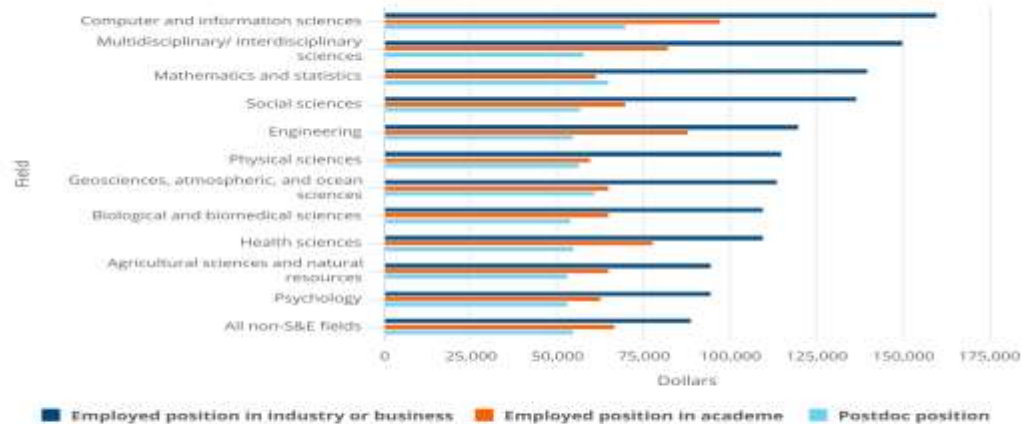
Source(s): National Center for Science and Engineering Statistics, Survey of Earned Doctorates, 2022. Related detailed table 4-4.

Salary by Broad Field and Employer Type

National Center for Science and Engineering Statistics | NSF 24-300

Figure 25

Median annual salary of doctorate recipients with definite commitments in the United States, by position type and broad field: 2022



S&E = science and engineering.

Note(s):

Definite commitment refers to a doctorate recipient who is either returning to predoctoral employment or has signed a contract (or otherwise made a definite commitment) for employment or postdoctoral study in the coming year and plans to stay in the United States. Industry includes all nonacademic sectors, including self-employment, private for-profit and private nonprofit, and government. The survey data collection for field of study changed in 2021, which may affect the data comparability across years. For more information, see the "Data source" section.

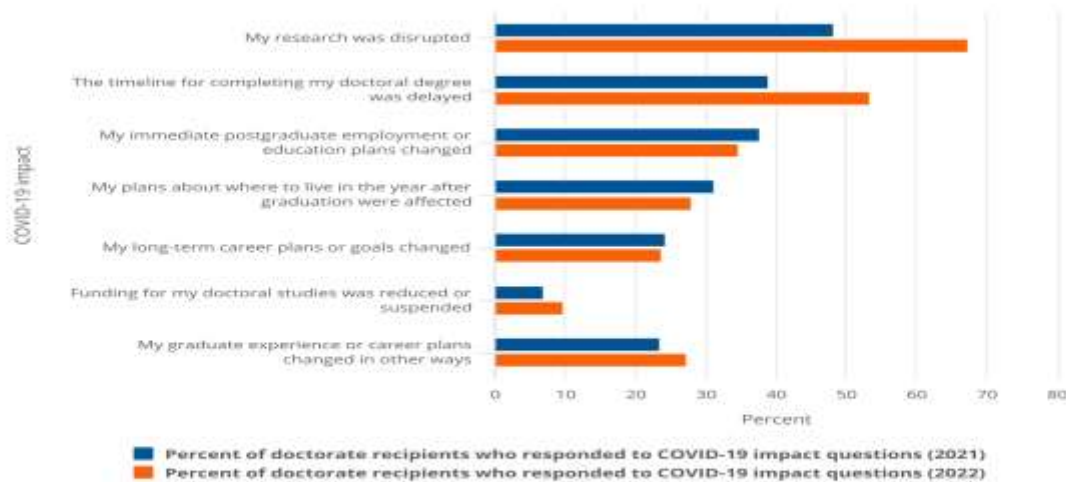
Source(s):

National Center for Science and Engineering Statistics, Survey of Earned Doctorates, 2022. Related detailed table 6-6 and table 6-7.

COVID-19 Pandemic Impacts

National Center for Science and Engineering Statistics | NSF 24-300

Figure 27
COVID-19 pandemic impacts among doctorate recipients: 2021 and 2022



Note(s):
 Percentages are based on the number of doctorate recipients who responded to the COVID-19 impact questions (42,060 respondents in 2021; 51,063 respondents in 2022).

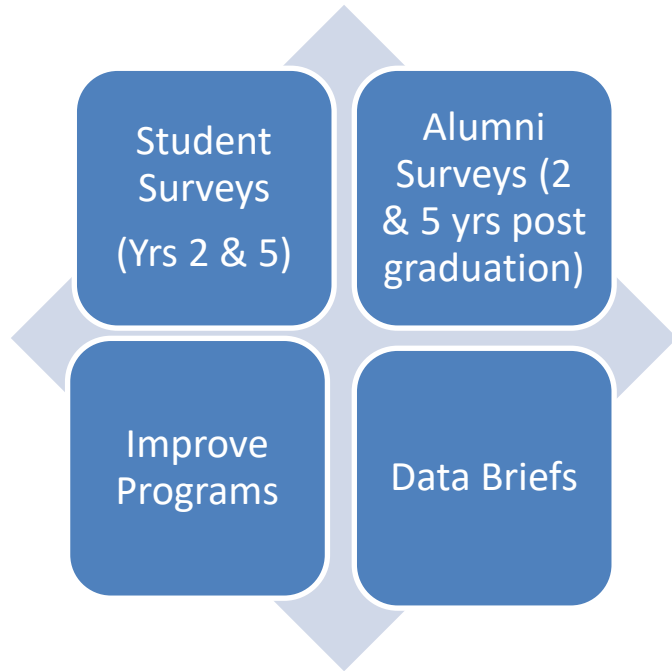
Source(s):
 National Center for Science and Engineering Statistics, Survey of Earned Doctorates, 2022.



PHD CAREER PATHWAYS PROJECT

Council of Graduate Schools

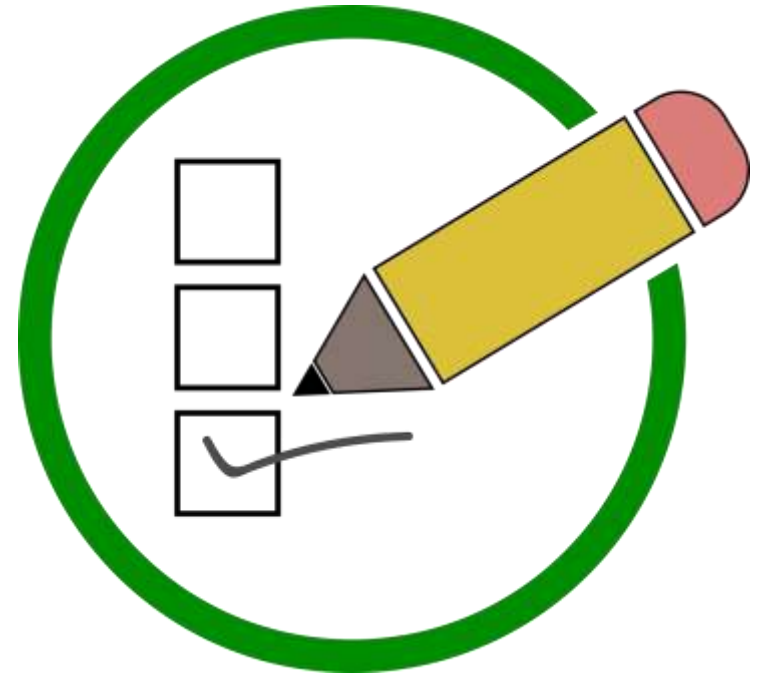
PhD Career Pathways



- Sponsored by the National Science Foundation, the Andrew Mellon Foundation and the Alfred P. Sloan Foundation
- Began 2017; first surveys 2018
- 75 participating universities
- <https://cgsnet.org/project/understanding-phd-career-pathways-for-program-improvement>

PhD Career Pathways Survey Topics

- 40 questions
- How well programs prepare PhD graduates for their careers
- Professional development offered and individual participation
- Career pathways over time
- Would they pursue PhD again?



Recommendations to Universities



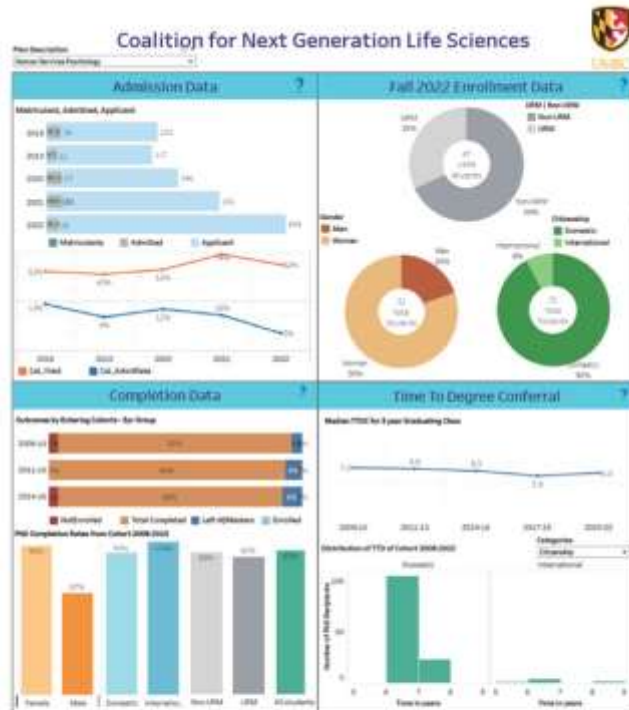
- Establish programs aimed at understanding the connection between graduate education and career paths.
- Track career outcomes and job placement information for graduate students.
- Connect graduate students with graduate alumni.
- Broaden the focus of graduate education to include development of professional skills.



Groups of Universities Working Together

UNIVERSITY LEVEL DATA TRANSPARENCY

Coalition for Next Generation Life Sciences



Goal is to bring transparency to PhD and postdoctoral training in order to empower and inform training for the next generation of scientists around the world. Launched 2017.

<https://nglscoalition.org/>

Association of American Universities

- Goal: PhD program and career outcome data transparency
- Agreement on common data set
- Discussion and hesitancy for several years
 - Group decided to do it and others followed
- Many now also providing master's level data
- Example: University of Illinois

<https://apps.grad.illinois.edu/dashboard/>



Using the Data: Combining Sources

- SED has very high completion rate, large data set and longitudinal data.
 - Only first job or postdoc included
 - Universities can get all of their data electronically in addition to the annual summary reports with graphs
 - Benchmark against similar universities and national data
 - Researchers can access the data
- PhD Completion Project adds career data at years 2 and 5 plus information on professional development and career preparation.
 - Discussion on whether to go further: how much connection to professional development as a student?
- The role of transparency in decision making for
 - Prospective students
 - Faculty to improve program

Using the Data: Doctoral Program Improvement

- Council of Graduate Schools Data Briefs and conference sessions
- Sharing data, analysis and recommendations with faculty
- Improving degree programs and professional/career development offerings



What's Next?

- Universities have been tracking career outcome data on their own
 - Surveys
 - Mining LinkedIn and web searches
- Companies springing up to provide career data at bachelor's, master's and doctoral levels
 - Provides information for current and prospective students on career possibilities and pathways our alumni took to those careers
 - Information for administrators and faculty to track alumni
 - Linking job duties to student learning outcomes
 - Predicting salaries based on job titles in comparison to job search sites

