



# NATIONAL SCIENCE BOARD SCIENCE & ENGINEERING INDICATORS 2024



## Higher Education

# Higher Education in Science and Engineering

NSB-2023-32

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This publication is part of the 2024 edition of the *Science and Engineering Indicators (Indicators)* suite of reports. *Indicators* is prepared under the guidance of the National Science Board by the National Science Foundation's National Center for Science and Engineering Statistics. The *Indicators* suite consists of a summary report called *The State of U.S. Science and Engineering*, more-detailed thematic reports with supporting data, and a data tool that provides state-level indicators.



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## Executive Summary

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### Key takeaways:

- U.S. higher education institutions awarded 79,000 certificates, 155,000 associate's degrees, 812,000 bachelor's degrees, 217,000 master's degrees, and 48,000 doctoral degrees in science and engineering (S&E) fields in 2021. Overall, S&E degree awards at all levels continued long-term trends of gradual increases during the COVID-19 pandemic, although S&E doctoral degrees decreased from 2020 to 2021.
- S&E degree awards increased as a share of all certificates, associate's degrees, bachelor's degrees, and master's degrees awarded between 2012 and 2021. The share of doctoral degrees awarded in S&E fields did not increase but was the highest among award levels at 66% of total doctoral degrees.
- In 2021, most associate's degrees in S&E and S&E-related fields were awarded by community colleges. The most popular field of study for these credentials was health professions and related programs.
- S&E certificates and doctoral degrees awarded by for-profit institutions increased by 58% and 203%, respectively, from 2012 to 2021. In contrast, associate's, bachelor's, and master's degree awards from for-profit institutions declined by 82%, 54%, and 18%, respectively.
- In 2019, about a third of postsecondary students took at least one distance education course; in 2020, about three-fourths did so, including nearly half of students who were exclusively taking distance education courses, reflecting the need for remote instruction during the COVID-19 pandemic.
- Between 2012 and 2021, the percentage of S&E certificates and degrees earned by American Indian or Alaska Native, Black or African American, and Hispanic students collectively increased at every award level.
- Surpassing pre-COVID pandemic levels, enrollment of international S&E graduate students studying in the United States increased rapidly from about 196,000 in fall 2020 to 308,000 in fall 2022.
- In 2020, India awarded the most S&E first university degrees (2.5 million), followed by China (2.0 million) and then the United States (900,000). China awarded the highest number of S&E doctoral degrees (43,000), followed closely by the United States (42,000), which China surpassed in 2019.

## Introduction

In its *Vision 2030*, the National Science Board (NSB) noted that talent is one of four elements of science and engineering (S&E) leadership that the United States must maintain if it is to continue leading the world in innovation in 2030 (NSB 2020). Building on elementary and secondary education in science, technology, engineering, and mathematics (STEM), higher education in S&E and S&E-related fields is essential to developing the talent of U.S. adults and attracting and retaining talent from around the world.

This report describes U.S. undergraduate and graduate education in S&E and S&E-related fields of study, including trends in awards over the last decade and international comparisons. Degree data are generally provided from academic year 2011–12 to academic year 2020–21, meaning that this is the first edition of the report to include detailed indicators of U.S. S&E higher education during the COVID-19 pandemic. In this report, S&E fields include the following disciplines, referred to as *broad fields of study*: agricultural sciences and natural resources; biological and biomedical sciences; computer and information sciences; engineering; geosciences, atmospheric sciences, and ocean sciences; mathematics and statistics; multidisciplinary and interdisciplinary sciences; physical sciences; psychology; and social sciences. At the doctoral level only, health sciences are also included in S&E fields of study.

S&E-related fields of study include health professions and related programs; homeland security and fire protection; science and mathematics teacher education; technology and technical fields; and other S&E-related fields. For more information on the definitions of S&E and S&E-related fields and changes in them over time, see sidebar **Revisions to Classification of IPEDS Degree Data under the NCSES Taxonomy of Disciplines**.

### SIDEBAR

#### Revisions to Classification of IPEDS Degree Data under the NCSES Taxonomy of Disciplines

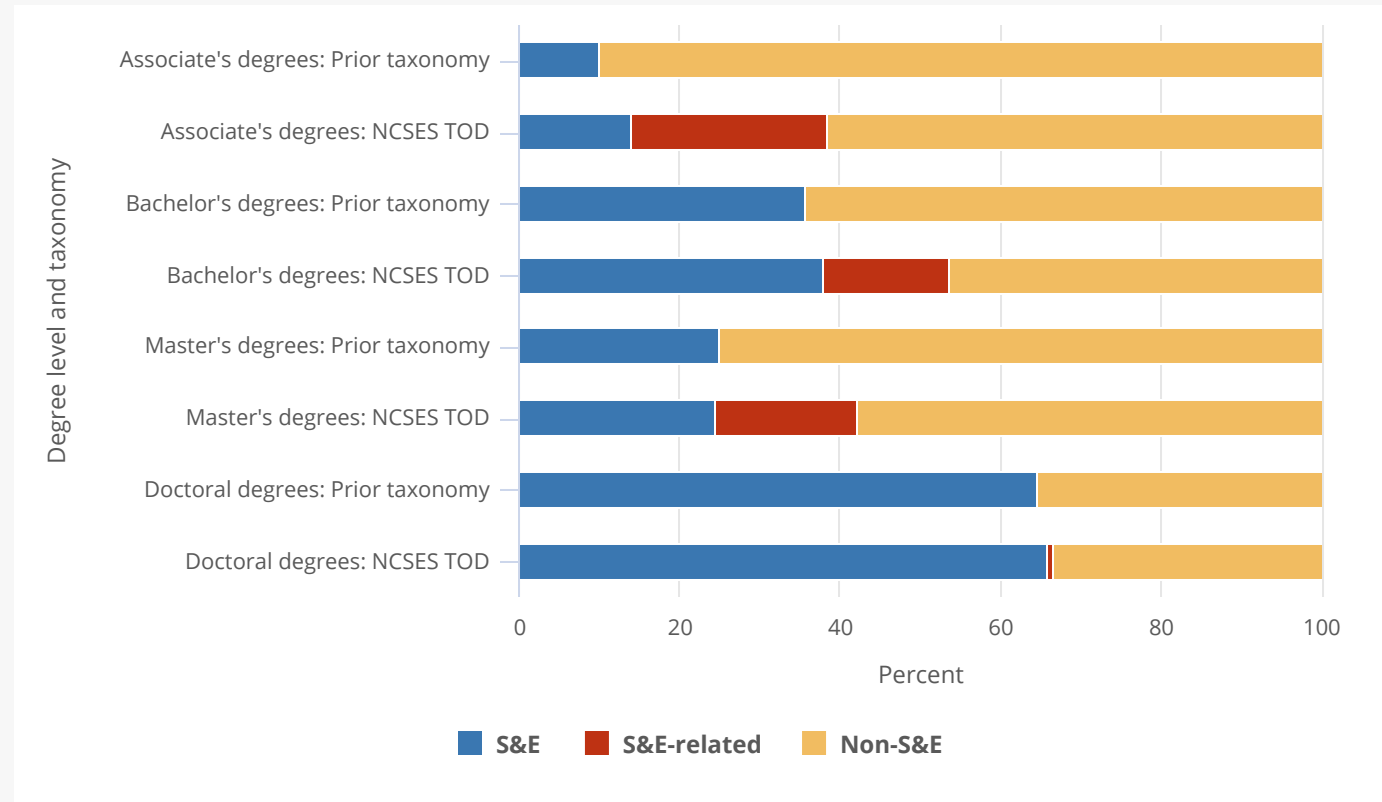
For the first time, this edition of the “Higher Education in Science and Engineering” *Indicators* report classifies degree data from the Integrated Postsecondary Education Data System (IPEDS) according to the National Center for Science and Engineering Statistics (NCSES) Taxonomy of Disciplines (TOD). The implementation of the TOD means that IPEDS degree data presented in this report are not comparable to the data presented in earlier editions.

The TOD was developed to promote uniformity in reporting of academic disciplines across the NCSES data collections. The TOD is closely aligned with the National Center for Education Statistics Classification of Instructional Programs (CIP), which is used in the IPEDS Completions Survey. However, because the NCSES TOD is used for the reporting of different academic discipline concepts (e.g., degrees, research fields) with different purposes, there are some differences between the TOD and IPEDS CIP structure.

The adoption of the TOD with respect to IPEDS data has changed the distribution of degree awards among S&E, non-S&E, and S&E-related fields; the latter of these was not present in the prior taxonomy (**Figure HED-A**). The extent of this change varies considerably by degree level, with the greatest impacts observed at lower degree levels. The S&E share of degrees awarded in 2019 increases from 10% to 14% under the TOD at the associate’s level and increases from 36% to 38% at the bachelor’s level. Much of the increase is attributable to the shift of criminal justice and certain interdisciplinary fields from non-S&E to S&E; these fields are far more prevalent at lower degree levels. The shift of public administration degrees—which are most popular at the master’s level—from S&E to non-S&E leads to a small net decrease in the share of S&E master’s degrees. Educational psychology and school psychology, which have had their classification changed from education (non-S&E) to psychology (S&E), account for much of the comparatively small increase in S&E degrees at the doctoral level.



Figure HED-A  
Degrees awarded, by field, level of degree, and taxonomy: 2019



NCSES = National Center for Science and Engineering Statistics; TOD = taxonomy of disciplines.

**Note(s):**  
Data are based on institutions eligible to participate in Title IV federal financial aid programs. Data are not available for S&E-related fields in the prior taxonomy because this category did not exist in the prior taxonomy. Doctoral degree programs include research doctoral degree programs only and do not include professional doctoral programs (e.g., Doctor of Medicine). *Prior taxonomy* is the S&E field classification for Integrated Postsecondary Education Data System (IPEDS) degree data in *Indicators 2022* and prior reports. NCSES TOD is the S&E field classification used for IPEDS degree data for the first time in *Indicators 2024*.

**Source(s):**  
National Center for Science and Engineering Statistics, special tabulations (2022) of the National Center for Education Statistics, Integrated Postsecondary Education Data System (IPEDS), Completions Survey, provisional release data.

Science and Engineering Indicators

The new category of S&E-related fields includes health professions, protective services, science and mathematics teacher education, and technology-oriented programs. Degrees in registered nursing are by far the most common S&E-related degrees at the associate's, bachelor's, and master's levels. A variety of other health-oriented practitioner and technician programs make up much of the remainder of S&E-related degrees. S&E-related degrees are most frequent at the associate's level, where they account for 24% of degrees (**Figure HED-A**). This is because degrees in other S&E-related technician programs outside of health, such as automotive mechanics, are awarded almost exclusively at the associate's level. Doctoral degrees in S&E-related fields are rare; this is largely because health fields are classified as S&E rather than S&E-related fields at the doctoral level. In contrast to lower degree levels, NCSES

classifies health doctorates in the IPEDS degree data as S&E because these fields are more likely to be research oriented rather than practitioner oriented at the doctoral level. Note that in this report, doctoral degree programs include research doctoral degree programs only and do not include professional doctoral programs (e.g., Doctor of Medicine).

The report begins by discussing diversity among postsecondary institutions in the United States, including minority-serving institutions (MSIs), community colleges, for-profit institutions, geographic diversity in S&E concentration of academic awards, and online or distance education. This provides important context for describing 10-year trends in completions of S&E and S&E-related awards—including sub-associate certificates as well as associate's, bachelor's, master's, and research doctoral degrees—in the second section. The third section examines the demographic characteristics of S&E and S&E-related awardees, including sex, race and ethnicity, and citizenship. The fourth section of the report compares U.S. postsecondary educational attainment and S&E degree production with those of other countries, with new content on S&E degree production intensity that takes into account differences in countries' population size. Selected aspects of students' experiences related to the COVID-19 pandemic are discussed in the sidebar **Higher Education and COVID-19: Effects on Student Participation, Plans, and Enrollment**.

Information concerning U.S. higher education in S&E fields is also available in other *Indicators* reports. The *Indicators 2024* report "[2024] Elementary and Secondary STEM Education" describes STEM education that precedes higher education and students' transitions from secondary to postsecondary education. The *Indicators 2024* report "[2024] Academic Research and Development" provides more detail on graduate education, including financial support of S&E graduate students and postdocs. The *Indicators 2024* report "[2024] The STEM Labor Force: Scientists, Engineers, and Skilled Technical Workers" addresses the employment patterns and career outcomes of individuals with various levels of education in S&E and S&E-related fields. *Science and Engineering Indicators State Indicators* provides information on many of these topics within U.S. states (NSB 2022c).

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#### SIDEBAR

##### Higher Education and COVID-19: Effects on Student Participation, Plans, and Enrollment

In 2020, the COVID-19 pandemic disrupted education at all levels throughout the United States, and researchers are beginning to understand its short- and longer-term impacts on students' learning and educational progress. In spring 2020, most undergraduates (87%) reported that they had experienced disruptions and changes in their enrollment as a result of the pandemic (Cameron et al. 2021). In particular, 84% of students reported that some or all of their in-person classes moved to online-only instruction, 4% reported that they withdrew from their institutions, and another 4% took a leave of absence in response to pandemic disruptions.

The pandemic also affected potential students, including postbaccalaureate students. In its summer 2020 interviews of 2015–16 bachelor's degree recipients, the Baccalaureate and Beyond Longitudinal Study (B&B:16/20) follow-up survey asked these college graduates about the effects of the pandemic on their participation in postsecondary education. Compared to all 2015–16 bachelor's degree recipients, lower shares of science, technology, engineering, and mathematics (STEM) degree recipients reported that they had either delayed or pursued additional education or training because of the pandemic. Whereas 13% of all bachelor's degree recipients reported that they delayed enrolling in additional education or training due to the pandemic, 9% of STEM degree recipients delayed enrolling (Thomsen et al. 2022). Among all bachelor's degree recipients, 14% pursued additional education or training because of the pandemic, compared with 12% of STEM degree recipients.

Despite many institutions and students returning to in-person instruction and the reduction in illness achieved through vaccination and other measures, the pandemic has continued to affect postsecondary enrollment, student learning and well-being, institutional finances, and workforce development. Data on spring enrollment in postsecondary education from the National Student Clearinghouse Research Center (NSCRC) indicate that total postsecondary enrollment fell 4.0% (685,000 students) from spring 2021 to spring 2022 (NSCRC ***Current Term Enrollment Estimates 2022: Table 1***). This represents an additional decline beyond the 3.5% decrease observed between spring 2020 and spring 2021. Undergraduate enrollment dropped 4.7% between spring 2021 and spring 2022 on top of a 4.9% loss between spring 2020 and spring 2021. In all, there were nearly 1.4 million fewer undergraduates in 2022 than there had been before the pandemic, a 9.4% decline (NSCRC ***Current Term Enrollment Estimates 2022: Table 2***).

Community colleges' enrollment fell by 7.8% (or 351,000 students) between 2021 and 2022, and these institutions have now lost over 827,000 students since spring 2020 (NSCRC ***Current Term Enrollment Estimates 2022: Table 2***). The California Community Colleges system alone lost nearly 300,000 students over this period, with the largest enrollment reductions among Black and Hispanic students (Bulman and Fairlie 2022).

## Institutions in S&E Higher Education

A variety of institutions provide the education necessary to maintain and enhance the U.S. S&E enterprise. Different types of institutions offer access to S&E education for students with varying resources and needs. Open access institutions that offer certificates and degrees below the bachelor’s degree are more available to students with limited financial resources or limited geographic mobility due to family obligations, for example. Four-year institutions include small, liberal arts colleges, which are largely private, nonprofit institutions; broad access public and for-profit universities focused largely on teaching; and selective public and private nonprofit universities that have significant research activity as well as teaching. Moreover, these institutions are interdependent: community colleges train the skilled technical workforce (STW)—people who work in occupations that require specific STEM knowledge and skills but do not require a bachelor’s degree—and research careers begin in these institutions as well. Research universities train community college faculty as well as the scientists and engineers who develop technologies used by skilled technical workers.

In academic year 2021–22, about 6,000 U.S. institutions conferred postsecondary education awards, including certificates and associate’s, bachelor’s, master’s, and doctoral degrees (Table HED-1).<sup>1</sup> In addition to the level of awards they confer, institutions vary by control (e.g., whether they are public or private entities and, among private institutions, whether they are for-profit or nonprofit). About a third of all institutions offered awards that required less than 2 years to complete but were not degrees, and most of these (1,600 out of 2,000) were for-profit institutions. In contrast, 60% of doctoral institutions were private nonprofit.

Table HED-1  
Institutions, by control and highest award conferred: 2021–22

(Number)

Highest award conferred	All institutions	Public	Private nonprofit	Private for profit
All institutions	6,045	1,974	1,792	2,279
Certificates	1,985	303	115	1,567
Associate's degrees	1,311	850	85	376
Bachelor's degrees	687	229	321	137
Master's degrees	836	168	534	134
Doctoral degrees	1,226	424	737	65

**Note(s):**  
Data are based on institutions eligible to participate in Title IV federal financial aid programs. Certificates include only awards of less than 2 academic years below the associate's degree level. *Control* refers to whether an institution is operated by publicly elected or appointed officials (*public control*) or by privately elected or appointed officials and derives its major source of funds from private sources (*private control*).

**Source(s):**  
National Center for Education Statistics, Integrated Postsecondary Education Data System (IPEDS), Institutional Characteristics Survey.

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Institutions’ contributions to S&E and S&E-related knowledge and skill development vary by level and control. Training that leads to employment in the STW, which includes education in both S&E and S&E-related fields, is usually available at certificate- and associate’s-level institutions. Doctoral-level institutions train scientists and college and university faculty to lead S&E and S&E-related research and to teach undergraduates and graduate students. These institutions also provide infrastructure for research and development (R&D) by faculty and students. Associate’s-, bachelor’s-, and master’s-level institutions train students for specific occupations, educate them in the S&E disciplines and research methods necessary for careers in S&E research and teaching at the elementary and secondary levels, and also conduct and support original R&D. S&E degree holders find employment across all sectors of the economy, with most individuals with an S&E bachelor’s degree or higher working at for-profit businesses (see forthcoming *Indicators 2024* report “[2024] The STEM Labor Force: Scientists, Engineers, and Skilled Technical Workers”).

## Minority-Serving Institutions

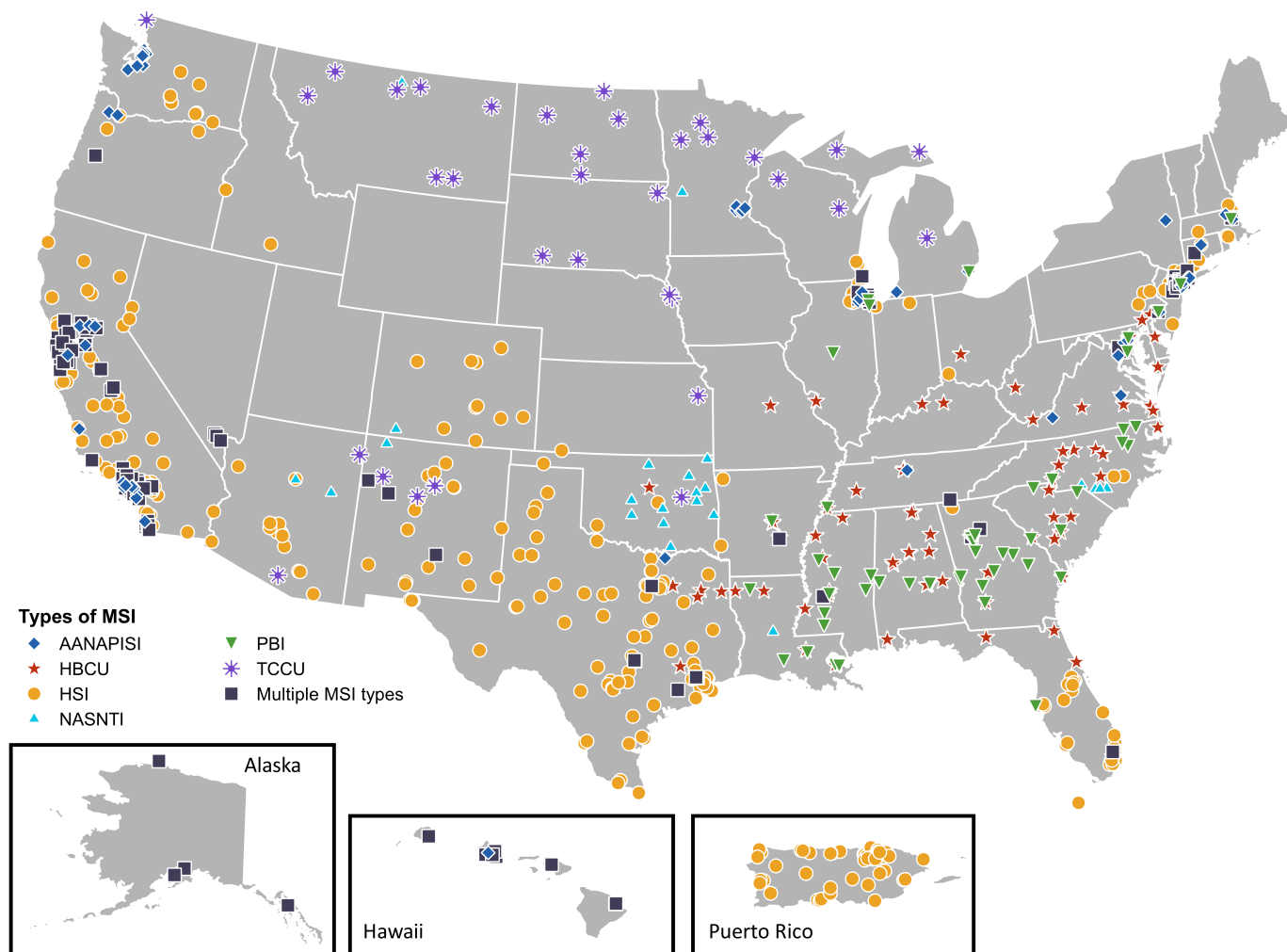
Relative to all postsecondary institutions, MSIs serve larger proportions of students from specific racial and ethnic groups.<sup>2</sup> The 35 American Indian tribally controlled colleges and universities (TCCUs) and 100 historically Black colleges and universities (HBCUs) extant in 2021 were defined as such by the Higher Education Act based on the populations of students they have served since their founding (Table SHED-1). Other types of MSIs—including Alaska Native and Native Hawaiian–serving institutions (ANNHSIs, 16 institutions), Asian American and Native American Pacific Islander–serving institutions (AANAPISIs, 191 institutions), Hispanic-serving institutions (HSIs, 516 institutions), Native American–serving nontribal institutions (NASNTIs, 30 institutions), and predominantly Black institutions (PBIs, 64 institutions)—are defined by the racial and ethnic distribution of their students; designation as one of these institutions can vary from year to year, depending on enrollment.<sup>3</sup> In 2021, there were 811 MSI institutions in the United States, 139 of which had more than one MSI designation. All ANNHSIs, for example, have at least one other MSI designation as well.

In 2021, half of HBCUs were public institutions, and at least two-thirds of the institutions in each of the other MSI categories were also public; the remainder were private nonprofit. None of the MSIs in these categories grant only certificates, but all MSI categories had institutions at the associate’s level or above, with the exception of TCCUs, which had no doctoral institution.

Reflecting the geographic distribution of the racial and ethnic groups they serve, different categories of MSIs cluster in different areas of the country (**Figure HED-1**). HBCUs and PBIs, for example, cluster in Southeastern states; NASNTIs tend to be in Oklahoma and the Southwest; and TCCUs are found largely in the upper Midwest and northern Plains states.

Figure HED-1

## Minority-serving institutions, by location and type: 2021



AANAPISI = Asian American and Native American Pacific Islander–serving institution, ANNHSI = Alaska Native and Native Hawaiian–serving institution, HBCU = historically Black college or university, HSI = Hispanic-serving institution, MSI = minority-serving institution, NASNTI = Native American–serving nontribal institution, PBI = predominantly Black institution, TCCU = tribally controlled college or university.

**Note(s):**

Data are based on institutions eligible to participate in Title IV federal financial aid programs. The detailed data of MSIs by location and type are available at <https://nces.nsf.gov/pubs/nsb202332/assets/institutions-in-s-e-higher-education/figures/nsb202332-fighed-001.xlsx>.

**Source(s):**

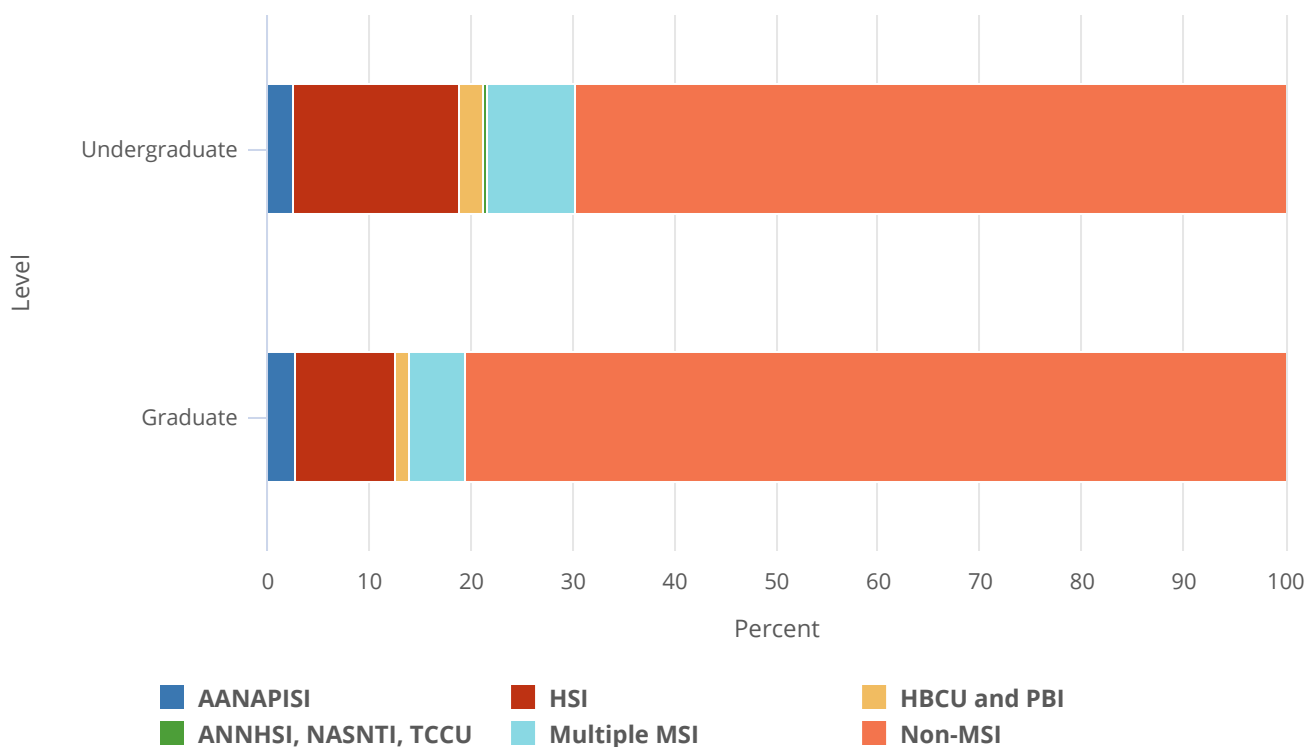
National Center for Education Statistics, Integrated Postsecondary Education Data System (IPEDS), Institutional Characteristics component, and FY 2022 Title III and Title V institutions designated eligible for the waiver of the nonfederal share matching requirements. Available at <https://www2.ed.gov/about/offices/list/ope/ides/eligibility.html#el-inst>. Accessed 5 December 2022.

Science and Engineering Indicators

In academic year 2015–16, about 5,400,000 undergraduates, 30% of all undergraduates, were enrolled at MSIs (Figure HED-2; Table SHED-2). At the graduate level, about 550,000 students were enrolled at MSIs, accounting for 19% of all graduate students. Among MSIs, HSIs enrolled the most students, 16% of all undergraduates and 10% of graduate students.<sup>4</sup> Institutions serving indigenous students—ANNHSIs, NASNTIs, and TCCUs—served the fewest. The percentage of students enrolled at MSIs differed by award level. About 21% of students in certificate programs were enrolled at an MSI, as were 43% of associate’s degree seekers, 21% of students in a bachelor’s degree program, 20% of master’s degree students, and 14% of doctoral degree students (Table SHED-2).

Figure HED-2

## Minority-serving institutions' enrollment, by type and level: 2015–16



AANAPISI = Asian American and Native American Pacific Islander-serving institution, ANNHSI = Alaska Native and Native Hawaiian-serving institution, HBCU = historically Black college or university, HSI = Hispanic-serving institution, MSI = minority-serving institution, NASNTI = Native American-serving nontribal institution, PBI = predominantly Black institution, TCCU = tribally controlled college or university.

**Note(s):**

Data are based on institutions eligible to participate in Title IV federal financial aid programs.

**Source(s):**

National Center for Education Statistics, 2015–16 National Postsecondary Student Aid Study (NPSAS:16).

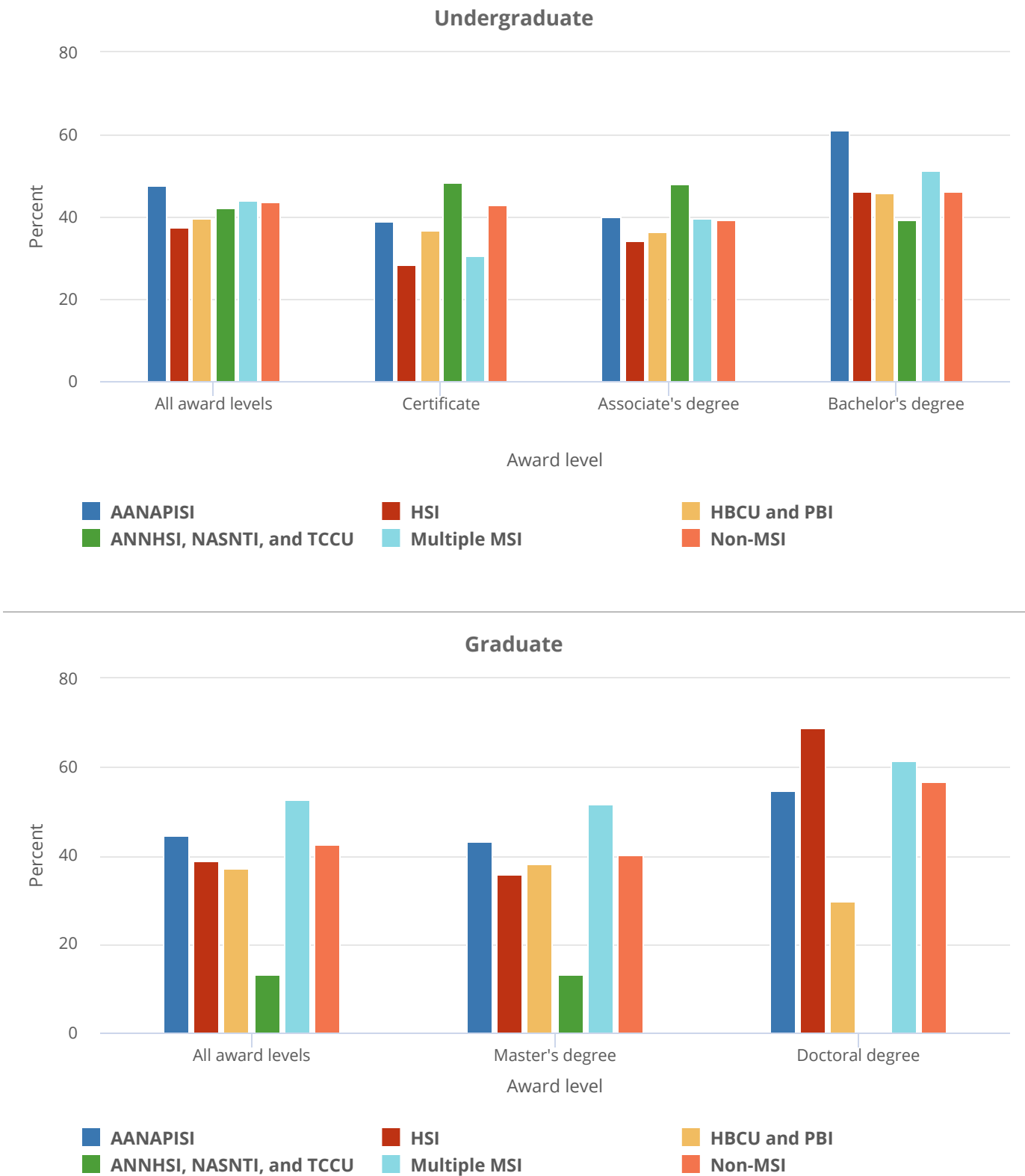
*Science and Engineering Indicators*

Among undergraduates who were enrolled in degree programs, 43% of students in all institutions and 40% of those in an MSI were majoring in S&E and S&E-related fields.<sup>5</sup> The percentage of MSI undergraduates who majored in S&E and S&E-related fields ranged from 37% at HSIs to 47% of students enrolled in AANAPISIs. At the graduate level, 43% of both MSI and all students were enrolled in S&E or S&E-related fields. Among types of MSIs, the percentage of graduate students enrolled in S&E or S&E-related fields ranged from 13% at institutions serving indigenous students to 45% at AANAPISIs.

The percentage of students who were pursuing a degree in S&E or S&E-related fields differed by award level and MSI type. For example, 61% of bachelor's degree students at AANAPISIs majored in S&E or S&E-related fields, compared with 51% or less among bachelor's degree students in other MSI types (Figure HED-3). Among doctoral students, 30% of those at HBCUs and PBIs were enrolled in S&E or S&E-related fields, compared with 55% of students at AANAPISIs and 69% of those at HSIs.

Figure HED-3

S&E and S&E-related program enrollment, by award level and type of MSI: 2015–16





AANAPISI = Asian American and Native American Pacific Islander-serving institution; ANNHSI = Alaska Native and Native Hawaiian-serving institution; HBCU = historically Black college or university; HSI = Hispanic-serving institution; MSI = minority-serving institution; NASNTI = Native American-serving nontribal institution; PBI = predominantly Black institution; TCCU = tribally controlled college or university.

**Note(s):**

Data are based on institutions eligible to participate in Title IV federal financial aid programs. Data for ANNHSI, NASNTI, and TCCU at the doctoral level are suppressed for reasons of confidentiality and/or reliability.

**Source(s):**

National Center for Education Statistics, 2015–16 National Postsecondary Student Aid Study (NPSAS:16).

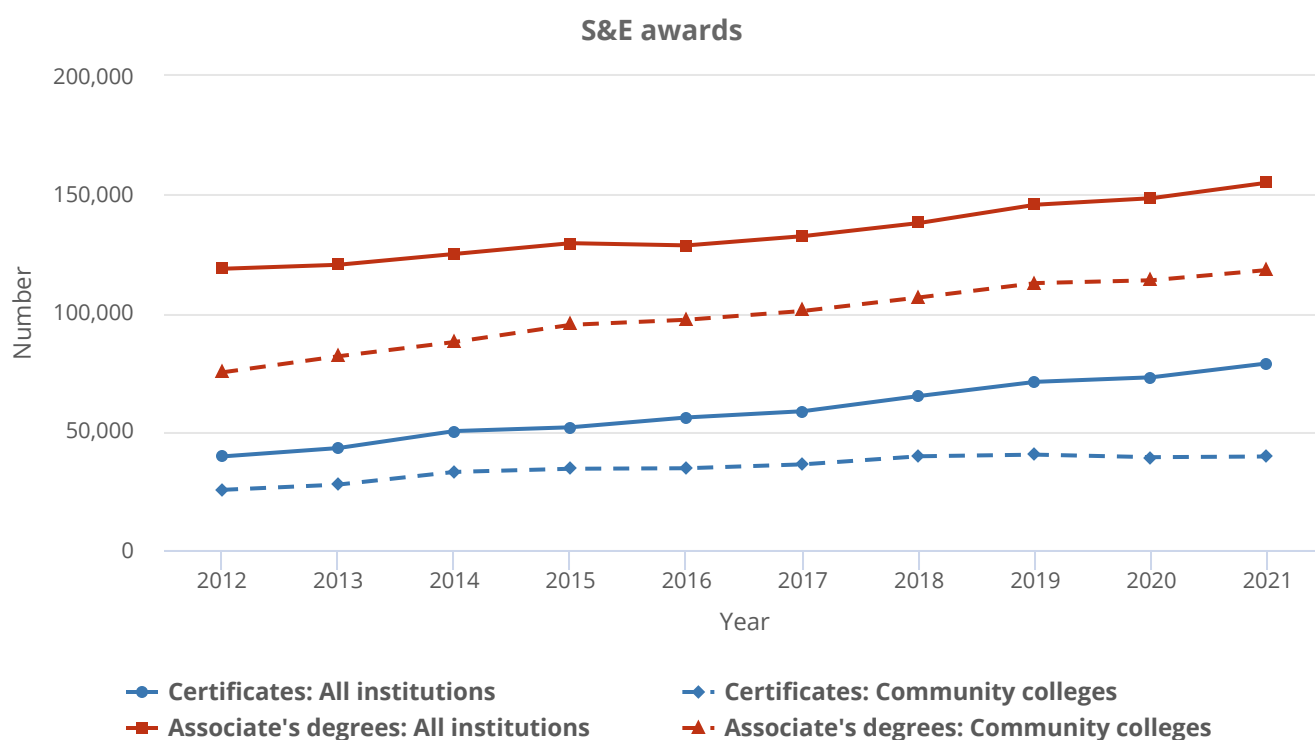
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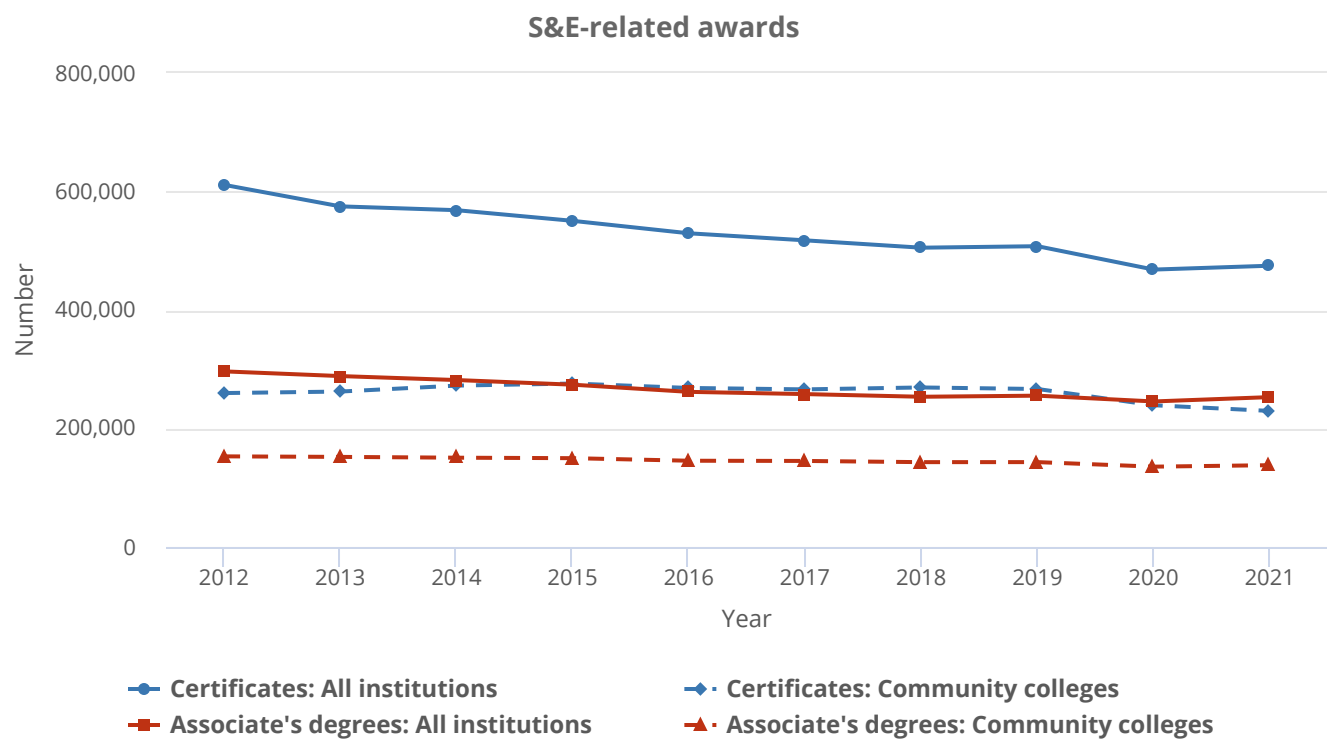
## Community Colleges

Community colleges are public colleges that offer certificate and associate's degree programs that require 2 years or less to complete.<sup>6</sup> They specialize in providing relatively affordable programs of study, including those in S&E and S&E-related fields. Certificates and associate's degrees are common forms of preparation for S&E-related occupations in the STEM workforce (see *Indicators 2022* report "The STEM Labor Force of Today: Scientists, Engineers, and Skilled Technical Workers" section "Education and Training of Workers in STEM"). Community colleges awarded 50% of the S&E certificates and 76% of the S&E associate's degrees conferred in 2021 (**Figure HED-4**). Community colleges also awarded 48% of S&E-related certificates and 55% of S&E-related associate's degrees. From 2012 to 2021, the number of certificates and associate's degrees awarded by community colleges increased in S&E fields but decreased in S&E-related fields.

**Figure HED-4**

**S&E and S&E-related certificates and associate's degrees awarded, by institution type: 2012–21**





**Note(s):**  
Data are based on institutions eligible to participate in Title IV federal financial aid programs. Certificates include only awards of less than 2 academic years below the associate's degree level.

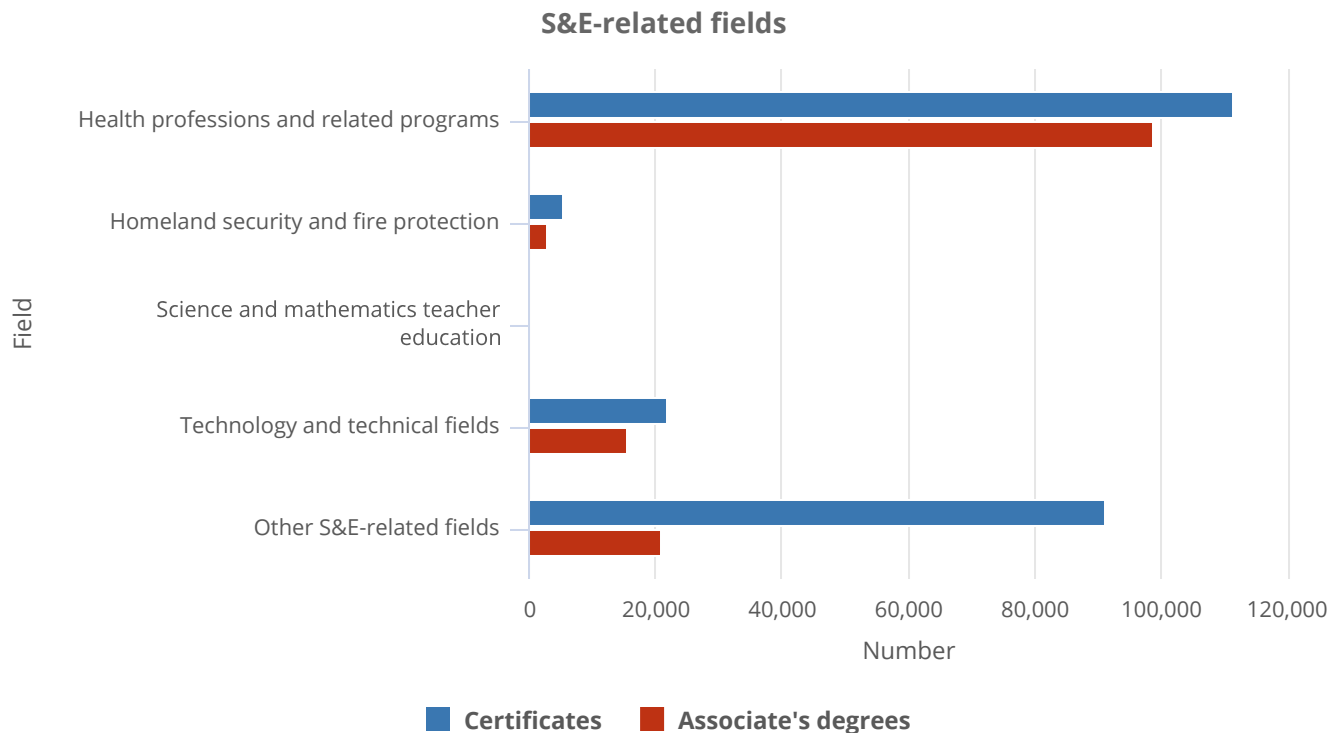
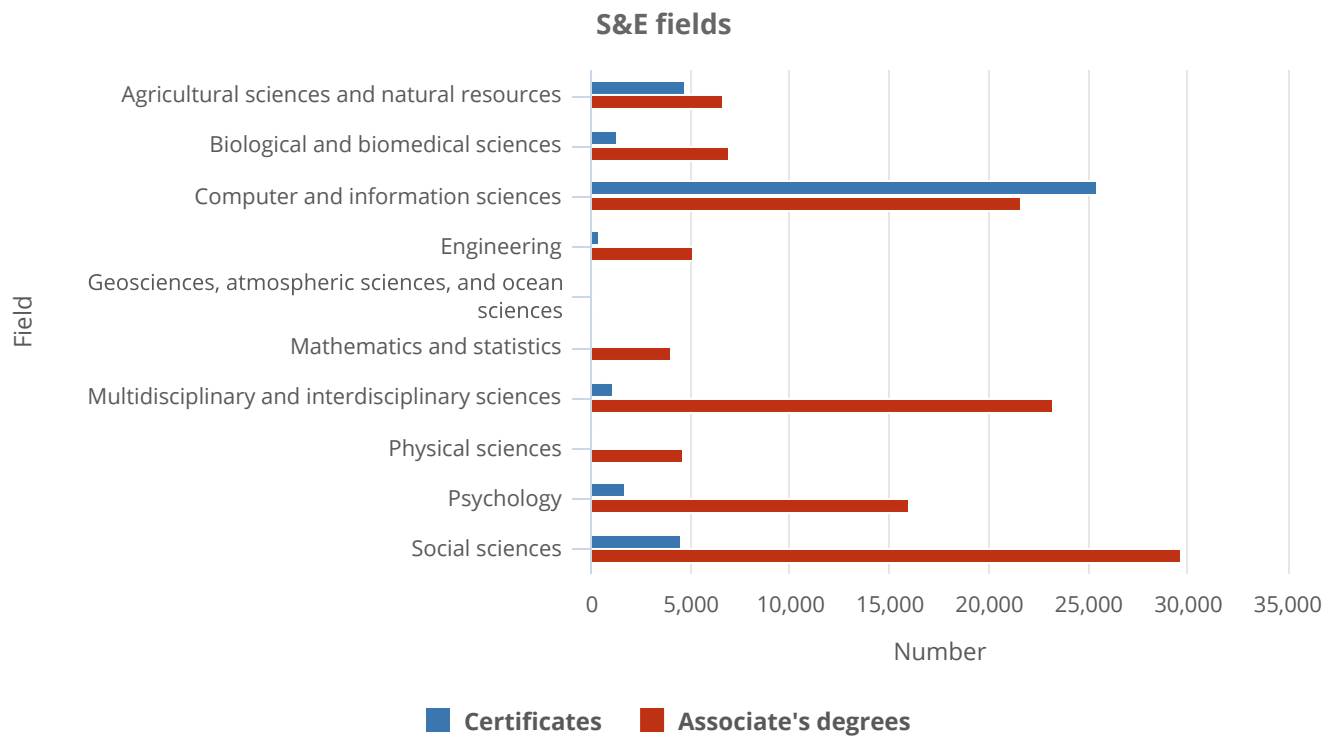
**Source(s):**  
National Center for Science and Engineering Statistics, special tabulations (2022) of the National Center for Education Statistics, Integrated Postsecondary Education Data System (IPEDS), Completions Survey, provisional release data.

Science and Engineering Indicators

The most popular broad S&E or S&E-related field of study for both certificates and associate's degrees awarded by community colleges was health professions and related programs, an S&E-related field (**Figure HED-5**). Among S&E fields, community colleges awarded the largest number of certificates in computer and information sciences and the largest number of associate's degrees in social sciences.

Figure HED-5

Broad field for S&amp;E certificates and associate's degrees awarded by community colleges: 2021



**Note(s):**

Data are based on institutions eligible to participate in Title IV federal financial aid programs. Certificates include only awards of less than 2 academic years below the associate's degree level.

**Source(s):**

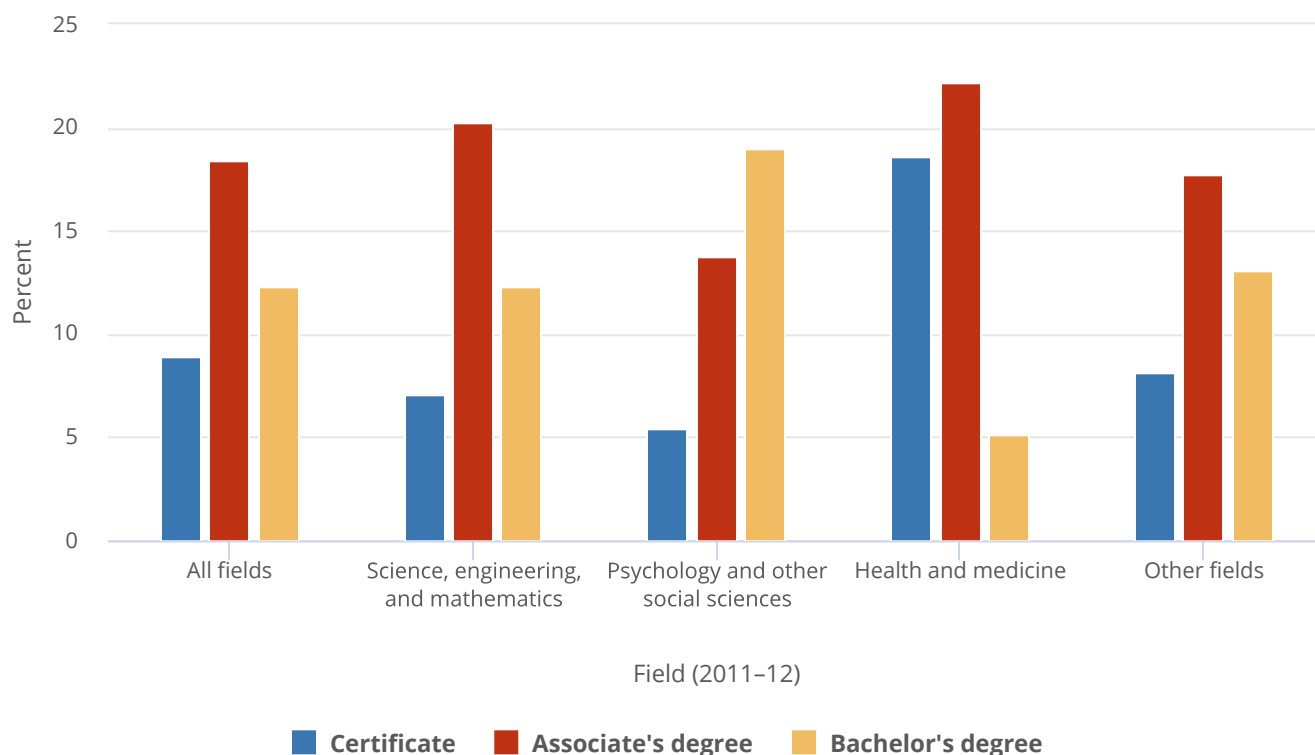
National Center for Science and Engineering Statistics, special tabulations (2022) of the National Center for Education Statistics, Integrated Postsecondary Education Data System (IPEDS), Completions Survey, provisional release data.

*Science and Engineering Indicators*

In addition to offering certificates and associate's degrees, community colleges can be the first stop on the road to a bachelor's or higher degree (Foley, Milan, and Hamrick 2020). Among students who began postsecondary education in science, engineering, and mathematics fields at a community college in academic year 2011–12, 12% had earned a bachelor's degree within 6 years (i.e., by 2017) (**Figure HED-6**).<sup>7</sup> In addition, 19% of community college students who had declared majors in psychology and other social sciences earned a bachelor's degree within 6 years. Among 2015–16 bachelor's degree recipients in S&E fields, about a quarter had begun postsecondary education at a community college, as had about a third of degree recipients in health and medicine (Table SHED-5).

**Figure HED-6**

**Awards earned by 2011–12 first-time postsecondary students who began postsecondary education in community colleges, by award level and 2011–12 field of study: 2017**

**Note(s):**

Data are based on institutions eligible to participate in Title IV federal financial aid programs. Field is the major field of study that students declared in academic year 2011–12, their first year of postsecondary education. Attainment categories are mutually exclusive and represent the highest credential earned as of 2017.

**Source(s):**

National Center for Education Statistics, 2012/17 Beginning Postsecondary Students Longitudinal Study (BPS:12/17).

*Science and Engineering Indicators*

Education at the associate's degree level, predominantly offered by community colleges, also plays a role in the preparation of S&E doctorate recipients. Among individuals who earned doctorates in S&E fields between 2017 and 2021, 6% had previously earned associate's degrees, including 12% of doctorate recipients in health sciences (Table SHED-6). Within some racial and ethnic groups, obtaining an associate's degree was more common: 17% of American Indian or Alaska Native doctorate recipients, 10% of Black or African American doctorate recipients, and 10% of Hispanic doctorate recipients had previously earned an associate's degree.

## For-Profit Institutions

Since the advent of the Servicemen's Readjustment Act of 1944 (GI Bill), enrollment in for-profit institutions has fluctuated considerably both in the number of students and as a percentage of all postsecondary enrollment, largely due to changes in federal financial aid regulations (Whitman 2018). Most recently, enrollment in for-profit institutions grew between 2000 and 2010 and then declined through 2018 (Table HED-2). In the early 2000s, regulations permitted for-profit institutions to realize more revenue from federal financial aid, including Pell Grants and federal student loans. The number of for-profit institutions increased, rising from 2,463 in 2002–03 to 3,533 in 2012–13 (Figure HED-7), and more financially needy students enrolled in these institutions (Deming, Goldin and Katz 2013; Fry and Cilluffo 2019). Between 2009 and 2015, the U.S. Department of Education proposed and implemented regulations that prevented institutions from participating in federal financial aid programs if too few of their graduates earned incomes sufficient to repay their loans (TICAS 2019). At least in part due to such regulations, the number of for-profit postsecondary institutions declined to 2,279 in 2021–22, and enrollment in for-profit institutions declined from 2.4 million to 1.3 million students between 2010 and 2021 (Table HED-2). At the certificate level, for-profit institutions made up 79% of U.S. institutions in 2021–22 (Table HED-1).

Table HED-2

### Total fall enrollment in postsecondary institutions, by institutional control: Selected years, 2000–21

(Number and percent change)

Year	Public		Private nonprofit		Private for profit	
	Number	Percent change	Number	Percent change	Number	Percent change
2000	11,891,450		3,137,108		672,851	
2002	12,883,071	8.3	3,299,094	5.2	852,862	26.8
2004	13,081,358	1.5	3,440,559	4.3	1,188,881	39.4
2006	13,281,664	1.5	3,543,455	3.0	1,380,355	16.1
2008	14,092,109	6.1	3,684,723	4.0	1,797,563	30.2
2010	15,280,273	8.4	3,881,906	5.4	2,425,945	35.0
2012	14,996,482	-1.9	3,975,542	2.4	2,175,031	-10.3
2014	14,765,873	-1.5	4,015,094	1.0	1,882,497	-13.4
2016	14,692,988	-0.5	4,095,815	2.0	1,435,266	-23.8
2018	14,639,681	-0.4	4,147,604	1.3	1,221,149	-14.9
2020	13,974,219	-4.5	4,113,506	-0.8	1,268,086	3.8
2021	13,655,528	-2.3	4,126,289	0.3	1,254,795	-1.0

#### Note(s):

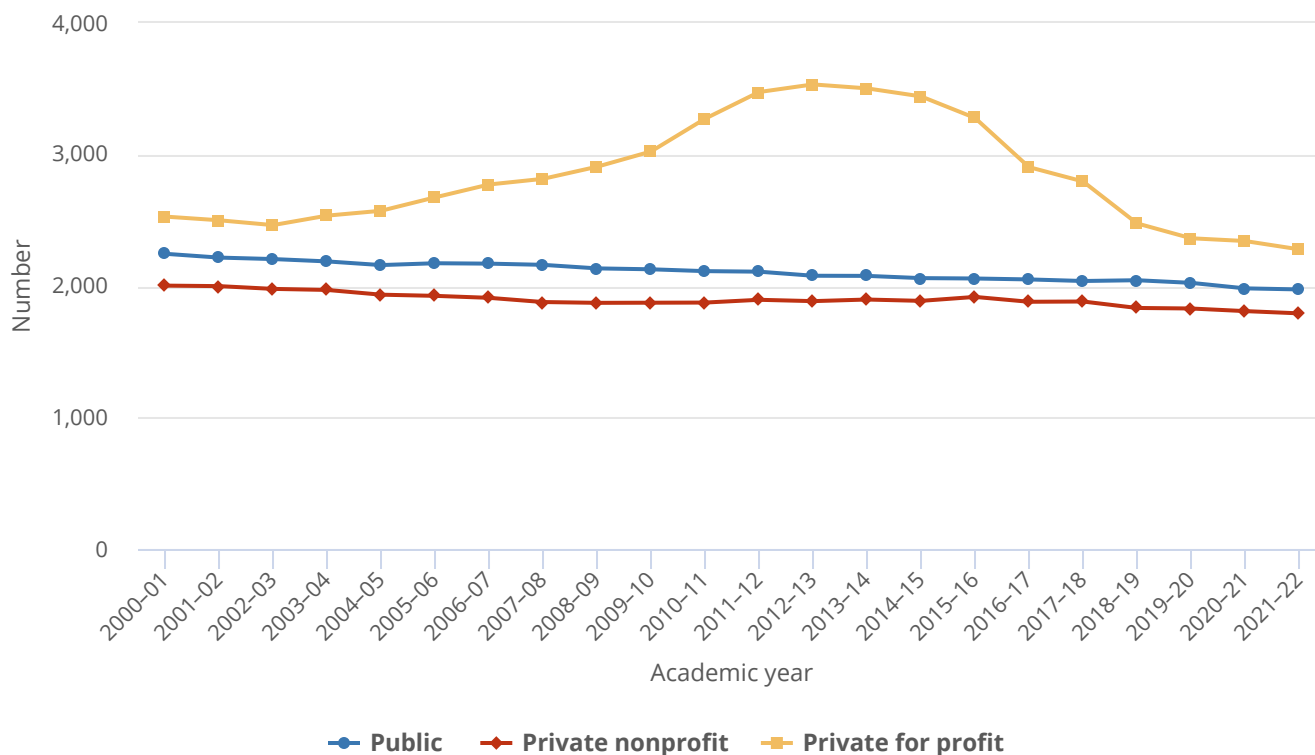
Data are based on institutions eligible to participate in Title IV federal financial aid programs. *Control* refers to whether an institution is operated by publicly elected or appointed officials (*public control*) or by privately elected or appointed officials and derives its major source of funds from private sources (*private control*).

#### Source(s):

National Center for Education Statistics, Integrated Postsecondary Education Data System (IPEDS) Spring 2001–Spring 2021, Fall Enrollment Survey.

Figure HED-7

## Postsecondary institutions, by institutional control: 2000–22

**Note(s):**

Data are based on institutions eligible to participate in Title IV federal financial aid programs. *Institutional control* refers to whether an institution is operated by publicly elected or appointed officials (*public control*) or by privately elected or appointed officials and derives its major source of funds from private sources (*private control*).

**Source(s):**

National Center for Education Statistics, Integrated Postsecondary Education Data System (IPEDS), Institutional Characteristics Survey.

*Science and Engineering Indicators*

With the exception of certificates in S&E fields, the number of postsecondary awards conferred by for-profit institutions in S&E and S&E-related fields rose dramatically from 2000 through 2012 (**Table HED-3**). From 2012 through 2021, however, total awards conferred by for-profit institutions dropped precipitously, including a 48% decrease in S&E awards and a 36% decrease in S&E-related awards. Trends during this period differed between award levels and between S&E and S&E-related fields. In S&E fields, certificate and doctoral degree awards by for-profit institutions increased. In contrast, they declined in associate's, bachelor's, and master's degree awards during this time. In S&E-related fields, certificate and associate's degree awards decreased, while degree awards at the bachelor's and master's degree levels increased. For-profit institutions awarded no doctoral degrees in S&E-related fields through 2012 and awarded 24 doctoral degrees in 2021; however, doctoral degrees in S&E-related fields are relatively uncommon, making up about 1% of all doctoral degrees in each year from 2012 through 2021 (**Table SHED-14**).

Table HED-3

**Trends in for-profit institution awards, by degree level and field: 2000–21**

(Number and percent)

Degree level and field	2000	2012	2021	Change 2000–12		Change 2012–21	
				Number	Percent	Number	Percent
Total	340,259	852,463	521,115	512,204	150.5	-331,348	-38.9
S&E	40,480	78,274	40,754	37,794	93.4	-37,520	-47.9
Certificate	24,377	7,715	12,168	-16,662	-68.4	4,453	57.7
Associate's degree	10,421	32,513	5,816	22,092	212.0	-26,697	-82.1
Bachelor's degree	4,002	27,840	12,669	23,838	595.7	-15,171	-54.5
Master's degree	1,329	9,427	7,740	8,098	609.3	-1,687	-17.9
Doctoral degree	351	779	2,361	428	121.9	1,582	203.1
S&E-related	154,831	405,984	258,152	251,153	162.2	-147,832	-36.4
Certificate	120,971	282,188	150,361	161,217	133.3	-131,827	-46.7
Associate's degree	30,004	89,172	40,474	59,168	197.2	-48,698	-54.6
Bachelor's degree	2,894	23,126	42,352	20,232	699.1	19,226	83.1
Master's degree	962	11,498	24,941	10,536	1,095.2	13,443	116.9
Doctoral degree	0	0	24	0	NA	24	NA
Non-S&E	144,948	368,205	222,209	223,257	154.0	-145,996	-39.7
Certificate	91,062	136,361	109,254	45,299	49.7	-27,107	-19.9
Associate's degree	31,799	87,852	22,735	56,053	176.3	-65,117	-74.1
Bachelor's degree	13,331	82,636	49,045	69,305	519.9	-33,591	-40.6
Master's degree	8,507	59,069	38,597	50,562	594.4	-20,472	-34.7
Doctoral degree	249	2,287	2,578	2,038	818.5	291	12.7

NA = not available.

**Note(s):**

Data are based on institutions eligible to participate in Title IV federal financial aid programs. Certificates include only awards of less than 2 academic years below the associate's degree level. Doctoral degree programs include research doctoral degree programs only and do not include professional doctoral programs (e.g., Doctor of Medicine).

**Source(s):**

National Center for Science and Engineering Statistics, special tabulations (2022) of the National Center for Education Statistics, Integrated Postsecondary Education Data System (IPEDS), Completions Survey, provisional release data.

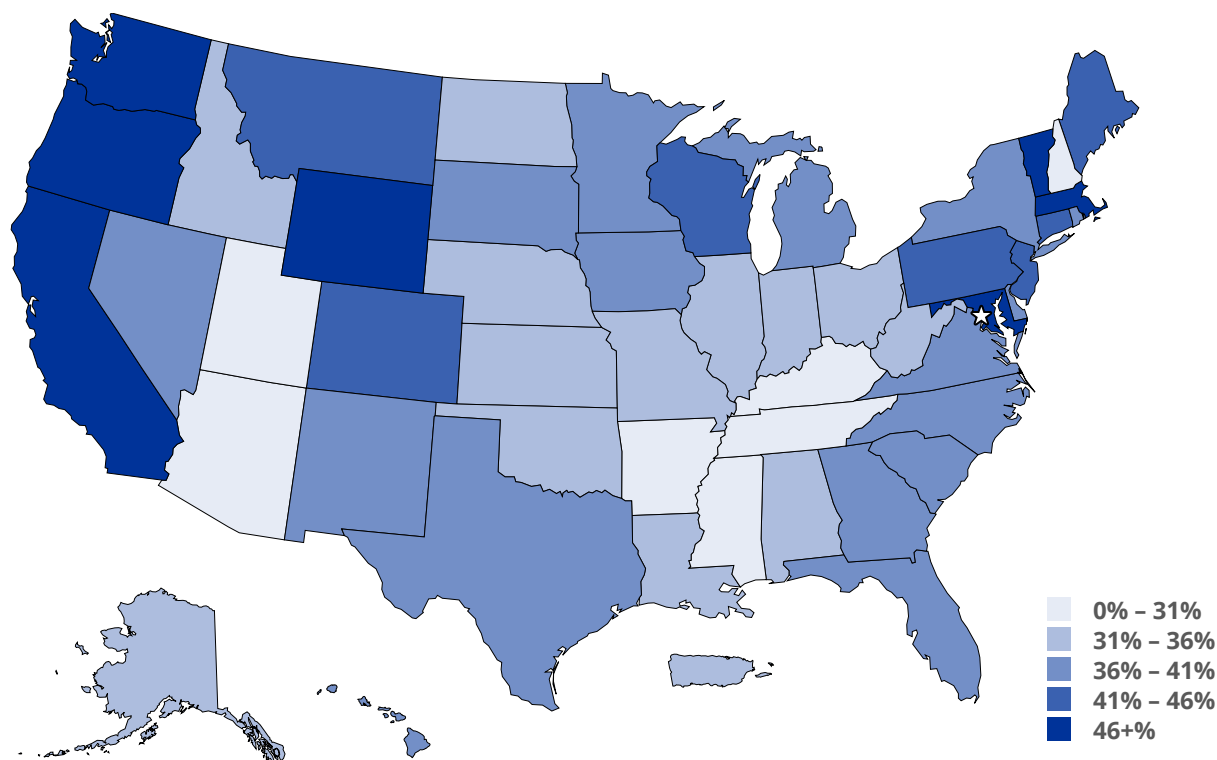
*Science and Engineering Indicators*

## Geographic Differences

Policymakers and others have expressed concern over geographic inequities across the United States in access to high-quality S&E education and careers (NSB 2020; NSF/EHR 2020). Higher education institutions vary in the percentage of degrees they award that are in S&E fields, and this variation is apparent at the state level.<sup>8</sup> States with the greatest share of bachelor's degrees awarded in S&E fields—for example, Maryland (52%), Vermont (51%), District of Columbia (50%), California (49%), Oregon (49%), Washington (48%), and Massachusetts (46%)—were primarily on the West Coast and in the northeastern United States, with the exception of Wyoming (51%) (**Figure HED-8**). States with lower shares of bachelor's degrees awarded in S&E fields were generally located in the middle and southeastern regions of the country, although the western states of Arizona (25%) and Utah (27%) had the lowest shares.

Figure HED-8

Share of bachelor's degrees awarded in S&amp;E fields, by state: 2021

**Note(s):**

Data are based on institutions eligible to participate in Title IV federal financial aid programs.

**Source(s):**

National Center for Science and Engineering Statistics, special tabulations (2022) of the National Center for Education Statistics, Integrated Postsecondary Education Data System (IPEDS), Completions Survey, provisional release data.

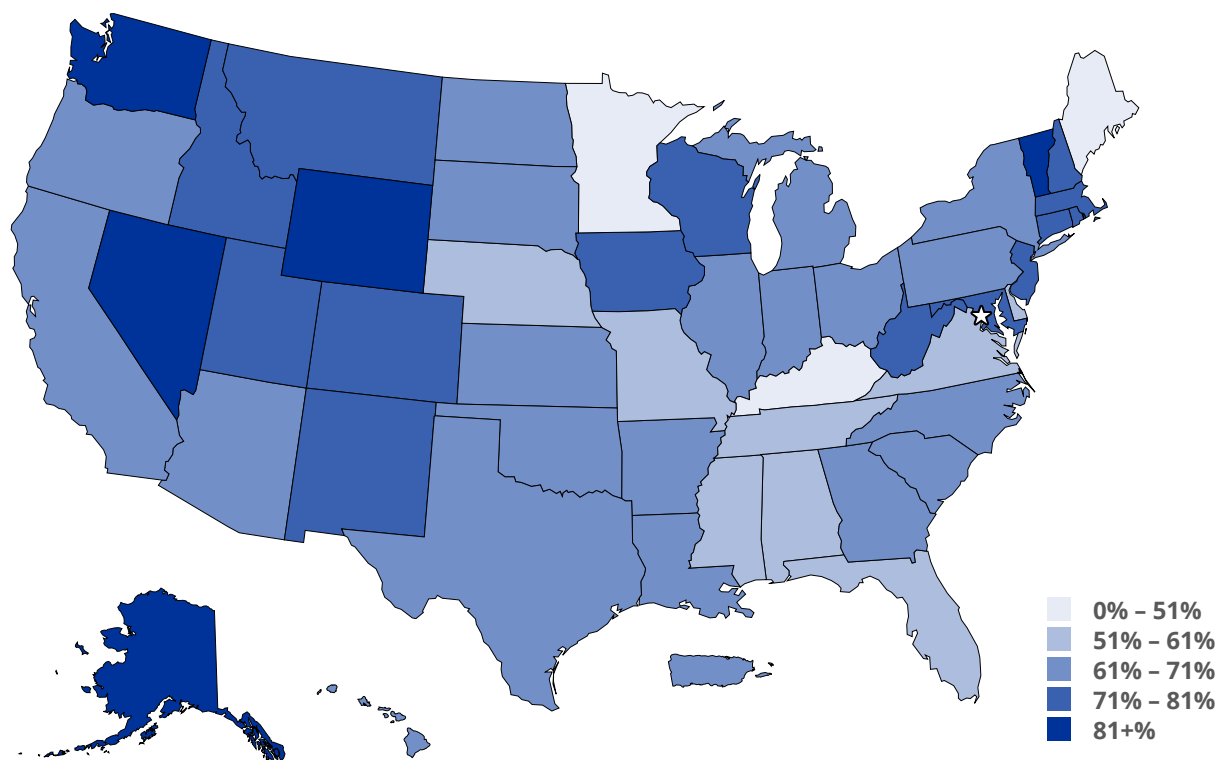
*Science and Engineering Indicators*

At the doctoral level, several states produced considerably higher concentrations of S&E degrees than were observed at the bachelor's level. Alaska, which had the highest share of doctoral degrees awarded in S&E fields of any state (93%), awards a much smaller total number of doctoral degrees than most states and awards a comparatively high proportion of degrees in geosciences, atmospheric sciences, and ocean sciences (**Figure HED-9**). Several other states with high percentages of S&E doctoral degrees are also in the West—Washington (82%), Wyoming (82%), Nevada (81%)—and several northeastern states also awarded high percentages of doctorates in S&E fields: Vermont (82%), Massachusetts (80%), and Rhode Island (77%). In three states, institutions awarded 50% or less of all doctoral degrees in S&E fields: Kentucky (42%), Maine (43%), and Minnesota (50%).



Figure HED-9

Share of doctoral degrees awarded in S&amp;E fields, by state: 2021

**Note(s):**

Data are based on institutions eligible to participate in Title IV federal financial aid programs. Doctoral degree programs include research doctoral degree programs only and do not include professional doctoral programs (e.g., Doctor of Medicine).

**Source(s):**

National Center for Science and Engineering Statistics, special tabulations (2022) of the National Center for Education Statistics, Integrated Postsecondary Education Data System (IPEDS), Completions Survey, provisional release data.

*Science and Engineering Indicators*

## Online Education

Even before the COVID-19 pandemic, online coursetaking increased through the early 21st century. For many students—for example, those who commute significant distances to attend classes or who balance postsecondary education with work or family responsibilities—online courses can reduce the cost of commuting in terms of time as well as of financial resources (NCES 2021b; Travers 2020). As Web-based technology advanced the quality of online interaction, broadband Internet access became more available, and the cost of the necessary electronic devices diminished, the percentages of postsecondary students who took at least one online course increased (NCES 2021b).

The percentage of students who enrolled in online education, whether individual courses or programs, differed by award level and field of study. In 2015–16, online classes were generally more popular among master's degree students than among certificate, associate's, bachelor's, or doctoral degree students. Forty-six percent of science, engineering, and mathematics, 55% of psychology and other social sciences, and 60% of health and medicine master's degree students

took an online class (Table SHED-8). Fewer doctoral students took an online course: 13% in science, engineering, and mathematics programs; 31% in psychology and other social sciences programs; and 42% in health and medicine programs. From 2012 to 2016, the share of students who took an online course increased at every level from certificate to doctoral students and in nearly all fields.<sup>9</sup>

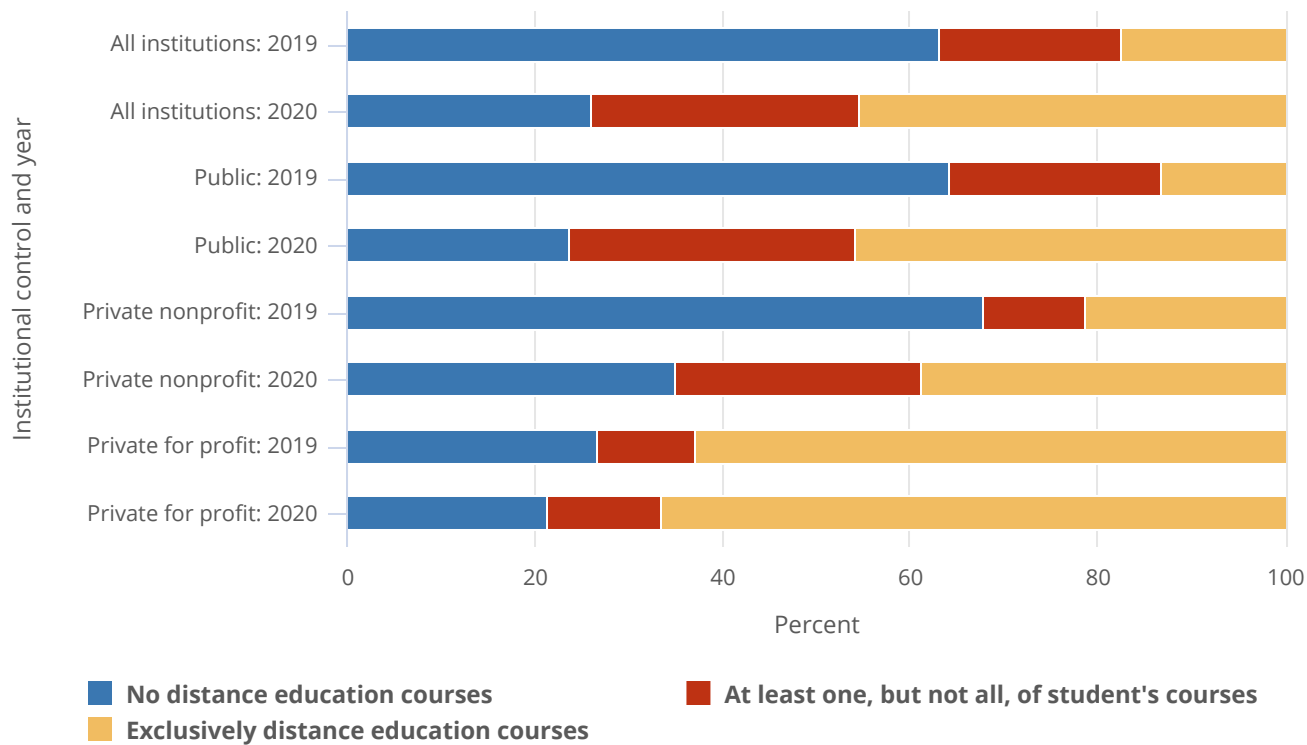
Compared with the percentage of students who took at least one online course, fewer students enrolled in postsecondary programs that were entirely online.<sup>10</sup> Online programs were more common among master's degree students than among students at other degree levels.<sup>11</sup> Thirty-six percent of master's degree students in psychology and other social sciences, as well as in health and medicine, were enrolled in online programs (Table SHED-9). Among doctoral students, larger percentages of those in psychology and other social sciences (24%) and in health and medicine (27%) were enrolled in online programs than students in science, engineering, and mathematics fields (5%). The percentage of doctoral students in science, engineering, and mathematics fields who were enrolled in online programs increased from 2% in 2012 to 5% in 2016.

In response to the COVID-19 pandemic, public health measures required institutions to limit in-person instruction; as a consequence, participation in online postsecondary education accelerated dramatically between fall 2019 and fall 2020.<sup>12</sup> In 2019, about a third of postsecondary students took at least one distance education course; in 2020, this share increased to about three-fourths (**Figure HED-10**). The percentage of students who took only distance education courses more than doubled between 2019 and 2020, increasing from 18% to 45%.

The increase in distance education participation between 2019 and 2020 differed by institution control, with greater increases for private nonprofit and public institutions relative to for-profit institutions, though for-profit institutions continued to have a substantially higher percentage of students taking distance education courses. For-profit institutions began offering more online instruction in the late 1990s and continuing through the 2000s and 2010s (Howarth and Stifler 2019; Whitman 2018). Consequently, the percentage of students in for-profit institutions who took only distance education courses increased from 63% in 2019 to 67% in 2020, a difference of 4 percentage points (**Figure HED-10**). In contrast, the percentage of students in private nonprofit institutions who took only distance education courses increased from 21% to 39%; among students in public institutions, the percentage increased from 13% to 46%.

Figure HED-10

Students enrolled in degree-granting postsecondary institutions, by distance education participation and institutional control: Fall 2019 and fall 2020



**Note(s):**  
Data are based on institutions eligible to participate in Title IV federal financial aid programs.

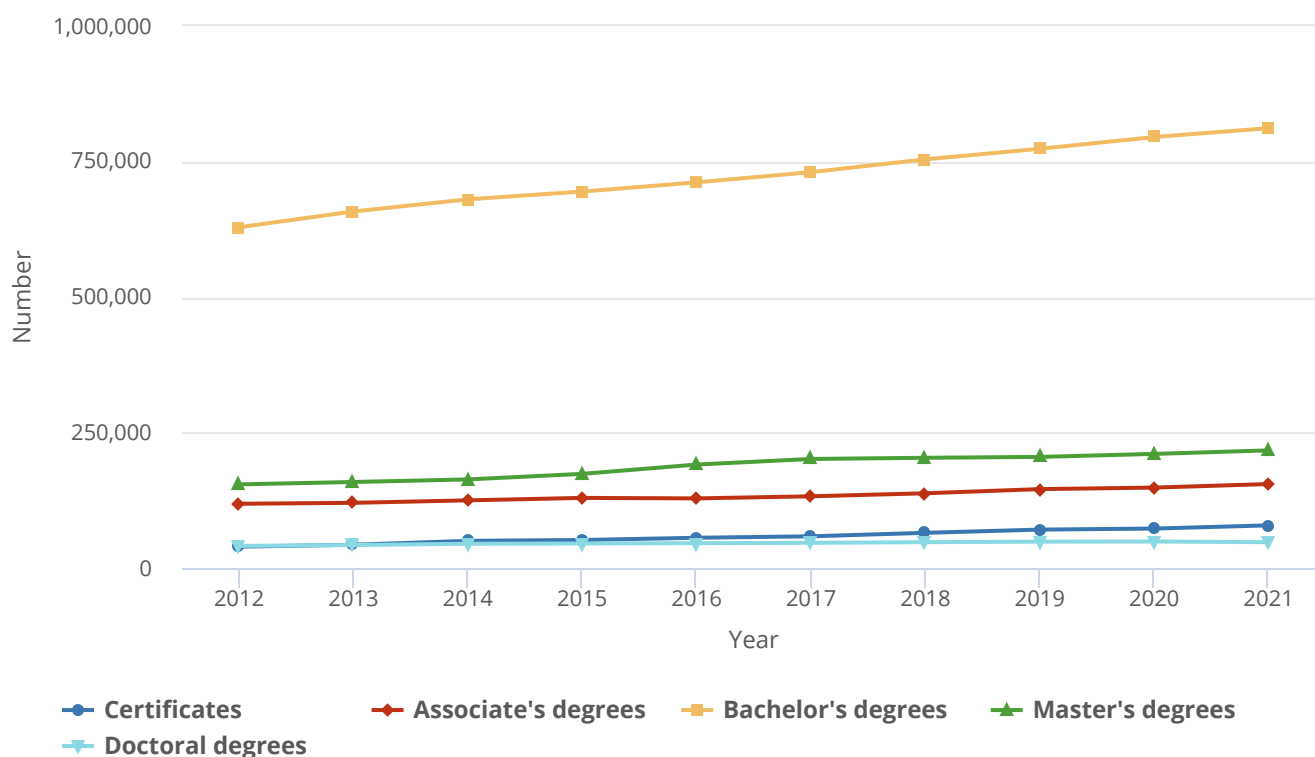
**Source(s):**  
National Center for Education Statistics, Integrated Postsecondary Education Data System (IPEDS), Fall Enrollment Survey.

## Trends in S&E Degree Awards

Between 2012 and 2021, the number of S&E awards conferred by U.S. postsecondary institutions increased at all levels (Figure HED-11). Proportionally, the greatest increase occurred at the certificate level: the number of S&E certificates awarded doubled from 39,000 in 2012 to 79,000 in 2021. The number of S&E associate's degrees awarded increased by 31%, S&E bachelor's degrees increased by 29%, S&E master's degrees increased by 41%, and S&E doctoral degrees increased the least, by 17%. As discussed below, growth in engineering and computer and information sciences degrees accounted for much of the increase in total S&E degrees awarded at most levels.

Figure HED-11

S&E awards conferred, by award level: 2012–21



**Note(s):**

Data are based on institutions eligible to participate in Title IV federal financial aid programs. Certificates include only awards of less than 2 academic years below the associate's degree level. Doctoral degree programs include research doctoral degree programs only and do not include professional doctoral programs (e.g., Doctor of Medicine).

**Source(s):**

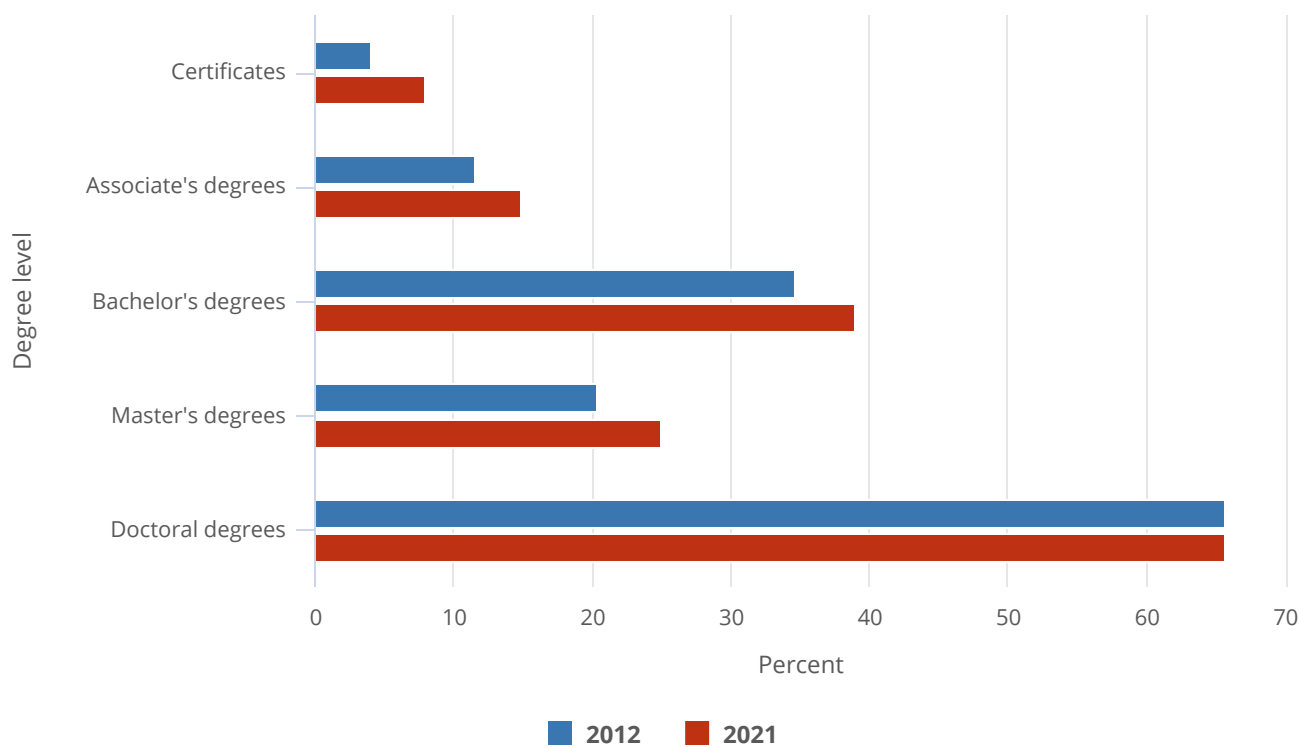
National Center for Science and Engineering Statistics, special tabulations (2022) of the National Center for Education Statistics, Integrated Postsecondary Education Data System (IPEDS), Completions Survey, provisional release data.

Science and Engineering Indicators

The increase in the number of S&E certificate and degree awards reflects not only a growing population of postsecondary students but also an increasing share of postsecondary awards in S&E fields of study. The share of certificates awarded in S&E fields increased at the highest rate among all award levels, doubling from 4% of all certificates awarded in 2012 to 8% in 2021 (Figure HED-12). The share of awards in S&E fields at the associate's, bachelor's, and master's degree levels also increased but to a much lesser degree. Although the percentage of S&E doctorates did not increase, it remained the highest at 66%.

Figure HED-12

## S&amp;E degrees as a percentage of total degrees awarded: 2012 and 2021

**Note(s):**

Data are based on institutions eligible to participate in Title IV federal financial aid programs. Certificates include only awards of less than 2 academic years below the associate's degree level. Doctoral degree programs include research doctoral degree programs only and do not include professional doctoral programs (e.g., Doctor of Medicine).

**Source(s):**

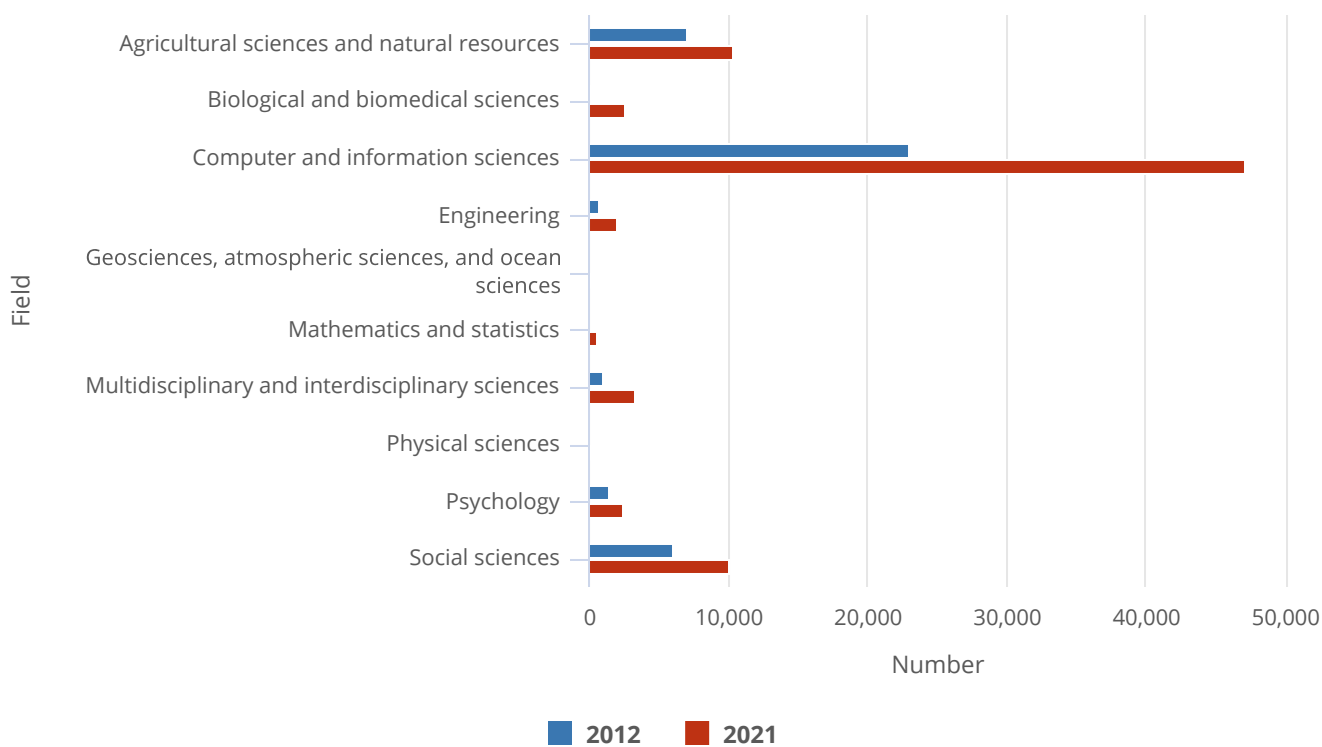
National Center for Science and Engineering Statistics, special tabulations (2022) of the National Center for Education Statistics, Integrated Postsecondary Education Data System (IPEDS), Completions Survey, provisional release data.

*Science and Engineering Indicators*

At the certificate level, the most popular S&E field among award recipients in both 2012 and 2021 was computer and information sciences. In 2012, students earned 23,000 certificates in computer and information sciences, followed by agricultural sciences and natural sciences (7,000 certificates) and social sciences (6,100 certificates) (**Figure HED-13**). By 2021, the number of certificates in these fields had grown but did so at different rates; the number of certificates in computer and information sciences more than doubled to 47,000 certificates, whereas agricultural sciences and natural resources certificates increased by 48%, and social sciences certificates increased by 65%.

Figure HED-13

## S&amp;E certificates awarded, by field: 2012 and 2021

**Note(s):**

Data are based on institutions eligible to participate in Title IV federal financial aid programs. Certificates include only awards of less than 2 academic years below the associate's degree level.

**Source(s):**

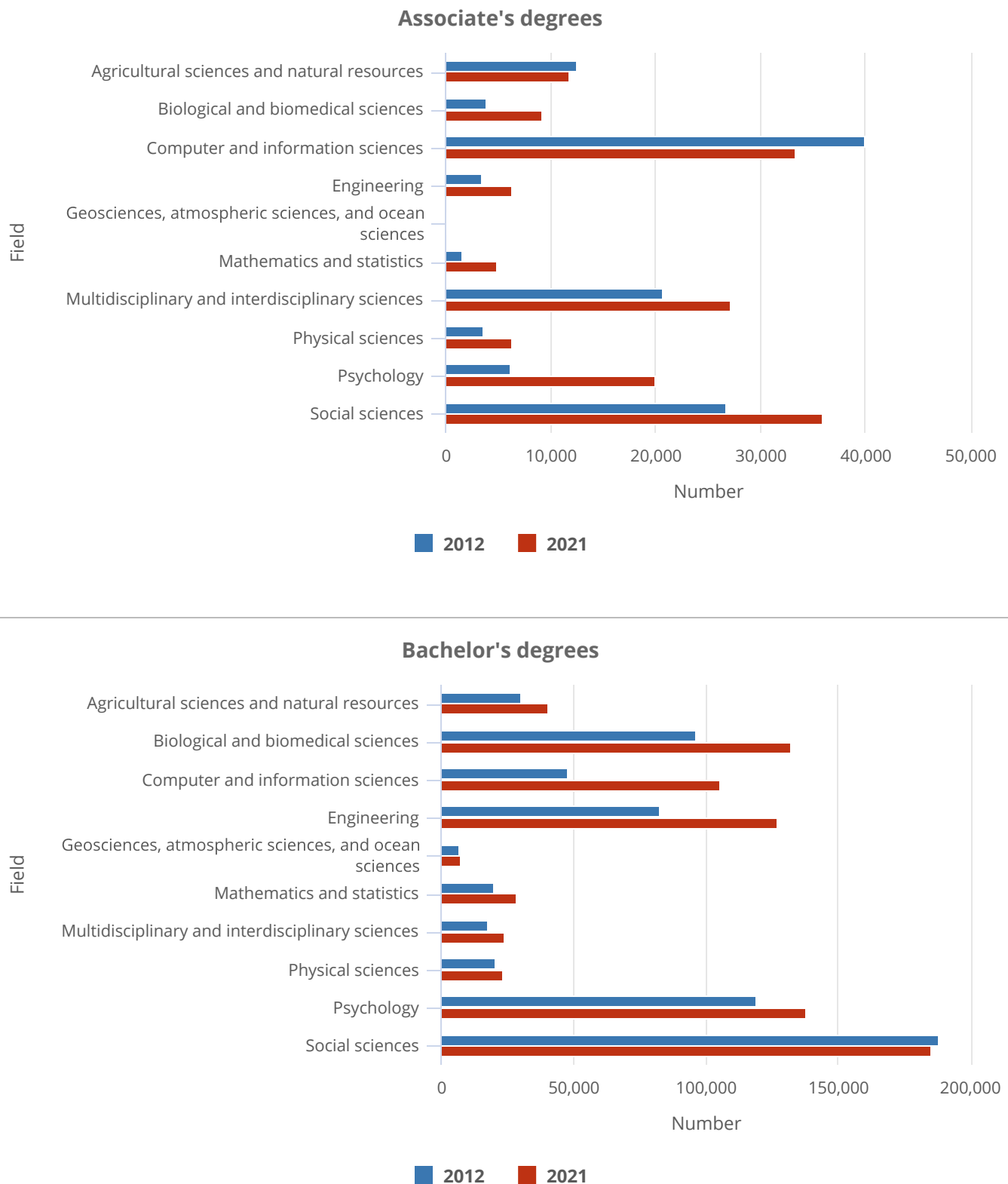
National Center for Science and Engineering Statistics, special tabulations (2022) of the National Center for Education Statistics, Integrated Postsecondary Education Data System (IPEDS), Completions Survey, provisional release data.

*Science and Engineering Indicators*

Computer and information sciences and the social sciences were also the most common S&E fields for associate's degree awards in both 2012 and 2021, although the number of associate's degrees awarded in computer and information sciences declined during this period (Figure HED-14). Similarly, in 2021, the most popular S&E field at the bachelor's degree level remained the social sciences, although the number of awards had decreased since 2012. The decline in social sciences bachelor's degrees stands out because the number of bachelor's degrees increased in all other S&E fields during this time. The number of computer and information sciences bachelor's degrees more than doubled over the decade, from 48,000 to 105,000.

Figure HED-14

S&amp;E undergraduate degrees awarded, by field: 2012 and 2021



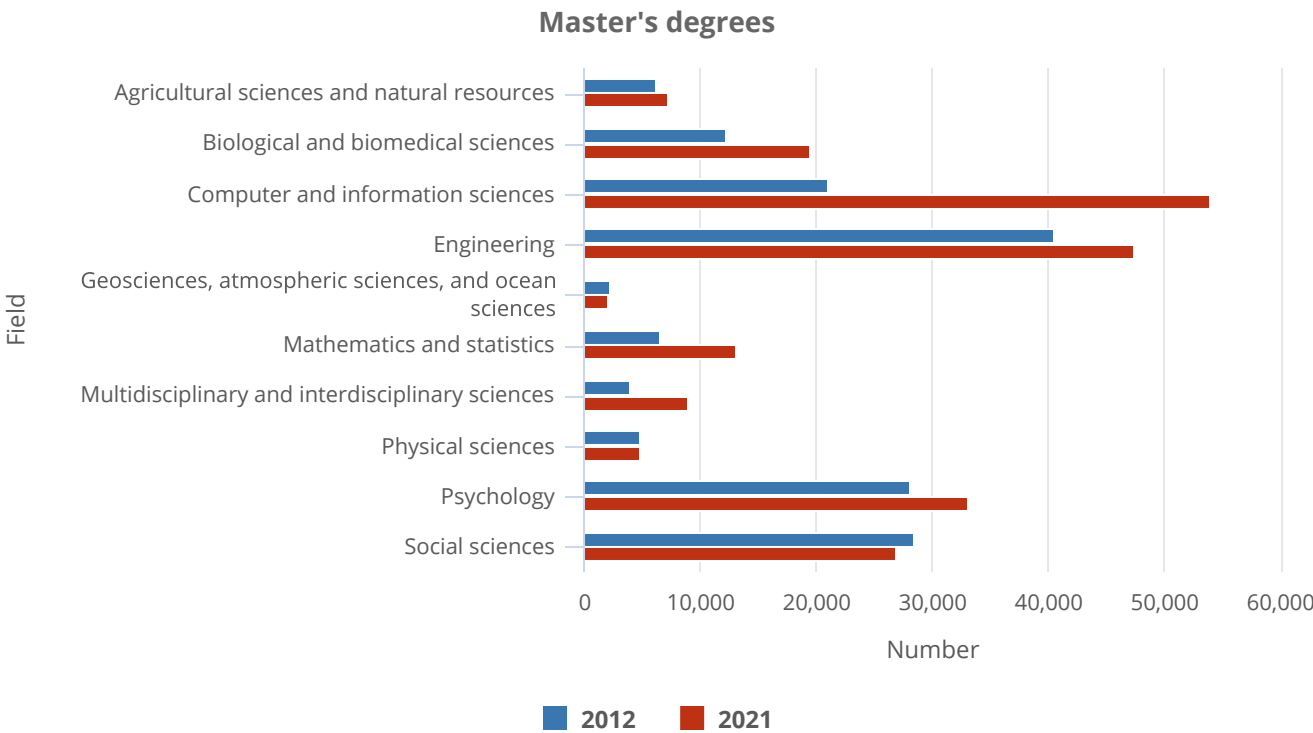
**Note(s):**  
Data are based on institutions eligible to participate in Title IV federal financial aid programs.

**Source(s):**  
National Center for Science and Engineering Statistics, special tabulations (2022) of the National Center for Education Statistics, Integrated Postsecondary Education Data System (IPEDS), Completions Survey, provisional release data.

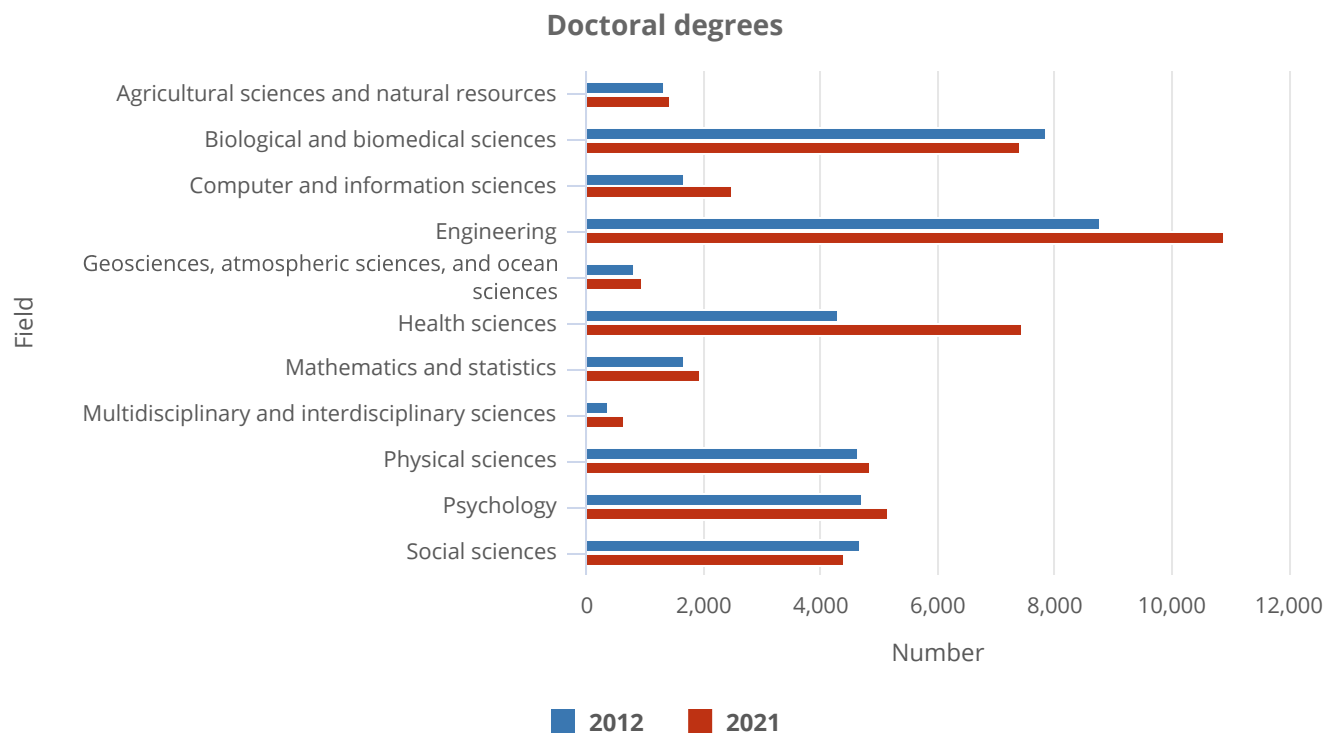
Science and Engineering Indicators

Engineering is among the most popular S&E fields for advanced degree recipients. The most popular S&E field among 2012 master’s degree recipients was engineering, but greater growth in computer and information sciences master’s degrees meant that this field had become the most prevalent S&E field among master’s degree recipients by 2021 (**Figure HED-15**). In contrast, relatively few doctoral degree recipients had studied computer and information sciences. Instead, the largest number of doctoral degree recipients in 2021 had studied engineering, followed by health sciences and then biological and biomedical sciences.

**Figure HED-15**  
**S&E graduate degrees awarded, by field: 2012 and 2021**







**Note(s):**  
Data are based on institutions eligible to participate in Title IV federal financial aid programs. Doctoral degree programs include research doctoral degree programs only and do not include professional doctoral programs (e.g., Doctor of Medicine).

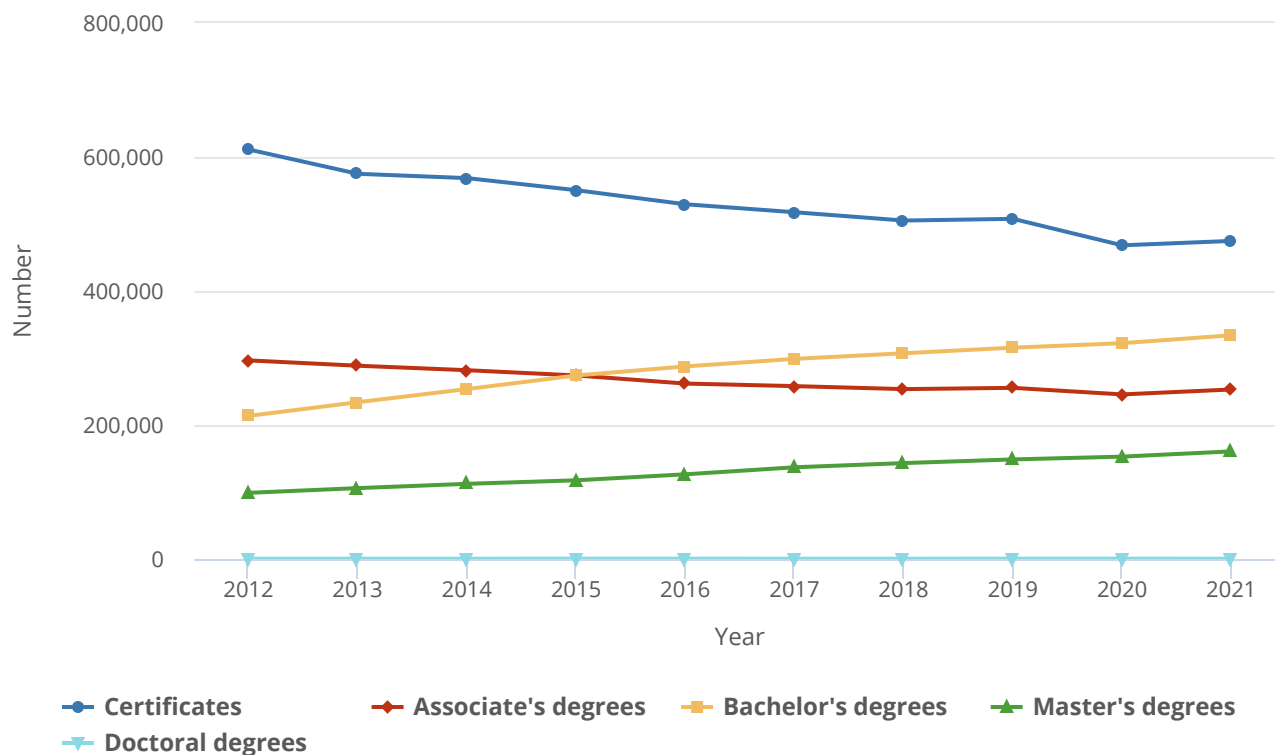
**Source(s):**  
National Center for Science and Engineering Statistics, special tabulations (2022) of the National Center for Education Statistics, Integrated Postsecondary Education Data System (IPEDS), Completions Survey, provisional release data.

*Science and Engineering Indicators*

In contrast with the growth in S&E awards at all levels between 2012 and 2021, the trend in the number of S&E-related awards differed by award level (**Figure HED-16**). The number of S&E-related certificates and associate’s degrees awarded decreased between 2012 and 2021, while the number of bachelor’s and master’s degrees increased. The number of S&E-related doctoral degrees, which are comparatively rare, fluctuated with little long-term change.

Figure HED-16

S&amp;E-related awards conferred, by award level: 2012–21

**Note(s):**

Data are based on institutions eligible to participate in Title IV federal financial aid programs. Certificates include only awards of less than 2 academic years below the associate's degree level. Doctoral degree programs include research doctoral degree programs only and do not include professional doctoral programs (e.g., Doctor of Medicine).

**Source(s):**

National Center for Science and Engineering Statistics, special tabulations (2022) of the National Center for Education Statistics, Integrated Postsecondary Education Data System (IPEDS), Completions Survey, provisional release data.

*Science and Engineering Indicators*

The field of health professions and related programs, which includes degrees in registered nursing, is by far the most prevalent broad S&E-related field (**Table HED-4**). This field accounted for the largest share of S&E-related awards from the certificate level to the doctorate level for both 2012 and 2021. Despite a 36% decline in the number of certificates awarded in health professions and related programs since 2012, it remained the most popular S&E-related field for certificates by a large margin. In contrast, the number of degrees in health professions and related programs increased by 64% (from 183,000 to 299,000) at the bachelor's level and by 70% (from 86,000 to 146,000) at the master's level. Other S&E-related degrees with proportionally large growth over this period included bachelor's and master's degrees in homeland security and fire protection. Awards with declining numbers included bachelor's and master's degrees in science and mathematics teacher education.

Table HED-4

**S&E-related degrees awarded, by degree level and field: 2012 and 2021**

(Number and percent change)

Degree level and field	2012	2021	Percent change
Certificates			
Health professions and related programs	413,354	266,333	-35.6
Homeland security and fire protection	9,046	9,511	5.1
Science and mathematics teacher education	33	81	145.5
Technology and technical fields	35,920	35,918	*
Other S&E-related fields	152,876	162,891	6.6
Associate's degrees			
Health professions and related programs	217,779	187,273	-14.0
Homeland security and fire protection	5,172	4,636	-10.4
Science and mathematics teacher education	80	56	-30.0
Technology and technical fields	39,651	24,753	-37.6
Other S&E-related fields	33,737	36,287	7.6
Bachelor's degrees			
Health professions and related programs	182,585	299,237	63.9
Homeland security and fire protection	2,901	5,298	82.6
Science and mathematics teacher education	5,039	3,455	-31.4
Technology and technical fields	19,593	22,569	15.2
Other S&E-related fields	3,433	3,361	-2.1
Master's degrees			
Health professions and related programs	86,248	146,478	69.8
Homeland security and fire protection	1,414	3,084	118.1
Science and mathematics teacher education	4,492	3,702	-17.6
Technology and technical fields	5,000	7,204	44.1
Other S&E-related fields	1,610	181	-88.8
Doctoral degrees			
Health professions and related programs	175	172	-1.7
Homeland security and fire protection	1	35	3,400.0
Science and mathematics teacher education	177	111	-37.3
Technology and technical fields	90	149	65.6
Other S&E-related fields	1	2	100.0

\* = value &lt; 0.05%.

**Note(s):**

Data are based on institutions eligible to participate in Title IV federal financial aid programs. Certificates include only awards of less than 2 academic years below the associate's degree level. Doctoral degree programs include research doctoral degree programs only and do not include professional doctoral programs (e.g., Doctor of Medicine).

**Source(s):**

National Center for Science and Engineering Statistics, special tabulations (2022) of the National Center for Education Statistics, Integrated Postsecondary Education Data System (IPEDS), Completions Survey, provisional release data.

*Science and Engineering Indicators*

## Characteristics of S&E Degree Recipients

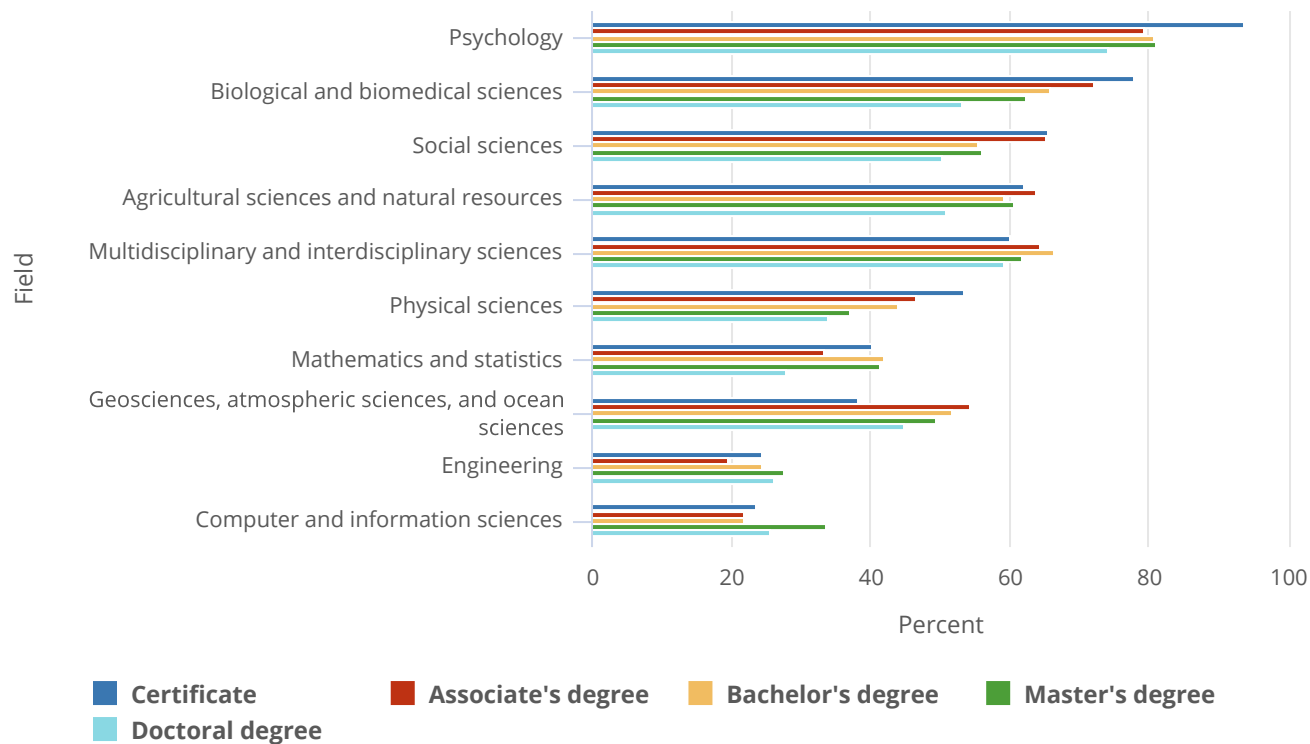
In recent years, S&E degree recipients have become increasingly diverse in terms of both sex and race and ethnicity, although the representation of women and some racial and ethnic groups remains uneven among S&E fields. Demographic data on S&E degree recipients illustrate the relative position of underrepresented groups in U.S. S&E, groups that are collectively termed the “missing millions” by NSB (NSB 2020). This section of the report extends some analyses from *Diversity and STEM: Women, Minorities, and Persons with Disabilities 2023* (NCSES 2023) using 2021 data from the Integrated Postsecondary Education Data System (IPEDS) categorized by the NCSES Taxonomy of Disciplines to address differences in degree attainment by sex and by race and ethnicity.

### S&E Degrees by Sex

The percentage of S&E certificates and degrees that women earned in 2021 differed by field and by award level (**Figure HED-17**). Across all award levels, women earned more certificates and degrees than men in agricultural and biological sciences, social sciences, and psychology. Women earned the highest shares of certificates and degrees in psychology, accounting for 94% of certificates in psychology and at least 74% of psychology degrees at other levels.

Figure HED-17

S&E degrees awarded to women, by field and degree level: 2021



**Note(s):** Data are based on institutions eligible to participate in Title IV federal financial aid programs. Certificates include only awards of less than 2 academic years below the associate's degree level. Doctoral degree programs include research doctoral degree programs only and do not include professional doctoral programs (e.g., Doctor of Medicine).

**Source(s):**

National Center for Science and Engineering Statistics, special tabulations (2022) of the National Center for Education Statistics, Integrated Postsecondary Education Data System (IPEDS), Completions Survey, provisional release data.

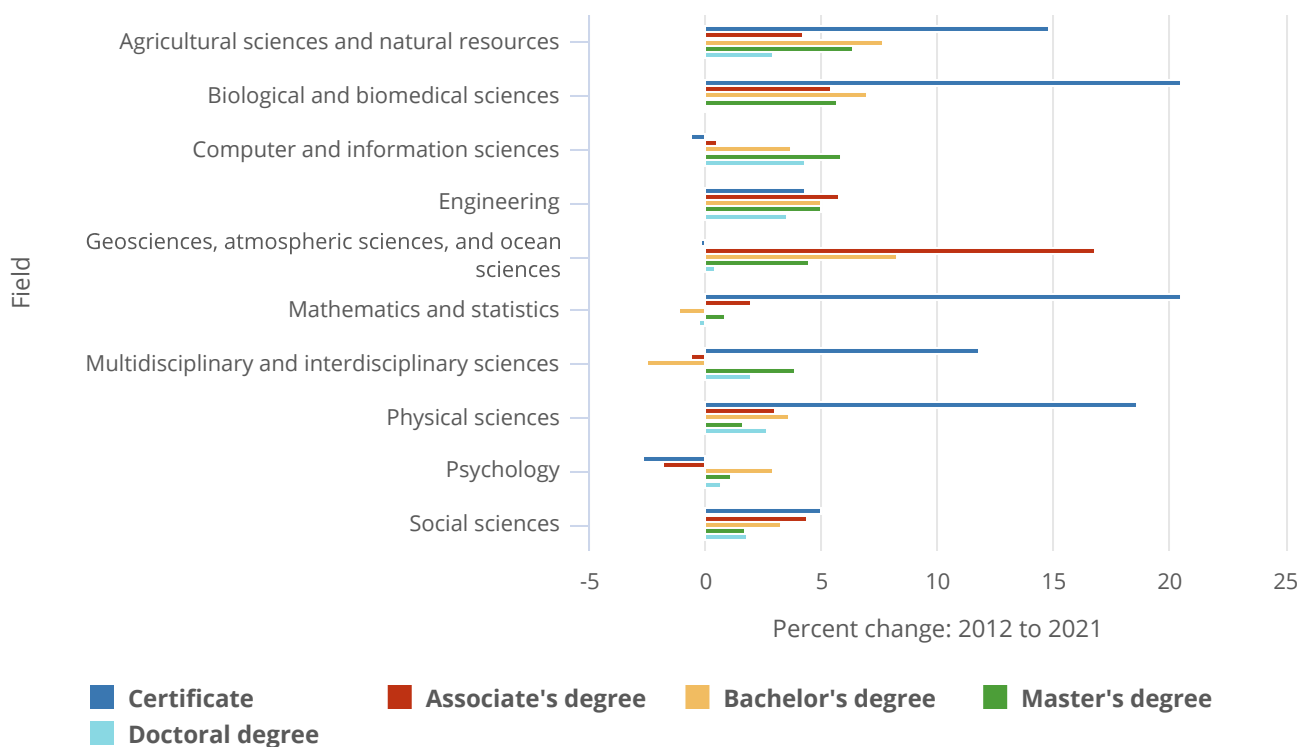
Science and Engineering Indicators

In other S&E fields, women made up the minority of award recipients in 2021. In computer and information sciences and in engineering, women earned no more than about a third of awards at any level. In geosciences, atmospheric sciences, and ocean sciences, women earned about half of the associate's, bachelor's, and master's degrees but less than half of the certificates and doctoral degrees. In the physical sciences, women earned 54% of certificates, but the proportion of awards that women earned decreased as award level increased, with women receiving 34% of doctoral degrees.

From 2012 to 2021, the percentage of S&E awards that women earned either increased or remained about the same, depending on the field and award level. The largest increases occurred at the certificate level in biological and biomedical sciences (20 percentage points), mathematics and statistics (21 percentage points), and the physical sciences (19 percentage points) (Figure HED-18). In engineering, one of the fields in which women are most underrepresented, the share of awards that women earned increased by 6 percentage points or less at all award levels. Similarly, the share of computer and information sciences awards that women earned increased by 4–6 percentage points at the bachelor's, master's, and doctoral levels.

Figure HED-18

**S&E degrees awarded to women, by field and degree level: 2012 and 2021**

**Note(s):**

Data are based on institutions eligible to participate in Title IV federal financial aid programs. Certificates include only awards of less than 2 academic years below the associate's degree level. Doctoral degree programs include research doctoral degree programs only and do not include professional doctoral programs (e.g., Doctor of Medicine).

**Source(s):**  
National Center for Science and Engineering Statistics, special tabulations (2022) of the National Center for Education Statistics, Integrated Postsecondary Education Data System (IPEDS), Completions Survey, provisional release data.

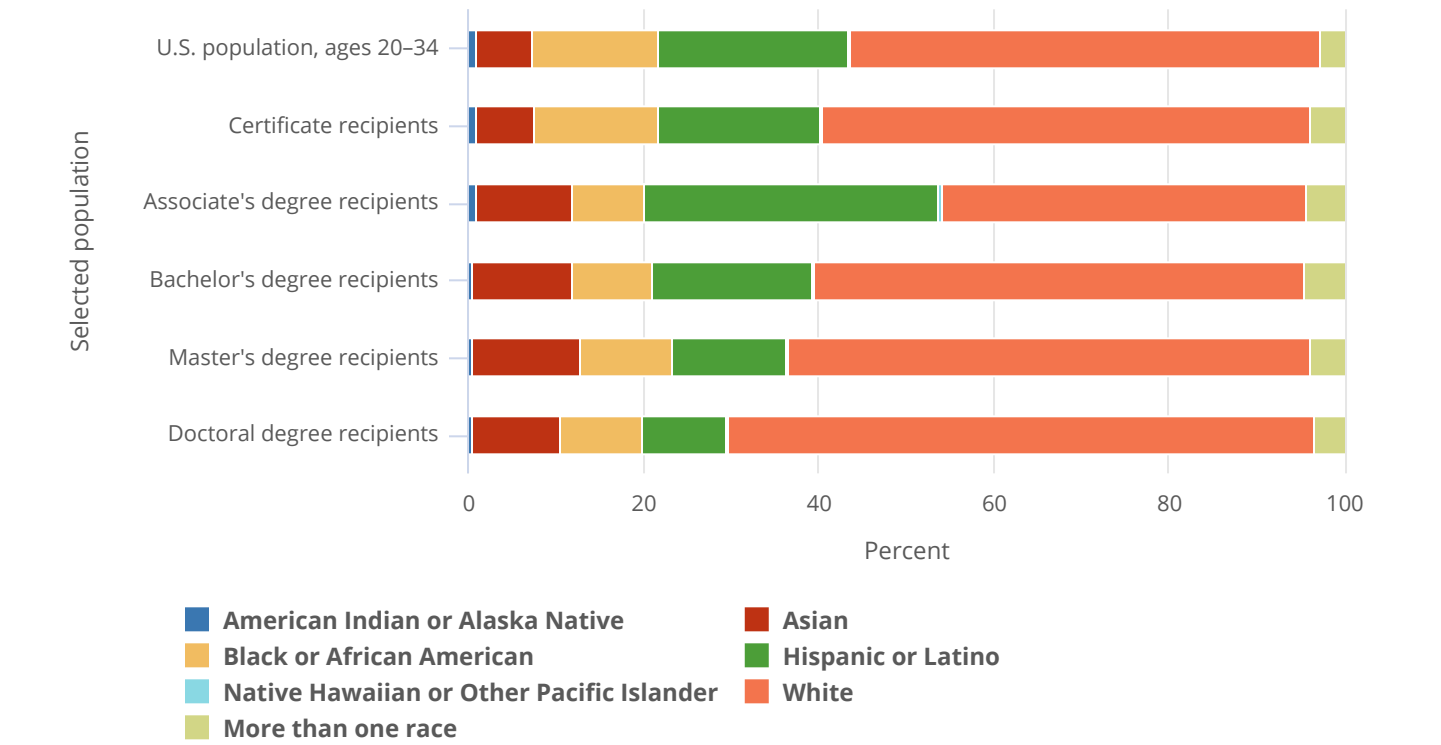
Science and Engineering Indicators

S&E Degrees, by Race and Ethnicity

As of 2021, American Indian or Alaska Native, Black or African American, and Hispanic students were underrepresented among S&E certificate and degree award recipients at most award levels relative to their proportions of the U.S. population ages 20–34 years old (Figure HED-19). One notable exception is that Hispanic students comprised 33% of S&E associate’s degree recipients, compared to 22% of the U.S. population ages 20–34 years old. On the other hand, Hispanic students comprised 10% of S&E doctoral degree recipients. Asian individuals were overrepresented among S&E postsecondary award degree recipients at all levels, and White individuals were overrepresented at all levels except the associate’s degree level.

Figure HED-19

Race and ethnicity of U.S. population ages 20–34 and S&E award recipients, by degree level: 2021



**Note(s):**  
Data are based on institutions eligible to participate in Title IV federal financial aid programs. Certificates include only awards of less than 2 academic years below the associate's degree level. Doctoral degree programs include research doctoral degree programs only and do not include professional doctoral programs (e.g., Doctor of Medicine). Hispanic or Latino may be any race; race categories exclude Hispanic origin. Data about the race and ethnicity of S&E award recipients represent U.S. citizens and permanent residents only. Award recipients with unknown race and ethnicity are not included.

**Source(s):**

National Center for Science and Engineering Statistics, special tabulations (2022) of the National Center for Education Statistics, Integrated Postsecondary Education Data System (IPEDS), Completions Survey, provisional release data; U.S. Census Bureau, Population Division, Annual Estimates of the Resident Population by Sex, Age, Race, and Hispanic Origin for the United States: April 1, 2020 to July 1, 2021 (NC-EST2021-ASR6H).

Science and Engineering Indicators

The number of S&E certificates and degrees earned by students from most racial and ethnic groups has grown at most award levels over the last decade (Table HED-5). At the associate's degree level and above, S&E degrees earned by Hispanic students increased by the greatest number from 2012 to 2021, including a 71,000 increase in S&E bachelor's degrees. The prominent growth in Hispanic S&E degree recipients has occurred in tandem with a large increase in the overall U.S. Hispanic population, which is considerably younger than the nation's non-Hispanic population.<sup>13</sup> S&E degrees earned by students of more than one race grew most rapidly on a percentage basis during this time, but the number of degree recipients from this group is comparatively small. From 2012 to 2021, S&E degrees earned by American Indian or Alaska Native students decreased at the associate's, bachelor's, master's, and doctoral levels; this was the only racial or ethnic group that experienced a decline in S&E master's or doctoral degrees.

**Table HED-5**

**S&E degrees awarded to U.S. citizens and permanent residents, by degree level, race, and ethnicity: 2012 and 2021**

(Number and percent change)

Degree level, race, and ethnicity	2012	2021	Change in degrees	
			Number	Percent
Certificates				
American Indian or Alaska Native	464	699	235	50.6
Asian	1,420	4,923	3,503	246.7
Black or African American	5,481	10,480	4,999	91.2
Hispanic or Latino	5,899	13,874	7,975	135.2
Native Hawaiian or Other Pacific Islander	134	226	92	68.7
White	22,970	41,571	18,601	81.0
More than one race	514	2,808	2,294	446.3
Associate's degrees				
American Indian or Alaska Native	1,282	1,115	-167	-13.0
Asian	6,726	16,359	9,633	143.2
Black or African American	12,339	12,125	-214	-1.7
Hispanic or Latino	18,570	49,155	30,585	164.7
Native Hawaiian or Other Pacific Islander	662	594	-68	-10.3
White	64,037	61,161	-2,876	-4.5
More than one race	1,554	6,335	4,781	307.7
Bachelor's degrees				
American Indian or Alaska Native	3,661	3,038	-623	-17.0
Asian	54,924	84,161	29,237	53.2
Black or African American	55,148	67,450	12,302	22.3
Hispanic or Latino	63,425	134,194	70,769	111.6
Native Hawaiian or Other Pacific Islander	1,568	1,530	-38	-2.4
White	379,086	410,637	31,551	8.3
More than one race	10,234	33,991	23,757	232.1
Master's degrees				
American Indian or Alaska Native	554	518	-36	-6.5
Asian	10,216	16,509	6,293	61.6
Black or African American	9,883	14,191	4,308	43.6
Hispanic or Latino	8,878	17,779	8,901	100.3

Table HED-5

**S&E degrees awarded to U.S. citizens and permanent residents, by degree level, race, and ethnicity: 2012 and 2021**

(Number and percent change)

Degree level, race, and ethnicity	2012	2021	Change in degrees	
			Number	Percent
Native Hawaiian or Other Pacific Islander	207	264	57	27.5
White	71,362	80,229	8,867	12.4
More than one race	1,945	5,131	3,186	163.8
Doctoral degrees				
American Indian or Alaska Native	123	106	-17	-13.8
Asian	2,527	2,947	420	16.6
Black or African American	1,535	2,664	1,129	73.6
Hispanic or Latino	1,537	2,817	1,280	83.3
Native Hawaiian or Other Pacific Islander	24	40	16	66.7
White	18,632	19,409	777	4.2
More than one race	255	1,014	759	297.6

**Note(s):**

Data are based on institutions eligible to participate in Title IV federal financial aid programs. Certificates include only awards of less than 2 academic years below the associate's degree level. Doctoral degree programs include research doctoral degree programs only and do not include professional doctoral programs (e.g., Doctor of Medicine). Hispanic or Latino may be any race; race categories exclude Hispanic origin. Students on temporary visas are excluded, as are award recipients with unknown race and ethnicity.

**Source(s):**

National Center for Science and Engineering Statistics, special tabulations (2022) of the National Center for Education Statistics, Integrated Postsecondary Education Data System (IPEDS), Completions Survey, provisional release data.

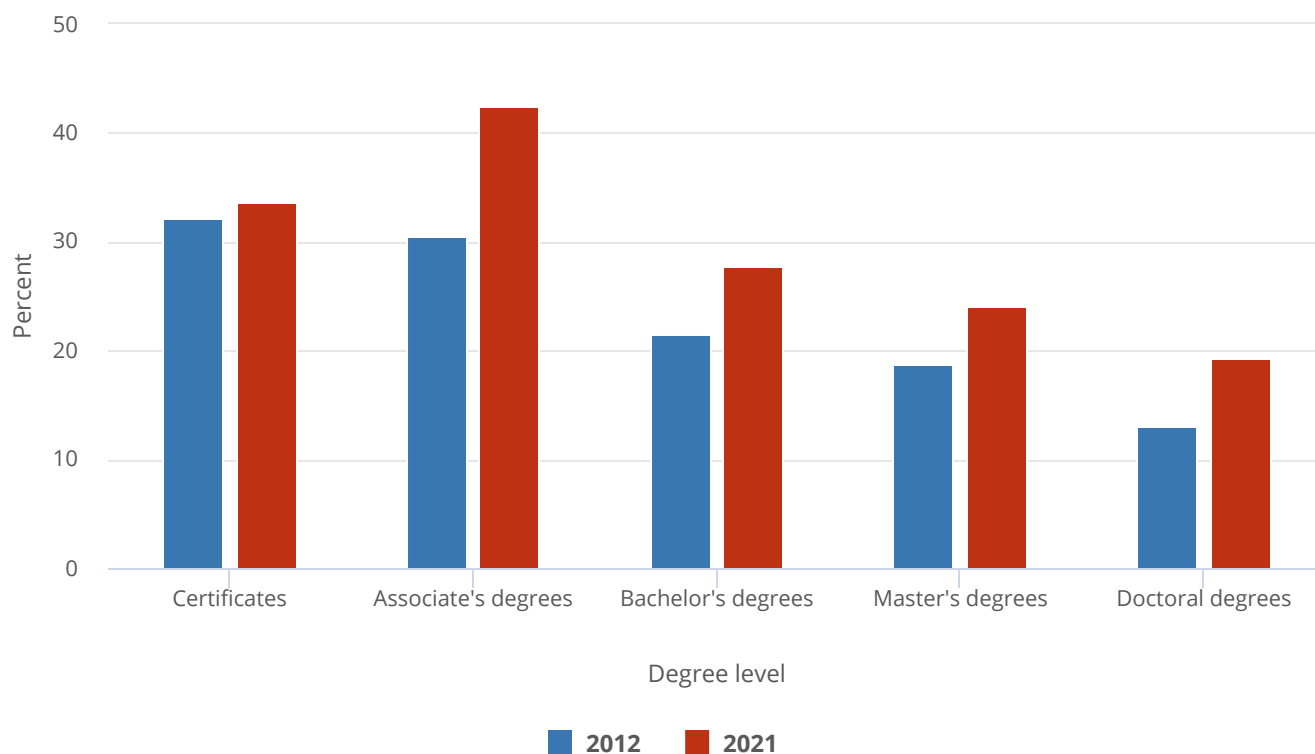
*Science and Engineering Indicators*

Between 2012 and 2021, the percentage of S&E awards collectively earned by American Indian or Alaska Native, Black or African American, and Hispanic or Latino students increased at every award level (**Figure HED-20**). The largest increase occurred at the associate's degree level (from 31% to 42%), while the smallest increase occurred at the certificate level. The percentage of S&E bachelor's degrees earned by students from these underrepresented groups increased from 22% to 28%, an increase that was driven by the increase in bachelor's degree awards to Hispanic students. The percentage of S&E bachelor's degrees earned by Hispanic graduates increased by at least 3 percentage points in every broad S&E field of study between 2012 and 2021 (Table SHED-15). In comparison, in each S&E field the percentage of bachelor's degrees earned by Black students and American Indian or Alaska Native students either decreased or increased by a relatively small amount.



Figure HED-20

**S&E degrees awarded to American Indian or Alaska Native, Black or African American, or Hispanic or Latino students, by degree level: 2012 and 2021**

**Note(s):**

Data are based on institutions eligible to participate in Title IV federal financial aid programs. Certificates include only awards of less than 2 academic years below the associate's degree level. Doctoral degree programs include research doctoral degree programs only and do not include professional doctoral programs (e.g., Doctor of Medicine). Race categories exclude Hispanic origin. Data represent U.S. citizens and permanent residents only. Award recipients with unknown race and ethnicity are not included.

**Source(s):**

National Center for Science and Engineering Statistics, special tabulations (2022) of the National Center for Education Statistics, Integrated Postsecondary Education Data System (IPEDS), Completions Survey, provisional release data.

*Science and Engineering Indicators*

## S&E Higher Education: Cost, Financial Aid, and Debt

The cost of higher education has increased in recent decades, as has the percentage of students who borrow to finance their education and the total amount of student debt (Ma and Pender 2022). Concern over the cost of higher education has grown among policymakers and the public in general because it poses a barrier for many individuals who cannot afford these expenses. This section presents cost data for higher education for all students and, when possible, for S&E students specifically.

In academic year 2019–20, first-time, full-time undergraduate students attending 4-year institutions faced an average net price of attendance—tuition, fees, and living expenses minus grant aid—of \$14,200 at public institutions, \$28,100 at private nonprofit institutions, and \$23,200 at private for-profit institutions (in constant 2020–21 dollars) (NCES 2022).<sup>14</sup> To pay these costs, students used federal, state, local, and institution grants and took out student loans. Although the federal government provides most student loans, students also borrow through state loan programs and from private lenders. In 2019–20, most first-time, full-time undergraduates received some financial aid; the percentage of aid recipients ranged

from 81% among students in public 2-year institutions to 94% among students in private nonprofit 2-year institutions (Table HED-6). Students in private 2-year institutions borrowed at the highest rates: 76% in private for-profit institutions, and 78% in private nonprofit institutions. Students in public 2-year institutions borrowed at the lowest rate, 17%. Among those who borrowed, students in public 2-year institutions borrowed the lowest average amount, \$4,700, and students in private for-profit 2-year institutions borrowed the highest average amount, \$7,600 (NCES *Digest of Education Statistics 2021*: Table 331.20).

Table HED-6

**First-time, full-time undergraduates awarded financial aid, by type of financial aid and institutional control and level: Academic year 2019–20**

(Percent)

Institutional control and level	Any aid	Federal grants	State and local grants	Institutional grants	Student loans
Public					
2-year	80.6	60.0	45.5	17.7	17.2
4-year	85.1	48.8	38.4	52.7	41.7
Private nonprofit					
2-year	93.6	84.8	10.2	19.2	78.2
4-year	90.3	42.7	24.8	83.6	55.8
Private for profit					
2-year	88.2	77.4	6.1	17.0	76.4
4-year	87.1	69.2	9.6	36.1	67.8

**Note(s):**

Data are based on institutions eligible to participate in Title IV federal financial aid programs.

**Source(s):**

National Center for Education Statistics, Integrated Postsecondary Education Data System (IPEDS), Student Financial Aid Survey (excerpted from *Digest of Education Statistics*, Table 331.20).

*Science and Engineering Indicators*

Students' ability to repay their student loan debt after leaving school is a major concern among the public and policymakers. In 2020, about 4 years after completing their bachelor's degrees, the median amount borrowed among 2015–16 bachelor's degree recipients who had taken out federal student loans was \$30,000, and the average was \$41,000, indicating that some students borrowed much higher amounts (Table HED-7). The total amount borrowed includes borrowing for education after completing the 2015–16 bachelor's degree: graduates who had enrolled for an additional postsecondary degree or certificate had borrowed a median amount of \$43,500, compared with a \$27,000 median amount among students who had no further enrollment. By major field of study, the median amounts borrowed ranged from \$27,000 among engineering graduates to \$36,000 among graduates in health care fields.

Table HED-7  
Borrowing, debt, repayment, and repayment amount among 2015–16 bachelor's degree recipients who borrowed to pay for undergraduate or graduate education: 2020

(Average and median in current dollars; percent)

Institution control, undergraduate major, postbaccalaureate enrollment	Amount borrowed (\$)		Ratio of amount owed to amount borrowed		Percent in repayment	Monthly payment amount (\$)	
	Average	Median	Average	Median		Average	Median
Total	41,300	30,000	78.2	92	27.7	230	200
2015–16 bachelor's degree-granting institution control							
Public	40,000	29,000	77.2	92	27.5	220	190
Private nonprofit	41,700	29,000	75.8	89	24.4	250	240
Private for profit	50,800	48,500	97.4	111	43.2	280	200
Bachelor's degree major							
Computer and information sciences	33,500	29,500	65.6	74	36.5	260	200
Engineering and engineering technology	29,500	27,000	51.2	59	19.1	240	260
Biological and physical sciences, science technology, mathematics, and agricultural sciences	59,500	31,000	77.1	94	17.3	220	190
Social sciences	46,800	32,000	87.8	101	28	240	200
Health care fields	44,700	36,000	73	86	29.6	260	230
General studies and other	41,100	28,500	91.8	107	34.6	200	120
Humanities	36,300	27,300	80.6	95	24.7	200	200
Business	33,200	27,600	75.1	84	32.4	240	200
Education	36,100	31,000	86.4	100	27.3	220	170
Other applied	39,100	29,800	83	98	30	230	170
Ever enrolled in postbaccalaureate degree or certificate program as of 2020							
Yes	59,400	43,500	85.6	102	18.8	260	210
No	28,500	27,000	73	80	34	230	190

**Note(s):**  
Estimates pertain to individuals who completed the requirements for a bachelor’s degree in 2015–16 and were awarded their degree by a Title IV–eligible postsecondary institution in the 50 states, the District of Columbia, or Puerto Rico no later than 30 June 2017. Federal student loans include subsidized and unsubsidized Direct Loans (formerly called Stafford Loans), excluding Direct Unsubsidized Loans to students who received a TEACH Grant and failed to fulfill the service obligation; Perkins Loans; and Graduate PLUS Loans. Loans exclude Parent PLUS Loans. Respondents may owe more on their federal student loans than originally borrowed due to accumulating loan interest; thus, the ratio of amount owed to amount borrowed may be greater than 100%. Average and median monthly payment amount for student loans is calculated among those with at least one student loan in repayment. Monthly payment amounts include monthly payments of \$0 for federal student loans under an income-driven repayment plan. Respondents with multiple majors were classified by the first field of study reported. General studies and other includes liberal arts and sciences, general studies, and humanities; multidisciplinary and interdisciplinary studies; basic skills; citizenship activities; health-related knowledge and skills; interpersonal and social skills; leisure and recreational activities; personal awareness and self-improvement; high school or secondary diplomas and certificates; and other majors. Other applied includes personal and consumer services; manufacturing, construction, repair, and transportation; military technology and protective services; architecture; communications; public administration and human services; design and applied arts; law and legal studies; library sciences; and theology and religious vocations.

**Source(s):**  
National Center for Education Statistics, 2016/20 Baccalaureate and Beyond Longitudinal Study (B&B:16/20).

By 2020, the median amount that 2015–16 bachelor’s degree recipients owed in education loans was 92% of what they had borrowed, and the average amount owed was 78% of the amount they had borrowed (**Table HED-7**). Although 28% of borrowers were currently repaying their loans in summer 2020, reflecting the administrative forbearance that the federal government granted in response to the economic disruption caused by the COVID-19 pandemic, that percentage differed by students’ undergraduate field. Among biological and physical sciences, science technology, mathematics, and agricultural sciences majors, 17% were repaying their loans in 2020. In contrast, 37% of computer and information sciences majors were in repayment. Among those in repayment, the median monthly payment was \$200, and the average was \$230.

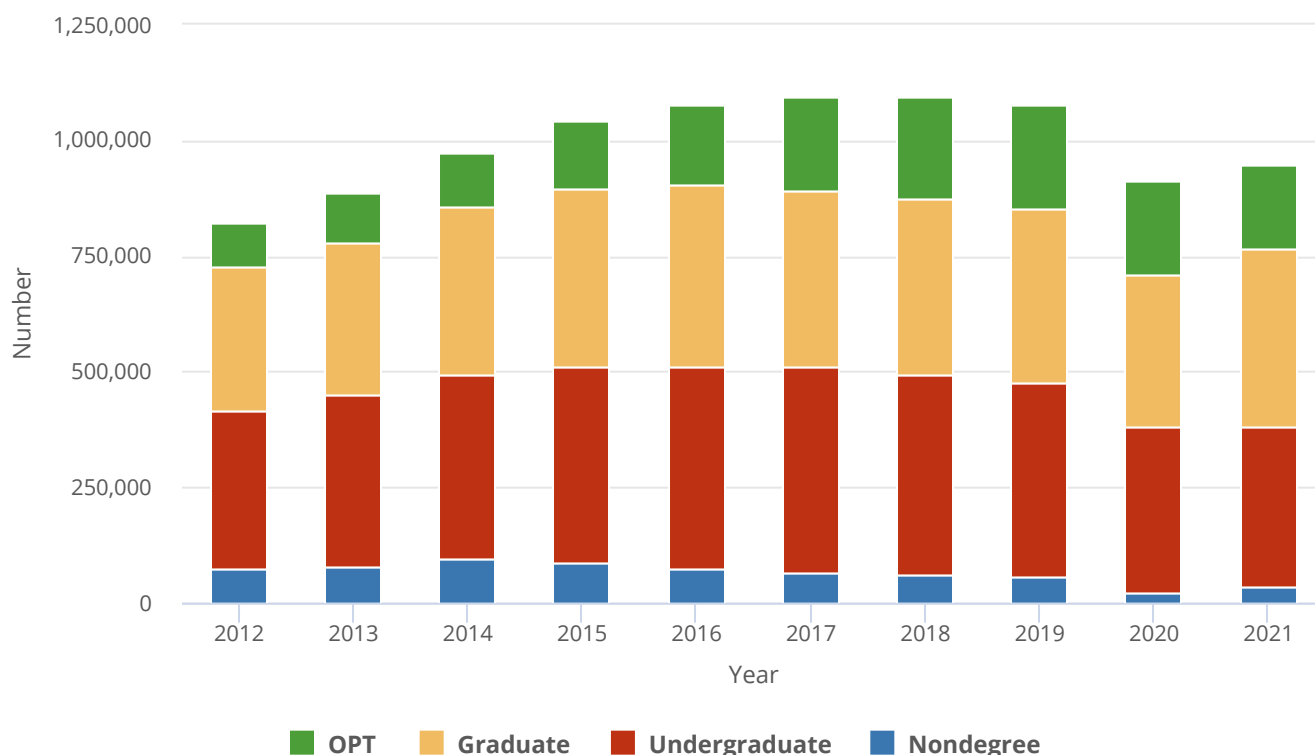
## International Students in U.S. S&E Higher Education

### International Student Enrollment

In fall 2021, 949,000 international students—including nondegree students, students enrolled both in person and online from abroad, and individuals on optional practical training—were enrolled in U.S. higher education institutions (**Figure HED-21**). International students accounted for an estimated 4.7% of total U.S. enrollment in fall 2021, a slight increase from the 4.6% share in 2020 but still below the pre-COVID-19 pandemic high of 5.5% in 2017–19 (IIE 2022c). Enrollment of international nondegree students, such as those on short-term exchange programs, experienced the greatest proportionate decrease from 2019 to 2021. International undergraduate enrollment, which peaked in 2017, and graduate enrollment, which peaked in 2016, both began declining prior to the COVID-19 pandemic. International undergraduate enrollment decreased by 4% from 2020 to 2021, in contrast to graduate enrollment, which increased by 17% (**Figure HED-21**).

Figure HED-21

International students enrolled in coursework at U.S. higher education institutions or on optional practical training, by type of student: 2012–21



OPT = optional practical training.

**Note(s):**

Data include students enrolled in person in the United States and those enrolled online from abroad, regardless of visa status, as well as those on OPT. Undergraduate level includes associate's and bachelor's degrees; graduate level includes master's and doctoral degrees. Data reflect fall enrollment in a given year. Data in this table differ from other tables on international students due to differences in the definition of international student.

**Source(s):**

Institute of International Education, International Students by Academic Level, *Open Doors Report on International Educational Exchange* (2022).

*Science and Engineering Indicators*

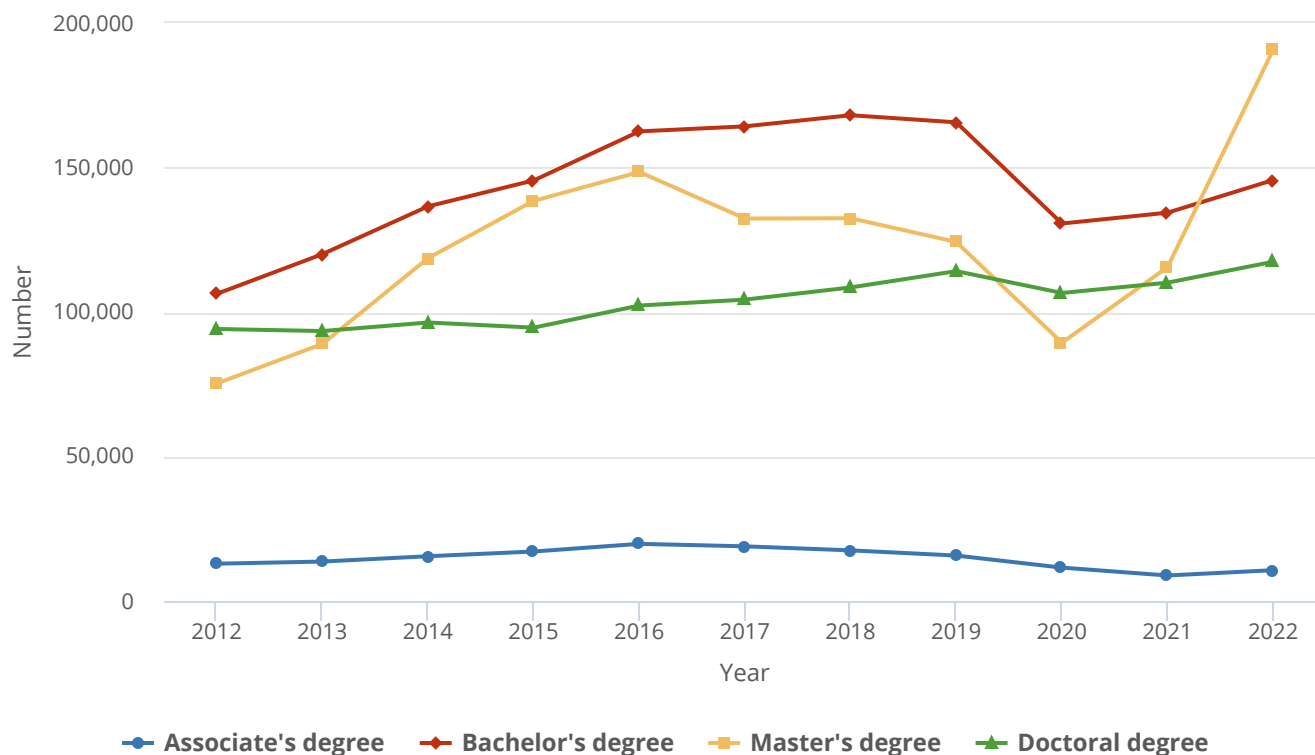
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Regulatory changes around the optional practical training (OPT) program led to increases in these students prior to the pandemic, but their numbers fell between 2019 and 2021. International student participation in OPT measured 185,000 students in 2021, a 9% decrease from 204,000 in 2020, which was a decline from the 2019 peak of 224,000 (**Figure HED-21**). OPT is a temporary work permission program that allows eligible international students on F-1 visas to acquire work experience related to their field of study. The STEM OPT extension allows qualified students who have earned degrees in STEM fields to receive an extension on their OPT tenure.<sup>15</sup> The increase in international students on OPT in the years prior to the COVID-19 pandemic followed a 2016 modification of the program that expanded the duration of the STEM OPT extension from 17 months to 24 months (IIE 2022a). According to one analysis, annual approvals of OPT applications for STEM students increased fivefold, from 34,000 in 2008 to 172,000 in 2016 (Ruiz and Budiman 2018).

Enrollment of international student visa holders traveling to the United States for postsecondary degrees in S&E fields has increased substantially since fall 2020.<sup>16</sup> In 2022, S&E enrollment of international students on active F-1 visas, excluding those approved for OPT, was 11,000 at the associate's level, 146,000 at the bachelor's level, 191,000 at the master's level, and 117,000 at the doctoral level (**Figure HED-22**). International S&E master's enrollment more than doubled from 2020 to 2022; as a result of this sharp increase, total international S&E graduate enrollment reached 308,000 in 2022, the highest level in the past decade. Students on temporary visas have long accounted for much higher shares of total S&E degrees awarded by U.S. institutions at the master's and doctoral levels than they have at the associate's and bachelor's levels. Consequently, compared to international undergraduate enrollment, changes in international graduate enrollment may have a greater impact on U.S. S&E higher education (see section **International Degree Recipients**).

Figure HED-22

International S&amp;E students on visas enrolled in U.S. higher education institutions, by level of enrollment: 2012–22

**Note(s):**

Data include active foreign national students on F-1 visas enrolled in person at U.S. higher education institutions. Individuals approved for optional practical training are excluded. Numbers are rounded to the nearest 10. Data reflect fall enrollment in a given year and include students with active status as of 15 November of that year.

**Source(s):**

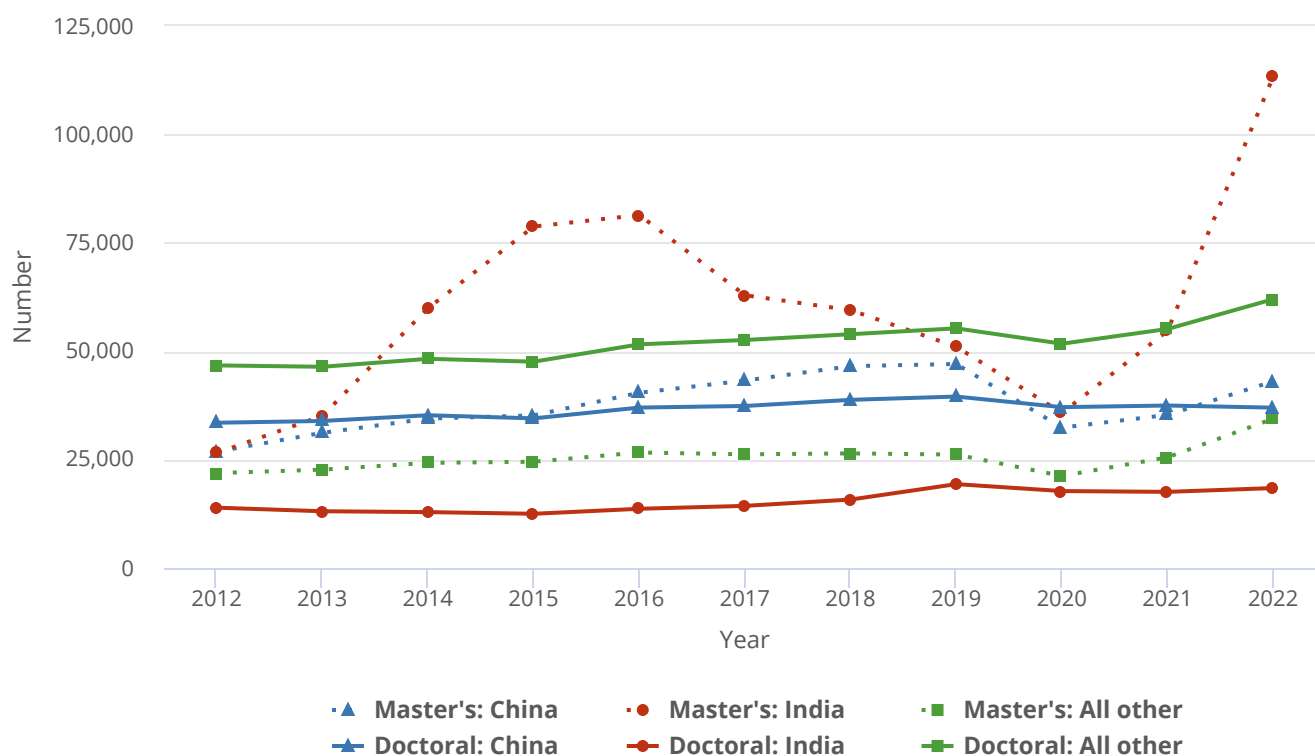
National Center for Science and Engineering Statistics, special tabulations (2022) of the U.S. Department of Homeland Security, U.S. Immigration and Customs Enforcement, Student and Exchange Visitor Information System (SEVIS) database.

*Science and Engineering Indicators*

India and China are the most common countries of origin for international S&E graduate students on visas in the United States (**Figure HED-23**; Table SHED-16, Table SHED-17). In 2022, there were 113,000 S&E master's students from India and 43,000 from China, each of which was higher than the number of S&E master's students from all other countries combined (34,000). S&E graduate enrollment from India is predominantly at the master's level and has varied dramatically in recent years. S&E master's enrollment from India reached a pre-COVID pandemic peak of 81,000 in 2016 and then bottomed out at 36,000 in 2020; since that time, enrollment has rapidly increased to 113,000 in 2022, by far the highest level in the past decade. Enrollment of graduate students from China has also increased since 2020, but not to the same extent as enrollment of students from India. At the doctoral level, China is the most common country of origin, with 37,000 S&E doctoral students enrolled in U.S. institutions in 2022, followed by India with 18,000 (**Figure HED-23**).

Figure HED-23

International S&E graduate students on visas enrolled in U.S. higher education institutions, by level and selected country of origin: 2012–22

**Note(s):**

Data include active foreign national students on F-1 visas enrolled in person at U.S. higher education institutions. Individuals approved for optional practical training are excluded. Numbers are rounded to the nearest 10. Data reflect fall enrollment in a given year and include students with active status as of 15 November of that year.

**Source(s):**

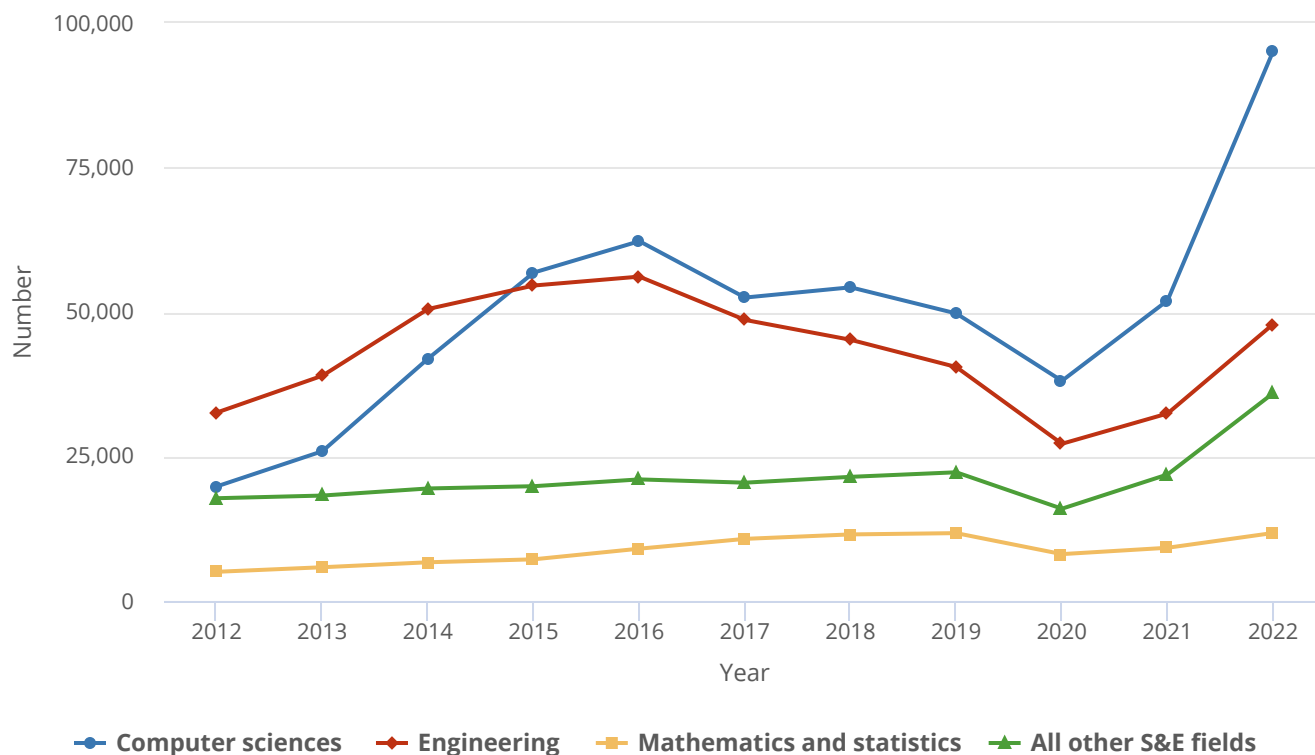
National Center for Science and Engineering Statistics, special tabulations (2022) of the U.S. Department of Homeland Security, U.S. Immigration and Customs Enforcement, Student and Exchange Visitor Information System (SEVIS) database.

*Science and Engineering Indicators*

Students from India and China, who drive the overall trends for international S&E graduate student enrollment in the United States, are heavily concentrated in computer and information sciences and in engineering (Table SHED-16, Table SHED-17). Accordingly, the decrease in master's enrollment from India and China coincided with declining numbers of students in these fields from 2016 to 2020 (Figure HED-24). Likewise, increased master's enrollment from India and China from 2020 to 2022 has resulted in substantial increases in enrollment in these fields, especially computer and information sciences. In 2022, 72,000 (76%) of the 95,000 international master's students studying computer and information sciences in the United States originated from India (Table SHED-16).

Figure HED-24

International S&amp;E master's students on visas enrolled in U.S. higher education institutions, by selected field: 2012–22

**Note(s):**

Data include active foreign national students on F-1 visas enrolled in person at U.S. higher education institutions. Individuals approved for optional practical training are excluded. Numbers are rounded to the nearest 10. Data reflect fall enrollment in a given year and include students with active status as of 15 November of that year.

**Source(s):**

National Center for Science and Engineering Statistics, special tabulations (2022) of the U.S. Department of Homeland Security, U.S. Immigration and Customs Enforcement, Student and Exchange Visitor Information System (SEVIS) database.

*Science and Engineering Indicators*

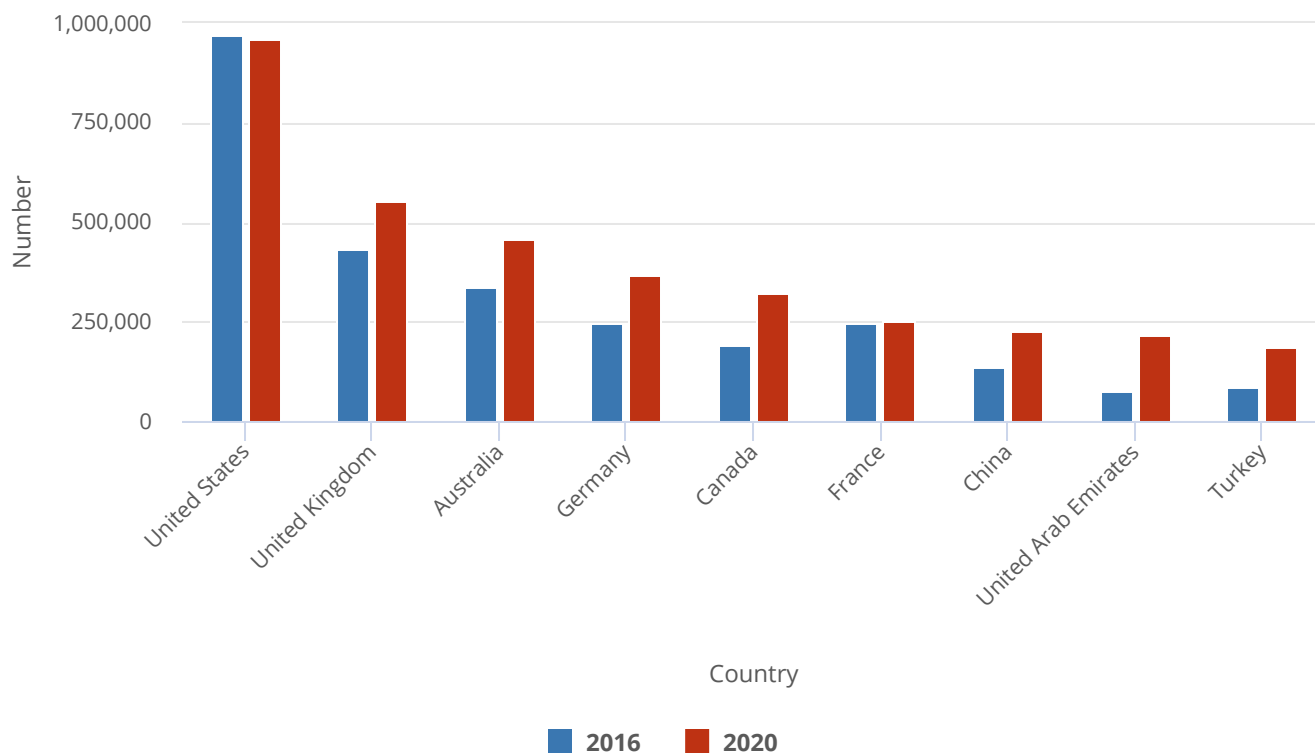
## U.S. Position in International Student Mobility

Global S&E connections and research collaboration, which can be facilitated by the international exchange of students, are areas of substantial interest to NSB (NSB 2020). The United States is the most popular destination for internationally mobile tertiary (postsecondary) students, though its share of all international students has declined (see **Glossary** section for definition of internationally mobile students). The United States enrolled 957,000 international students in 2020, followed by the United Kingdom (551,000), Australia (458,000), Germany (369,000), and Canada (323,000) (**Figure HED-25**). From 2016 to 2020, the number of international students decreased in the United States, whereas international enrollment increased in all other top countries of destination. The United States hosted 15% of all international students worldwide in 2020 (OECD 2022a), down from 17% in 2010 and 23% in 2000 (OECD 2012).



Figure HED-25

Internationally mobile students enrolled in tertiary education, by selected country of destination: 2016 and 2020

**Note(s):**

Data include only degree-mobile students who have physically crossed an international border to enroll with the objective of graduating with a degree in the country of destination. Students enrolled in short-term for-credit programs and exchange programs are excluded. China excludes Hong Kong and Macao.

**Source(s):**

United Nations Educational, Scientific and Cultural Organization (UNESCO) Institute for Statistics (UIS) database.

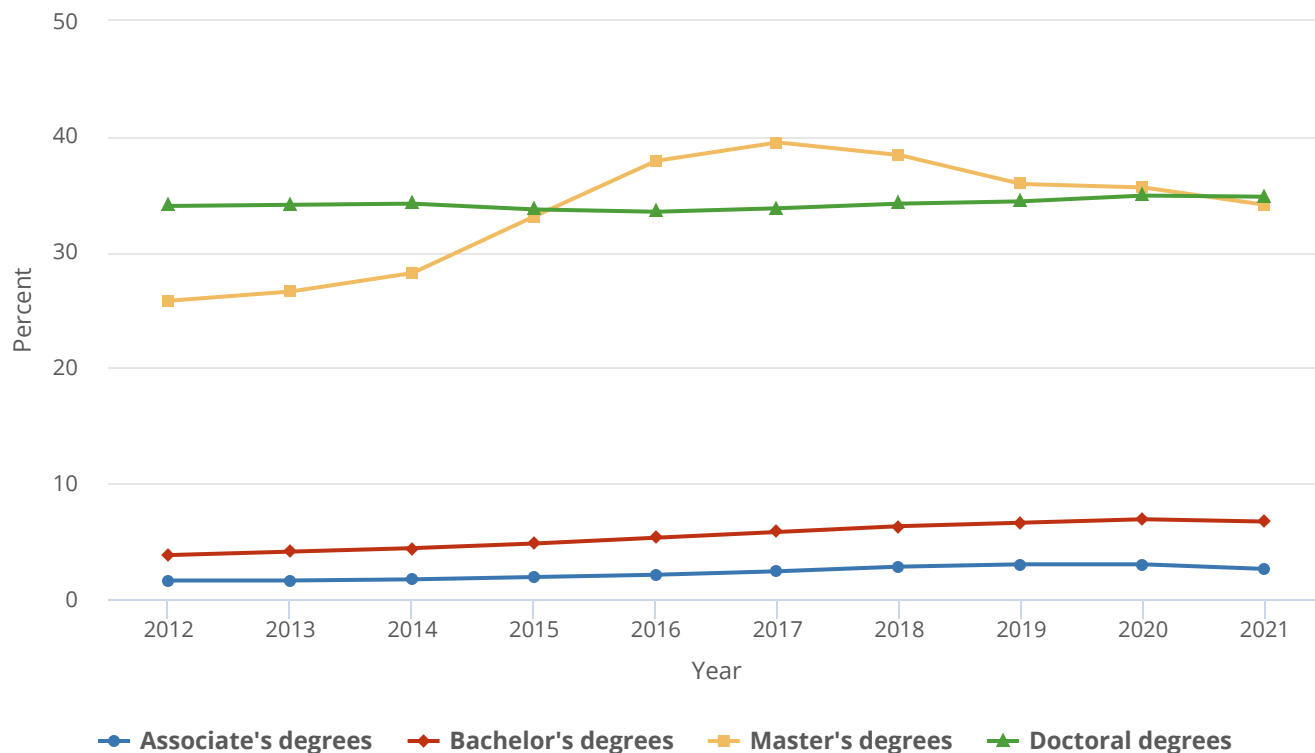
Science and Engineering Indicators

## International Degree Recipients

International students in the United States earn low shares of S&E postsecondary degrees at the associate's and bachelor's levels and much higher shares of S&E graduate degrees (**Figure HED-26**). In 2021, temporary visa holders earned 3% of S&E associate's degrees, 7% of S&E bachelor's degrees, 34% of S&E master's degrees, and 35% of S&E doctoral degrees.<sup>17</sup> The high proportion of international students among S&E advanced degree recipients and its potential consequences for the U.S. labor force has been a long-standing topic of interest among policymakers. Surveys of foreign-born S&E doctorate recipients have shown that most of these individuals intend to and ultimately do remain in the United States after graduation (for more information, see the forthcoming *Indicators 2024* report "[2024] The STEM Labor Force: Scientists, Engineers, and Skilled Technical Workers" section "Stay Rates of U.S.-Trained S&E Doctorates"). The temporary visa holder share of S&E degrees has increased for all degree levels, though most substantially at the master's level, where the share increased from 26% in 2012 to 34% in 2021—down from its peak level of 39% in 2017.

Figure HED-26

Share of S&amp;E degrees awarded to temporary visa holders, by degree level: 2012–21

**Note(s):**

Data are based on institutions eligible to participate in Title IV federal financial aid programs. Doctoral degree programs include research doctoral degree programs only and do not include professional doctoral programs (e.g., Doctor of Medicine).

**Source(s):**

National Center for Science and Engineering Statistics, special tabulations (2022), of the National Center for Education Statistics, Integrated Postsecondary Education Data System (IPEDS), Completions Survey, provisional release data.

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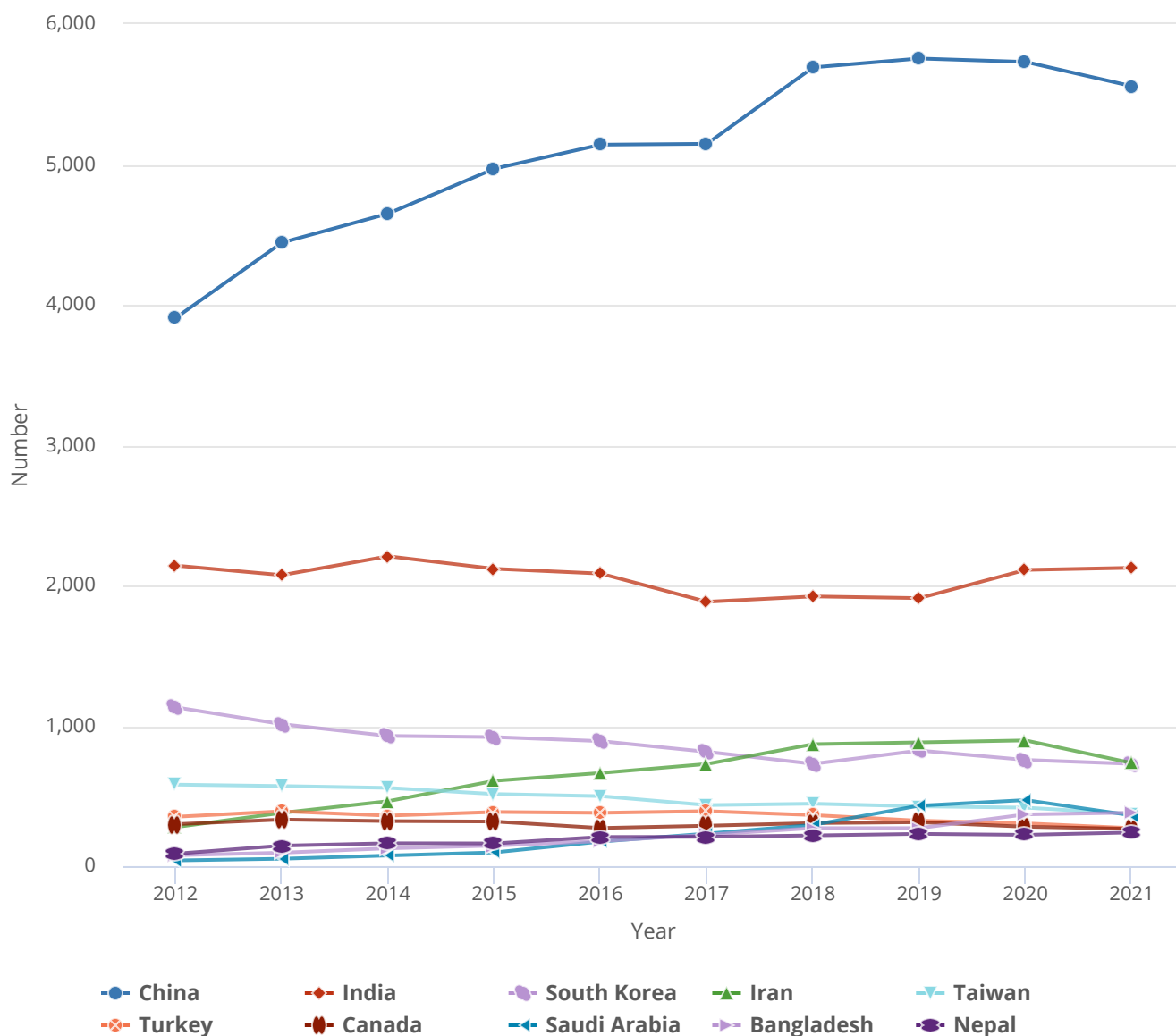
Postsecondary degree recipients on temporary visas are more concentrated in S&E fields than U.S. citizens and permanent residents are, especially at advanced degree levels. In 2021, at the master's level, 57% of temporary visa holders earned degrees in S&E fields, compared to 19% of U.S. citizens and permanent residents (Table SHED-13); at the doctoral level, the vast majority (83%) of temporary visa holders earned degrees in S&E fields compared to 59% of U.S. citizens and permanent residents (Table SHED-14). The overall high representation of temporary visa holders among S&E advanced degree recipients varies greatly by S&E field. In 2021, temporary visa holders earned 7% of doctoral degrees in psychology and more than half of doctoral degrees in computer and information sciences (59%), engineering (60%), and mathematics and statistics (54%) (Table SHED-14). Temporary visa holders also accounted for about half of the master's degrees awarded in each of these three fields (Table SHED-13).

## Countries of Origin for Research Doctorate Recipients

Over the last decade, China and India have consistently been the top countries of origin for U.S. S&E research doctorate recipients on temporary visas (**Figure HED-27**).<sup>18</sup> S&E doctorate recipients from China increased from 3,900 in 2012 to 5,600 in 2021, which was slightly lower than the pre-pandemic high in 2019. In contrast, S&E doctorate recipients from India remained relatively flat over this period, numbering around 2,000 each year. S&E doctorate recipients from Iran experienced rapid growth (164% increase) from less than 300 recipients in 2012 to more than 700 recipients in 2021, surpassing the number from South Korea, which has declined.

**Figure HED-27**

**U.S. S&E research doctorate recipients on temporary visas, by selected country or economy of origin: 2012–21**



**Note(s):**

China includes Hong Kong. Countries and economies of origin included in this figure are those with the highest total number of U.S. S&E doctorate recipients from 2012 to 2021.

**Source(s):**

National Center for Science and Engineering Statistics, special tabulations (2022) of the Survey of Earned Doctorates (SED).

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## International Comparisons of S&E Higher Education

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This section provides data on the U.S. position in higher education within a global context. Key topics include educational attainment in the overall population and trends in S&E first university and doctoral degree awards among the top degree-producing countries. Although the United States is among the most highly educated countries with respect to the share of its population with at least a bachelor's degree, it is below average within the Organisation for Economic Co-operation and Development (OECD) with respect to advanced degree attainment. Furthermore, over the last two decades, the share of younger adults with postsecondary education increased faster in nearly all other advanced economies than it did in the United States.

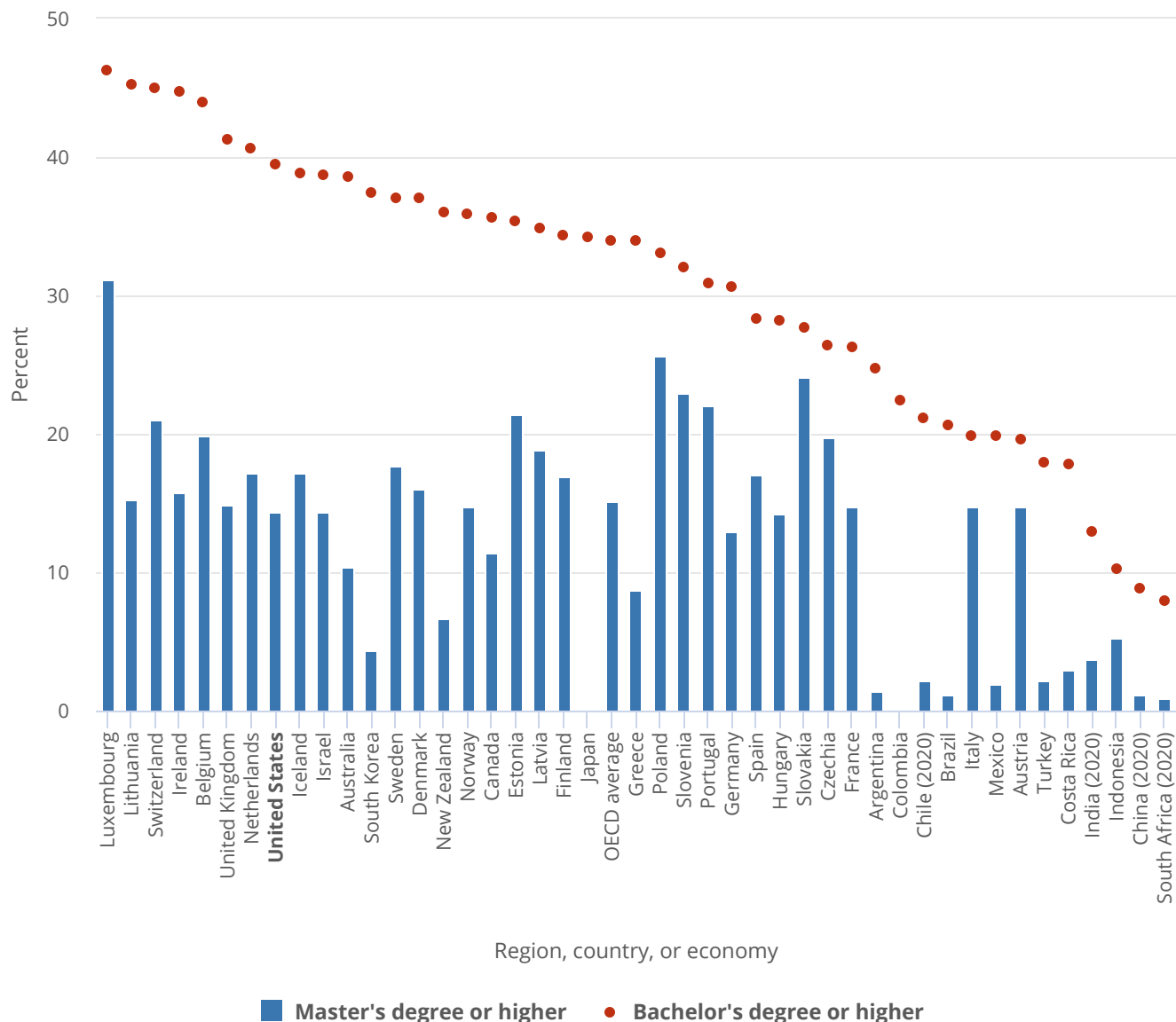
India and China have increased S&E degree production more rapidly in the past decade than have many OECD member countries. India awards the highest number of S&E first university degrees, and China awards the most S&E doctorates, followed closely by the United States. Despite their recent gains in the number of S&E degrees awarded, India and China measure far lower than the United States and other advanced economies in the share of their young adult populations (20–34 years old) that earn postsecondary S&E degrees. A higher share of S&E degrees in China is awarded in engineering compared to other countries, whereas degrees in the United States are more focused in the social and behavioral sciences.

### Educational Attainment

Educational attainment, measured as the proportion of a population that has reached a specific level of education, is often used as a proxy for human capital and the skill levels associated with that level of study (OECD 2022a). The United States ranks highly on educational attainment at the bachelor's level: 39.5% of the 25- to 64-year-old population had a bachelor's degree or higher in 2021, compared to the OECD average of 34.0% (**Figure HED-28**). However, educational attainment varies greatly by demographic group and by region in the United States. For example, in 2019, bachelor's degree holders ranged from a high of 70.4% of individuals 25–44 years old in the District Columbia to a low of 22.7% in Mississippi (NSB 2022a: **State Indicator S-30**). The United States ranks comparatively lower internationally in educational attainment with respect to advanced degrees. In 2021, 14.4% of U.S. 25- to 64-year-olds had attained a master's degree or higher, below the OECD average of 15.1% (**Figure HED-28**).

Figure HED-28

Educational attainment of the 25- to 64-year-old population, by level of education and region, country, or economy: 2021



OECD = Organisation for Economic Co-operation and Development.

**Note(s):**

Data include degrees at International Standard Classification of Education (ISCED) 2011 levels 6 (bachelor's or equivalent), 7 (master's or equivalent), and 8 (doctorate or equivalent). Educational attainment data at the master's degree or higher level are not available for Colombia and Japan.

**Source(s):**

Organisation for Economic Co-operation and Development (OECD), *Education at a Glance 2022: OECD Indicators* (2022).

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In recent years, educational attainment has increased faster in other advanced economies than it has in the United States. From 2000 to 2021, the share of 25- to 34-year-olds with tertiary education (roughly speaking, an associate's degree or higher) increased by 13 percentage points in the United States, compared to an average increase of 21 percentage points across OECD member countries (OECD 2022a). The size of the increase in the United States during this period was

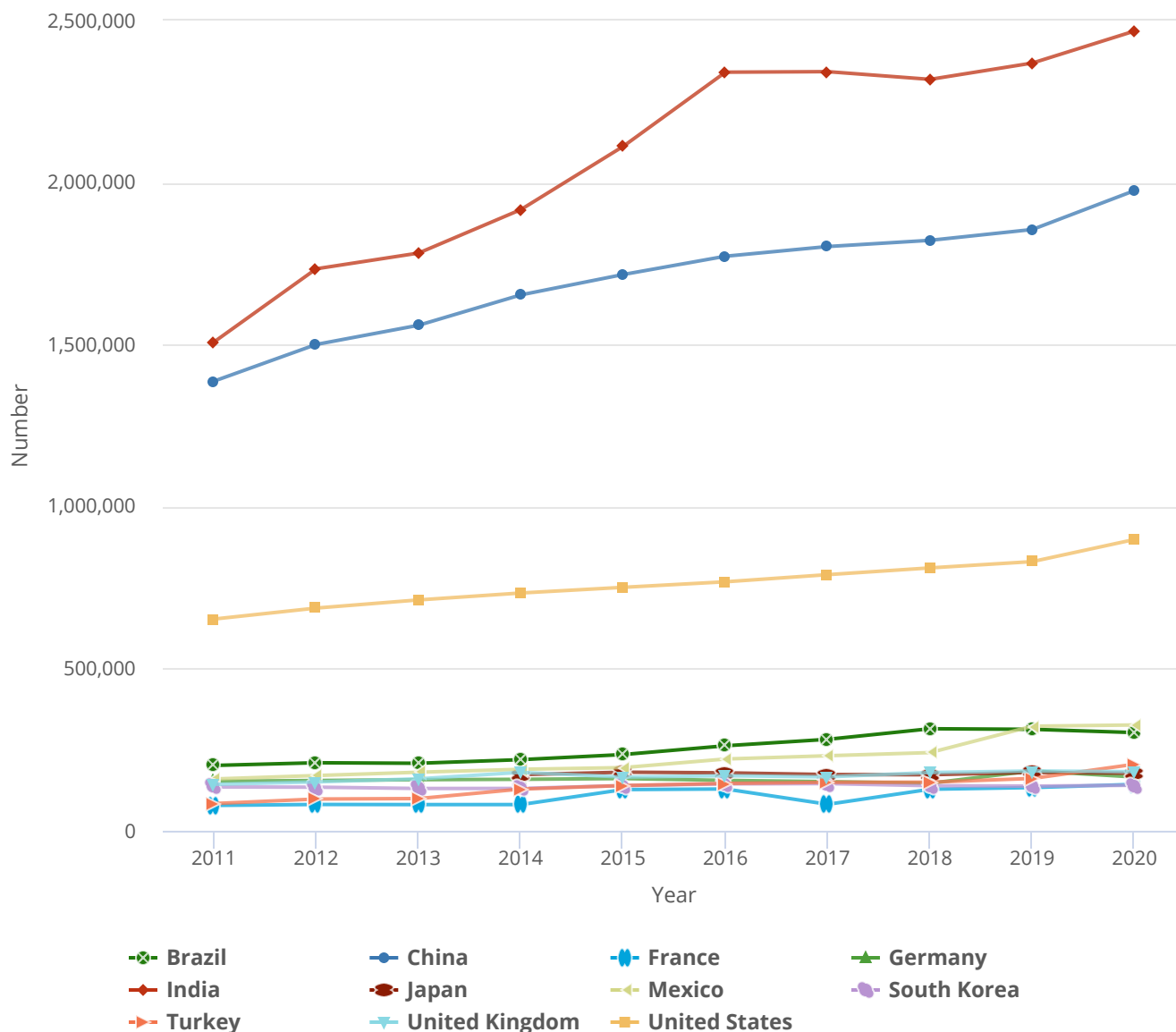
smaller than the increase experienced in nearly all other OECD countries. The share of younger adults (25–34 years old) with at least a bachelor's degree in the United States is slightly larger than the share for 25- to 64-year-olds; this contrasts with many other OECD countries, wherein this younger cohort is substantially more educated than the overall working-age population (NSB 2022b).

## S&E First University Degrees

First university degrees are used in international comparisons to accommodate differences between national higher education systems. First university degrees are usually equivalent to bachelor's degrees, but they also include "long first degrees" awarded by some countries that are comparable to master's degrees (for more information, see the **Glossary** section, and see the **Technical Appendix**). India awarded 2.5 million S&E first university degrees in 2020, followed by China (2.0 million) and then by the United States (900,000) (**Figure HED-29**). On a percentage basis, Mexico and Turkey experienced the most rapid growth in S&E first university degree awards from 2011 to 2020. However, in contrast to S&E first university degrees, these countries are not among the top producers of S&E doctoral degrees (see the following section **S&E Doctoral Degrees**).

Figure HED-29

## S&amp;E first university degrees awarded, by selected country: 2011–20

**Note(s):**

To facilitate international comparison, data for the United States are those reported to the Organisation for Economic Co-operation and Development; these data vary from the National Center for Science and Engineering Statistics classification of fields presented in other sections of the report. Data for Japan are not available prior to 2014.

**Source(s):**

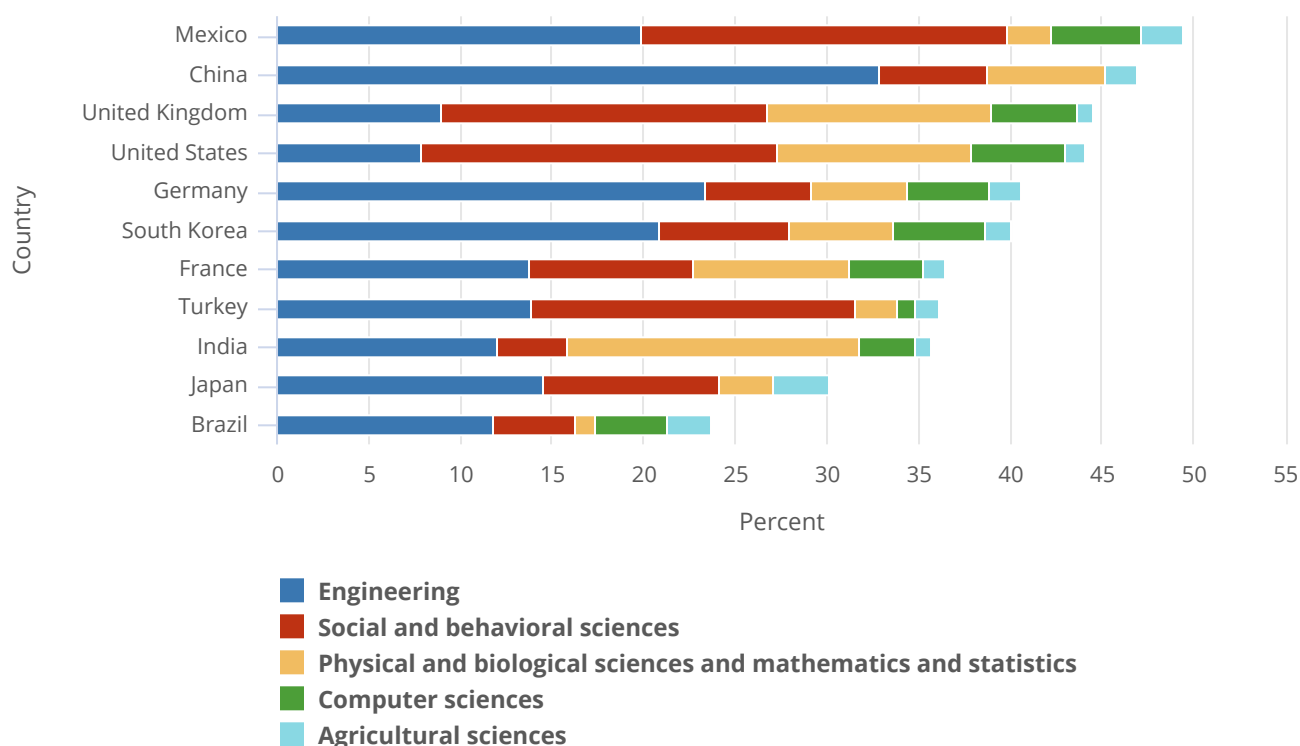
Organisation for Economic Co-operation and Development (OECD), *Education at a Glance*; National Bureau of Statistics of China, *China Statistical Yearbook*; People's Republic of China, Ministry of Education data; Government of India, Ministry of Education, Department of Higher Education, *All India Survey on Higher Education*.



The proportion of all first university degrees awarded in S&E fields varies across the top degree-producing countries, from a high of 49% in Mexico to a low of 24% in Brazil in 2020 (**Figure HED-30**). Engineering is generally the most popular broad S&E degree field, but the share varies considerably by country. For example, engineering accounted for 33% of all first university degrees in China in 2020. In contrast, engineering degrees were less common in the United Kingdom and the United States, where they accounted for 9% and 8% of first university degrees, respectively. These two countries were also among the most concentrated in the social and behavioral sciences: in 2020, the United Kingdom awarded 18% of first university degrees in this broad field, and the United States awarded 19%, surpassed only by Mexico (20%).

**Figure HED-30**

**First university degrees awarded, by S&E field and selected country: 2020**



**Note(s):**

Computer sciences is included under engineering for China and Japan. To facilitate international comparison, data for the United States are those reported to the Organisation for Economic Co-operation and Development; these data vary from the National Center for Science and Engineering Statistics classification of fields presented in other sections of the report.

**Source(s):**

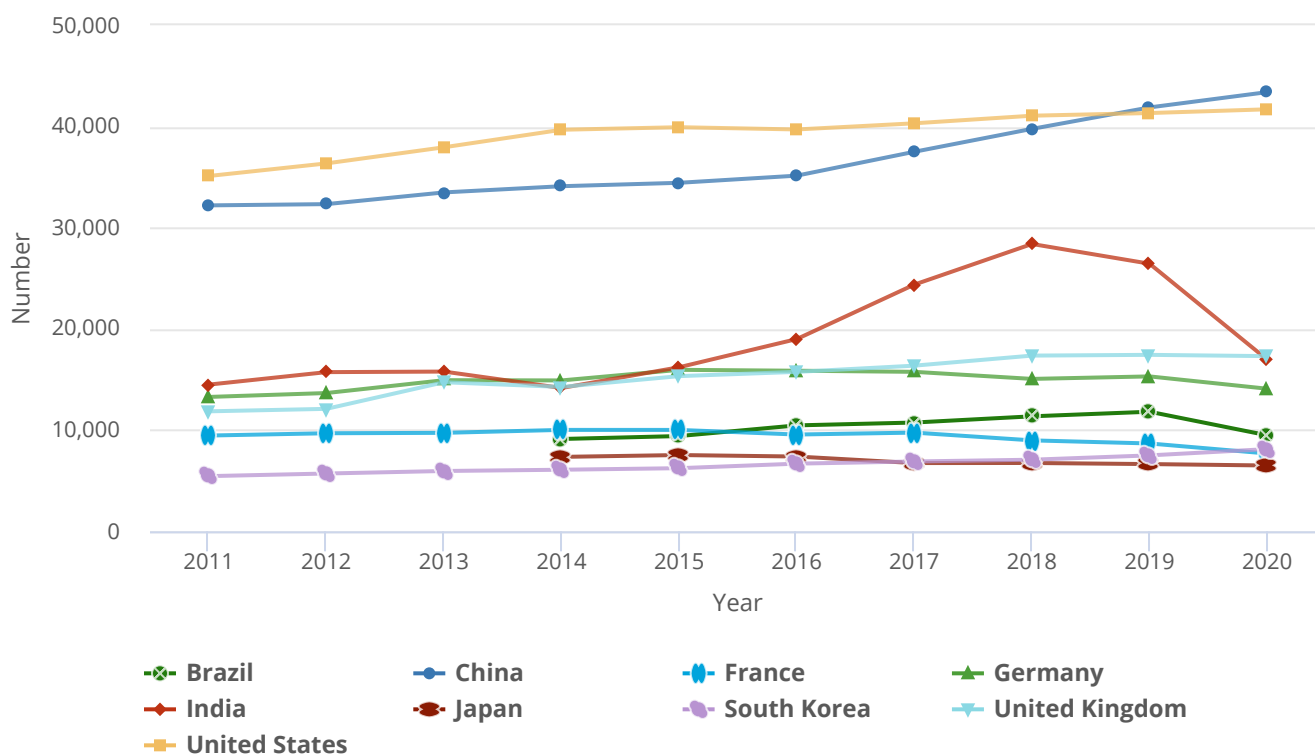
Organisation for Economic Co-operation and Development (OECD), *Education at a Glance*; People's Republic of China, Ministry of Education data; Government of India, Ministry of Education, Department of Higher Education, *All India Survey on Higher Education*.

## S&E Doctoral Degrees

China awarded the highest number of S&E doctoral degrees (43,000) in 2020, followed closely by the United States (42,000), which China surpassed in 2019 (Figure HED-31). Given the proximity of the United States and China on this indicator, additional discussion is provided in the sidebar **Considerations for International Comparisons of S&E Doctoral Degrees**. After experiencing rapid growth in the mid-2010s, the number of S&E doctorates awarded in India dropped to 17,000 in 2020, falling slightly below the number awarded by the United Kingdom.<sup>19</sup> Other top producers of S&E doctoral degrees include Germany (14,000), Brazil (9,000), South Korea and France (about 8,000 each), and Japan (7,000). Among these countries, South Korea increased S&E doctoral degree production at the fastest rate (49%) from 2011 to 2020.

Figure HED-31

S&E doctoral degrees awarded, by selected country: 2011–20



**Note(s):**

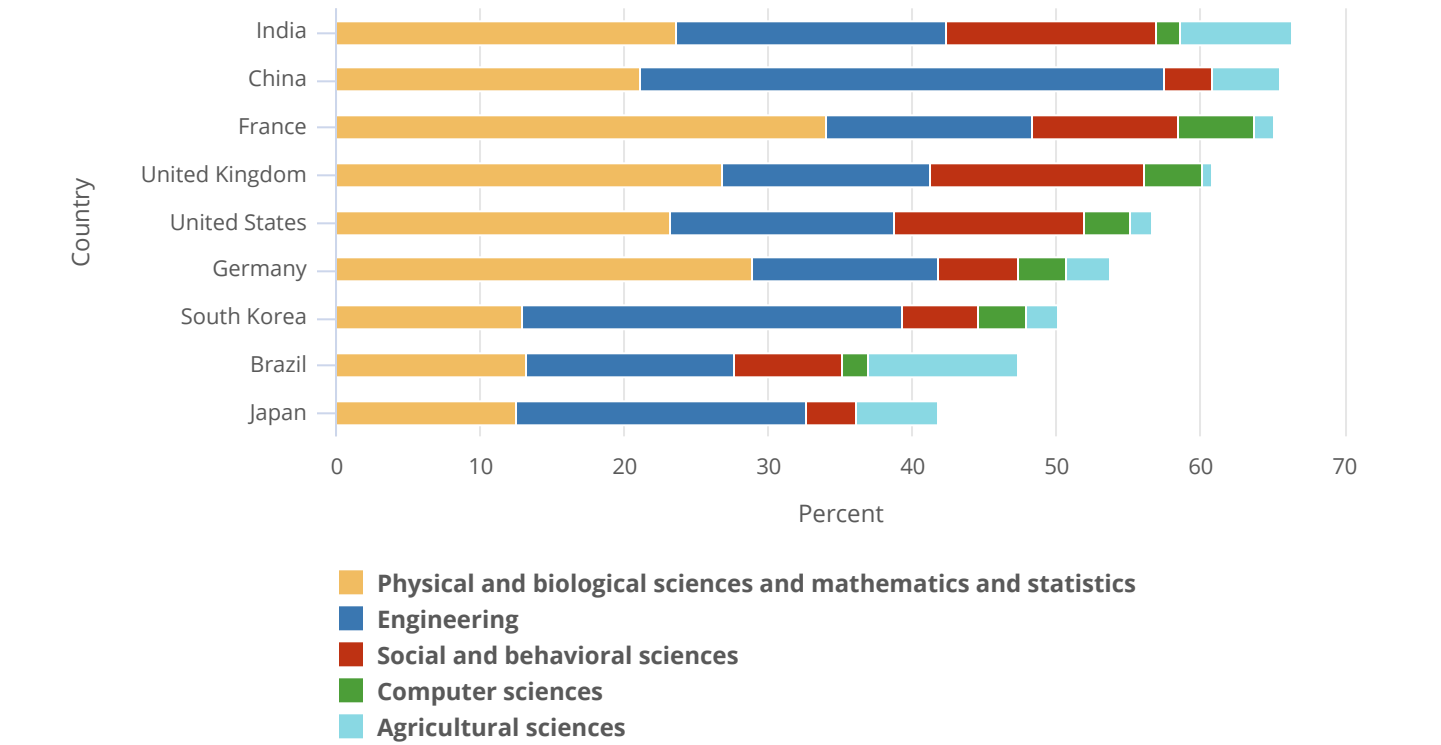
To facilitate international comparison, data for the United States are those reported to the Organisation for Economic Co-operation and Development, which vary from the National Center for Science and Engineering Statistics classification of fields presented in other sections of the report. Data for Brazil and Japan are not available prior to 2014.

**Source(s):**

Organisation for Economic Co-operation and Development (OECD), *Education at a Glance*; National Bureau of Statistics of China, *China Statistical Yearbook*; People's Republic of China, Ministry of Education data; Government of India, Ministry of Education, Department of Higher Education, *All India Survey on Higher Education*.

For most of the top producers of S&E doctoral degrees, more than half of all doctoral degrees awarded in 2020 were in S&E fields (**Figure HED-32**). Degrees in physical and biological sciences and mathematics and statistics accounted for the largest share of doctoral degrees in S&E fields in most of these countries. However, engineering degrees were more common in East Asian countries, especially China, where 36% of all doctorates were awarded in engineering in 2020. Doctoral degrees in computer sciences and agricultural sciences typically account for the lowest shares of S&E degrees, but agricultural sciences were comparatively more common in Brazil (10% of all doctorates awarded in 2020) and India (8%).

**Figure HED-32**  
**Doctoral degrees awarded, by S&E field and selected country: 2020**



**Note(s):**  
Computer sciences is included under engineering for China and Japan. To facilitate international comparison, data for the United States are those reported to the Organisation for Economic Co-operation and Development, which vary from the National Center for Science and Engineering Statistics classification of fields presented in other sections of the report.

**Source(s):**  
Organisation for Economic Co-operation and Development (OECD), *Education at a Glance*; People's Republic of China, Ministry of Education data; Government of India, Ministry of Education, Department of Higher Education, *All India Survey on Higher Education*.

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SIDEBAR

Considerations for International Comparisons of S&E Doctoral Degrees

Several factors warrant consideration in international comparisons of S&E degree production, especially comparisons between the United States and China at the doctoral level. First, calculations of S&E degree awards can vary based on the selection of data sources. For international comparisons of U.S. S&E degrees, this report uses data published by the Organisation for Economic Co-operation and Development (OECD); these data are derived from an international effort to facilitate cross-nationally comparable statistics on education (see the **Technical Appendix** for more information). The OECD data used in this section can differ from the Integrated Postsecondary Education Data System (IPEDS) Completions Survey data that are used elsewhere in this report for analyzing domestic U.S. S&E degree trends.

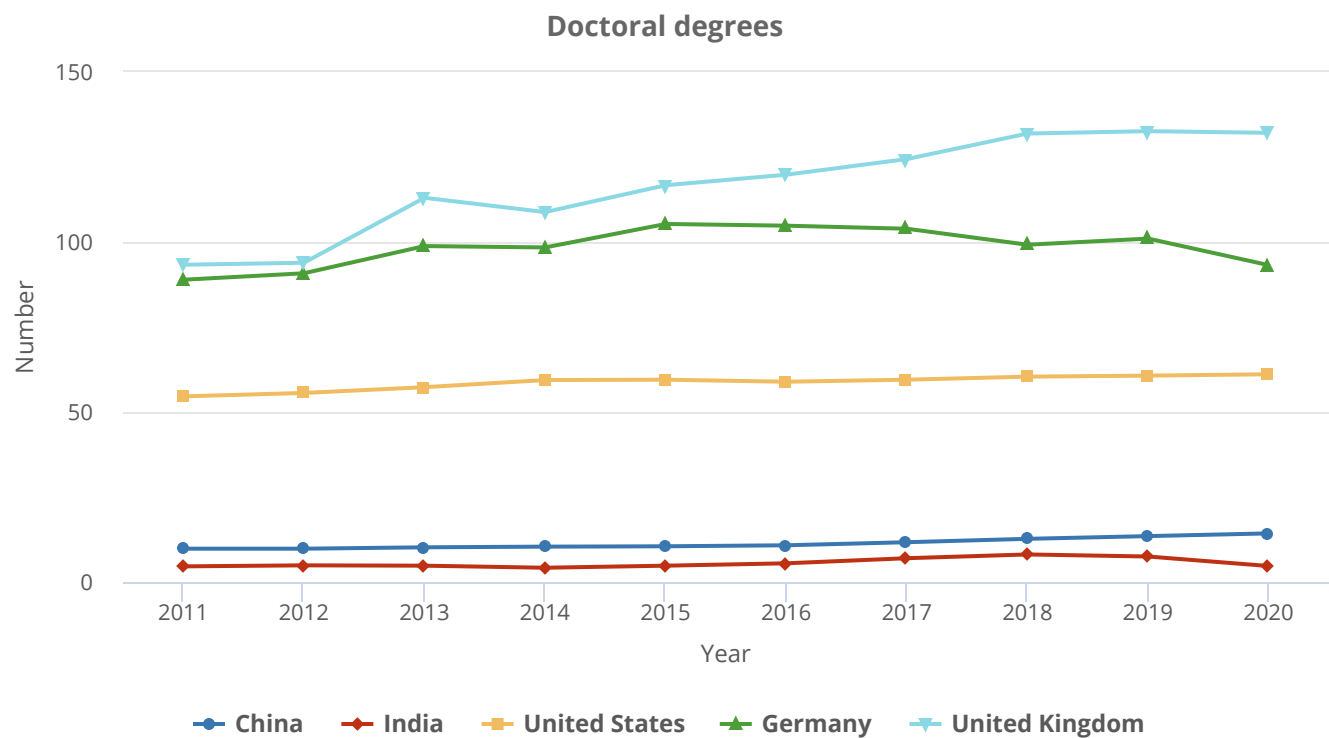
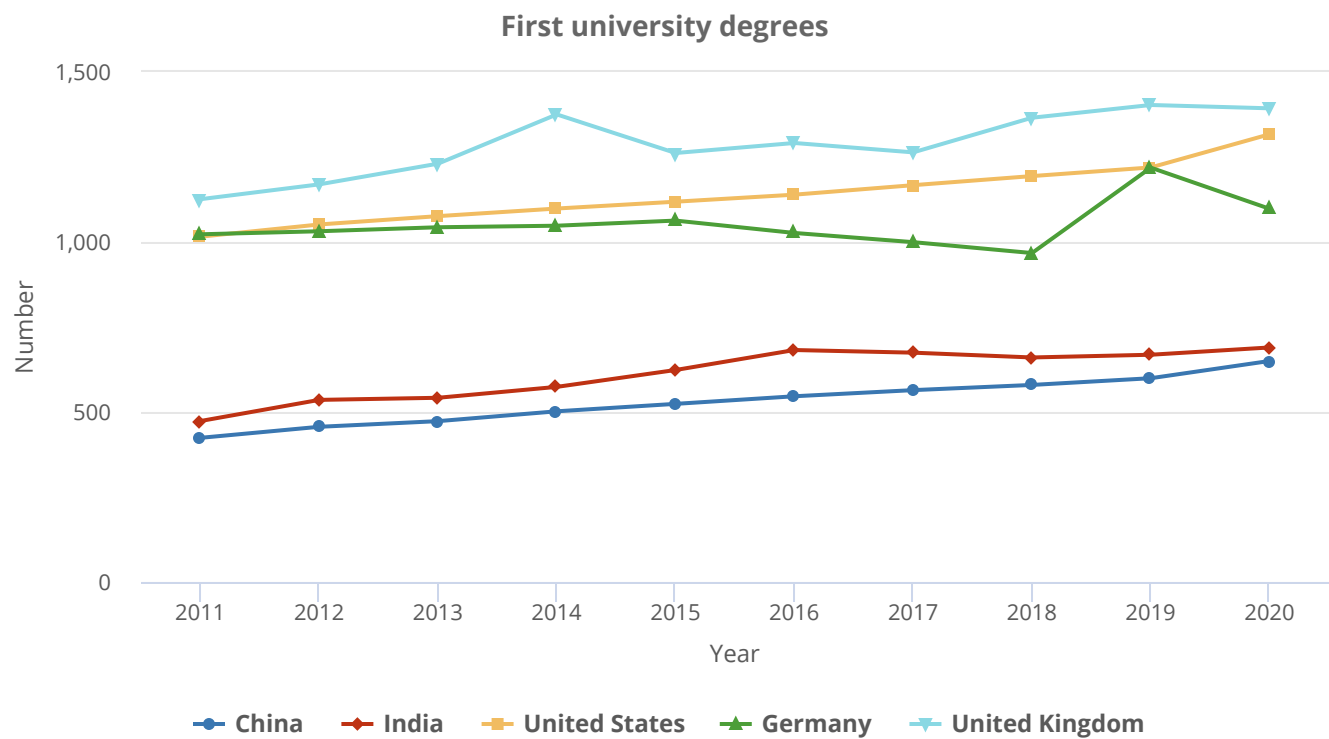
Second, the calculation of aggregate measures of S&E degrees across different data sources can present analytical trade-offs. This report does not include degrees classified by China under medicine within S&E because this report does not consider medical degrees and other professional and practitioner doctoral degrees as S&E degrees. However, doctoral degrees in medicine in China could be regarded as S&E (or science, technology, engineering, and mathematics) on the basis that many degree recipients in this field are expected to have research experience under the Chinese educational system (Zwetsloot et al. 2021). Regardless of how Chinese degrees in medicine are classified, China has been the top producer of natural sciences and engineering degrees (i.e., excluding social and behavioral sciences) since 2007. (See *Indicators 2022* report “**Higher Education in Science and Engineering**” section “**U.S. Position in Global S&E Higher Education.**”)

Finally, the high representation of international students among S&E doctorate recipients in the United States is also worth noting. In 2021, 37% of U.S. S&E research doctorate recipients were temporary visa holders (NCSES *SED 2021: Table 1-6*). China was the most common country of origin for temporary visa holders, accounting for 5,600 S&E research doctorate recipients (**Figure HED-27**) out of a total of 41,000 S&E research doctorate recipients that year. However, many temporary visa holders who earn S&E doctorates in the United States, including a large majority of individuals from China, remain in the country after graduation. For example, 40,000 temporary visa holders from China received S&E doctorates from U.S. institutions from 2006 to 2015. As of 2017, 87% of these doctorate holders were still residing in the United States (Okrent and Burke 2019).

## S&E Degree Production Intensity

Adjusting S&E degree awards relative to national population levels provides useful context when comparing S&E higher education across nations of varying sizes. S&E degree production intensity indicates the prevalence of S&E higher education among the portion of a country’s population in the age range most commonly pursuing postsecondary education. It is defined here as the number of S&E degrees awarded per 100,000 individuals ages 20–34 years old, including degrees awarded to international students. China and India both award more S&E first university degrees than the United States (**Figure HED-29**), yet they measure substantially lower in terms of S&E degree production intensity (**Figure HED-33**). The United States awarded over 1,300 S&E first university degrees per 100,000 20- to 34-year-olds in 2020, about twice the rate of China and India. The United States measures comparably to the United Kingdom and Germany, other top sources of S&E human capital, on this metric.

Figure HED-33  
S&E degrees awarded per 100,000 of the 20- to 34-year-old population, by selected country: 2011–20



**Note(s):**

Figure includes the top five countries by S&E doctorates awarded in 2020. To facilitate international comparison, data for the United States are those reported to the Organisation for Economic Co-operation and Development, which vary from the National Center for Science and Engineering Statistics classification of fields presented in other sections of the report.

**Source(s):**

Organisation for Economic Co-operation and Development (OECD), *Education at a Glance*; National Bureau of Statistics of China, *China Statistical Yearbook*; People's Republic of China, Ministry of Education data; Government of India, Ministry of Education, Department of Higher Education, *All India Survey on Higher Education*; United Nations, Department of Economic and Social Affairs, Population Division, *World Population Prospects 2022* (2022).

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Comparisons of S&E degree production intensity show considerable differences among top degree-producing nations at the doctoral level (**Figure HED-33**). The United Kingdom has the highest degree production intensity, awarding 132 S&E doctoral degrees per 100,000 individuals ages 20–34 years old in 2020, followed by Germany (93) and then the United States (61). Although China and India have both increased their number of S&E degrees awarded over the last decade, these countries remain far eclipsed by advanced economies in S&E doctoral degree production intensity. For example, in 2020 China awarded 14 S&E doctoral degrees per 100,000 20- to 34-year-olds and India awarded 5 S&E doctoral degrees, or about 23% and 8%, respectively, of the degree production intensity of the United States.

## Conclusion

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Higher education institutions in the United States train many of the world's scientists, engineers, and skilled technical workers. The number of S&E certificates and degrees that U.S. institutions awarded increased between 2012 and 2021, as did the share of all certificates and degrees (except doctoral degrees) that were in S&E fields. Internationally, the United States is among the leading producers of S&E degrees but is no longer the top producer of either S&E first degrees or doctoral degrees. However, U.S. colleges and universities remain a top destination for S&E students from outside the United States, as evidenced by the rapid increase in international S&E graduate student enrollment since a low point during the first year of the COVID-19 pandemic.

Demographic diversity in some S&E fields has increased over the past decade. As of 2021, women earned more than 50% of S&E awards in the agricultural and biological sciences, multidisciplinary and interdisciplinary sciences, psychology, and social sciences. On the other hand, women remained underrepresented among award recipients in such fields as engineering and computer and information sciences. American Indian or Alaska Native, Black, and Hispanic individuals were also underrepresented, although the percentage of S&E awards that they collectively earned increased at every award level between 2012 and 2021.

## Glossary

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### Definitions

**Award:** A credential given by a postsecondary institution. The award types that are counted in this report are certificates, associate's degrees, bachelor's degrees, master's degrees, and research doctoral degrees. In this report, an award recipient with multiple major fields of study is counted only once, for the recipient's first major field of study (as defined by the awarding institution).

**Certificate:** A postsecondary credential at the sub-associate level with an expected time to completion that is less than 2 years.

**Community college:** A public institution that offers certificate and associate's degree programs with an expected time to completion for full-time students that is less than 4 years and, typically, 2 years or less. Institutions that offer bachelor's degree programs are not counted as community colleges in this report.

**Control (of institution):** A classification of whether an institution is operated by publicly elected or appointed officials (*public control*) or by privately elected or appointed officials and derives its major source of funds from private sources (*private control*).

**Doctoral degree:** In this report, "doctoral degree" or "doctorate" means a research doctorate. The Integrated Postsecondary Education Data System terms these degrees "doctor's degree-research/scholarship" and defines them as "a PhD or other doctor's degree that requires advanced work beyond the master's level, including the preparation and defense of a dissertation based on original research, or the planning and execution of an original project demonstrating substantial artistic or scholarly achievement. Some examples of this type of degree may include EdD, DMA, DBA, DSc, DA, or DM, and others, as designated by the awarding institution."

**First university degree:** A terminal undergraduate degree program; these degrees are classified within level 6 (bachelor's degree or equivalent) or as "long first degrees" within level 7 (master's degree or equivalent) in the 2011 International Standard Classification of Education (ISCED). For more on ISCED levels, see the **Technical Appendix**.

**Internationally mobile students:** Students who are enrolled in an education institution in a country other than their country of origin. Internationally mobile students include *degree mobile students* but may or may not also include *credit mobile students*, depending on the data source. International statistical bodies such as the United Nations Educational, Scientific and Cultural Organization (UNESCO) Institute for Statistics (UIS) and Organisation of Economic Co-operation and Development (OECD) focus on *degree mobile students*, those that are enrolled as regular students with the objective of graduating with a degree in the country of destination. The UIS definition only includes individuals who physically cross an international border (UIS 2022). In contrast, the Institute of International Education (IIE) uses a more expansive definition that also includes *credit mobile students*, those that travel outside their country for short-term for-credit study (IIE 2022b).

**Science and engineering (S&E) fields:** Under the National Center for Science and Engineering's Taxonomy of Disciplines, S&E fields include agricultural sciences and natural resources; biological and biomedical sciences; computer and information sciences; engineering; geosciences, atmospheric sciences, and ocean sciences; mathematics and statistics; multidisciplinary and interdisciplinary sciences; physical sciences; psychology; and social sciences. At the doctoral level, degrees in health fields are classified as health sciences under S&E, whereas these same fields are classified as health professions and related programs under S&E-related at other degree levels.



**Science and engineering–related (S&E-related) fields:** Under the National Center for Science and Engineering’s Taxonomy of Disciplines, S&E-related fields include health professions and related programs; homeland security and fire protection; science and mathematics teacher education; technology and technical fields; and other science and engineering related fields. At the doctoral level, degrees in health fields are classified as health sciences under S&E, whereas these same fields are classified as health professions and related programs under S&E-related at other degree levels.

**Underrepresented minorities:** This category comprises three racial or ethnic minority groups (Blacks or African Americans, Hispanics or Latinos, and American Indians or Alaska Natives) whose representation in S&E education is smaller than their representation in the U.S. population.

## Key to Acronyms and Abbreviations

**AANAPISI:** Asian American and Native American Pacific Islander–serving institution

**ANNHSI:** Alaska Native and Native Hawaiian–serving institution

**CIP:** Classification of Instructional Programs

**DHS:** Department of Homeland Security

**HBCU:** historically Black college or university

**HSI:** Hispanic-serving institution

**IIE:** Institute of International Education

**IPEDS:** Integrated Postsecondary Education Data System

**ISCED:** International Standard Classification of Education

**MSI:** minority-serving institution

**NASNTI:** Native American–serving nontribal institution

**NCES:** National Center for Education Statistics

**NCSES:** National Center for Science and Engineering Statistics

**NSB:** National Science Board

**NSCRC:** National Student Clearinghouse Research Center

**NSF:** National Science Foundation

**OECD:** Organisation for Economic Co-operation and Development

**OPT:** optional practical training

**PBI:** predominantly Black institution

**R&D:** research and development

**S&E:** science and engineering

**SED:** Survey of Earned Doctorates

**SEVIS:** Student and Exchange Visitor Information System

**STEM:** science, technology, engineering, and mathematics

**STW:** skilled technical workforce

**TCCU:** tribally controlled college or university

**TOD:** Taxonomy of Disciplines

**UIS:** UNESCO Institute for Statistics

**UNESCO:** United Nations Educational, Scientific and Cultural Organization

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## Notes

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- 1** Previous editions of this report provided the number of degree-granting institutions in the United States. This edition includes non-degree-granting institutions as well because many of them confer only sub-associate certificates, awards that take less than 2 years to complete. Although postsecondary institutions confer other certificates as well, the statistics in this report include only sub-associate certificates, referred to as *certificates* throughout the report.
- 2** The student populations described in MSI designations do not necessarily map uniformly to standard race and ethnicity categories used by federal statistical agencies. Furthermore, these student populations can include a mix of racial and ethnic groups that vary in their degree of representation in S&E higher education.
- 3** The categories of MSIs discussed in this report were determined using the 2022 eligibility matrix developed by the U.S. Department of Education to award federal funding to support institutions serving these groups of students. See <https://www2.ed.gov/about/offices/list/ope/itudes/eligibility.html#el-inst> for annual lists of institutions designated as eligible for these funds.
- 4** All comparative statements in this report derived from sample surveys have undergone statistical testing; unless otherwise noted, all comparisons are statistically significant at the 0.10 significance level.
- 5** All statistics in this paragraph refer to students in degree programs with declared majors. Other students are excluded from the analysis. Percentages of students majoring in S&E and S&E-related fields are calculated from unrounded values and may differ from rounded values provided in Table SHED-2.
- 6** Community colleges are defined here as publicly controlled institutions that confer awards up to the at least 2-year but less than 4-year level. This includes both associate's degrees and sub-associate's certificates taking less than 2 years to complete.
- 7** The aggregation of fields of study in the National Postsecondary Student Aid Study (NPSAS), Beginning Postsecondary Students Longitudinal Study (BPS), and Baccalaureate and Beyond Longitudinal Study (B&B) differs from the NCSES Taxonomy of Disciplines, which is used to classify awards from the Integrated Postsecondary Education Data System (IPEDS).
- 8** S&E degrees discussed here are categorized by institution location and include postsecondary degrees awarded to all students, regardless of their residence or where they earned a high school credential.
- 9** Differences between 2012 and 2016 were not statistically significant for certificate and associate's degree students in psychology and other social sciences, nor were they so for doctoral students in health and medicine.
- 10** Differences were not statistically significant for certificate and doctoral degree students in psychology and other social sciences, nor were they so for doctoral students in health and medicine.
- 11** Differences were not statistically significant between master's and certificate students in psychology and other social sciences, nor were they so between master's and doctoral degree students in health and medicine.
- 12** Estimates of online coursetaking in 2012 and 2016 were derived from student interviews collected as part of NPSAS. At the time this report was prepared, the IPEDS Fall Enrollment Survey was the only source of data on distance education for 2020. The IPEDS Fall Enrollment Survey does not disaggregate by comparable fields of study, uses different terminology, and is based on institution, rather than student, reports.
- 13** From 2010 to 2020, the U.S. Hispanic or Latino population grew by 11.6 million, whereas the combined non-Hispanic population grew by 11.1 million. In 2020, the median age of the total population was 38.8 years, and the median age of the Hispanic or Latino population was 30.0 years. For more information, see U.S. Census Bureau (2023).



**14** Grants include need- and merit-based funding such as scholarships, Pell Grants, Supplemental Educational Opportunity Grants, and state, local, and institution-provided grants. The term *grant* applies to any aid the student is not expected to repay.

**15** For more information on the OPT program, see U.S. Department of Homeland Security (DHS/ICE 2022a). In 2022, the list of fields eligible for the STEM OPT Extension was expanded. NCSES classifies many of the fields in the DHS STEM Designated Degree Program List as S&E, but the NCSES S&E and DHS STEM definitions are not identical. For more information, see U.S. Department of Homeland Security (DHS/ICE 2022b).

**16** These data are tabulated from the U.S. Department of Homeland Security Student Exchange Visitor Information System (SEVIS) and are not comparable to the IIE data cited earlier. SEVIS data used in this report are limited to foreign national students on F-1 visas who are enrolled in person at U.S. higher education institutions and exclude individuals approved for OPT. Additionally, these data are not comparable to SEVIS data analyzed in earlier versions of this report due to a change in the taxonomy of S&E fields.

**17** The 35% share is derived from the National Center for Education Statistics (NCES) IPEDS and is similar to that reported by the NCSES Survey of Earned Doctorates (SED), according to which temporary visa holders accounted for 37% of U.S. S&E research doctorates in 2021 (NCSES [SED 2021: Table 3-3](#)).

**18** These data are from the NCSES SED and differ from doctorate data from the NCES IPEDS used elsewhere in this report. The SED collects country of origin for degree recipients on temporary visas, whereas IPEDS does not.

**19** Surveys of doctoral students in India in 2020 reported severe disruptions in funding, limited access to facilities and equipment, and stalled progress on field work. See “India’s PhD Students Want Fellowship Tenures Extended” (2021) and R, Roy, and Das (2022). In September 2021, India’s Ministry of Education announced that it was postponing the requirement of a doctoral degree for assistant professor appointments due to disruptions in doctoral education during the COVID-19 pandemic (Niazi 2021).

**20** For a detailed discussion on classifying educational programs to ISCED levels, see OECD. 2018. *OECD Handbook for Internationally Comparative Education Statistics 2018: Concepts, Standards, Definitions and Classifications*. Paris, France: OECD Publishing. Available at <https://doi.org/10.1787/9789264304444-en>. Accessed 6 November 2022.



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## Technical Appendix

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### Methodology Notes for International Degree Data

International data for first degrees and doctoral degrees for the *Indicators 2024* report “[2024] Higher Education in Science and Engineering” were retrieved from several sources, including the Organisation for Economic Co-operation and Development (OECD) and national statistical offices. These methodology notes provide details on the degree field classifications, degree-level definitions, and sources used for the international higher education data.

#### Degree Fields and Levels

Fields of degree used in the international section of this report are based on the most recent coding system of the **International Standard Classification of Education (ISCED)**, ISCED Fields of Education and Training 2013 (ISCED-F 2013), to facilitate international comparisons. Table SAHED-1 shows the crosswalk of science and engineering (S&E) degree fields used to map degree data from international and national data sources to the fields used in this report. Comparing degree fields across higher education systems with different degree taxonomies may require classification decisions that unavoidably result in either overcounting or undercounting of degree fields of interest. For example, degrees in political science and sociology are reported under the law field by China, but data are not published for these fields individually. Political science and sociology are typically included within social and behavioral sciences, but this report does not classify degrees awarded in law within social and behavioral sciences for China because the law field also includes traditional legal disciplines.

Levels of degree for international degree data in this report are based on the ISCED 2011 system. Doctoral degrees correspond to ISCED 2011 level 8 (doctoral degree or equivalent). First degrees may correspond to ISCED 2011 level 6 (bachelor’s degree or equivalent) or include a combination of degrees at ISCED 2011 levels 6 and 7 (master’s degree or equivalent), depending on the data source. Some countries grant bachelor’s degrees and *long first degrees*. These degrees typically take at least 5 years to complete and involve training at a level comparable to a master’s degree in the United States. Similar to bachelor’s degree programs, long first degree programs only require completion of secondary education to enroll, and completion of a program provides the first opportunity to enter the labor market with an academic credential at the tertiary level (excluding shorter-duration, occupationally focused programs).<sup>20</sup> The United States does not report long first degrees. Combined bachelor’s and master’s programs in the United States may provide roughly similar educational training to long first degrees, but there are very few such programs, and institutions award both degrees to these joint program graduates.

Where data are available, national totals for first degrees presented in the section **International Comparisons of S&E Higher Education** equal the sum of first degrees at level 6 (bachelor’s degree or equivalent) and long first degrees at level 7 (master’s degree or equivalent). If data were unavailable for first degrees at level 6, the sum of all level 6 degrees and level 7 long first degrees was used. For countries such as the United States that do not report data specifically for first degrees, first degree totals are bachelor’s degrees.

#### OECD

Unless otherwise specified, international degree data in the report were retrieved from the OECD Education at a Glance Database, accessed through **OECD.Stat**. The data reported by OECD come from an annual collection of education data conducted jointly by the United Nations Educational, Scientific and Cultural Organization (UNESCO) Institute for Statistics (UIS), OECD, and Eurostat (UOE data collection). OECD degree data in this report use current ISCED codes (ISCED 2011, levels of education; ISCED-F 2013, fields of education).

## China

Degree award data for China through 2015 come from the *China Statistical Yearbook* of the National Bureau of Statistics of China and remain unchanged from *Indicators 2022*. Newer years of data come from annual tables published by the Chinese **Ministry of Education**. Data for first degrees were retrieved from the table “Number of Regular Students for Normal Courses in HEIs (Higher Education Institutions) by Discipline” and data for doctorates were retrieved from the table “Number of Postgraduate Students by Academic Field (Total).”

## India

Degree award data for India were retrieved from the India Department of Higher Education’s *All India Survey on Higher Education*. Data for India in this report will not match data reported in *Indicators 2020*, which were retrieved from OECD when available. OECD has since ceased publication of higher education degree data for India; thus, a national-level data source was required. The number of degrees for India also varies slightly from the totals reported in *Indicators 2022* due to a revision of the S&E fields crosswalk (Table SAHED-1) since the last report.

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