Mission Not Accomplished:

UNEQUAL OPPORTUNITIES AND OUTCOMES FOR BLACK AND LATINX ENGINEERS

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Introduction

Engineering has long been a highly respected and high-paying profession. Engineers make up less than 2 percent of the workforce, but the public holds engineers in high regard, on par with medical doctors, for what they are perceived to contribute to society.[1] Engineers help improve our quality of life with their advancements in research, development, production, and output, and with this occupational prestige comes a significant earnings premium.

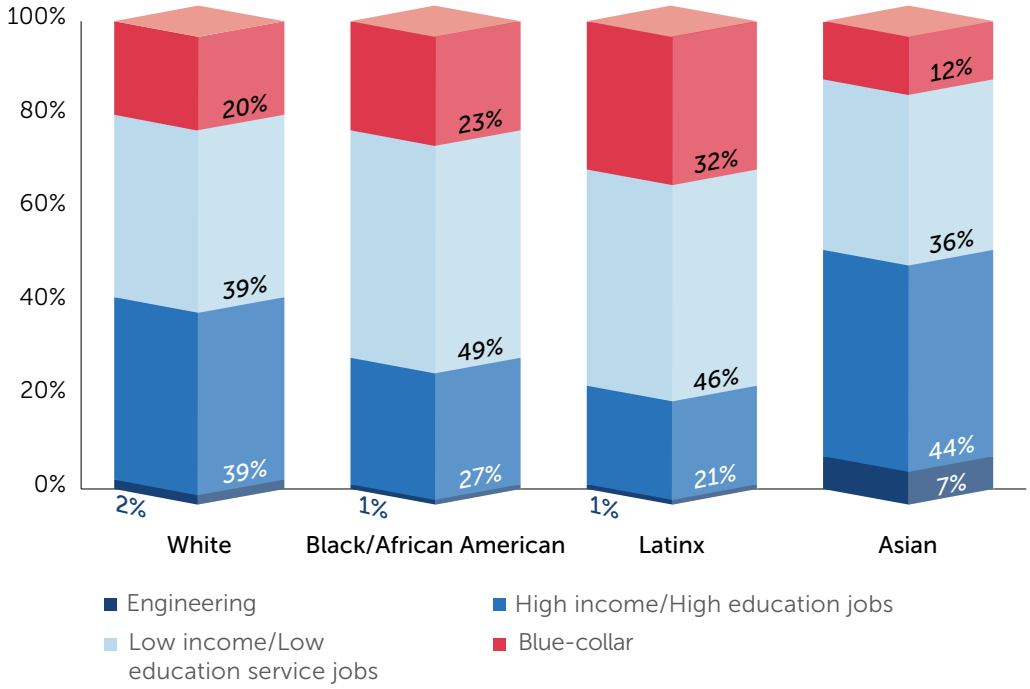
Prime-age[2] adults working full-time in an engineering occupation had median earnings of $91,000 in 2019. That is nearly twice the median earnings of all prime-age full-time workers. But this prosperity is not evenly spread across society: to become an engineer in this country, it helps a lot to be White or Asian, and a man.

Legislation, government agencies, professional associations, and foundations have been working to diversify engineering and related scientific professions since at least 1950.[3] But that mission has not been accomplished, and progress has been agonizingly slow. Of the 1.7 million prime-age engineers in the United States in 2019, 81 percent were either White or Asian, and 84 percent were men. A mere 3 percent were either Black/African American or Latinx[4] women.[5] In the past decade, the share of employed engineers who are Black/African American hasn't changed (it remains at 5 percent). The share of Latinx employed engineers increased from 6 percent to 9 percent, but the proportion of Black/African American and Latinx engineers remains well below their share of the prime-age population.[6]

Put in a more direct way, Black/African American and Latinx prime-age adults are roughly a third (33 percent) of the adult population, but just 15 percent of engineers—a woeful bias in workforce ratios. The Black/African American and Latinx communities have long been underrepresented in engineering jobs. They continue to lag in terms of admissions to engineering programs, completion of degrees, occupational penetration, and tenure in engineering jobs.

1 PEW Research Center, "Public Esteem for Military Still High," 2013.
2 Prime-age workers are defined as 25–54 years old.
3 The National Science Foundation Act of 1950 required the president to give due regard to equitable representation of scientists who are women and who represent underrepresented groups in making nominations for the National Science Board. Thirty years later, in 1980, the Science and Engineering Equal Opportunities Act broadened that initiative to recognize the "full development and use of the scientific and engineering talents and skills of men and women, equally, of all ethnic, racial, and economic backgrounds" as in the national interest.
4 In this report, we use the term Black/African American to refer to people who identify as Black or African American and the term Latinx to refer to people who identify as Hispanic or Latino, including people who identify racially as Black and ethnically as Latino. In charts, tables, and related references to data, we use the terms White, Black/African American, Asian, and Latinx.
5 Georgetown University Center on Education and the Workforce analysis of data from the American Community Survey (ACS), 2019. Restricted to prime-age adults (25–54) working in an engineering occupation.
6 Georgetown University Center on Education and the Workforce analysis of data from the American Community Survey (ACS), 2019.

Figure 1. Latinx and Black/African American workers are more likely than White and Asian workers to be employed in low-paying occupations and much less likely to work in high-paying occupations.



Why is that important? Both the earnings and prestige afforded to engineers in the American culture and economy make the unequal access to the engineering profession a prime social indicator of racial, ethnic, and gender inequality in our education system and economy. Engineering is among the highest-paying occupations in the nation (Figure 1).

Of all White workers in the economy, 41 percent are working in engineering or other high-paying prestigious jobs. Asian representation in these types of jobs is even greater—51 percent of all Asian workers are employed in engineering or other high-paying jobs that have well-developed career pathways. In contrast, only 22 percent of Latinx workers and 28 percent of Black/African American workers are employed in engineering or other high-paying prestigious jobs.

It is not just an issue of getting more Black/African American and Latinx students to study engineering—it is making sure they have opportunities to advance and have successful careers. Within the United States, opportunities for access and completion in postsecondary education have been traditionally segregated by race and class elements.[7] Consequently, Black/African American and Latinx workers who have engineering occupations are more likely than workers of other races to have lower

7 Carnevale and Strohl, *Separate and Unequal, 2013.*

educational attainment: 25 percent of Black/African American and Latinx engineers work in engineering jobs without a bachelor' degree, but only 16 percent of White and Asian engineers do.[8] These Black/African American and Latinx engineering workers are paid less and have less chance of advancing in the field.

Even when underrepresented minorities pursue bachelor's degrees in engineering, they disproportionately pursue general engineering degrees that tend not to be as financially lucrative as specialized engineering degrees. Overall, Black/African American (23 percent) and Latinx (19 percent) engineering majors are more likely to have a general engineering degree than White or Asian engineering majors (both 14 percent).[9] People who majored in general engineering, irrespective of where they work, are paid less ($85,000) than engineering majors overall ($95,000). They are also paid less than those in specialized fields such as petroleum engineering ($106,000), the highest paying field, and mechanical engineering ($96,000), the most common specialty for White engineers.[10]

The lack of opportunity for Black/African American engineers may be, in part, because of discrimination at large technology companies against graduates of Historically Black Colleges and Universities (HBCUs), which have long produced a large percentage of Black/African engineers. A recruiter for Google, who worked in outreach to HBCUs, alleges that Google systematically downgraded graduates of those institutions, preferring to hire engineers from better-known colleges. Google and other technology giants, including Apple, Facebook, and Microsoft, have made little or no progress since 2014 in increasing the percentage of "technical workers" who are Black/African American or Latinx.[11]

Women are also underrepresented and underpaid in engineering. Women represent a little less than half of the employed prime-age population, but they only represent 16 percent of engineers.[12] This low level of representation holds true across races and

8 Georgetown University Center on Education and the Workforce analysis of data from the American Community Survey (ACS), 2019.
9 Georgetown University Center on Education and the Workforce analysis of data from the American Community Survey (ACS), 2009–2019 (pooled).
10 Georgetown University Center on Education and the Workforce analysis of data from the American Community Survey (ACS), 2015–2019 (pooled). Data are for positive earners who majored in engineering, (as opposed to positive earners working as engineers). Later in the report, we show that returns are even higher when workers with engineering bachelor's degrees work in field.
11 Tiku, "Google's approach to historically Black schools helps explain why there are few Black engineers in Big Tech," 2021.
12 Georgetown University Center on Education and the Workforce analysis of data from the American Community Survey (ACS), 2019.

ethnicities. Black/African American and Latinx women together represent 15 percent of the workforce but only 3 percent of engineers. Overall, women who work in engineering earn less ($82,000) than men ($90,000). Black/African American women engineers earn $80,000 per year and Latinx women engineers are paid even less, $76,000.[13]

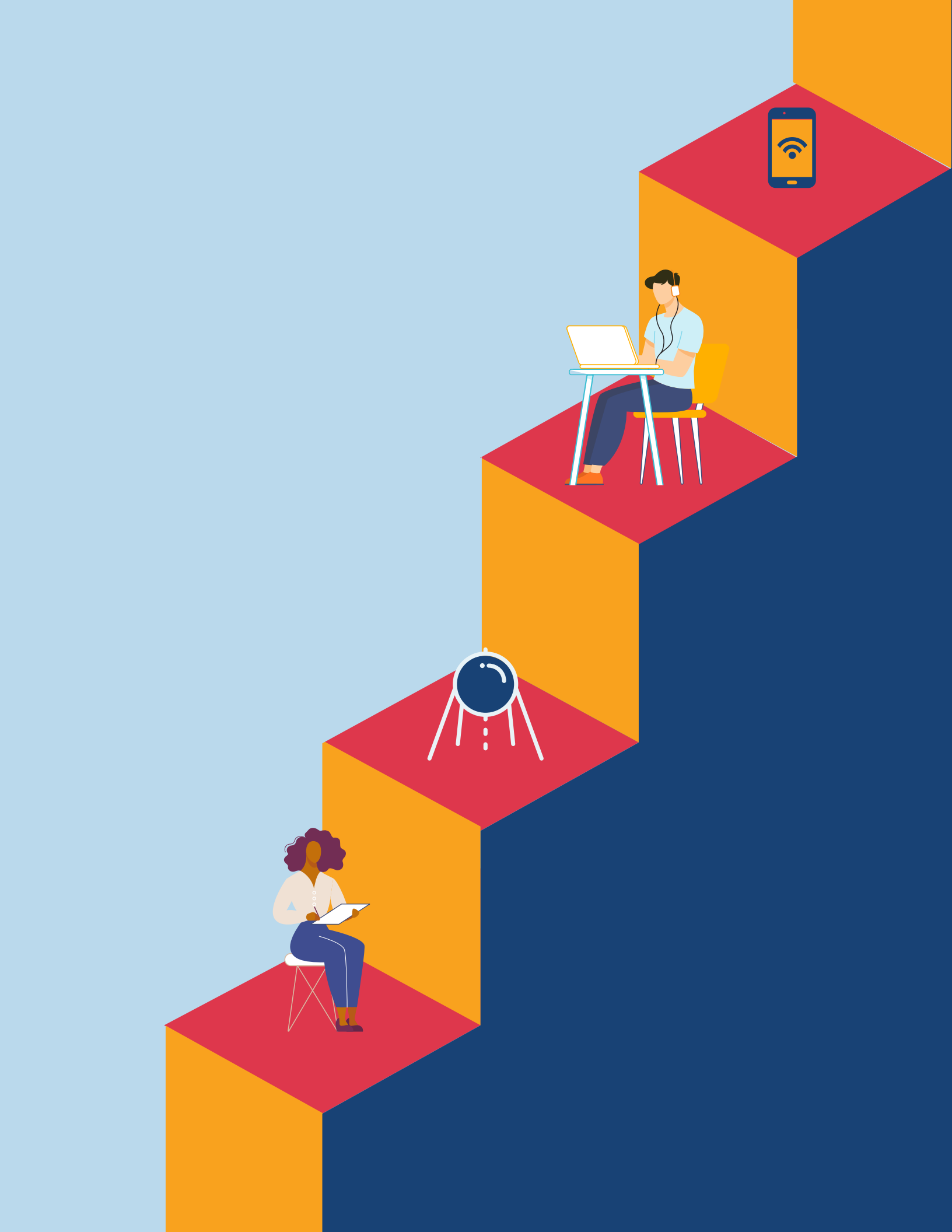
Women's representation in engineering occupations has been improving, but barely. Ten years ago, 15 percent of engineers were women. Today it is only 1 percentage point higher: 16 percent.[14] Job tenure is also troublesome as women are much more likely to leave the profession. About 43 percent of women working in the STEM (science, technology, engineering, and math) professions left their full-time STEM-related jobs after having their first child, compared to 23 percent of men.[15] Cultural norms that place a greater proportion of parenting and elder care responsibility on women cause them, in general, to leave their careers more often than men. In STEM fields, including engineering, women are even more prone to leave their careers than other professional fields. Career rewards, such as high pay and job satisfaction, "fail to build commitment among women in STEM."[16]

Lawmakers, federal agencies, colleges, and some foundations continue to push for more Black/African American and Latinx graduates to pursue STEM occupations. The STEM Opportunities Act of 2019, for example, pledged to "promote research on, and increase understanding of, the participation and trajectories of women, minorities, and other groups historically underrepresented in STEM studies and careers, including persons with disabilities, older learners, veterans, and rural, poor, and tribal populations, at institutions of higher education and Federal science agencies, including Federal laboratories."

But passing more laws and resolutions won't be enough. If we are to see more underrepresented students and women in engineering jobs, we will need:

- Fresh approaches to recruitment of individuals within these populations, as well as more focus on enrolling, counseling, and graduating these students;
- A renewed commitment to diversity in engineering majors and the workforce;
- A renewed commitment to hiring diverse faculty that can contribute to the in-classroom experiences of Black/African American and Latinx students, and women; and
- More messaging that highlights the importance—culturally and financially—of greater representation of all sectors of our population in one of our workforce's most prestigious and lucrative professions.

13 Georgetown University Center on Education and the Workforce analysis of data from the American Community Survey (ACS), 2015–2019 (pooled). Data are for positive earners who majored in engineering (as opposed to positive earners working as engineers).
14 Georgetown University Center on Education and the Workforce analysis of data from the American Community Survey (ACS), 2009, 2019.
15 Else, "Nearly half of US female scientists leave full-time science after first child," 2019.
16 Glass et al., "What's so special about STEM?," 2013.



PART 1.

Engineering—A Driver of Innovation and Economic Opportunity

The explosion of interest in engineering in the United States was initially due to the launch of the Soviet Union satellite Sputnik into space in 1957.[17] At that time, the desire to improve engineering and science education and outcomes in the US was framed as a national security challenge. If nothing was done in the short run to improve our engineering pipeline, politicians believed that the US would be left behind in the technological revolution and the race for world leadership. In 1983, *A Nation at Risk* renewed the call to improve the country's crumbling education system, which was seen as a threat to the nation's "once unchallenged preeminence in commerce, industry, science, and technological innovation." The report goes on to lament that "we have even squandered the gains in student achievement made in the wake of the Sputnik challenge."[18]

17 Stine, "U.S. Space Priorities: Reflections 50 Years After Sputnik," 2009.
18 National Commission on Excellence in Education, *A Nation at Risk, 1983.*

The overarching concerns about being left behind in the race for innovation through research and development[19] initially led to a concerted effort toward grooming more engineers by increasing the number of engineering programs and majors, as well as supporting other institutions that prepare students for work in the field.[20] Looking back along the education pipeline, scholars and legislators alike have subsequently emphasized the role of science and engineering in learning at all levels of education, up to the college degree.[21] Yet at that time, there were no specific policy directives geared toward achieving equity, equality, or a goal for representation in specific fields.

The reaction to *A Nation at Risk* resulted in great successes in improving the scientific and technical workforce,[22] but diversity was still lacking. Racial and gender bias directly contributed to the abysmally low enrollment, persistence, and completion rates for women and racial and ethnic minorities in engineering and many other technical and scientific majors.[23]

The misallocation of resources among the pool of underrepresented minorities and women who were not given the option to pursue their comparative advantage in the workforce has resulted in lost productivity for the nation as a whole since the 1960s. Researchers have found that the modest improvements in diversity and employment opportunities for women and Black/African American men since the 1960s has resulted in a 20–40 percent increase in aggregate economic output, but that is well below the potential increase if talent were distributed more equally across highly-skilled occupations such as engineering.[24]

The US higher education system has made tremendous strides in educating the engineering workforce. In the 1970–71 academic year, US colleges conferred just 45,000 engineering bachelor's degrees. Almost 50 years later, that production had more than doubled: 122,000 engineering bachelor's degrees were conferred in the 2017–18 academic year.[25] This growth rate is almost twice as fast as that of the labor force for the comparable time period. Progress has been made on increasing diversity, too, but there is still a long way to go. The rising cost of college disproportionately discourages enrollment by underrepresented students, so higher education faces increasing challenges in reaching diversity goals. These challenges include:

19 National Academy of Sciences, "Rising Above the Gathering Storm," 2007.
20 National Academy of Sciences, "Rising Above the Gathering Storm, Revisited," 2010.
21 Atkinson, "Supply and Demand," 1990; Weinstein, "Labor Shortages of Scientists and High-Tech Workers," 1998.
22 Stedman, "The Sandia Report and U.S. Achievement," 2010.
23 Leaper and Starr, "Helping and Hindering Undergraduate Women's STEM Motivation," 2018.
24 Hsieh et al., "The Allocation of Talent and U.S. Economic Growth," 2019.
25 Georgetown University Center on Education and the Workforce analysis of data from Table 322.10 of the Digest of Education Statistics, 2019.

Enrollment increases that are not matched by increases in funding at the local, state, and federal levels;

Incorporating new learning technologies, learning analytics, and updating teaching styles as a strategy to increase access, affordability, and retention of underrepresented groups; and

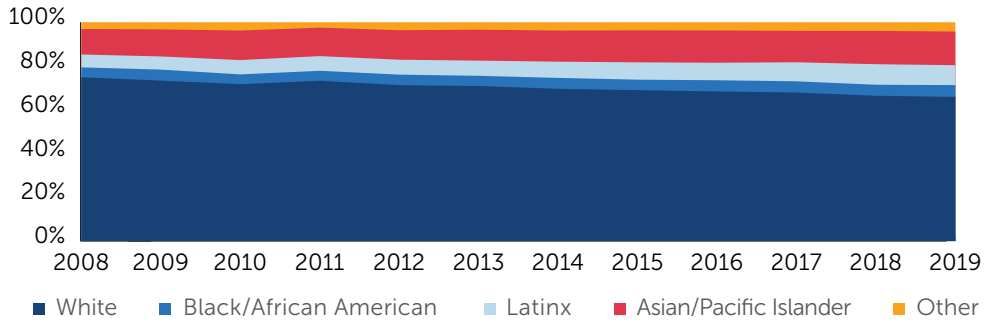
Lack of diverse faculty to mentor and counsel underrepresented students.[26]

Over the past 30 years, the demographics of students in American K–12 classrooms have shifted dramatically toward greater diversity, both in terms of the racial/ethnic composition of student bodies but also in terms of country of origin, native language, culture, and the socioeconomic status of students.[27] Today's K–12 classrooms are very much reflective of tomorrow's America. According to the Census Bureau, by 2045,[28] the United States will become a majority-minority country. In other words, the sum total of people from racial/ethnic minority groups will outnumber the number of persons who identify themselves as White, non-Latinx. Six states—California, Hawaii, Maryland, Nevada, New Mexico, and Texas—along with the District of Columbia have already reached this milestone. Arizona, Florida, Georgia, and New Jersey are probably next in line.[29]

Young America is already majority-minority. At the K–12 level, students from racial and ethnic minority groups have outnumbered White students since 2014.[30] The Latinx population continues to grow especially quickly—the number of Latinx public schoolchildren has doubled in the last few decades. The population of Asian students has also grown, as has the number of Black/African American and Native American students. The population of White students, however, has fallen by about 15 percent over the past 30 years, reflecting

26 These issues are compounded for underrepresented students majoring in engineering because of the lack of faculty of color and women.
27 Owens, Income Segregation between School Districts and Inequality in Students' Achievement, 2018.
28 Vespa et al., Demographic Turning Points for the United States, 2018.
29 Vespa et al., Demographic Turning Points for the United States, 2018.
30 Vespa et al., Demographic Turning Points for the United States, 2018.

Figure 2. White workers dominate the engineering profession: 66 percent of all workers in the field were White in 2019.



Source: Georgetown University Center on Education and the Workforce analysis of data from the American Community Survey (ACS), 2009–2019.
Note: Restricted to prime-age adults (ages 25–54) with positive earnings.

declining fertility rates among White women.[31] Despite changing demographics in the population, our selective colleges are still failing to reflect this diversity; those campuses continue to be stratified by race and class as Black/African American and Latinx students are disproportionately tracked into under-resourced open-access institutions.[32]

One consequence of this is the disparity in access to engineering programs. If previous patterns persist, the gaps between socioeconomic groups will be exacerbated in terms of access, persistence, and completion.

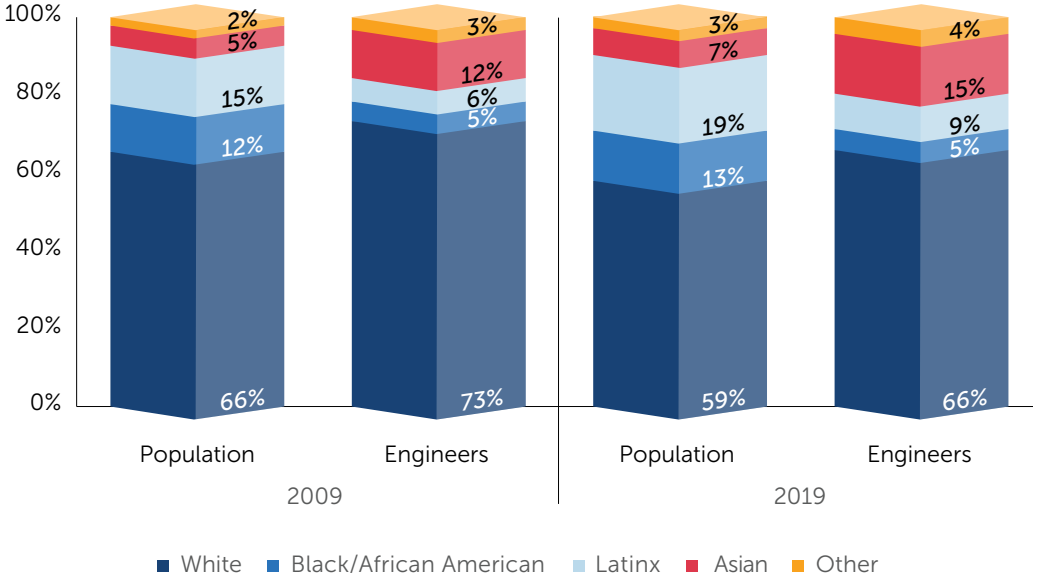
Engineering departments as a whole should be particularly concerned about these changing demographics. If the profession is to reflect the diversity of society, engineering departments will need to attract more Black/African American and Latinx students and see them through to completion. Increasing the number of engineers from underrepresented groups is not just important symbolically. It is also important culturally and financially. Children who see people who look like them in influential respected jobs, such as engineers, can then see themselves in such positions when they grow up.

The engineering workforce does not reflect the gender or racial/ethnic diversity of the population.

In 2019, there were 1,633,000 prime-age adults employed in engineering occupations in the United States. Of these, 1,076,000 (66 percent) were White, 88,000 (5 percent) were Black/African American, 149,000 (9 percent) were Latinx, and 251,000 (15 percent) were Asian[33] (Figure 2).

31 Mathews, "Total Fertility Rates," 2019.
32 Carnevale and Strohl, *Separate and Unequal, 2013.*
33 Georgetown University Center on Education and the Workforce Analysis of data from the American Community Survey (ACS), 2019.

Figure 3. The engineering profession has become more diverse in the past 10 years, but because of demographic changes, large gaps in diversity remain.



Source: Georgetown University Center on Education and the Workforce analysis of data from the American Community Survey (ACS), 2009–2019.
Note: Restricted to prime-age adults (ages 25–54). Values may not sum to 100 percent due to rounding.

In the decade between 2009 and 2019, the engineering profession became more diverse. The share of engineers who were not White or Asian increased from 14 percent to 18 percent. However, the actual percentage point gaps between the share of engineers who are Black/African American or Latinx and the overall prime-age population has remained unchanged because of population changes. The share of engineers who are Latinx increased by three percentage points, but the share of the prime-age workers who are Latinx increased by four percentage points. Among Black/African Americans, the share of adults employed in an engineering occupation remained the same, even though the share of Black/African American adults in the workforce increased by one percentage point (Figure 3).

The number of Black/African American and Latinx engineering graduates is increasing over time, but there is still far from equitable representation.

Between 1990 and 2019 the total number of Black/African American and Latinx students who graduated with a bachelor's degree in engineering increased nearly fourfold: these programs became more diverse simply because initial representation of Black/African American and Latinx students was abysmally low. Yet we have a long way to go to achieve equity in the engineering profession. The Latinx share of bachelor's degrees in engineering

Table 1. The share of Latinx students among engineering bachelor's degree graduates has increased quickly since 1990, but the share of Black/African American students has not changed.

	White	Black/African American	Latinx	Asian/PI*	Other †	
1990	82%	4%	3%	11%	< 1%	100%
2019	66%	4%	13%	13%	4%	100%

Source: Georgetown University Center on Education and the Workforce analysis of data from the Integrated Postsecondary Data System (IPEDS), 1989–90, and 2018–19.
Note: Values may not sum to 100 percent due to rounding.
* Asian/PI includes Asian and Pacific Islander students.
† The "Other" category is not comparable between years. The category included American Indians in 1990 and American Indians as well as multiracial people in 2019.

increased from 3 percent to 13 percent between 1990 and 2019, while holding steady at 4 percent for Black/African American students over the same time period (Table 1).

This change in bachelor's degrees conferred that favors Latinx students is partly reflective of changes in demographics. The Latinx college-age population increased from 12 percent to 23 percent between 1990 and 2019 (while Black/African American population share declined slightly, from 14 percent to 13 percent).[34]

Even with the growth in diversity among engineering students, at the current pace, it would take 76 more years to achieve Black/African American and Latinx student equity in engineering occupations—on par with national representation. However, it would take up to 256 years at the current pace to achieve equity for just Black/African American engineering workers.[35]

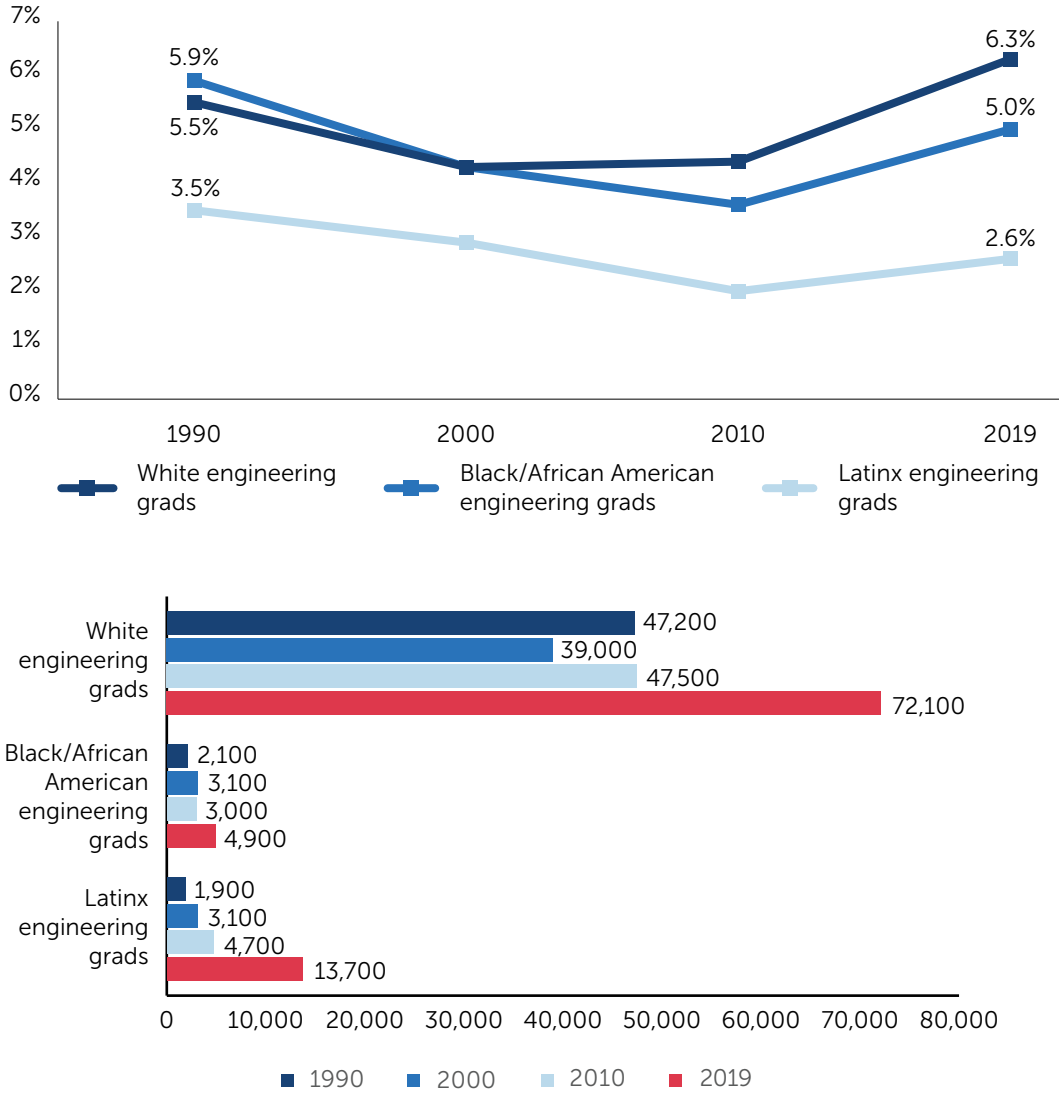
The number of engineering degrees earned by students from underrepresented groups has increased but not enough to match their proportions of all workers.

This slow progress can partly be explained by different rates of access to college. Despite Black/African American and Latinx students steadily increasing their college-going rate over the past 50 years, they still lag behind White and Asian students. Also,

34 Georgetown University Center on Education and the Workforce analysis of data from the US Census Bureau and Bureau of Labor Statistics, Current Population Survey (CPS), 1990 and 2019. College-age refers to 18-to-25-year-olds.

35 To arrive at these figures, the study examined engineering completion data for White, Black/African American, and Latinx engineers from 1990 through 2019. We then projected that data forward, based on the assumption that enrollment and completion rates remain unchanged. Here, equity refers to proportional representation, and its relative achievement is measured by the ratio of workforce to college students shares who were Black/African American and/or Latinx. For instance, in 1990 the Black/African American and Latinx share of college students was 26 percent, but their share of the engineering workforce was just 7 percent. Thus, their 1990 workforce to college student ratio was 0.27 [(7%)/(26%)]. In 2019, their workforce ratio was 0.47 [(17%)/(36%)]. We would need around 2.6 times this change moving forward to achieve proportionately. Since the observed change took 29 years, assuming the same rate it would take an additional 76 years to achieve proportionality for Black/African American and Latinx students. Isolating Black/African American workers, we calculated that it would take an additional 256 years to achieve Black/African American parity.

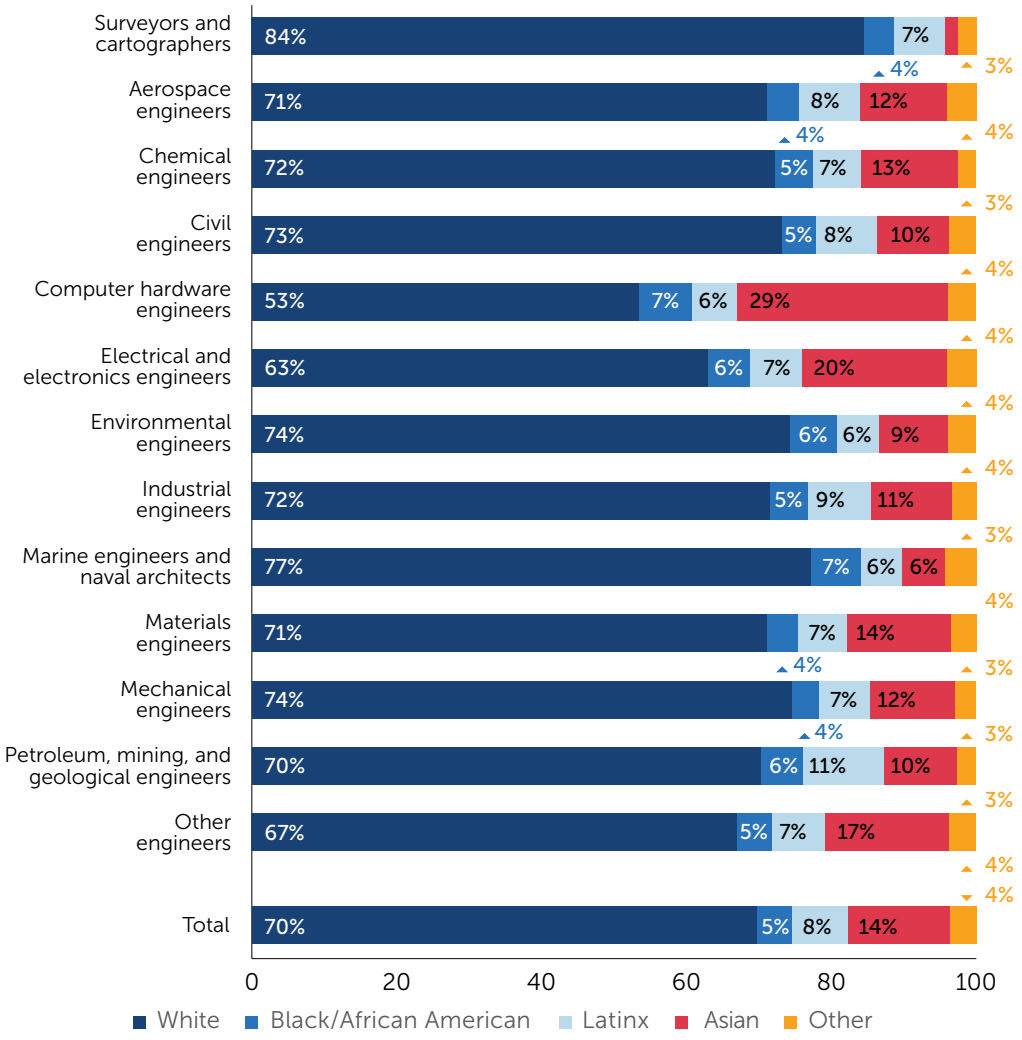
Figure 4. The number of Black/African American and Latinx engineering bachelor's degree graduates has increased, but among Black/African American and Latinx college graduates, the share of engineering majors among all college graduates is decreasing.
Bachelor's degree completions



Source: Georgetown University Center on Education and the Workforce analysis of data from the Integrated Postsecondary Data System (IPEDS), 1989–90, 1999–2000, 2009–10, and 2018–19.

Black/African American and Latinx students who earn a bachelor's degree are slightly less likely to earn a degree in engineering. In 1990, 3.5 percent and 5.9 percent of Black/African American and Latinx bachelor degree completers, respectively, earned a degree in engineering. Today it is just 2.6 percent and 5 percent, respectively. For White graduates the reverse is true: they are slightly more likely to earn an engineering degree (5.5 percent in 1990 compared to 6.3 percent today) (Figure 4).

Figure 5. Black/African American and Latinx engineers have greater representation in some subfields of engineering than they do in the profession as a whole.



Source: Georgetown University Center on Education and the Workforce analysis of data from the American Community Survey (ACS), 2009–2019 (pooled).
Note: Restricted to prime-age adults (ages 25–54) with positive earnings. Values may not sum to 100 percent due to rounding.

Some of the subfields within engineering have greater diversity. For instance, while roughly 5 percent of all engineers between 2009 and 2019 were Black/African American, they made up 7 percent of computer hardware engineers. And while Latinx engineers constituted 8 percent of all engineers, they represent 11 percent of all petroleum, mining, and geological engineers (Figure 5).

The continued lack of access bodes ill for improving the large disparities in race/ethnicity representation among engineering majors. Not all engineers have an

Table 2. Black/African American and Latinx engineering students were more likely to receive degrees in general engineering from 2009 to 2019 than in engineering subfields, compared to White and Asian students.

	White	Black/ African American	Latinx	Asian	Other	Total
General engineering	14%	23%	19%	14%	15%	15%
Chemical engineering	7%	7%	6%	6%	6%	7%
Civil engineering	12%	8%	11%	6%	13%	10%
Computer engineering	7%	9%	9%	14%	11%	9%
Electrical engineering	20%	25%	19%	33%	24%	23%
Industrial and manufacturing engineering	5%	5%	10%	2%	5%	5%
Materials engineering and materials sciences	1%	1%	0%	1%	0%	1%
Mechanical engineering	22%	13%	15%	15%	17%	19%
Aerospace engineering	3%	2%	2%	1%	3%	3%
Biomedical engineering	3%	2%	3%	3%	2%	3%
Other	7%	5%	6%	4%	5%	6%
Total	100%	100%	100%	100%	100%	100%

Source: Georgetown University Center on Education and the Workforce analysis of data from the American Community Survey (ACS), 2009–2019 (pooled).
Values may not sum to 100 percent due to rounding.

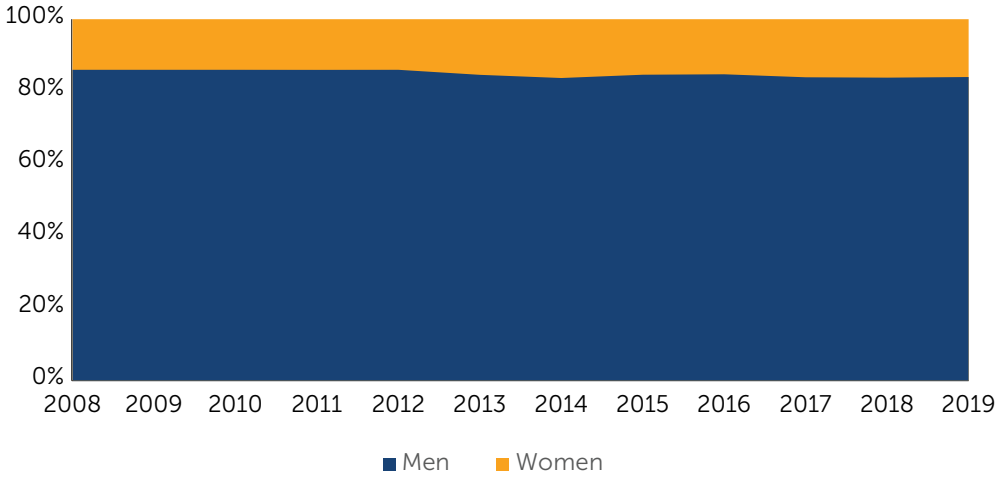
engineering bachelor's degree, but most (62 percent) do.[36] Those engineers with a bachelor's degree in engineering have higher earnings ($95,000) than those engineers with a bachelor's degree in a different field ($80,000).[37]

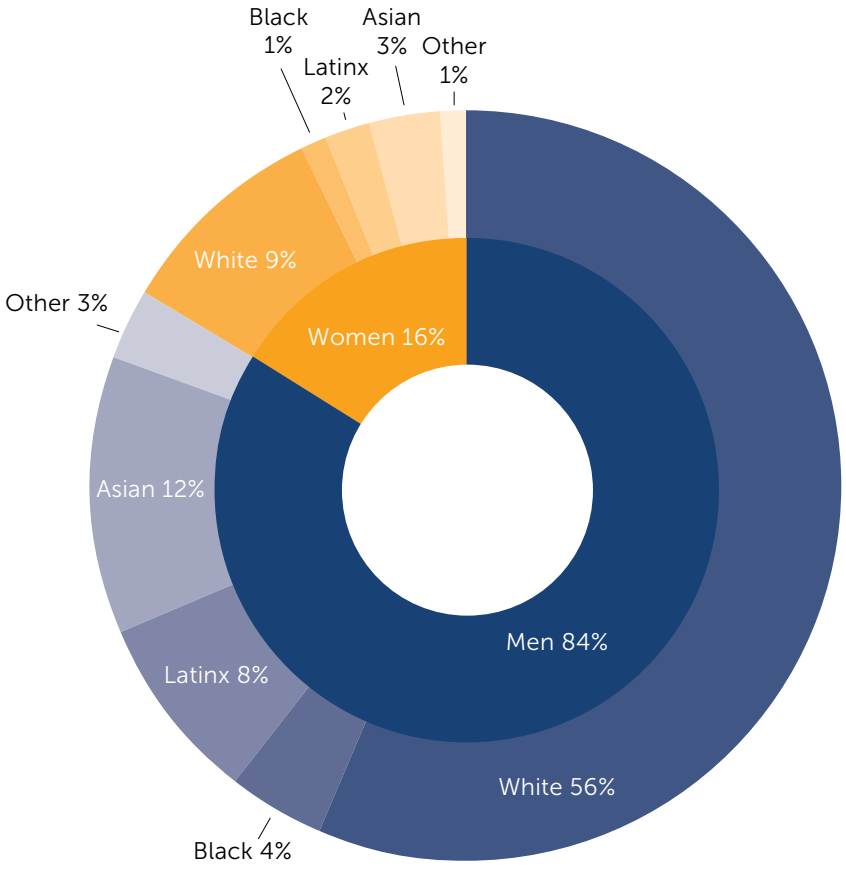
There are also racial disparities among prime-age adults that have earned an engineering degree. Latinx (19 percent) and Black/African American (23 percent) engineering majors are more likely to major in general engineering than their White (14 percent) counterparts, a major that is likely to result in lower earnings than if they had majored in one of the many specialized fields of engineering (Table 2).

The persistent gap in diversity over the past decade holds true for women as well. In 2009, only 15 percent of engineers were women, a share that slowly grew to 16 percent in 2019 (Figure 6). However, 16 percent is still a far cry from equitable representation between the sexes.

36 An additional 24 percent of engineering workers have a bachelor's degree in a discipline other than engineering. The remaining engineering workers don't have a bachelor's degree, but may have other qualifications such as an associate's degree.
37 Georgetown University Center on Education and the Workforce analysis of data from the American Community Survey (ACS), 2019.

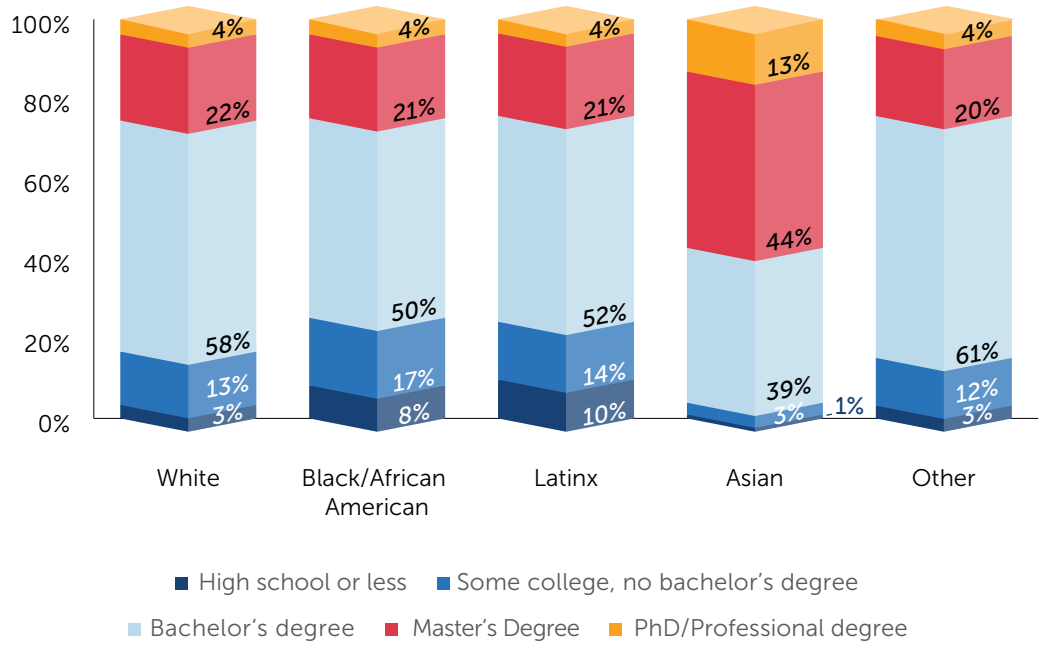
Figure 6. The share of women working in engineering has barely changed in the past decade.





Source: Georgetown University Center on Education and the Workforce analysis of data from the American Community Survey (ACS), 2009–2019.
Note: Restricted to prime-age adults, with positive earnings.
Values may not sum to 100 percent due to rounding.

Figure 7. Black/African American and Latinx workers are more likely than White or Asian workers to have an engineering job without a bachelor's degree.



Source: Georgetown University Center on Education and the Workforce analysis of data from the American Community Survey (ACS), 2019.

The diversity of the engineering workforce is dependent on access to postsecondary education because nearly every engineer (96 percent) holds a postsecondary credential.[38] Most of that group is made up of workers with at least a bachelor's degree (85 percent). Only about 12 percent of engineering workers have a sub-baccalaureate credential or training (certificates, associate's degrees, or some college), but this non-bachelor's engineering pathway is disproportionately followed by Black/African American and Latinx engineers (Figure 7).

While a sub-baccalaureate qualification in engineering is a financially viable credential, those with sub-baccalaureate credentials in engineering get paid less than those with bachelor's degrees and are far less likely to be promoted into positions of responsibility.

Black/African American and Latinx students are less likely to be exposed to the possibility of studying engineering.

Postsecondary training is important, but so is the pipeline that gets students to that point. Disparate graduation rates by race/ethnicity begin at the high school level. White and Asian students graduate public high school at a rate that is more than

38 If we further restrict the population to young engineering workers, the share without a college degree becomes even smaller.

10 percentage points higher than that of Black/African American and Latinx students.[39] Those gaps get wider at higher levels of educational attainment: White and Asian students earn a college-level credential at a rate about 20 percentage points higher than that of Black/African American and Latinx students.[40]

The college-going rates of Black/African American and Latinx students have increased steadily over the past 30 years, though these students are still less likely to enroll in or graduate from college than their White or Asian peers.

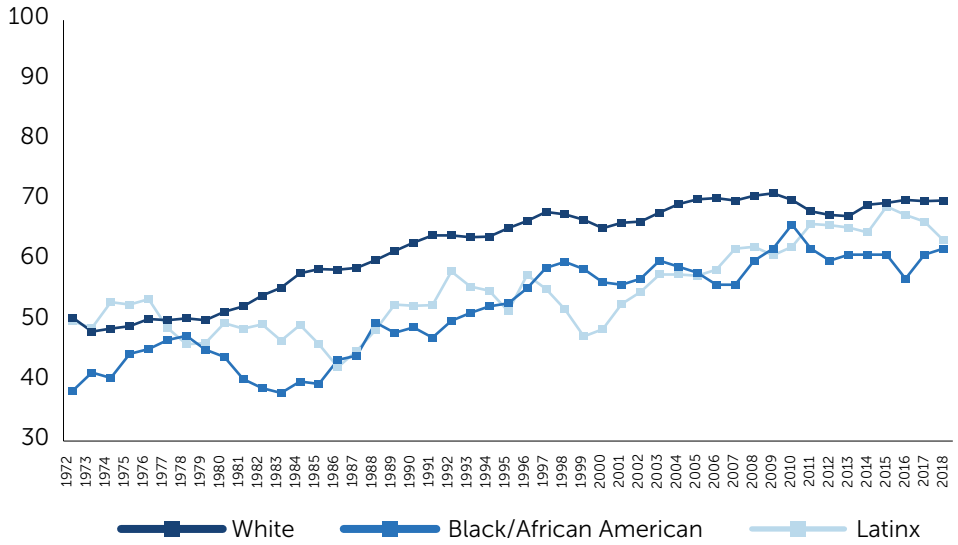
The college-going rates of Black/African American and Latinx students have increased, but they have only just achieved the college-going rate that White students reached in about 1990.

When Black/African American and Latinx students go to college, they disproportionately drop out compared to students of other racial and ethnic groups. In general, 70 percent of White students but only 52 percent of Black/African American and Latinx college students graduate within six years of enrollment—provided that they initially enrolled as new full-time students at either private or public four-year institutions seeking a baccalaureate degree. This is a full 18 percentage point graduation gap between White baccalaureate-degree-seeking candidates and Black/African American and Latinx baccalaureate-degree-seeking candidates.[41] Between 1972 and 2018, the college-going rates of Black/African American and Latinx recent high school completers increased by approximately 24 percentage points and 14 percentage points, respectively. The college-going rate for Black/African American students increased from approximately 38 percent to 62 percent, and the rate for Latinx students increased from approximately 50 percent to 63 percent (Figure 8). But that only means these groups have achieved college-going rates that White students reached in about 1990.

This matters because upskilling and reskilling precipitated by technological improvements have led to increased demands for education within occupations. Over the next 10 years, the vast majority (90 percent) of job openings for engineers and engineering technicians will require at least a bachelor's degree.[42] Even engineering technician jobs will generally need training beyond an associate's degree, the current credential required for many of these jobs.

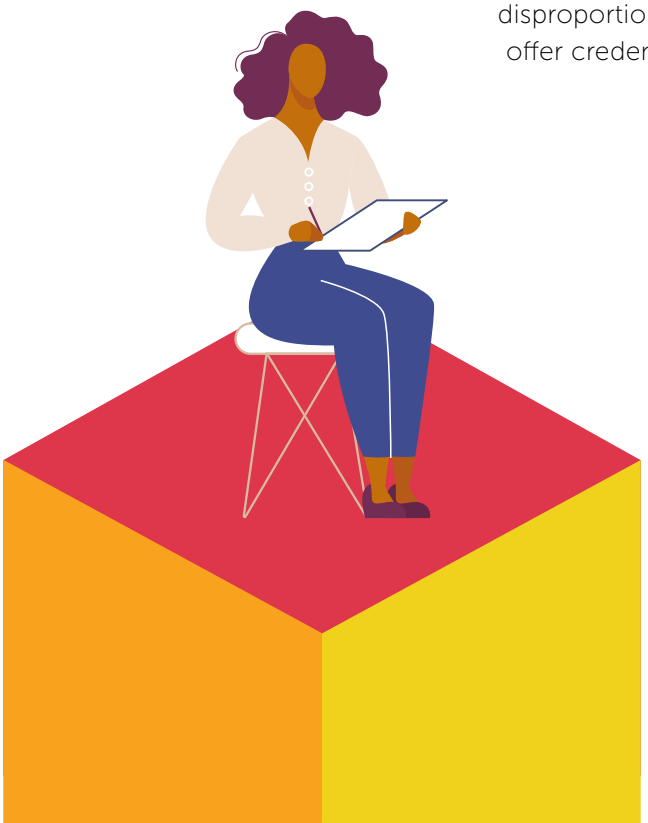
39 National Center for Education Statistics, "The Condition of Education," 2019.
40 National Student Clearinghouse Research Center, "Completing College," 2017.
41 Nichols and Anthony, "Graduate Rates Don't Tell the Full Story," 2020.
42 Carnevale et al., *The Future of Work and Education Requirements, forthcoming.*

Figure 8. Since 1972, the college enrollment rates of Black/African American and Latinx students have increased, but they still lag behind White students.



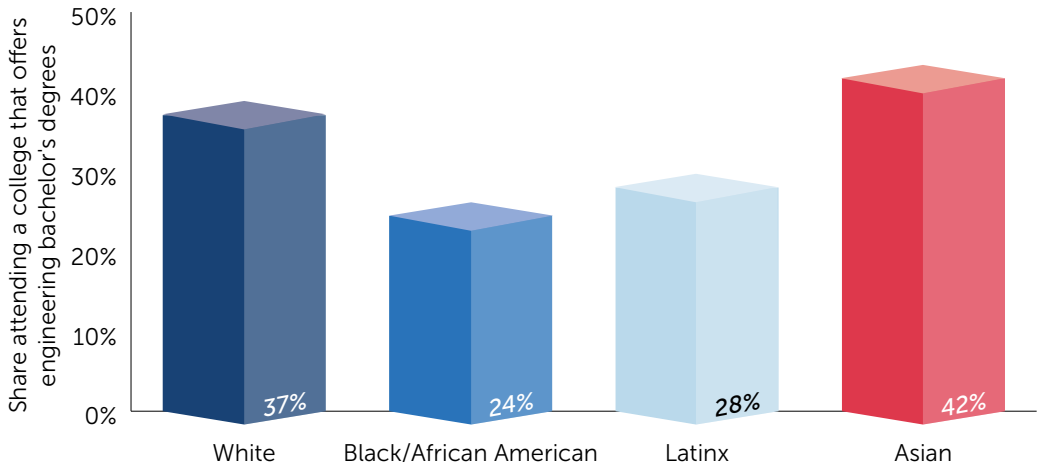
Source: Georgetown University Center on education and the Workforce analysis of data from Table 302.20 of the Digest of Education Statistics, 2018.
Note: Data is smoothed using a rolling three-year average.

About 500,000 students who graduate in the top half of their high school classes never get any kind of postsecondary credential, not even a certificate. About 21 percent of this group is either Black/African American or Latinx.[43] When they do attend colleges, Black/African American and Latinx students are more likely to attend open-access two-year and four-year institutions than the more selective four-year colleges that White students disproportionately attend.[44] Two-year institutions usually do not offer credentials beyond an associate's degree.



43 Georgetown University Center on Education and the Workforce, "The Forgotten 500,000 College-Ready Students," 2018.
44 Carnevale et al., *Our Separate & Unequal Public Colleges, 2018.*

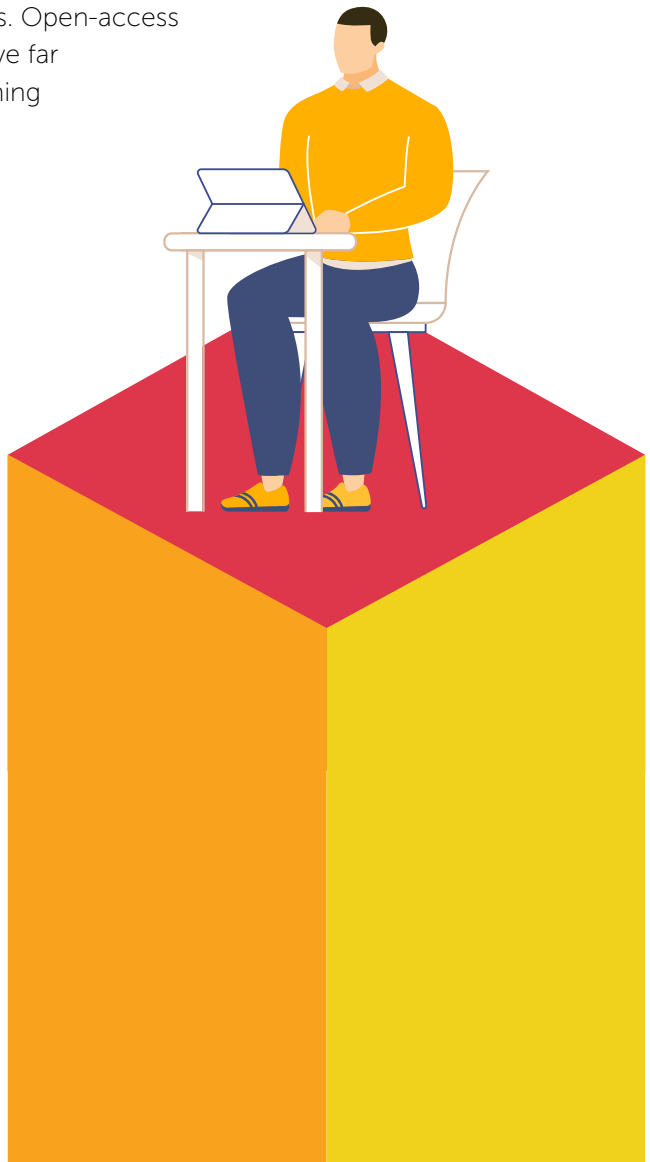
Figure 9. Black/African American and Latinx students are less likely than White and Asian students to attend a college that has an engineering bachelor's degree program.



Source: Georgetown University Center on Education and the Workforce analysis of data from the Integrated Postsecondary Data System (IPEDS), 2018–19.

Many underrepresented students may be falling short of their potential by attending open-access postsecondary institutions. Open-access schools (both four-year and two-year) in general have far fewer resources, which makes offering and maintaining engineering programs less likely.

During the 2018-19 academic year, 37 percent of White students were enrolled in a college that had an engineering bachelor's degree program. This was the case for just 24 percent of Black/African American students, and 28 percent of Latinx students (Figure 9). This lack of access to engineering programs for Black/African American and Latinx students may suggest systemic discrimination.



PART 2.

Who Works in Engineering?

Underrepresented students have made some gains in attaining engineering degrees, but they are still only about half as likely to be employed in engineering as a White or Asian worker. Women hold only 16 percent of engineering jobs even though they are half of the overall workforce. These disparities are then manifested in engineering occupations. Engineering is one of the highest-paying occupations in the US workforce, and is one of the most prestigious. The lack of representation by Black/African American and Latinx workers and women in engineering adds to the wealth gap in this country by race and by gender.

The engineering field has been dominated for so long by men, and by White and Asian workers, that they maintain strong advantages over other workers in such metrics as earnings, making more money when they work out of field, and in labor-force participation.

Table 3. Labor force participation rates for workers with bachelor's degrees in engineering are higher for men than for women, but they differ considerably by race or ethnicity.
Labor force participation rate for workers with bachelor's degrees in engineering

Race/Ethnicity	Men	Women	Total
White	96%	86%	95%
Black/African American	93%	91%	93%
Latinx	95%	79%	91%
Asian	95%	75%	90%
Other	94%	80%	91%
All engineering majors	96%	82%	93%

Source: Georgetown University Center on Education and the Workforce analysis of data from the American Community Survey (ACS), 2015–2019.
Note: Restricted to prime-age adults (ages 25–54).

Workforce participation rate of engineers is higher than the national average.

The average labor participation rate for prime-age (ages 25–54) holders of engineering bachelor's degrees is 93 percent, slightly higher than the average participation rate of 90 percent for all prime-age bachelor degree holders.[45]

Participation in the labor force differs noticeably by gender for prime-age adults with an engineering bachelor's degree. The labor force participation rate for prime-age women is 77 percent. If these prime-age women have a bachelor's degree, their labor force participation rate rises to 86 percent. For prime-age women with a bachelor's degree in engineering, the labor force participation falls slightly to 82 percent.

The labor force participation rate for prime-age men is 87 percent. For prime-age men with a bachelor's degree, the labor force participation rate is 95 percent. For prime-age men with a bachelor's degree in engineering, the labor force participation rises slightly to 96 percent. While the male participation rate does not vary much by race, this is not the case for women. The rates for Black/African American, White, and Latinx women with an engineering bachelor's degree are, respectively, 91 percent, 86 percent, and 79 percent (Table 3). Among prime-age women, a Black/African American woman with an engineering bachelor's degree is 5 percentage points more likely to be in the labor force than all women with a bachelor's degree. This speaks to the quality of opportunity and staying power in the workforce that a degree in engineering brings and how important it is to maintain representation across racial, ethnic, and gender lines.

45 Georgetown University Center on Education and the Workforce analysis of data from the American Community Survey (ACS), 2015–2019.

Table 4. White engineers are more likely to be working in field than engineers of other races and ethnicities.
Percentage of engineering majors working in field

Race/Ethnicity	Men	Women	Total
White	31%	24%	30%
Black/African American	21%	18%	20%
Latinx	22%	16%	20%
Asian	20%	14%	18%
Other	24%	19%	23%
Total	27%	19%	25%

Source: Georgetown University Center on Education and the Workforce analysis of data from the American Community Survey (ACS), 2015–2019.
Note: Restricted to prime-age adults (ages 25–54).

The percentage of engineering graduates working in the engineering field varies by gender and race/ethnicity.

Not everyone who gets a bachelor's degree in engineering works in that occupation. The share of engineering graduates working in field varies widely by race or ethnicity, gender, and engineering subfield.

About a quarter of those who have a bachelor's degree in engineering work directly as engineers. While that percentage may seem low, it actually matches the percentage of bachelor's degree holders, overall, who work in field.[46]

Sometimes workers move away from specific engineering specialties into the management of engineering workers. This means that they are classified as working out-of-field because they are managing or supervising engineers, rather than working as engineers themselves. Other workers with bachelor's degrees in engineering move away from specific engineering occupations into such positions as the teaching of engineering or other technical subjects. Once again, it is the engineering background that facilitates this transition.

The odds that a prime-age adult with an engineering bachelor's degree will be working in an engineering-related field differs along gender and race/ethnicity lines. Overall, White engineering majors are most likely to work in field (30 percent), compared to 20 percent for both Black/African American and Latinx engineering majors. Men with engineering bachelor's degrees (27 percent) are more likely overall to be working in field than women with engineering degrees (19 percent). Asian women with engineering majors were the least likely (14 percent) group to work in an engineering occupation (Table 4).

46 Abel et al., "Are recent college grads finding good jobs?," 2014.

Table 5. White engineering majors in every subfield are more likely to be working in field than engineers of any other race or ethnicity.
Share of prime-age adults working in an engineering field by race/ethnicity and detailed engineering major.

		PROPORTION WORKING IN FIELD					
	Median salary	White	Black/African American	Latinx	Asian	Other	All
Petroleum engineering	$137,700	46%	*	30%	33%	*	41%
Computer engineering	$117,200	11%	8%	7%	7%	7%	9%
Aerospace engineering	$116,500	35%	25%	34%	30%	30%	33%
Nuclear engineering	$113,500	30%	*	*	19%	*	26%
Chemical engineering	$108,800	28%	17%	19%	19%	25%	25%
Biological engineering	$102,000	20%	18%	6%	10%	10%	16%
Electrical engineering	$101,300	29%	23%	24%	19%	25%	24%
Materials engineering and materials sciences	$93,400	30%	*	14%	22%	*	26%
Naval architecture and marine engineering	$92,400	26%	*	*	21%	*	22%
Biomedical engineering	$91,400	18%	8%	12%	11%	9%	15%
Mining and mineral engineering	$91,200	30%	*	*	14%	*	27%
Geological and geophysical engineering	$91,200	31%	*	*	*	*	28%
General engineering	$89,000	27%	20%	16%	15%	21%	22%
Environmental engineering	$88,900	34%	*	28%	24%	26%	31%
Mechanical engineering	$88,400	39%	25%	31%	26%	31%	35%
Engineering mechanics, physics, and sciences	$88,400	23%	*	8%	14%	*	20%

Table 5. (cont.)

		PROPORTION WORKING IN FIELD					
	Median salary	White	Black/African American	Latinx	Asian	Other	All
Industrial and manufacturing engineering	$88,000	20%	14%	12%	12%	16%	17%
Civil engineering	$87,100	41%	26%	30%	30%	31%	37%
Architectural engineering	$80,700	32%	*	*	17%	*	29%
Metallurgical engineering	$78,700	24%	*	*	13%	*	20%
Miscellaneous engineering	$78,000	19%	12%	13%	13%	11%	17%
All engineering majors		29%	20%	19%	18%	23%	25%

Source: Georgetown University Center on Education and the Workforce analysis of data from the American Community Survey (ACS), 2015–2019.
Note: Restricted to prime-age adults (ages 25–54).
* Sample size was too small to give reliable results.

The odds of working in field for engineering bachelor's degree holders varies widely by specific subfield. Only 9 percent of prime-age adults who majored in computer engineering work in an engineering occupation (such as a computer hardware engineer), whereas 41 percent of petroleum engineering majors are working in an engineering occupation.

The differences in the likelihood of working in field for each subfield, however, can vary quite dramatically by race or ethnicity. This can make a huge difference in pay and opportunity. For instance, in petroleum engineering, the highest paid subfield on average, 46 percent of White majors are working in field, which is higher than in other engineering subfields. By contrast, the highest proportion of Black/African American engineering majors working in field are found in civil engineering (26 percent), which pays about $50,000 less on average per year than petroleum engineering.

In other engineering subfields, there is little substantial difference by race. In the relatively high-paying aerospace engineering subfield, for example, 35 percent of White and 34 percent of Latinx majors are working in an engineering occupation (Table 5).

Of those with an engineering bachelor's degree who do not work in an engineering occupation, 35 percent work in a managerial occupation. Some other related

occupations are quite common: 24 percent work in non-engineering STEM occupations, and 9 percent work in a blue-collar occupation.[47]

The non-engineering occupations in which these workers end up vary noticeably by race/ethnicity and gender. White men with an engineering bachelor's degree who are not working as engineers are by far the most likely to end up in a managerial occupation. For those not working directly in engineering, 43 percent of white men are in managerial and professional occupations. Among other race/ethnicity and gender groups, the groups that come closest to this share of White men working in management are White women (35 percent) and Black/African American women (33 percent).

Among those who do not end up in a management job, women with engineering bachelor's degrees are twice as likely as men to end up in education occupations, and much less likely to end up in blue-collar occupations than men. Other than management, the odds of ending up in a blue-collar occupation varies the most by race. Black/African American (18 percent) and Latinx (23 percent) workers are much more likely than White workers (11 percent) to end up in blue-collar occupations (Table 6).

White and Asian engineering workers earn more when working out of field while Black/African American and Latinx engineering workers earn more working in the field.

Regardless of the reason for the move or which new profession they move to, one thing is clear: White and Asian men with engineering degrees earn more when they move out of field, while Black/African American and Latinx men earn more when they remain in field.

An engineering bachelor's degree holder who works in an engineering occupation has median earnings of $95,000, which is significantly more than those in a blue-collar occupation ($57,000). Engineering majors who end up in a managerial occupation make more than twice as much ($119,000) as those in a blue-collar occupation. One reason may be that they are much more likely to have master's degrees.[48]

Since more than one-third of White men who majored in engineering work in managerial occupations, White men who do not work in engineering directly make more money than those who do. Among White men, the median earnings in an

47 Georgetown University Center on Education and the Workforce analysis of data from the American Community Survey (ACS), 2015–2019.

48 Georgetown University Center on Education and the Workforce analysis of data from the American Community Survey (ACS), 2015–2019.

Table 6. The plurality of engineering bachelor's degree holders work in managerial and professional office occupations.

Men	Total	White	Black/ African American	Latinx	Asian	Other
Managerial and professional office	37%	43%	27%	31%	30%	27%
STEM	25%	19%	17%	15%	43%	26%
Blue-collar	11%	11%	18%	23%	4%	15%
Sales and office support	10%	11%	15%	13%	7%	11%
Education	5%	5%	5%	4%	6%	4%
Food and personal services	3%	3%	6%	6%	1%	6%
Community services and arts	3%	3%	4%	3%	2%	4%
Unemployed	3%	2%	4%	3%	3%	3%
Healthcare professional and technical	2%	2%	3%	1%	2%	3%
Military	1%	1%	1%	1%	<1%	1%
Healthcare support	<1%	<1%	1%	<1%	<1%	1%
TOTAL	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**

Women	Total	White	Black/ African American	Latinx	Asian	Other
Managerial and professional office	30%	35%	33%	27%	23%	28%
STEM	20%	13%	14%	9%	33%	18%
Unemployed	14%	10%	7%	16%	19%	12%
Sales and office support	12%	13%	16%	19%	7%	14%
Education	9%	11%	8%	9%	7%	6%
Blue-collar	4%	4%	5%	7%	2%	4%
Healthcare professional and technical	4%	5%	6%	2%	3%	6%
Food and personal services	3%	3%	5%	7%	2%	5%
Community services and arts	3%	4%	5%	3%	2%	3%
Healthcare support	1%	<1%	1%	1%	<1%	2%
Military	<1%	<1%	1%	<1%	<1%	1%
TOTAL	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**

Source: Georgetown University Center on Education and the Workforce analysis of data from the American Community Survey (ACS), 2015–2019.
Note: Restricted to prime-age adults (ages 25–54). Values may not sum to 100 percent due to rounding.

Table 7. White and Asian engineering majors earn more when they work out of field, but Black/African American and Latinx engineers earn more when they remain in field.
Employed engineering bachelor's degree holders

	MEN			WOMEN		
	In field	Out of field	Total	In field	Out of field	Total
White	$97,000	$104,000	$101,000	$85,000	$74,000	$79,000
Black/ African American	$84,000	$67,000	$73,000	$90,000	$66,000	$75,000
Latinx	$89,000	$68,000	$75,000	$82,000	$46,000	$55,000
Asian	$102,000	$107,000	$105,000	$95,000	$87,000	$89,000
Other	$92,000	$78,000	$83,000	$91,000	$68,000	$75,000
Total	$97,000	$100,000	$98,000	$87,000	$75,000	$79,000

Source: Georgetown University Center on Education and the Workforce analysis of data from the American Community Survey (ACS), 2015–2019.
Note: Restricted to prime-age adults (25–54) with positive earnings.

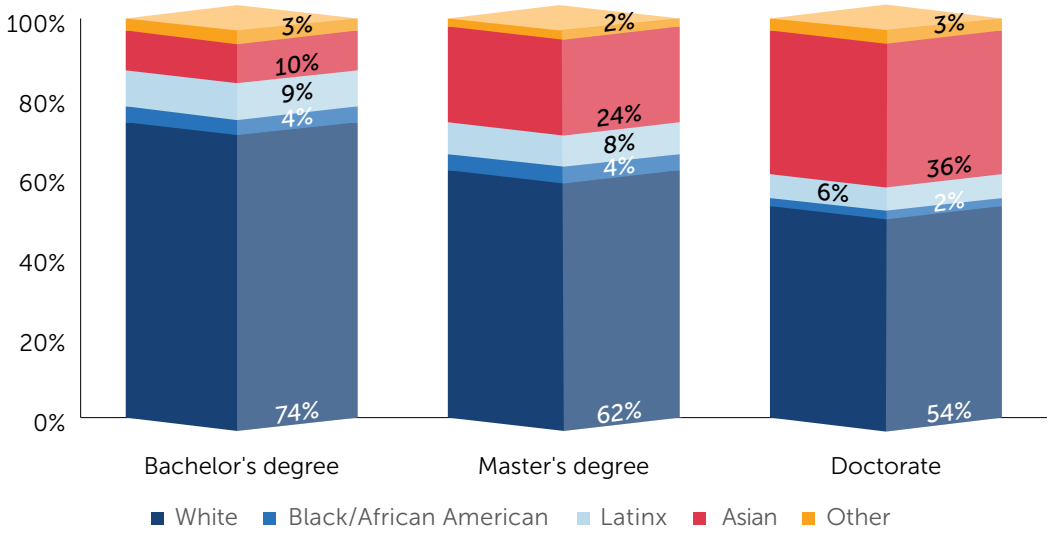
engineering field is $97,000, but for those working out of field, the median is $104,000. This is not the case for male engineers who are Black/African American or Latinx—they earn more working as engineers than they do out of field. This is also not true of women, regardless of race/ethnicity. For Black/African American and Latinx women, those who are working in an engineering field have higher median earnings than those who are working out of field. For example, the median earnings of a Latinx female engineering major working in an engineering field is $82,000, which is much higher than the median of working out of field: $46,000 (Table 7).

Black/African American and Latinx engineers have lower levels of educational attainment than other engineers, but even when they have equal education, they are paid less.

Asian engineers are the most educated racial or ethnic subset of those who majored in engineering. Though there are more White engineers with doctorates than Asian engineers with doctorates (White engineers comprise 54 percent of doctorate holders while Asian engineers comprise 36 percent), Asian engineers are more likely to obtain doctorates than to stop at any other degree level (47 percent of Asian engineers hold doctorates).[49] White and Asian adults combined make up 86 percent of those with a master's degree in engineering, and 90 percent of those with a doctorate in engineering. Black/African

49 Georgetown University Center on Education and the Workforce analysis of National Science Foundation, 2018. "National Center for Science and Engineering Statistics: Women, Minorities, and Persons with Disabilities in Science and Engineering Data Tables."

Figure 10. Black/African American and Latinx engineers are far less likely than their White and Asian counterparts to hold graduate degrees.



Source: Georgetown University Center on Education and the Workforce analysis of data from the National Science Foundation, 2018. "National Center for Science and Engineering Statistics: Women, Minorities, and Persons with Disabilities in Science and Engineering Data Tables."

American and Latinx engineers make up just 12 percent of those with a master's degree in engineering and 8 percent of those with a doctorate in engineering (Figure 10).

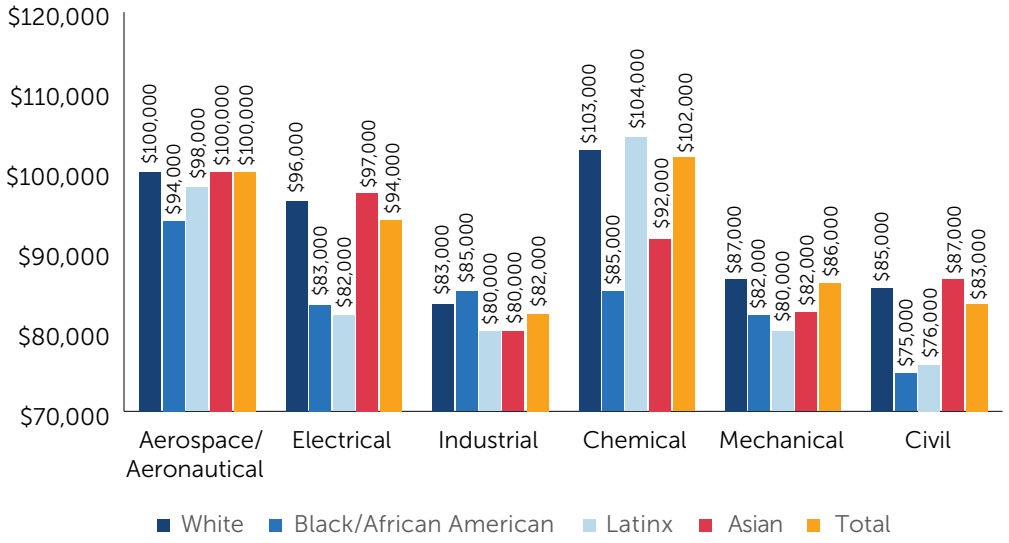
Black/African American and Latinx engineers earn less than White engineers across the board. In fact, a Black/African American or Latinx engineer generally must earn a graduate degree in engineering to earn as much as a White engineer with a bachelor's degree. On average, a White worker with no more than a bachelor's degree in engineering earns $90,000 a year, whereas a Black/African American or Latinx worker with a graduate degree on top of their engineering bachelor's degree earns an average of $87,000 and $92,000, respectively.[50]

White and Asian engineers tend to have higher earnings at every subdivision of the engineering profession for bachelor's degree holders. White and Asian aerospace/aeronautical engineers, for example, average about $100,000 in earnings per year, while Black/African American and Latinx aerospace/aeronautical engineers earn $94,000 and $98,000 per year, respectively, on average. Civil engineers with bachelor's degrees tend to earn lower wages overall than those in most other engineering specialties, regardless of racial/ethnic origins. Still, White and Asian civil engineers make close to $11,000 more than their Black/African American or Latinx counterparts. Of all the engineering subdivisions pursued by Black/African American and Latinx engineers, civil engineering had the lowest earnings ($76,000 on average[51]) (Figure 11).

50 Georgetown University Center on Education and the Workforce analysis of data from the American Community Survey (ACS), 2015–2019.

51 Georgetown University Center on Education and the Workforce analysis of National Science Foundation, 2018. "National Center for Science and Engineering Statistics: Women, Minorities, and Persons with Disabilities in Science and Engineering Data Tables."

Figure 11. Among engineers with bachelor's degrees, White engineers are paid more in almost every subdivision in the field.



Source: Georgetown University Center on Education and the Workforce analysis of data from the American Community Survey (ACS), 2015–2019 pooled.

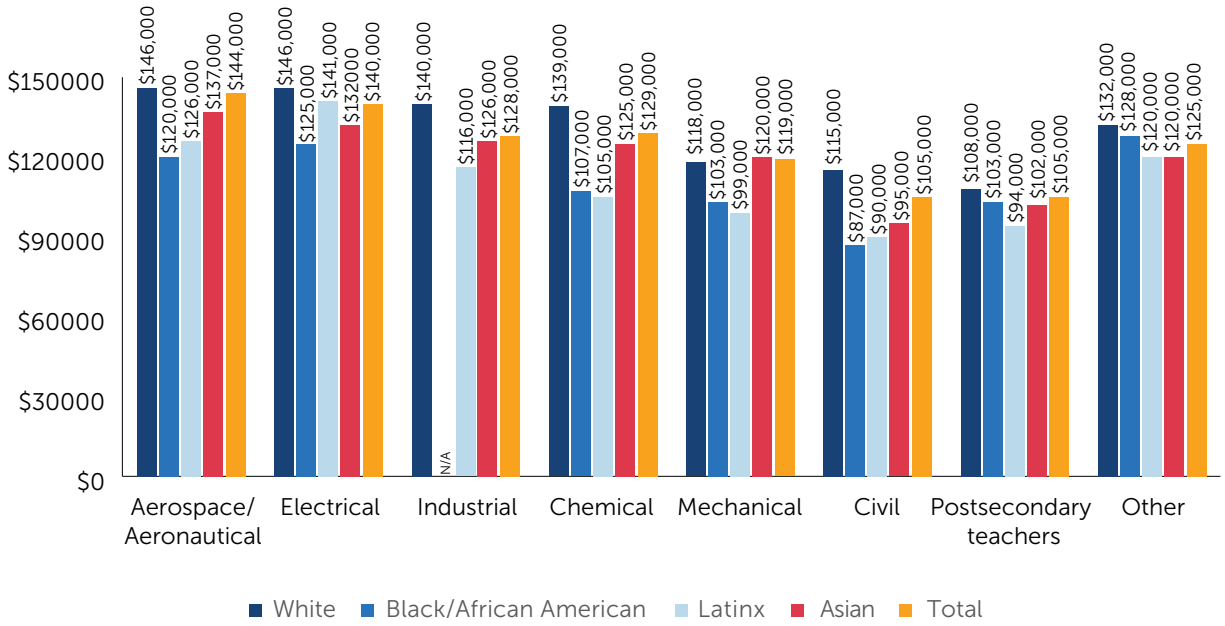
Field of study matters to the wages earned by engineering PhDs, but Black/African American and Latinx engineers consistently earn less than others.

Overall, aerospace and electrical engineering are among the highest paying engineering fields. However, the median annual earnings of Black/African American doctoral engineers employed in these fields are $21,000 to $26,000 lower than those of their White counterparts.[52] Latinx doctoral engineers in these fields earn $5,000 to $20,000 less than their White counterparts. White doctoral engineers employed in chemical engineering also have much higher median annual salaries ($32,000 higher than their Black/African American counterparts and $34,000 higher than their Latinx counterparts)[53] (Figure 12).

Overall, earnings for each racial/ethnic group tend to increase with age. The only exception is among Asian engineers between the ages of 50 and 75, who saw a slight dip in median annual earnings compared to Asian engineers ages 40 to 49.[54] The highest earning group is White engineers between the ages of 50 and 75 ($117,000/year), and the lowest earning group is Asian engineers under age 29 ($65,000/year).[55]

52 Georgetown University Center on Education and the Workforce analysis of National Science Foundation, 2017. "National Center for Science and Engineering Statistics: Survey of Doctoral Recipients."
53 Georgetown University Center on Education and the Workforce analysis of National Science Foundation, 2017. "National Center for Science and Engineering Statistics: Survey of Doctoral Recipients."
54 Small sample sizes may have contributed to this inconsistent result.
55 Georgetown University Center on Education and the Workforce analysis of National Science Foundation, 2018. "National Center for Science and Engineering Statistics: Women, Minorities, and Persons with Disabilities in Science and Engineering Data Tables."

Figure 12. White and Asian men with doctorates are paid more in almost every subdivision in engineering than men of other races and ethnicities with doctorates.

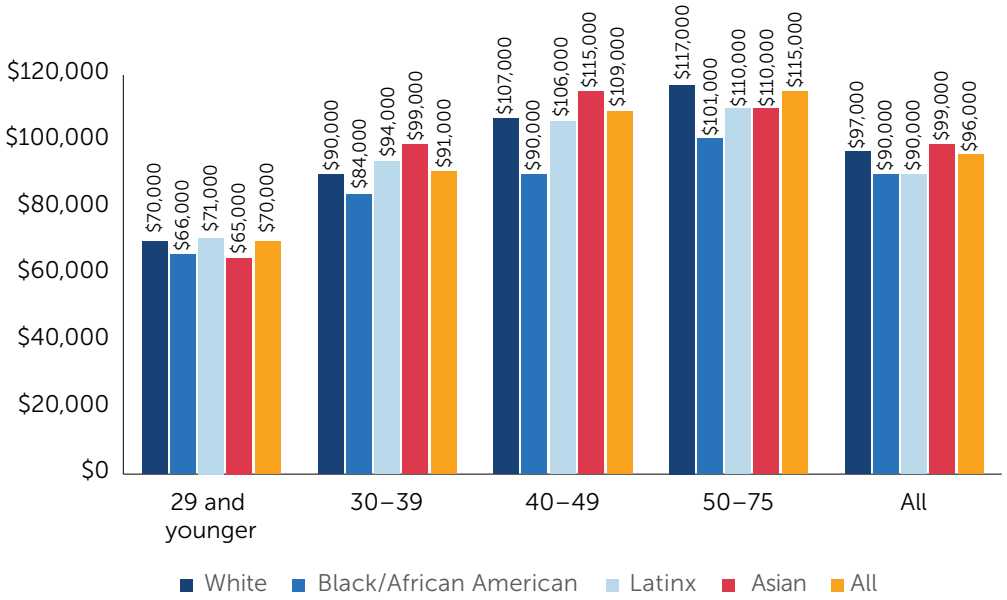


Source: Georgetown University Center on Education and the Workforce analysis of data from the National Science Foundation, 2017. "National Center for Science and Engineering Statistics: Survey of Doctoral Recipients."
*Note: Data for Black/African American Industrial engineers is suppressed because of small sample size.

However, Asian engineers see the greatest jump in earnings after the youngest category, and on average, Asian engineers earn more than any other racial or ethnic engineering group. Black/African American and Latinx engineers experience the slowest increases in earnings with age, and on average, these groups earn $6,000 less annually than the total engineering population[56] (Figure 13).

56 Georgetown University Center on Education and the Workforce analysis of National Science Foundation, 2018. "National Center for Science and Engineering Statistics: Women, Minorities, and Persons with Disabilities in Science and Engineering Data Tables."

Figure 13. The biggest gains in earnings are made between engineers in their 20s and those in their 30s. After that, gains in wages are more gradual for engineers of all races/ethnicities.



Source: Georgetown University Center on Education and the Workforce analysis of National Science Foundation, 2018. "National Center for Science and Engineering Statistics: Women, Minorities, and Persons with Disabilities in Science and Engineering Data Tables."

Conclusion

Despite efforts that pre-date the Civil Rights movement to attract a diverse group of students to engineering, stark disparities still exist in workforce participation in engineering by race. Black/African American and Latinx representation in the engineering workforce is still subpar despite the proliferation of programs that purportedly encourage Black/African American and Latinx students to pursue engineering.

While many aspire to careers in engineering, Black/African American and Latinx students have struggled with access to engineering majors at the college level—and indeed struggle even with access to the gatekeeper classes in high school that prepare a student to be an engineering major. Sadly, bias—conscious and unconscious—still exists even in providing explanations for why there are continued differences in access and representation within the discipline. Some believe the underrepresentation of Blacks/African Americans and Latinx workers in the engineering workforce is due to limited access to high quality education and opportunities, but others believe it is because Black/African American and Latinx students are not interested in engineering. Those views often differ by the race/ethnicity of the person giving their opinion. Furthermore, views on whether discrimination exists in hiring practices or promotion opportunities also differ by race. Black/African American and Latinx STEM employees are almost four times more likely than White and Asian STEM employees to believe that underrepresentation in STEM jobs by Black/African American and Latinx workers is due to discrimination.[57]

When Black/African American and Latinx students are able to obtain engineering degrees and enter the workplace, they face additional hurdles: underdefined career pathways as well as pay differences. White and Asian engineers are not only more likely to work, but also more likely to work in field once they secure an engineering degree. Women in general are much less likely to work in the engineering field. Latina women, especially, are likely to exit the engineering professions for alternative fields, often in education.

A focus on diversifying the engineering industry sends a signal about who and what we value.

By field of study, disparities also still exist by race and gender. The subdivisions within the engineering field that are disproportionately chosen by Black/African American or Latinx workers often pay less. Differences in subdivisions of fields alone is insufficient to explain disparities in earnings, though. When Black/African American and Latinx employees work in what are usually the higher paying subfields, they often do so at lower wages than White or Asian workers, even after controlling for educational attainment level. Legislation already exists to reduce disparities in pay that are proven to have resulted from discrimination. But legislation alone has not erased long-standing cultural and gender norms that have led to these disparities in earnings by race/ethnicity. Improving transparency in pay practices is therefore another important step toward achieving greater parity in earnings by race/ethnicity.

57 Parker and Funk, "Blacks in STEM jobs are especially concerned about diversity and discrimination in the workplace," 2018.

To increasingly diversify the engineering field, we will need to start with the educational system before college. White and Asian students graduate from public high school at rates about 10 percentage points higher than Black/African American and Latinx students.[58] When Black/African American and Latinx students go to college, they disproportionately transfer or drop out of engineering programs. They also disproportionately attend open-access two-year and four-year colleges with far less resources than other colleges. Often, these under-resourced colleges don't have engineering programs. About 37 percent of White students were enrolled during the 2018-19 academic year in a college that offered a bachelor's degree in engineering. That was true for just 24 percent of Black/African American students and 28 percent of Latinx students.[59] The engineering profession will not diversify if Black/African American and Latinx students don't even have the opportunity to study engineering. We need to better manage career development though counseling, management of degree choices, and mentoring of Black/African American and Latinx job candidates at every stage of their personal and professional development—including college and the workforce.

Making changes in diversifying the engineering profession will not solve all of the inequities in society. After all, engineers make up only about 2 percent of the workforce. Still, diversity in prestigious occupations such as engineering is important because these jobs pay well and offer great opportunity for upward mobility, and they are an indicator of equality of opportunity in society. A focus on diversifying the engineering industry sends a signal about who and what we value. Starting with recruiting, admission, counseling staff, and, most importantly, faculty, we need to redouble our efforts to make the engineering classroom more welcoming and diverse. This objective should never be taken lightly. Faculty representation affects behaviors and interactions on college campuses, and can also affect perceptions of those whom the academic institutions view as worthwhile, while shaping students' viewpoints of what is possible in learning and the world of work.[60]

58 Georgetown University Center on Education and the Workforce analysis of data from Table 219.46 of the Digest of Education Statistics, 2019.
59 Georgetown University Center on education and the Workforce analysis of data from the Integrated Postsecondary Data System (IPEDS), 2018–19.
60 Hurtado et al., "Assessing the Value of Climate Assessments," 2008.

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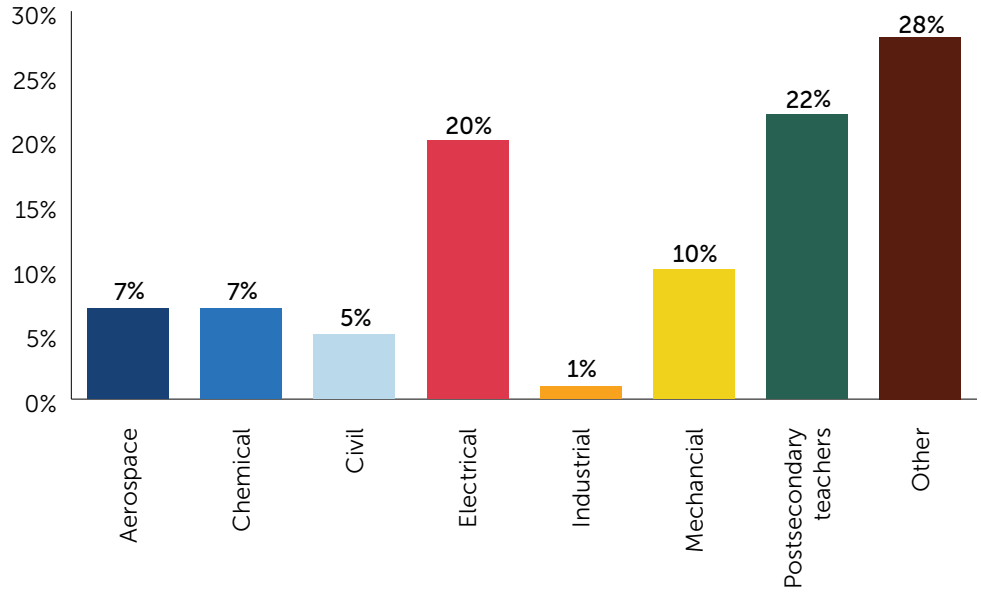
Appendix A: Engineering Doctoral Fields

Electrical engineering is the most popular field among employed doctoral engineers (20 percent).[1] Industrial (1 percent) and civil (5 percent) engineering are the least frequent fields, overall, for engineers with doctoral degrees.[2]

Figure A1. Occupational field of doctoral engineers



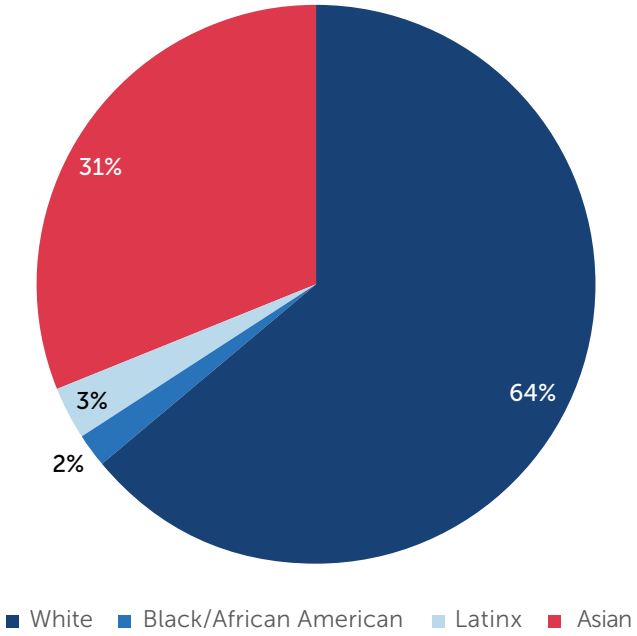
Source: Georgetown University Center on Education and the Workforce analysis of National Science Foundation, 2017. "National Center for Science and Engineering Statistics: Survey of Doctoral Recipients."

Chemical, electrical, and mechanical engineers with doctoral degrees are all split relatively evenly between Asian and White engineers, with Black/African American and Latinx engineers each comprising only 2 to 3 percent of the fields.[3] The largest representation of Black/African American doctoral-level engineers is in civil and industrial engineering, in which they make up

1 Georgetown University Center on Education and the Workforce analysis of National Science Foundation, 2017. "National Center for Science and Engineering Statistics: Survey of Doctoral Recipients."
2 Georgetown University Center on Education and the Workforce analysis of National Science Foundation, 2017. "National Center for Science and Engineering Statistics: Survey of Doctoral Recipients."
3 Georgetown University Center on Education and the Workforce analysis of National Science Foundation, 2017. "National Center for Science and Engineering Statistics: Survey of Doctoral Recipients."

about 4 percent of the total.[4] The largest representation of Latinx doctoral-level engineers is in civil engineering and postsecondary teaching (5 percent).[5]

Figure A2. Aerospace, aeronautical, and astronautical engineers with doctoral degrees, by race

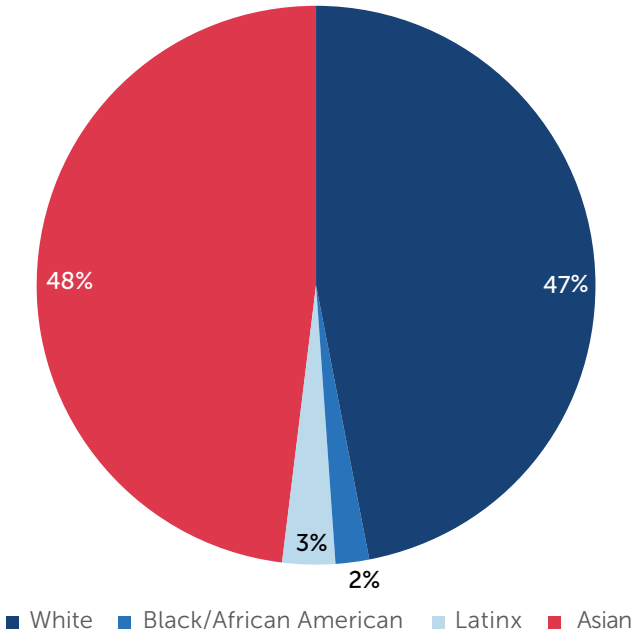


Source: Georgetown University Center on Education and the Workforce analysis of data from the National Science Foundation, "National Center for Science and Engineering Statistics: Survey of Doctoral Recipients," 2017.

4 Georgetown University Center on Education and the Workforce analysis of National Science Foundation, 2017. "National Center for Science and Engineering Statistics: Survey of Doctoral Recipients."

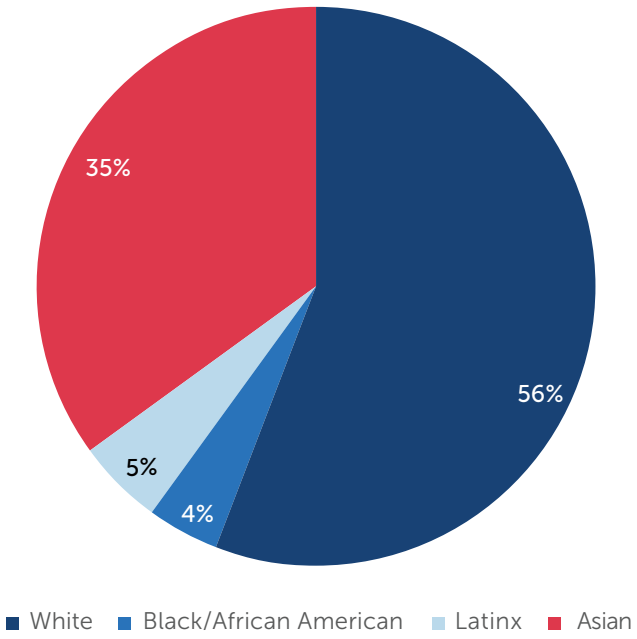
5 Georgetown University Center on Education and the Workforce analysis of National Science Foundation, 2017. "National Center for Science and Engineering Statistics: Survey of Doctoral Recipients."

Figure A3. Chemical engineers with doctoral degrees, by race



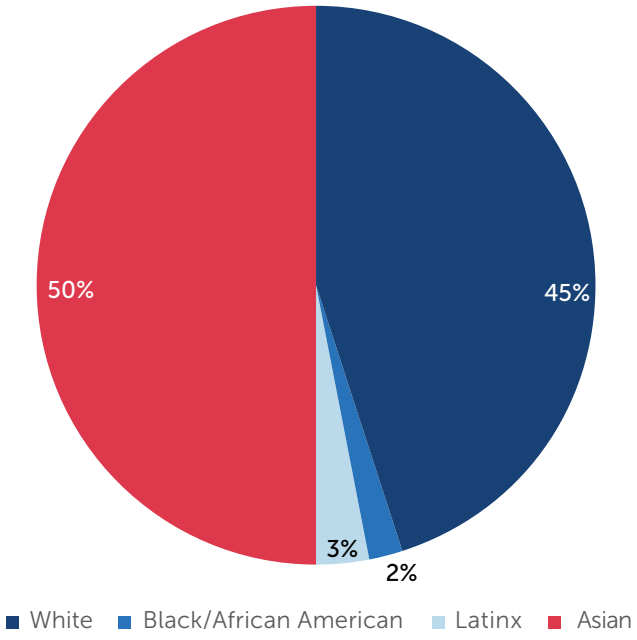
Source: Georgetown University Center on Education and the Workforce analysis of data from the National Science Foundation, "National Center for Science and Engineering Statistics: Survey of Doctoral Recipients," 2017.

Figure A4. Civil engineers with doctoral degrees, by race



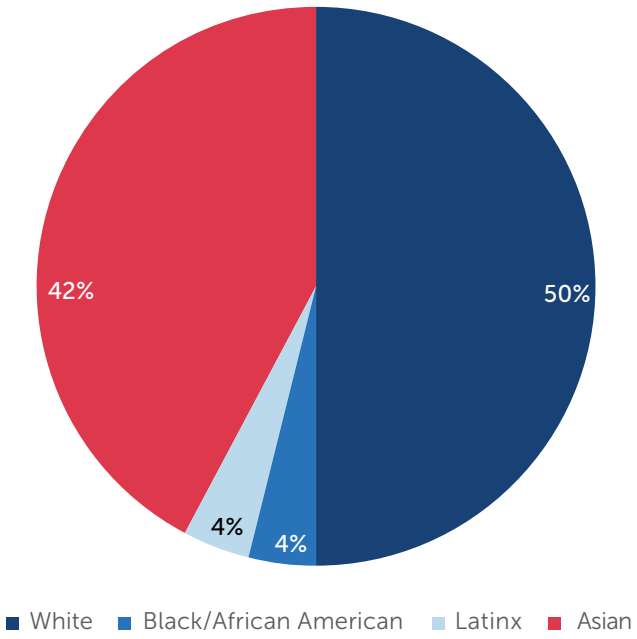
Source: Georgetown University Center on Education and the Workforce analysis of data from the National Science Foundation, "National Center for Science and Engineering Statistics: Survey of Doctoral Recipients," 2017.

Figure A5. Electrical engineers with doctoral degrees, by race



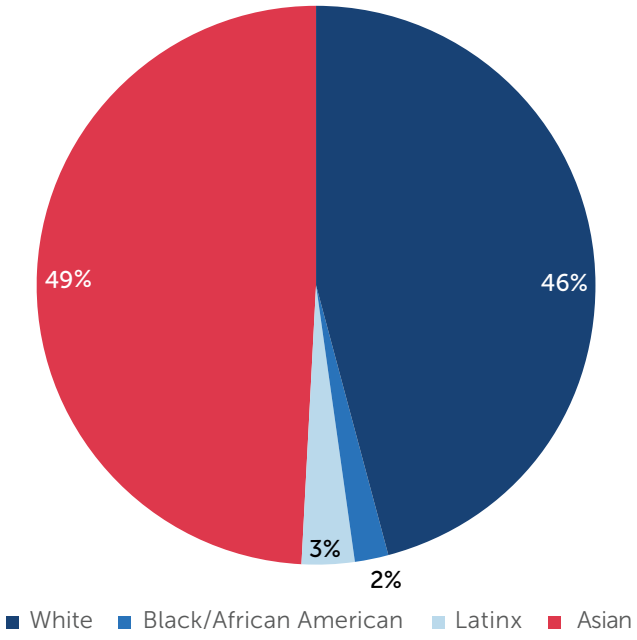
Source: Georgetown University Center on Education and the Workforce analysis of data from the National Science Foundation, "National Center for Science and Engineering Statistics: Survey of Doctoral Recipients," 2017.

Figure A6. Industrial engineers with doctoral degrees, by race



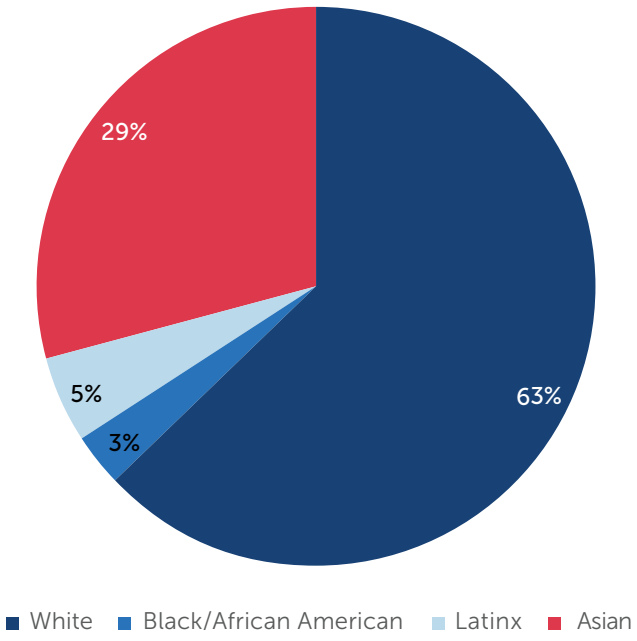
Source: Georgetown University Center on Education and the Workforce analysis of data from the National Science Foundation, "National Center for Science and Engineering Statistics: Survey of Doctoral Recipients," 2017.

Figure A7. Mechanical engineers with doctoral degrees, by race



Source: Georgetown University Center on Education and the Workforce analysis of data from the National Science Foundation, "National Center for Science and Engineering Statistics: Survey of Doctoral Recipients," 2017.

Figure A8. Postsecondary engineering instructors with doctoral degrees, by race



Source: Georgetown University Center on Education and the Workforce analysis of data from the National Science Foundation, "National Center for Science and Engineering Statistics: Survey of Doctoral Recipients," 2017.

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