Status of Underrepresented Minorities in Science, Technology, Engineering, and Mathematics (STEM)

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UPDATES: April 20, 2019

November 15, 2015

One of the most frequently discussed topics in academic and governmental circles today is what should be the role of colleges and universities and governmental agencies at the Federal, State, and Local level in increasing the number of underrepresented minorities[1] in the professional ranks of mainstream America, the creation and maintenance of effective, systemic programs that improve: the racial and ethnic climate in academe; the promotion of understanding and sensitivity on the various campuses; and the recruitment, retention, and graduation of these underrepresented minority students. This topic of discussion—especially for science, technology, engineering, and mathematics (STEM) fields—is extant at the undergraduate as well as at the graduate level. In this document ("White Paper"), we provide a historical overview of the extraordinarily long–yet still present–persistent–essentially unabated–underrepresentation problem. We also provide current data (current and spanning the past decade) and reports with sources. Using student graduation rates (a major measure indicator of university progress or lack of progress), we provide–for selected universities–the latest data available from the National Center for Education Statistics and other organizations. Finally, we present a sample University Organizational Unit Plan outline that we have found to be functionally effective in partially alleviating some of the nexus-like problems associated with underrepresented minority success in academic programs.

[1] We define underrepresented minorities as African-American (Black), Hispanic (Latino), or Native Americans.

EXECUTIVE SUMMARY

Purpose of this Document

The primary objective of this "White Paper" is to suggest solutions which address this chronic and acute problem of identifying, attracting, motivating, retaining, and then preparing talented underrepresented minority undergraduate students for graduation with STEM baccalaureate degrees, for further STEM graduate studies—especially at the doctorate level, and for productive careers in science, technology, engineering, mathematics and associated disciplines.

Specifically, suggested solution components should be as comprehensive, multi-disciplinary, and as collaborative as possible. The mission goals of a really good solution should include the capability: (1) To increase significantly the number and quality of underrepresented minority students receiving STEM baccalaureate degrees; (2) To increase the size of the pool of interested and academically qualified underrepresented minorities eligible for STEM graduate study; and (3) To increase the number of underrepresented minority students entering graduate schools who ultimately attain the doctorate in STEM fields.

Solution Components

- Seminal solution components of a topical nature include ion beam and accelerator physics theory and applications, materials science and condensed matter physics, chemistry, plasma and fluid dynamics science, environmental science theory and applications, quantum and nuclear physics theory and applications, computational science, mathematical modeling theory and applications, computer sciences, nanoscience theory and applications and associated nanotechnology, medical physics, and engineering associated with the afore-mentioned topics.

- Another seminal component (and a critical one) is the creation and administration of effective programs designed to identify, attract, motivate, retain, and prepare talented minority undergraduate students engaged in the topical components mentioned above for graduation with STEM baccalaureate and graduate degrees.

- Many information-rich, non-profit, non-partisan, government, and discipline-oriented society websites exist from which one can derive the following conclusion: ***Universities which have the most success in recruiting, retention, and graduation of underrepresented minorities generally have programs and resources of a systemic nature and which have a critical mass of motivated and appropriately rewarded faculty and staff personnel***.

- The lack of sufficient numbers of underrepresented minorities in science, technology, engineering, and mathematics fields is a problem of serious national concern and a solution should entertain the development and implementation of an *alliance* or *consortium* arrangement with universities, national laboratories, foundations, governmental units, and industry. It is mandatory that such an arrangement must span all or almost all federally funded agencies that have some role in education and research!

- ***A solution plan should also provide early research experience and bridge programs to participating students, strengthen the academic environment at all participating universities; provide mentoring, counseling, and role models for participants; and further promote the partnerships among alliance or consortium partners*. *Furthermore, solution plan faculty and staff personnel must be able to have designated "ombudsmen" with authority to solve expeditiously problems encountered by the students they serve. That implies that university administrative superiors must be very sincerely involved in solution plans at a root level—we have found that quite often program–student problems are readily solved by plan–participating professors when they have access to pertinent university infrastructural administrators who know they have implicit instructions to facilitate solvability of problems brought to their attention. Succinctly put, university offices at the presidential and provost level must let it be known to all faculty and staff that they fully support solution plans!***

Overview and Some Historical Background

Upon reviewing data from 1972-2006, the U.S. Department of Education, National Center for Education Statistics (NCES)[2] found that although the college enrollment participation rate[3] has improved for both Whites and African-Americans, the gap between the two groups has fluctuated resulting in no essential change over that period. In 2006, the gap was 13% [69% (White) versus 55% (Black)]. For Hispanics, a very similar situation obtains with a gap of 13% [69% (White) versus 58% (Hispanics)]. *Income is a factor in the above-mentioned data*[4]: The college enrollment rate was higher for high-income family students and lower for those students whose parents had less education or were low-income[5]. *Students whose parents had less education* also had lower rates of college enrollment in the period 1992–2006 when compared with students whose parents had a bachelor degree or higher.

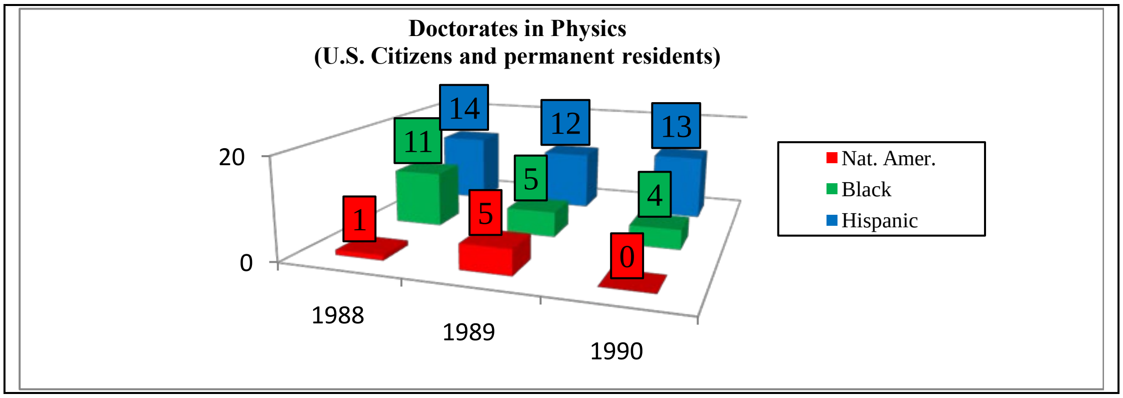

Figure 1. Black, Hispanic, and Native American doctoral recipients in Physics (Source: NSF detailed statistical tables and Department of Education/National Center for Education Statistics). (Prepared by M. D. Slaughter)

In 2007, African-Americans comprised roughly 4 percent of all employed doctorate scientists and engineers in this country even though they were about 12 percent of the general population while Hispanics comprised roughly 3% of all employed doctorate scientists and engineers in this country but constituted about 15 percent of the general population. In 1988 only 47 African-Americans earned science Ph.D.s and only 15 in engineering. While a few more Hispanics went into hard science fields, their numbers were quite small. According to AIP[6], "An additional obstacle facing Hispanic students is a significant age difference between them and other race-ethnic groups." In 1980, about 9.5% of high school seniors 19 years of age and older were Hispanic, whereas 8% were Black. The national average at the time was only 4%. In 1980, Hispanics earned 69 doctorates in the physical sciences and 43 in engineering, or only 2.3% of all doctorates awarded to U.S. citizens in those areas, whereas American Indians earned 0.3% (11 doctorates in the physical sciences and 4 in engineering) of all doctorates awarded to U.S. citizens. In order to illustrate graphically the serious and disturbing nature of the gross underrepresentation of minorities in science, we use the field of Physics as an example discipline (See Figure 1, Figure 1A, Table 1, and Figure 2).

[2] U.S. Department of Education, National Center for Education Statistics (http://nces.ed.gov/fastfacts) (2009).

[3]The college enrollment rate is defined as the percentage of all high school completer ages 16–24 that enroll in college (2- or 4-year) in the fall immediately after high school.

[4]*Paying for College: Students from Middle-Income Backgrounds*, http://trends.collegeboard.org/sites/default/files/trends-2009-middle-income-students-one-page.pdf, (2010). See Reference [20] for latest data.

[5]Low income refers to the bottom 20 percent of all family incomes while high income refers to the top 20 percent of all family incomes. Middle-income refers to the remaining 60%

[6]*Who Takes Science? A Report on Student coursework in High School Science and Mathematics,* Roman Czujko and David Bernstein. American Institute of Physics (AIP), New York, New York (1989).

DOCTORATES IN SELECTED STEM FIELDS (U. S. CITIZENS AND PERMANENT RESIDENTS)
BY
RACE/ETHNICITY AND DISCIPLINE (1988-1990)
Table 1

Discipline	Year	Black	Hispanic	Nat. Amer.	Asian	Other	White	Total
Chemistry	1988	17	43	5	48	29	1235	1377
	1989	20	40	5	42	24	1167	1276
	1990	12	48	3	53	24	1218	1358
Computer Science	1988	1	2	0	18	6	217	244
	1989	0	3	2	14	15	240	274
	1990	1	3	0	9	8	269	290
Engineering	1988	19	43	4	141	44	1530	1781
	1989	24	34	7	173	43	1583	1864
	1990	28	39	4	152	35	1669	1927
Mathematics	1988	2	3	2	17	10	308	342
	1989	6	8	0	13	15	351	393
	1990	4	7	1	9	7	341	369
Physics	1988	11	14	1	19	32	646	723
	1989	5	12	5	33	21	599	675
	1990	4	13	0	32	25	645	719

U. S. Citizen doctoral recipients in chemistry, computer science, engineering, mathematics, and physics in 1988, 1989, and 1990. (Source: NSF detailed statistical tables). (Prepared by M. D. Slaughter)

DOCTORATES IN PHYSICS (U. S. CITIZENS AND PERMANENT RESIDENTS)
BY
RACE/ETHNICITY AND DISCIPLINE (1988-1990 and 1997–2001)
Table 1A.

Discipline	Year	Black	Hispanic	Nat. Amer.	Asian	Other	White	Total
Physics	1988	11	14	1	19	32	646	723
	1989	5	12	5	33	21	599	675
	1990	4	13	0	32	25	645	719
	1997	14	22	2	157	29	659	883
	1998	10	18	1	111	32	652	824
	1999	8	16	3	66	19	630	742
	2000	16	23	1	68	13	571	692
	2001	16	15	0	68	25	558	682

The American Council on Education[7] found that the college participation rate of low-income African-American high school graduates between 18 and 24 years old dropped from 40 percent in 1976 to 30 percent in 1988. Low-income black males are participating at a much lower rate than low-income black females. In 1988, only 23 percent of low-income black males were enrolled in college, as compared to 37.2 percent 13 years ago. The college participation rate of low-income black women dropped from 41.7 percent to 35.6 percent during the same period, while the college participation rate for low-income white males dropped from 34.9 percent to 32.1 percent. For middle-income African-Americans, the more severe declines in college participation occurred during the late 1970's and early 1980's. By 1988, the college participation rate of middle- income African-Americans had fallen to 36 percent from 53 percent in 1976, with black males affected most severely.

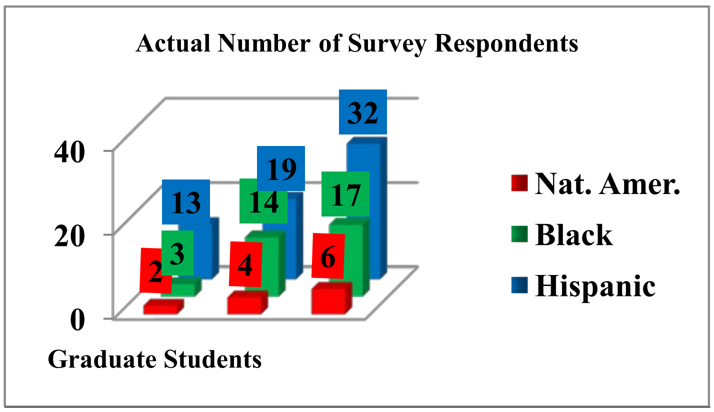

Figure 2. Underrepresented minority graduate student and non-graduate student respondents to an American Physical Society membership survey. (Source: APS 1990 Membership Survey). (Prepared by M. D. Slaughter).

An American Physical Society (APS) membership survey[8] indicated that, out of 2771 respondents to the survey, only 0.6% (17) were Black, 1.2% (32) were Hispanic, and 0.2% (6) were Native Americans. The survey also strongly indicated that an already poor production rate for Black physicists would become worse because of the relatively small number of Black graduate students in physics *even when compared to the number of Hispanic graduate students in physics* (See Figure 2). Also, only about 2% of all APS members identified themselves as belonging to a minority group—an *order of magnitude* less than the 20% minority representation then extant in the general population. Those nation-wide data[9] and APS survey results indicated that the production rate for minority physicists would not significantly increase in the next few years and *an already poor production rate for Black physicists would become worse*[10].

[7]American Council on Education, *Minorities in Higher Education: Eight annual Status Report, 1989* (Washington, D. C.).
[8]M. A. Forman, *The 1990 APS Membership Survey: Preliminary Report*. American Physical Society, New York, New York (1991).
[9]National Science Foundation, *Science and Engineering Doctorates: 1960-90*, NSF 91-310 final, Detailed Statistical Tables (Washington, D. C., 1991).
[10]Milton D. Slaughter, *Status of Minorities in Physics: Findings and Recommendations of the American Physical Society Committee on Minorities in Physics*. Presentation for the National Science Foundation Advisory Committee for Physics, October 18, 1991, Washington, D.C.

It is interesting to compare the 1988-1990 data with data from the period from 1997-2012 (See Figure 3, Figure 4, and Tables 2A and 2B): According to the American Institute of Physics (AIP) (See Figure 4.): *"Hispanic Americans and African Americans continue to be under represented among physics PhD recipients when compared to 26 - 35 year olds in the U.S. population. The number of Hispanic Americans and African Americans earning physics PhDs averaged 28 and 17 degrees respectively for the classes of 2010 through 2012. Of the 195 departments that offered a physics PhD in 2012, 4 were located at a Historically Black College and University (HBCU). These 4 departments were responsible for one-third of the PhDs earned by African Americans in the classes of 2010 through 2012."*

From a very interesting article in The Chronicle of Higher Education[11], we quote: "*Despite efforts to increase the number of doctorates awarded to African-Americans over the last decade, the latest federal data show that progress has been nonexistent.*" In addition, from that same article, we quote: "*For comparison, slight progress was made for another underrepresented minority group—Hispanics and Latinos—during the past 10 years. They made up 5.8 percent of doctorate recipients in 2014, up from 4.8 percent a decade earlier.*"

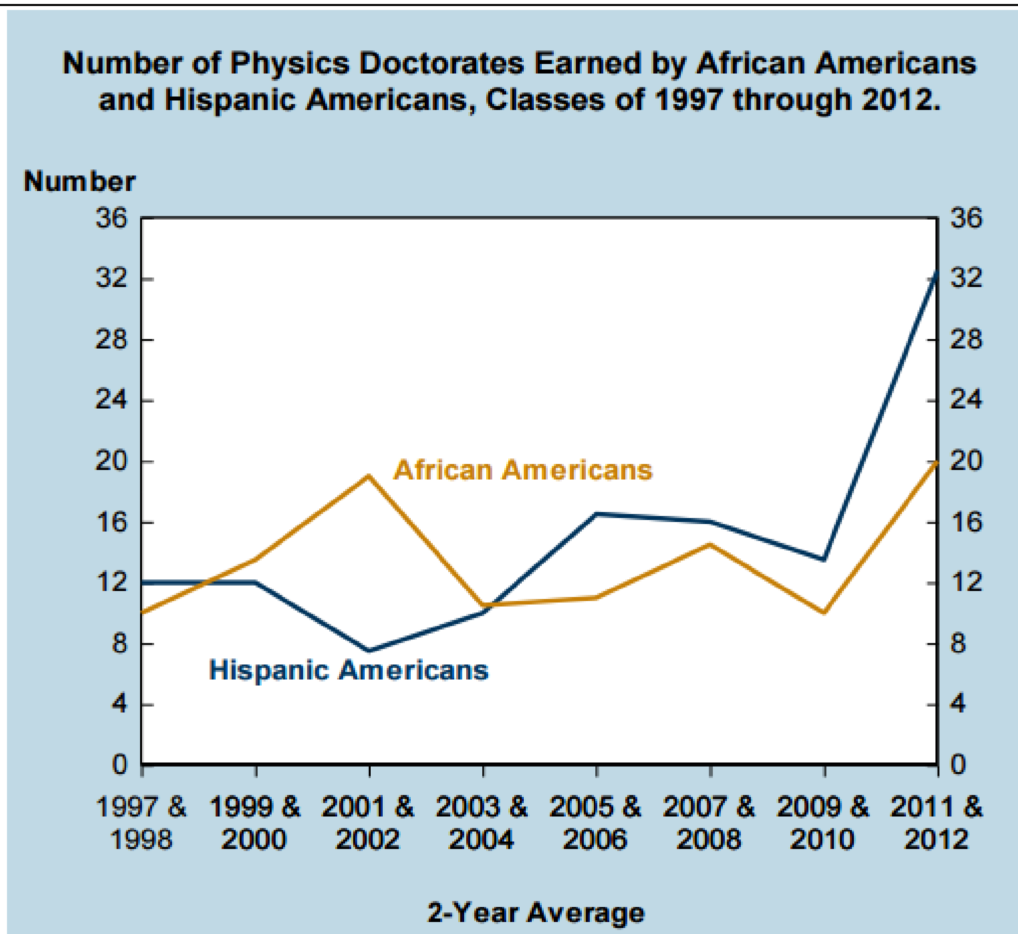

Figure 3. Number of Physics Doctorates Earned by African-Americans and Hispanic Americans. Source: Trends in Physics PhDs: Patrick J. Mulvey and Starr Nicholson https://www.aip.org/sites/default/files/statistics/graduate/trendsphds-p-12.2.pdf

[11] The Chronicle of Higher Education, *Dearth of Black Ph.D. Recipients Will Complicate Efforts to Diversify Faculty*, Vimal Patel, December 4, 2015, which references (also other sources) a report by the National Science Foundation, National Center for Science and Engineering Statistics, 2015. *Doctorate Recipients from U.S. Universities: 2014*.

Race and Ethnicity of Physics PhDs, Classes of 2010 through 2012.

	3-Year Average Number	Percent of all Physics PhDs	Percent of U.S. Physics PhDs*
White	744	45	88
Asian American	41	2	5
Hispanic American	28	2	3
African American	17	1	2
Other U.S. Citizens	13	1	2
Non-U.S. Citizens	826	49	-
Total	1,669	100%	100%

*Based on a 3-year average of 843 U.S. citizens.

Figure 4. Source: Trends in Physics PhDs: Patrick J. Mulvey and Starr Nicholson
https://www.aip.org/sites/default/files/statistics/graduate/trendsphds-p-12.2.pdf

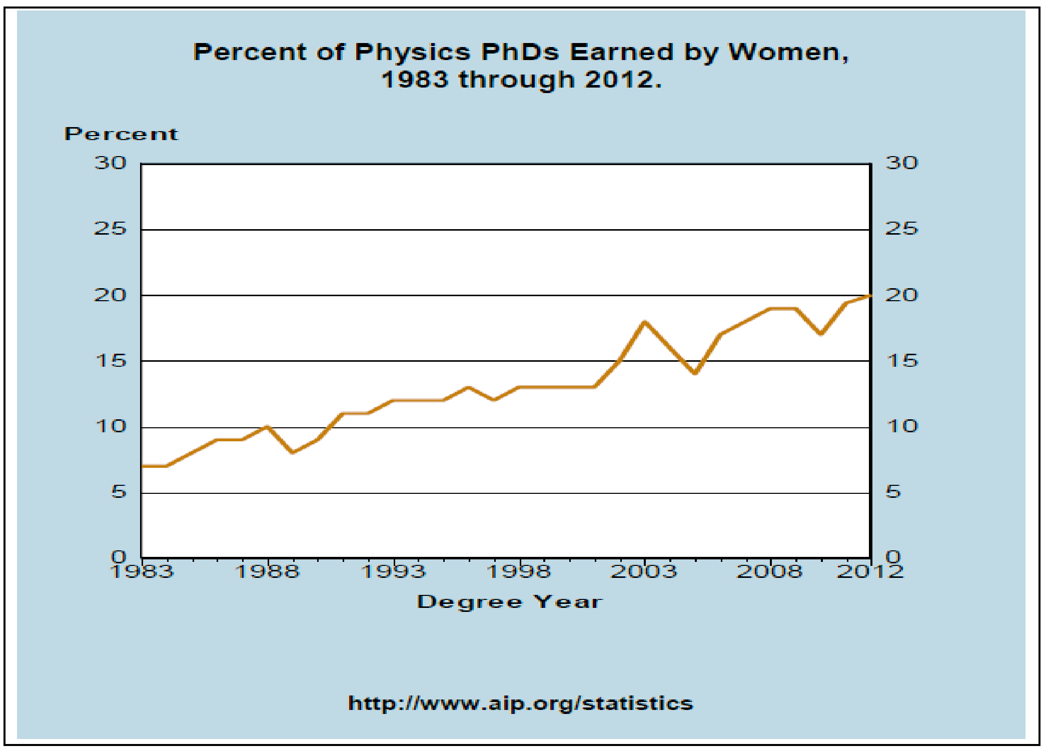

Figure 5. Source: Trends in Physics PhDs: Patrick J. Mulvey and Starr Nicholson
https://www.aip.org/sites/default/files/statistics/graduate/trendsphds-p-12.2.pdf

Also, according to AIP (see Figure 5.): "*The representation of women at the PhD level has reached an all-time high in the class of 2012. In the class of 2012, 20% of the physics PhDs were earned by women, this is up from 13% 11 years earlier. This increase along with a growth in the overall number of physics PhDs awarded has resulted in a sharp increase in the number of women receiving degrees. Women earned 354 of the physics PhDs in the class of 2012, up from only 153 in 2001 (a 131% increase)*".

DOCTORATES IN SELECTED STEM FIELDS (U. S. CITIZENS AND PERMANENT RESIDENTS) BY RACE/ETHNICITY AND DISCIPLINE (2002-2006)

Table 2A.

Discipline	Year	Black	Hispanic	Nat. Amer.	Asian	Other	White	Total
Chemistry	2002	46	48	7	120	103	1,031	1,355
	2003	47	44	6	111	88	1,078	1,374
	2004	51	58	9	127	90	986	1,321
	2005	37	57	6	139	106	1,021	1,366
	2006	43	70	6	160	102	1,080	1,461
Computer Science	2002	21	19	1	72	33	264	410
	2003	17	11	1	55	47	282	413
	2004	18	18	1	62	47	309	455
	2005	19	17	0	88	68	308	500
	2006	21	6	6	92	70	356	551
Engineering	2002	80	88	6	357	138	1,592	2,261
	2003	94	106	12	292	162	1,571	2,237
	2004	99	101	8	346	160	1,633	2,347
	2005	101	98	6	372	179	1,696	2,452
	2006	110	105	7	470	204	1,818	2,714
Mathematics	2002	21	19	1	72	33	264	410
	2003	17	11	1	55	47	282	413
	2004	18	18	1	62	47	309	455
	2005	19	17	0	88	68	308	500
	2006	21	6	6	92	70	356	551
Physics	2002	22	19	2	45	43	473	604
	2003	17	19	0	53	65	437	591
	2004	11	13	3	37	56	442	562
	2005	15	16	1	62	56	435	585
	2006	11	21	3	54	50	496	635

U. S. Citizen and permanent resident doctoral recipients in chemistry, computer science, engineering, mathematics, and physics in 2002—2006. (SOURCE: National Science Foundation, National Center for Science and Engineering Statistics, special tabulations of U.S. Department of Education, National Center for Education Statistics, Integrated Postsecondary Education Data System, Completions Survey, 2002–12). (Prepared by M. D. Slaughter)

DOCTORATES IN SELECTED STEM FIELDS (U. S. CITIZENS AND PERMANENT RESIDENTS) BY RACE/ETHNICITY AND DISCIPLINE (2007-2012)

Table 2B.

Discipline	Year	Black	Hispanic	Nat. Amer.	Asian	Other	White	Total
Chemistry	2007	64	65	3	155	106	1,071	1,464
	2008	62	89	4	150	116	993	1,414
	2009	66	86	7	148	134	1,145	1,586
	2010	59	72	8	151	157	1,095	1,542
	2011	67	79	7	139	169	1,131	1,592
	2012	58	76	4	169	173	1,104	1,584
Computer Science	2007	30	17	3	111	82	437	680
	2008	24	16	0	87	94	446	667
	2009	30	23	2	116	76	483	730
	2010	33	17	3	124	99	506	782
	2011	31	19	3	130	75	514	772
	2012	39	26	2	129	97	526	819
Engineering	2007	117	138	8	508	250	1,973	2,994
	2008	128	130	15	501	294	2,112	3,180
	2009	139	153	19	504	324	2,235	3,374
	2010	154	196	10	517	344	2,286	3,507
	2011	141	182	15	603	379	2,393	3,713
	2012	175	191	11	575	382	2,592	3,926
Mathematics	2007	30	17	3	111	82	437	680
	2008	24	16	0	87	94	446	667
	2009	30	23	2	116	76	483	730
	2010	33	17	3	124	99	506	782
	2011	31	19	3	130	75	514	772
	2012	39	26	2	129	97	526	819
Physics	2007	20	22	4	60	71	519	696
	2008	15	20	1	57	79	582	754
	2009	11	25	3	53	86	603	781
	2010	18	32	2	60	104	592	808
	2011	17	37	3	65	125	681	928
	2012	21	51	1	65	113	734	985

U. S. Citizen and permanent resident doctoral recipients in chemistry, computer science, engineering, mathematics, and physics in 2007—2012. (SOURCE: National Science Foundation, National Center for Science and Engineering Statistics, special tabulations of U.S. Department of Education, National Center for Education Statistics, Integrated Postsecondary Education Data System, Completions Survey, 2002–12). (Prepared by M. D. Slaughter)

From Reference [4], we quote (based on 2008-2010 data. See Reference [21] for the latest 2013 data):

"In 2008, the middle 20% of families in the United States had incomes ranging from $49,326 to $75,000. The mean income for this group of families was $61,582. This is one possible way of defining "middle class." A broader definition might include all families who are above the lowest quintile and below the highest quintile. This 60% of families had incomes ranging from $27,801 to $113,025 in 2008. Over the past decade, average incomes for middle-income families have been stagnant after adjusting for inflation. Families at the upper end of the broad middle-income range have seen their incomes increase slightly, while those at the lower end of this range have seen their incomes decline. Over the past decade, incomes have not risen measurably for anyone. But in the previous two decades, incomes rose rapidly at the upper end of the income distribution, and overall inequality increased significantly. During this time period, middle-income families lost income relative to the wealthy but gained relative to low-income families." And also:

"In addition to tuition and fees, students' total cost of attendance includes room and board, and allowances for books and supplies, transportation, and other expenses. The total cost of attendance, used to determine eligibility for need-based aid, varies considerably by institutional sector. In 2009-10, average total expenses at public two-year colleges for students living off campus were $14,285. At public four-year institutions, in-state students living on campus faced total average expenses of $19,388; for students enrolled in private not-for-profit four-year institutions who lived on campus, the total cost of attendance was just over $39,000. According to the federal formula for financial aid eligibility, for families of four with one child in college and no discretionary liquid assets, only those with incomes of about $95,000 or higher would be able to pay the average published price of tuition and fees and room and board at public four-year colleges without financial aid. About 28% of all families have incomes this high."

Data is available for 2002—2012 and unfortunately, the production rate for underrepresented minority physicists and other scientists has not qualitatively or quantitatively changed significantly for the better. Indeed, one could make a strong argument that production rates for Black, Hispanic, and Native American physicists, mathematicians, engineers, computer scientists, and chemists has effectively worsened in most STEM disciplines—Just compare the 21st century data with that of the period 1988-1990!

It is crystal-clear from the data in Tables 2A and 2B (these tables and all other tables omit multi-racial data) that the situation for minorities in chemistry, computer science, engineering, and mathematics is not qualitatively different from that in physics[12]. *It is also clear that the use of percentage increase or decrease is unwarranted due to the very low absolute number of minority doctoral recipients* in any particular category (indeed, that is the *prima facie* reason for utilizing the term "underrepresented minority"). Again, one sees that the problem of an extremely low doctoral production rate for Blacks and Hispanics in chemistry, computer sciences, engineering, mathematics, and physics is especially serious. These factors all imply strongly that the *systematic development of effective programs that will increase the pool of minority scientists is imperative and must commence very, very soon.*

We note that that survey data obtained from the U. S. Department of Education, National Center for Education Statistics is completed by institutional academic units that provide counts of the doctorate recipients graduating from their units. Survey data (Survey of Earned Doctorates [SED]—in particular NSF SED Tabulation Engine results are SED based) from the National Science Foundation is self-reported by individual doctorate recipients. We also note that often the NSF and NCES do not count numbers in the same way because their definitions of "research doctorate" differ although this is less a source of statistical divergence for STEM fields. Finally, NCES did not provide 1999 data and the NSF sometimes tabulates data provided to it by NCES. Thus, one must be careful when comparing datasets.

[12] We present a number of charts and tables for various STEM disciplines and sub-disciplines later in this document.

An excerpt from *Symmetry Magazine*[13] is very relevant in this status report:

- Women and members of underrepresented minorities have gained ground in scientific fields.
- From 1966 through 2006, the percentage of PhDs earned by women in all science and engineering fields increased from 8 percent to 38 percent. But while women were earning 34 percent of all chemistry PhDs by 2006, they were awarded only 17 percent of physics PhDs that year, according to the National Science Foundation.
- As for minorities, their numbers are still so low that Roman Czujko, director of the statistical research center at the American Institute of Physics, does not like to state them in percentages. "To tell you the truth, when I produce reports that say that the numbers have grown by 0.4 percent, people read right past it," he says. "That's the kind of thing we're talking about here." But when people learn that of the 41,446 PhDs granted in physics from 1973-2005, only 303 went to blacks, 504 to Hispanics and 43 to Native Americans, "it has a startle effect," Czujko says.
- In addition, large percentages of physics students and researchers in the United States are foreign. American citizens earned 75 percent of physics PhDs in 1973, but only 40 percent in 2006, according to the National Science Foundation.
- As opportunities in their home countries increase, an increasing number of foreign scientists are expected to go back, and not enough Americans are being attracted into the workforce to replace them.
- With the United States on track to become a majority-minority nation by 2042, it needs to attract more American women and minorities into science to ensure a robust scientific workforce in the future and boost the country's competitiveness, security, and defense, says Ernestine Psalmas, senior program officer for the National Academy of Sciences.
- As Bill Valdez, director of the US Department of Energy's Office of Workforce Development for Scientists and Teachers, puts it, "We have a stewardship responsibility to ensure that the next generation of physicists exists out there."

Evidently, while good programs exist in many of the STEM national societies in the United States, the net, overall progress (certainly at the national level) in the STEM doctoral production rate for underrepresented minorities has not been encouraging. The analogous situation for women in STEM is measurably better but could be and should be much better[14].

An informative American Institute of Physics (AIP) report is "***Untapped Talent: The African American Presence in Physics and the Geosciences***"[15], where the University of New Orleans was among the top nine Universities that awarded the largest number of physics masters and geosciences bachelor degrees to African Americans during the period 2000-2004. Another AIP report–"***Minority Issues***"[16] where one finds that Florida International University ranked first[17] among the top universities that awarded physics bachelor degrees to Hispanics during the period 1998–2007. More very informative statistical data (charts, tables, Figures) can be found at the AIP site http://www.aip.org/statistics/—***Trends in Physics PhDs,*** Patrick J. Mulvey and Starr Nicholson, February 2014, ***Trends in Bachelor's Degrees Earned by Hispanics in Physical Science Fields, 2002-2012,*** and ***Hispanic Participation among Bachelor's in Physical Sciences and Engineering***, Laura Merner, (October 2014) are examples.

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[13] Symmetry Magazine (DOE Fermilab/SLAC Publication), Vol. 6, Issue 6, July 9, 2009.
[14] See Figure 5 for women in physics.
[15] AIP Pub. Number R-444, Roman Czujko, Rachel Ivie, and James H. Stith, September, 2008.
[16] http://www.aip.org/statistics/trends/minoritytrends.html.
[17] http://www.aip.org/statistics/trends/highlite/minority/hispanicphysics_bach.htm.

Another recent (July 2014) AIP report[18] (The report is entitled ***African Americans & Hispanics among Physics & Astronomy Faculty***) contains information vital to understanding and solving some of the long-standing problems currently extant in STEM education and job placement for underrepresented minority faculty in the United States workplace is available and in our opinion is required reading for those (faculty, educational leaders, and local, state, and federal leaders) in the US academic, research, and corporate community—especially as the US rapidly becomes more racially and ethnically diverse. Along with other reports at our disposal, this report indicates **a strong correlation between the number of underrepresented faculty and underrepresented doctoral production presence in universities and colleges**. Though the report focuses on physics and astronomy, it is clear to us that it has ramifications for many other disciplines. This is particularly true since mathematics and physics are ***backbone STEM*** disciplines ***fundamental*** to almost all others (like engineering for example) and are ***prerequisite-unique*** disciplines for colleges and universities, which provide the underpinning training for just about all other disciplines. We take the opportunity here to provide a few quotes, graphics, tables, and figures (words in red are colored by us for emphasis) from that report:

"There is significant clustering of African-American faculty members at Historically Black Colleges and Universities (HBCUs). About half (89 of 190) of African-American physics faculty members are employed by physics departments at HBCUs, which account for only 4% (30 of 746) of all physics departments. Half of all African-American physics faculty members work at just 23 departments, meaning that most physics students will never see a black faculty member. On the other hand, half of all Hispanic physics faculty members work at 46 departments. Although the departments with the largest number of Hispanic physics faculty members are in Puerto Rico and Texas, we do not see significant clustering of Hispanic faculty members in certain types of departments."

"The United States is becoming more and more diverse, but the representation of some minority groups in physics and astronomy lags behind. Although 13% of the US population is African American or black, and 17% is Hispanic (US Census), the representation of these two groups in physics and astronomy is much lower."

"A large proportion of African-American physics faculty members work at HBCUs, and two-thirds of all HBCU physics departments grant bachelors as their highest degree. Consequently, about half of all African-American faculty members work at bachelors departments, compared to 28% of Hispanic-American faculty members. Likewise, a smaller proportion of African Americans work at departments that grant PhDs (36%) than Hispanic Americans (49%). Compared to the 60% of all physics faculty members that work at PhD-granting departments, both Hispanic- and African-American physics faculty are under-represented among PhD-granting departments."

[18] African Americans & Hispanics among Physics & Astronomy Faculty, Rachel Ivie, Garrett Anderson, & Susan White.

Number of Physics Departments with African-American and Hispanic Faculty
by Highest Degree Awarded, 2012

Number of Departments that have ...	Highest Degree Awarded PhD	Master's	Bachelor's	Total
both African-American & Hispanic faculty	16	3	8	27
African-American faculty (and no Hispanic faculty)	18	10	45	73
Hispanic faculty (and no African-American faculty)	76	22	53	151
neither African-American nor Hispanic faculty	82	26	387	495
Total	192	61	493	746

AIP Statistical Research Center (http://aip.org/sites/default/files/statistics/faculty/africanhisp-fac-pa-122.pdf)

Program Solution Outline

Sample Proposed, Effective Program at a University Organizational Unit (UOU)

Primary Goal of the UOU Program (UOUP) is to Increase Significantly the Number of Undergraduate and Graduate Degrees in STEM Earned by Underrepresented Minorities.
Question: How to Achieve Effectively and Efficiently UOUP Mission Success?

We expect that proper implementation of the UOUP outlined below to increase the minority pool of STEM doctoral candidates of a typical UOU by approximately 20% on a nation-wide basis and within a time frame of five to six years or less. We have found that use of Vector Analysis courses to be most propitious not only for maximizing ongoing STEM student success but for also for STEM student graduation.

UOUP (Phase One–Freshmen and Sophomores)

- Systemic Recruitment of Targeted Minorities
- Systemic Retention of Targeted Minorities
- Systemic Use of STEM Gateway Courses for Targeted Minorities
    - Vector Analysis course under the in-place curriculum or the creation of a special topic course. Understanding and utilization of vectors is (generally) a major obstacle for STEM-UOUP participants.
    - Summer course(s) in STEM subject(s)—Interdisciplinary preferred
    - Summer "Hands-on" laboratory course involving student presentations
    - Integration and coordination and interfacing with ongoing UOU educational projects
- Systemic Recruitment of Minorities Who Require Additional Help (academic or financial)
- Provide Access to Visiting Minority Lectureship (VML) Scientists or Engineers or Mathematicians
    - Two or three day visit by a VML Scientist or Engineer or Mathematician who would give a STEM colloquium and meet with UOUP students and interested faculty and student organizations.

UOUP (Phase Two–Juniors and Seniors)

- Primary Research Experience Phase of UOUP Involves Juniors and Seniors.
- Systemic Use of STEM Gateway Courses.
    - Vector Analysis (including differential and integral calculus and an introduction to tensors) course under the in-place curriculum or the creation of special topic courses. Understanding and utilization of vectors at this level—stress and strain, deformations, heat transfer, electric and magnetic fields, *etc*.—is (generally) a major obstacle for potential STEM-UOUP participants. Success in this area almost guarantees UOUP mission success at the undergraduate level.
    - Summer course(s) in STEM subject(s)—Interdisciplinary and "job market aware" preferred.
- Summer Research Internship Placement along with Gateway Course Usage.
- Promote Systemic Change in Curriculum to Create Credit Courses Suitable (general degree credit is acceptable) for UOUP Undergraduate Researchers.
- Provide Access to Visiting Minority Lectureship (VML) Scientists or Engineers or Mathematicians.
    - Two or three day UOU visit by a VML Scientist or Engineer or Mathematician who would present a STEM colloquium, meet with UOUP students and interested faculty and student organizations, and provide additional services conductive to UOUP mission success.

UOUP (Phase Three–Graduate Students)

- Create an *Undergraduate to Graduate Bridge Phase* of the UOUP. Supply a program of support that will successfully orient students to the demands of graduate level education by providing an academic environment favorable and conducive to the successful transition from undergraduate to graduate study.
  - This will require close coordination with Colleges, Departments and Schools, and Centers.
  - Provide STEM RA and TA partial or full assistance as appropriate.
  - Enrich the undergraduate educational training of participants by involving them in undergraduate research and teaching as an integral part of the program.
- Provide Guidance and Advice to UOUP Graduate Students.
  - Involve STEM postdoctoral fellows.
    - This will require close coordination with Colleges, Departments and Schools, and Centers already involved in STEM research at the graduate level.
- Provide Access to Visiting Minority Lectureship (VML) Scientists or Engineers or Mathematicians.
  - Two or three day UOU visit by a VML Scientist or Engineer or Mathematician who would give a STEM colloquium and meet with UOUP students and interested faculty and student organizations.

In Order to Carry Out Effectively the UOUP, It is Very Important to Note the Following:

The Admissions, Bursar, and Financial Aid offices, the Research Office, STEM-related Dean's Offices, and other administrative offices must function in a very synergistic fashion. Stipends or other aid to UOUP participants should not result in replacement of already extant participant resources—quite often such stipulations can be negotiated—a situation which can cause severe financial problems (example: a reduction in an existing student loan corresponding to the UOUP stipend received) for participants. UOUP faculty participants should receive recognition of their involvement at all administrative levels including the departmental and college/school/center level. Such recognition may well require some release time. Existing external funding or new funding sources can often be tailored to supplement in a true fashion UOUP activities. Pertinent statistical data (latest available as of November 2015) are:

- Average Student Debt for the Undergraduate College Class of 2013: $28,400 (for the Class of 2014, has risen to $28,950) [19,20,21];
- Enrollment Decrease Among Families Experiencing Home Equity Decline: ~30%[22];
- Student Loans in Default is 13.7% and Number of Recent College Graduates Who Can't Pay Their Loans (in default) is 371,227 (Federal Fiscal year 2011, 4-year Institutions)[23].
- Median Before-Tax Earnings: High School Graduate $35,400, Some College but no Degree $40,400, Bachelor's Degree $56,500, Master's Degree $70,000, Doctoral Degree $91,000, Professional Degree $102,200[19].

If an UOU is a sponsoring member of an entity such as the Oak Ridge Associated Universities (ORAU) consortium[24] which contains a STEM mission component (advancing scientific research and education through partnerships)—then the UOUP should work to develop (or create a consortium) synergistically its relationship with the ORAU or organizations similar to the ORAU that have *operational* HBCU components. For example, a number of Florida universities are ORAU sponsoring members.

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[19] Source: The Institute for College Access & Success, The Project on Student Debt.
[20] Source: The Institute for College Access & Success, *Student Debt and the Class of 2014*.
[21] Source: The College Board, Education Pays 2013, Sandy Baum, Jennifer Ma, Kathleen Payea.
[22] Source: The Pew Charitable Trusts, Executive Summary, Economic Mobility Project.
[23] Source: U. S. Department of Education, The National Center for Education Statistics (NCES).
[24] Source: The Oak Ridge Institute for Science and Education (ORISE).

There are numerous foundations and agencies that possess keen interest in projects that contain strong mission goals in medical research and the application and dissemination of such research at the national and international level. The same situation obtains for work in computational science, materials science, nanotechnology, and nanoscience. These entities could provide funding which would help ensure the long-term sustainability of the UOUP and could aid in the creation and development of fully functional interdisciplinary UOU "Tech Parks" in many instances.

Thus, the UOUP should focus on submission of proposals which tend to emphasize research (for example) on: dielectric wall accelerators (DWA) for use in compact proton therapy and ion beam accelerators (Pelletron) which offer a broad range of nuclear applications in environmental management (ocean engineering, geophysics, *etc.*), cultural heritage (non-destructive dating analysis, anthropological analyses, *etc.*), natural resources, human health (oncological, ophthalmic, epidemiological, *etc.*), and industry.

Ion beam accelerators are also well suited to handle manpower development opportunities in areas such as radiation detection, nuclear instrumentation, high voltage, and vacuum systems; and developing a knowledge base from which UOU faculty could participate more fully in activities at advanced nuclear facilities such as high flux research reactors, synchrotron light sources, spallation neutron sources, and specialized ion beam facilities. A facility at an UOU built around such an accelerator should also be designed to facilitate undergraduate and graduate teaching and research and to serve as a showcase for prospective students (and their parents) and alumni and consortium partners. In most cases, there exist a number of faculty at a typical UOU—Medical School, College of Engineering, College of Arts and Sciences—for whom such an instrument would be invaluable for their basic and applied research and research with technology transfer and collaborative possibilities. At present, there are only a small number of such facilities in the USA.

Selected STEM Charts, Tables, and Other Data

We present a variety of STEM charts, tables, and other data[25] (unless otherwise noted, most source data (latest available as of November 2015) is derived from the Department of Education, The National Center for Education Statistics (NCES) with corresponding charts prepared by Prof. M. D. Slaughter) below. *As is easily ascertained, significant systemic progress over more than two decades for underrepresented minorities has not been achieved in STEM education.*

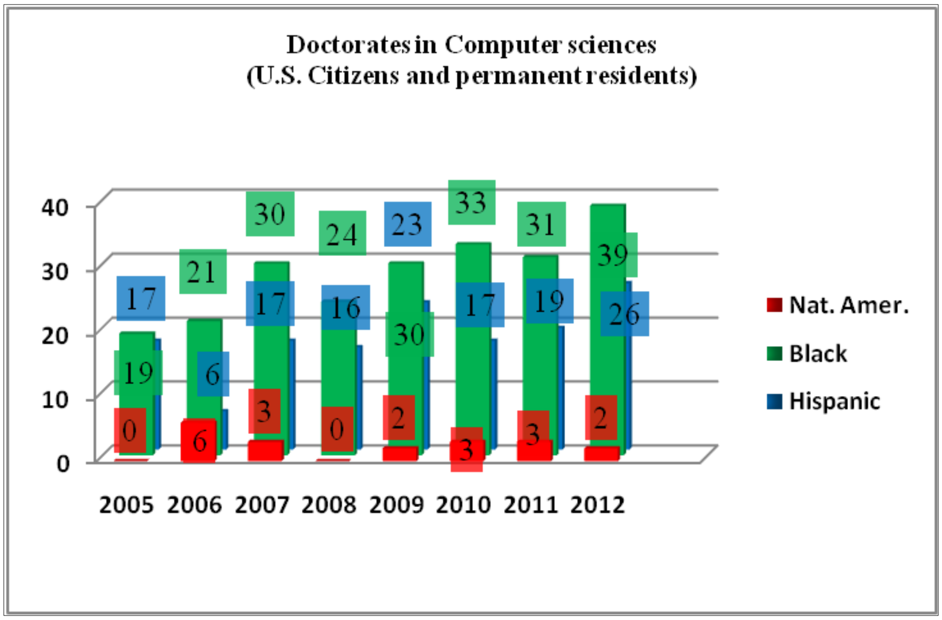
We also present links to interesting and informative websites that contain STEM or other data and reports and articles on underrepresented minorities and women (student and faculty and university at the national and state level). The web sites at http://collegeresults.org (contains an interactive search engine) and http://edtrust.org and NCES College Navigator and trends.collegeboard.org and The Institute for College Access & Success and The Center for American Progress[26] are especially useful. Some of the data from these links can be compared with data from selected STEM charts and data presented in this document which are primarily derived directly from data based provided by two federal surveys: the Integrated Postsecondary Education Data System (IPEDS) Completions Survey, the U.S. Department of Education (ED), the Survey of Earned Doctorates (SED), the National Science Foundation (NSF), and the National Center for Science and Engineering Statistics (NCSES). Bachelors, masters, and doctoral degree data were collected by IPEDS. Data on research doctoral degrees in all fields except engineering technologies were collected by the SED National Center for Education Statistics of the Department of Education. Dot Com sites we find very useful are *Women in Academia Report*, *The Chronicle of Higher Education*, and *The Journal of Blacks in Higher Education*.

[25] The National Opinion Research Center (NORC) at the University of Chicago prepared the comprehensive report (report from which this "White Paper" derived some of its data results) under the direction of Mark K. Fiegener. NORC staff members who worked on this report were Brianna Groenhout, Lino Jimenez, Lindsay Virost, and Vincent Welch, Jr..

[26] This site is extremely useful as it contains relevant and current articles on Higher Education and Race and Ethnicity and other societal subjects. An example (interactive) is ***The Demographic Evolution of the American Electorate, 1980–2060*****,** Rob Griffin, William H. Frey, Ruy Teixeira, (February 24, 2015).

DOCTORATES IN SELECTED FIELDS

Table 3

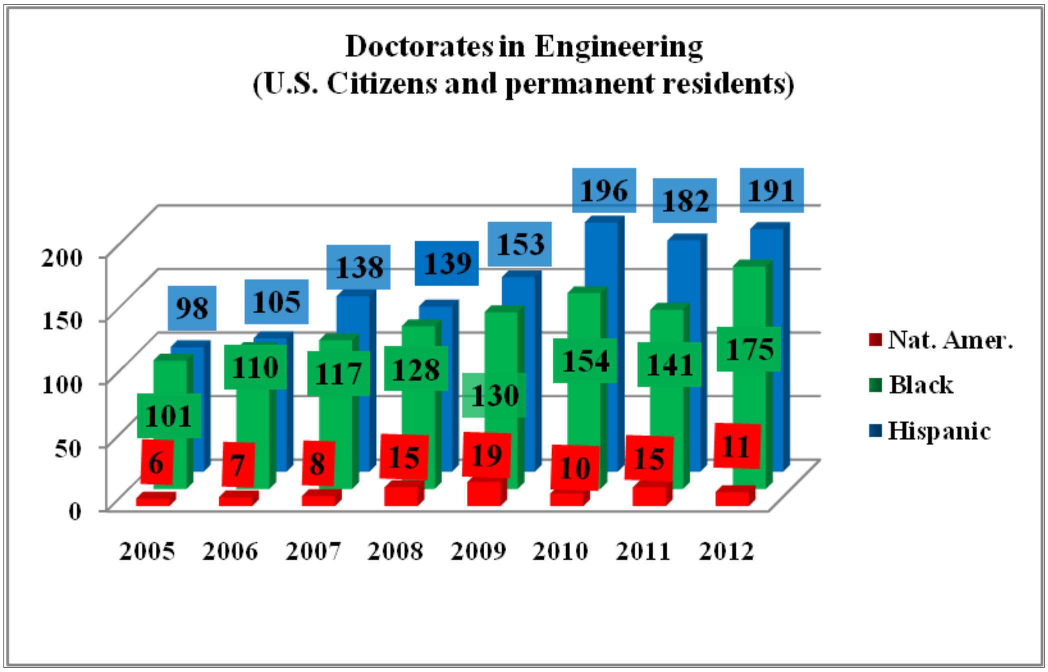


Computer sciences	U.S. citizens and permanent residents	White	Asian	Black	Hispanic	Nat. Amer.	Other	Temporary resident
2005	500	308	88	19	17	0	68	621
2006	551	356	92	21	6	6	70	865
2007	680	437	111	30	17	3	82	917
2008	667	446	87	24	16	0	94	1,029
2009	730	483	116	30	23	2	76	844
2010	782	506	124	33	17	3	99	779
2011	772	514	130	31	19	3	75	790
2012	819	526	129	39	26	2	97	871

U. S. Citizen and permanent resident doctoral recipients in Computer sciences.

(SOURCE: National Science Foundation, National Center for Science and Engineering Statistics, special tabulations o f U .S. Department o f E ducation, N ational C enter for E ducation S tatistics, Integrated Postsecondary Education Data System, Completions Survey, 2005–12. Prepared by M. D. Slaughter)

Table 4

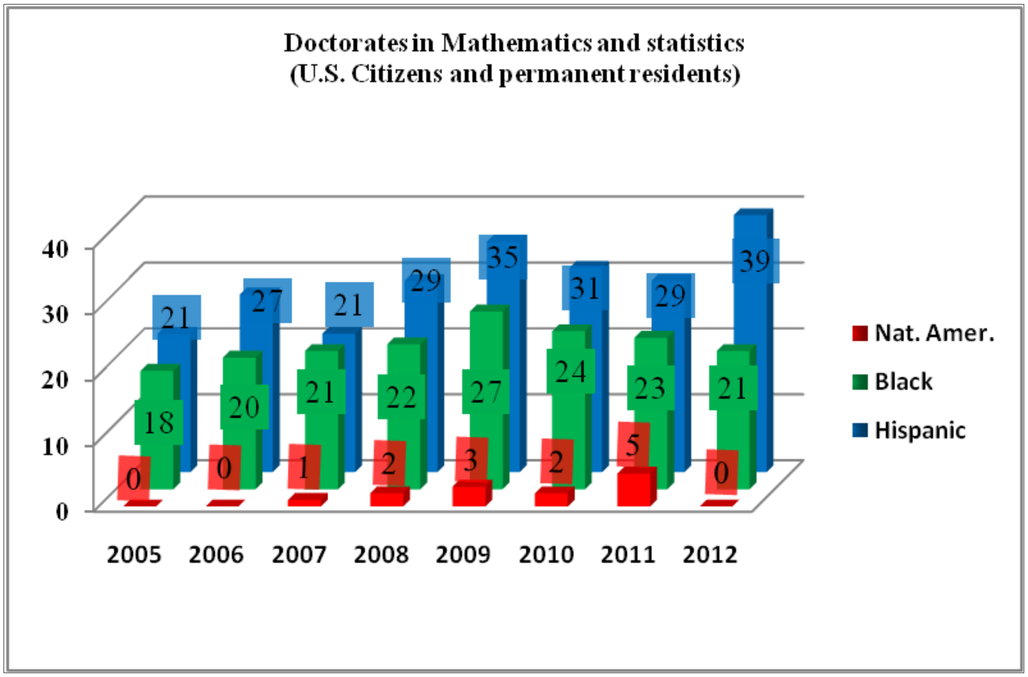


Engineering	U.S. citizens and permanen residents	White	Asian	Black	Hispanic	Nat. Amer	Other	Temporary resident
2005	2,452	1,696	372	101	98	6	179	4,096
2006	2,714	1,818	470	110	105	7	204	4,688
2007	2,994	1,973	508	117	138	8	250	5,072
2008	3,180	2,112	501	128	130	15	294	4,930
2009	3,374	2,235	504	139	153	19	324	4,541
2010	3,507	2,286	517	154	196	10	344	4,305
2011	3,713	2,393	603	141	182	15	379	4,765
2012	3,926	2,592	575	175	191	11	382	4,947

U. S. Citizen and permanent resident doctoral recipients in Engineering.

(SOURCE: National Science Foundation, National Center for Science and Engineering Statistics, special tabulations of U.S. Department of Education, National Center for Education Statistics, Integrated Postsecondary Education Data System, Completions Survey, 2005–12. Prepared by M. D. Slaughter))

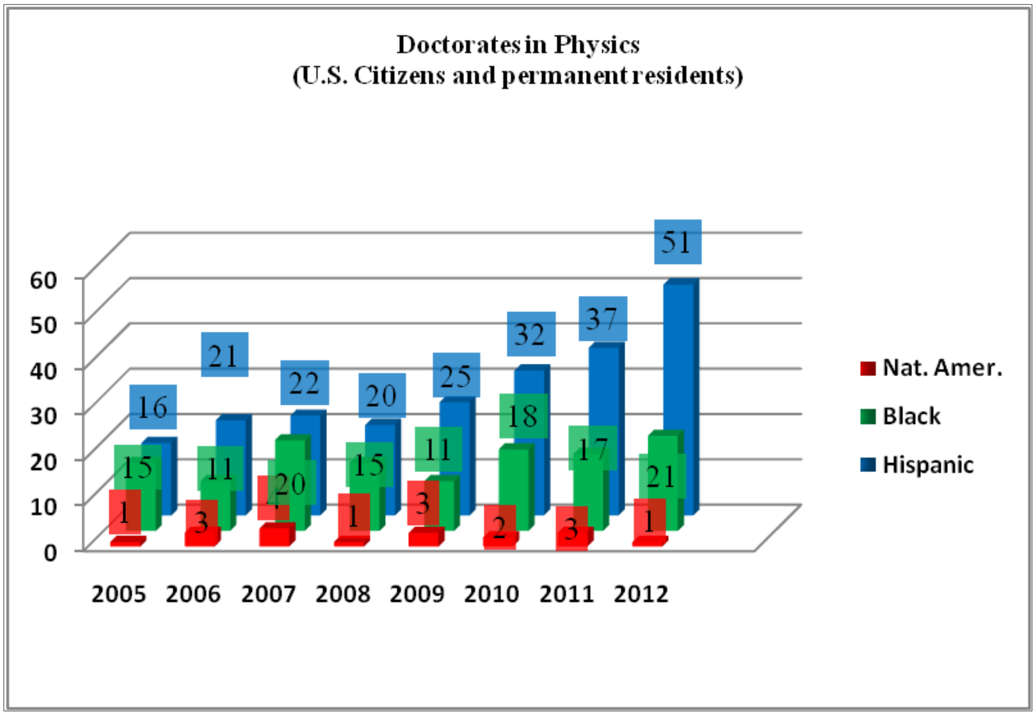
Table 5



Mathematics and statistics	U.S. citizens and permanent residents	White	Asian	Black	Hispanic	Nat. Amer.	Other	Temporary resident
2005	540	398	54	18	21	0	49	640
2006	583	428	63	20	27	0	45	714
2007	645	458	79	21	21	1	65	711
2008	671	490	53	22	29	2	75	691
2009	788	559	78	27	35	3	86	748
2010	863	634	84	24	31	2	88	731
2011	849	627	90	23	29	5	75	741
2012	852	636	72	21	39	0	84	818

U. S. Citizen and permanent resident doctoral recipients in Mathematics and statistics. (SOURCE: National Science Foundation, National Center for Science and Engineering Statistics, special tabulations of U.S. Department of Education, National Center for Education Statistics, Integrated Postsecondary Education Data System, Completions Survey, 2005–12. Prepared by M. D. Slaughter))

Table 6

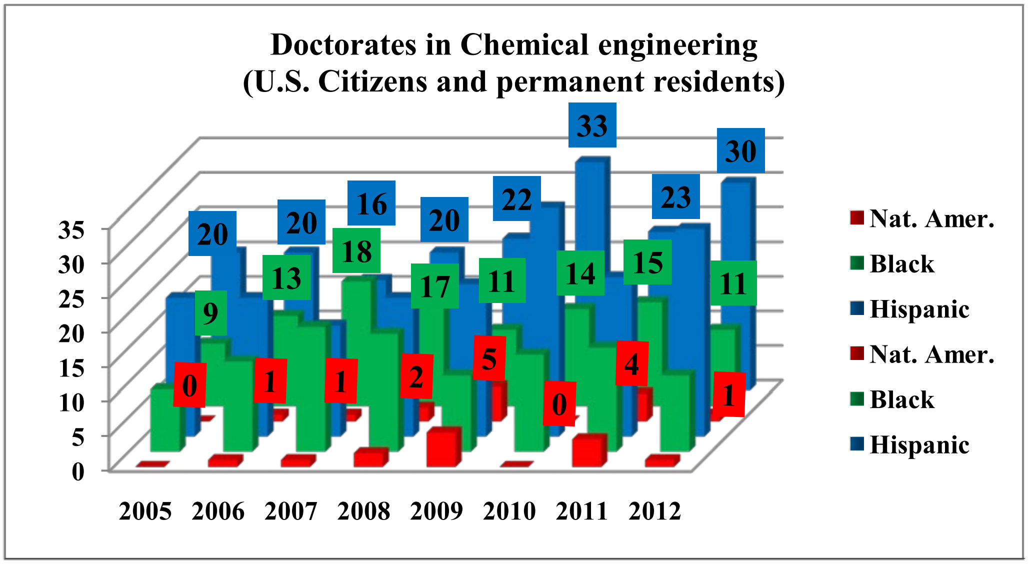


Physics	U.S. citizens and permanent residents	White	Asian	Black	Hispanic	Nat. Amer.	Other	Temporary resident
2005	585	435	62	15	16	1	56	669
2006	635	496	54	11	21	3	50	706
2007	696	519	60	20	22	4	71	746
2008	754	582	57	15	20	1	79	753
2009	781	603	53	11	25	3	86	799
2010	808	592	60	18	32	2	104	762
2011	928	681	65	17	37	3	125	742
2012	985	734	65	21	51	1	113	767

U. S. Citizen and permanent resident doctoral recipients in Physics.

(SOURCE: National Science Foundation, National Center for Science and Engineering Statistics, special tabulations of U.S. Department of Education, National Center for Education Statistics, Integrated Postsecondary Education Data System, Completions Survey, 2005–12. Prepared by M. D. Slaughter))

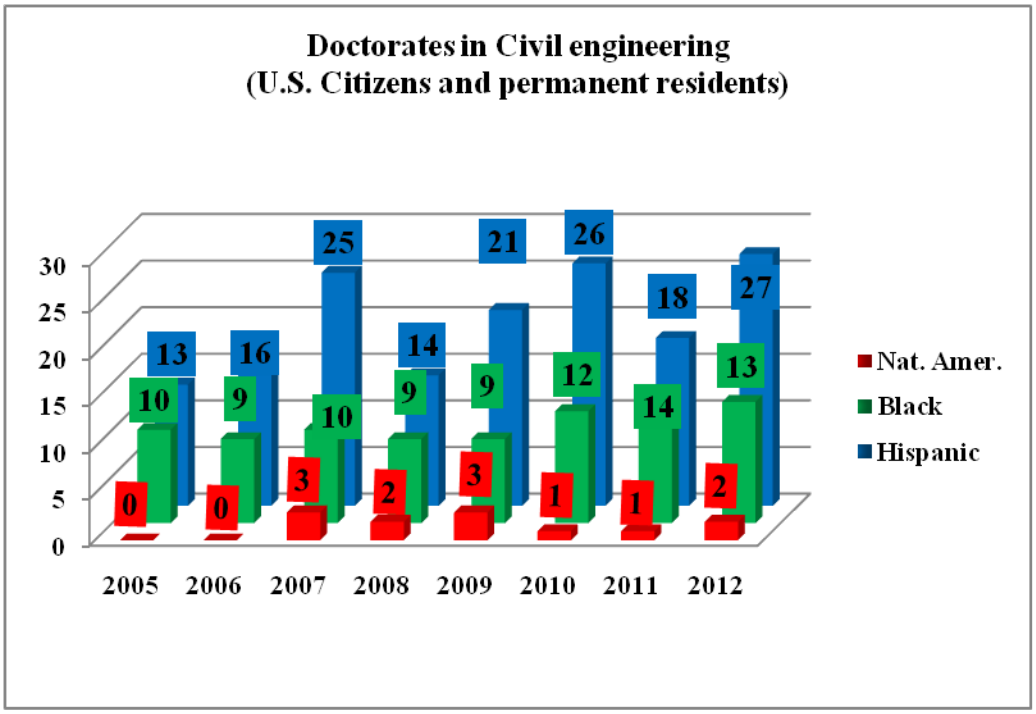
Table 7



Chemical engineering	U.S. citizens and permanent residents	White	Asian	Black	Hispanic	Nat. Amer.	Other	Temporary resident
2005	360	275	43	9	20	0	13	512
2006	423	297	70	13	20	1	22	488
2007	373	250	63	18	16	1	25	542
2008	417	296	55	17	20	2	27	533
2009	437	312	56	11	22	5	31	449
2010	469	331	65	14	33	0	26	460
2011	440	307	59	15	23	4	32	511
2012	442	296	66	11	30	1	38	527

U. S. Citizen and permanent resident doctoral recipients in Chemical engineering.
(SOURCE: N ational Sc ience Foundation, N ational C enter for S cience a nd E ngineering Statistics, special tabulations o f U .S. Department o f E ducation, N ational C enter for Education S tatistics, Integrated Postsecondary Education Data System, Completions Survey, 2005–12. Prepared by M. D. Slaughter))

Table 8

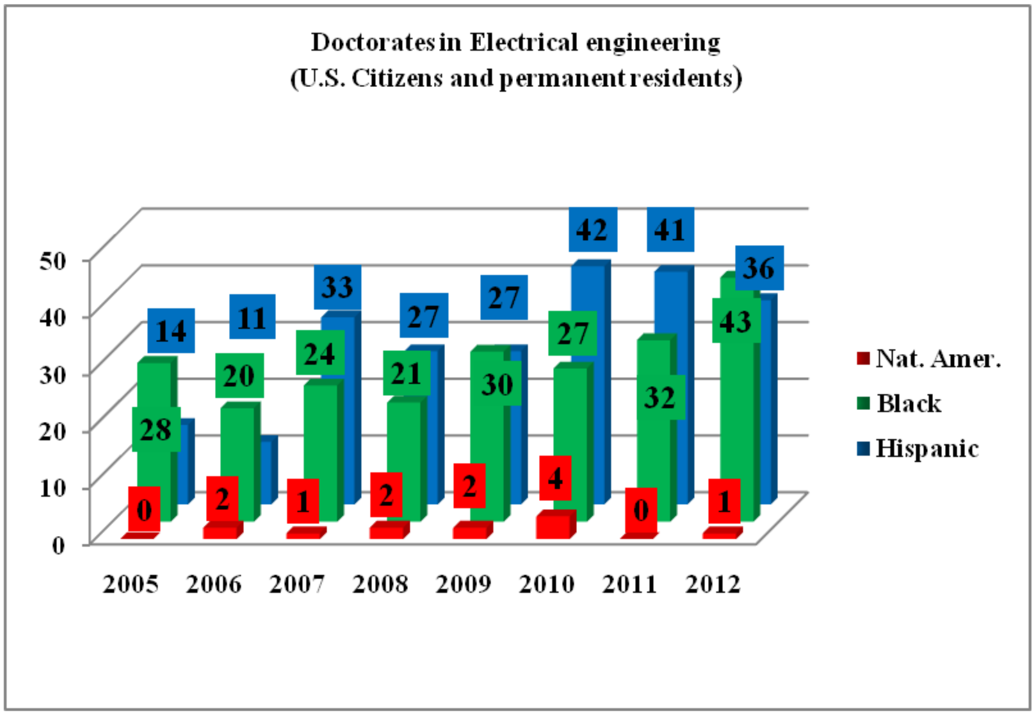


Civil engineering	U.S. citizens and permanent residents	White	Asian	Black	Hispanic	Nat. Amer.	Other	Temporary resident
2005	296	209	40	10	13	0	24	534
2006	296	208	44	9	16	0	19	568
2007	359	245	50	10	25	3	26	576
2008	330	231	38	9	14	2	36	579
2009	348	241	35	9	21	3	39	554
2010	347	235	37	12	26	1	36	504
2011	353	228	46	14	18	1	46	541
2012	366	257	35	13	27	2	32	556

U. S. Citizen and permanent resident doctoral recipients in Civil engineering.

(SOURCE: National Science Foundation, National Center for Science and Engineering Statistics, special tabulations of U.S. Department of Education, National Center for Education Statistics, Integrated Postsecondary Education Data System, Completions Survey, 2005–12. Prepared by M. D. Slaughter))

Table 9

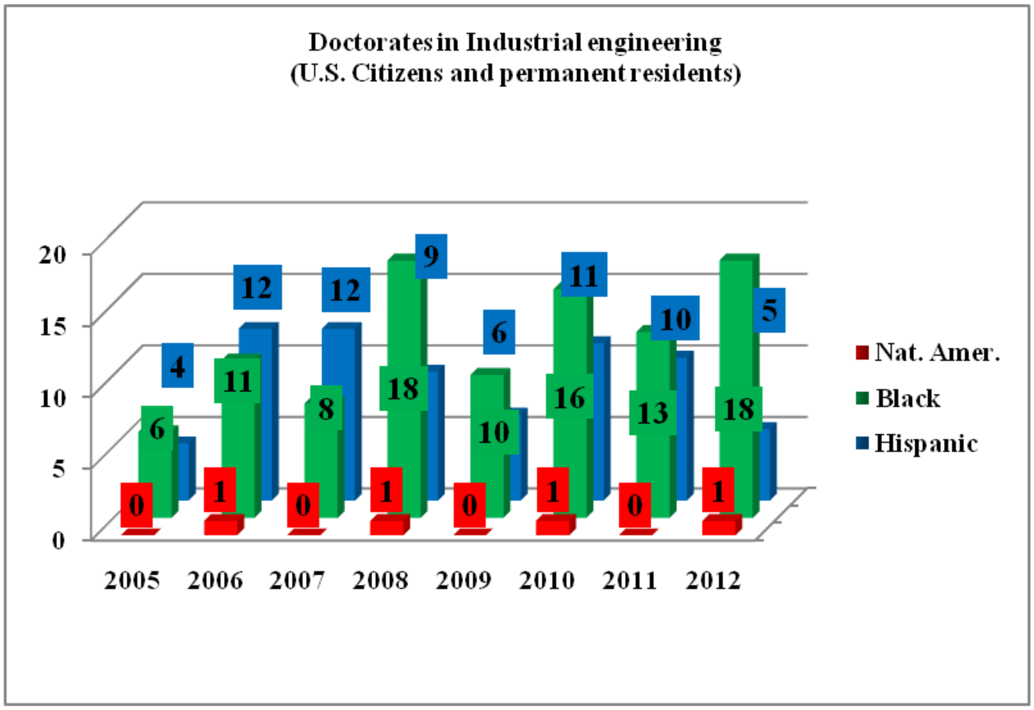


Electrical engineering	U.S. citizens and permanent residents	White	Asian	Black	Hispanic	Nat. Amer.	Other	Temporary resident
2005	567	346	128	28	14	0	51	1,215
2006	560	346	121	20	11	2	60	1,564
2007	645	367	156	24	33	1	64	1,735
2008	704	397	174	21	27	2	83	1,575
2009	711	415	156	30	27	2	81	1,379
2010	757	426	154	27	42	4	104	1,412
2011	815	468	179	32	41	0	95	1,537
2012	847	486	184	43	36	1	97	1,628

U. S. Citizen and permanent resident doctoral recipients in Electrical engineering.

(SOURCE: National Science Foundation, National Center for Science and Engineering Statistics, special tabulations of U.S. Department of Education, National Center for Education Statistics, Integrated Postsecondary Education Data System, Completions Survey, 2005–12. Prepared by M. D. Slaughter))

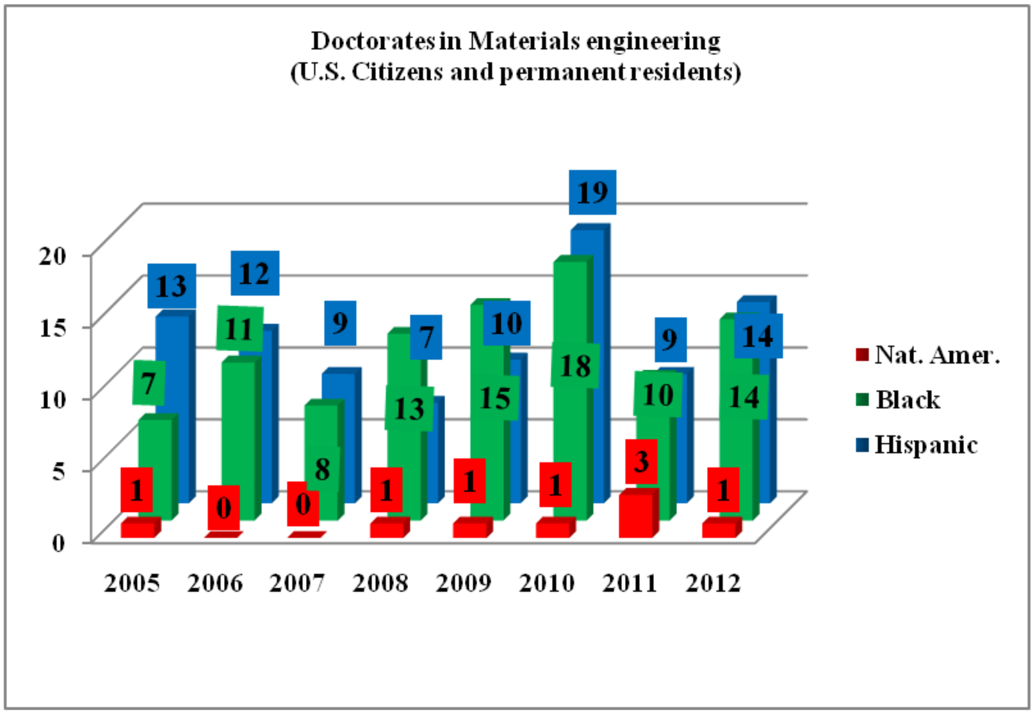
Table 10



Industrial engineering	U.S. citizens and permanent residents	White	Asian	Black	Hispanic	Nat. Amer.	Other	Temporary resident
2005	107	73	17	6	4	0	7	179
2006	117	77	10	11	12	1	6	185
2007	129	82	15	8	12	0	12	235
2008	125	71	17	18	9	1	9	221
2009	112	71	15	10	6	0	10	221
2010	116	66	15	16	11	1	7	174
2011	124	77	14	13	10	0	10	195
2012	124	78	9	18	5	1	13	224

U. S. Citizen and permanent resident doctoral recipients in Industrial engineering.
(SOURCE: National Science Foundation, National Center for Science and Engineering Statistics, special tabulations of U.S. Department of Education, National Center for Education Statistics, Integrated Postsecondary Education Data System, Completions Survey, 2005–12. Prepared by M. D. Slaughter))

Table 11

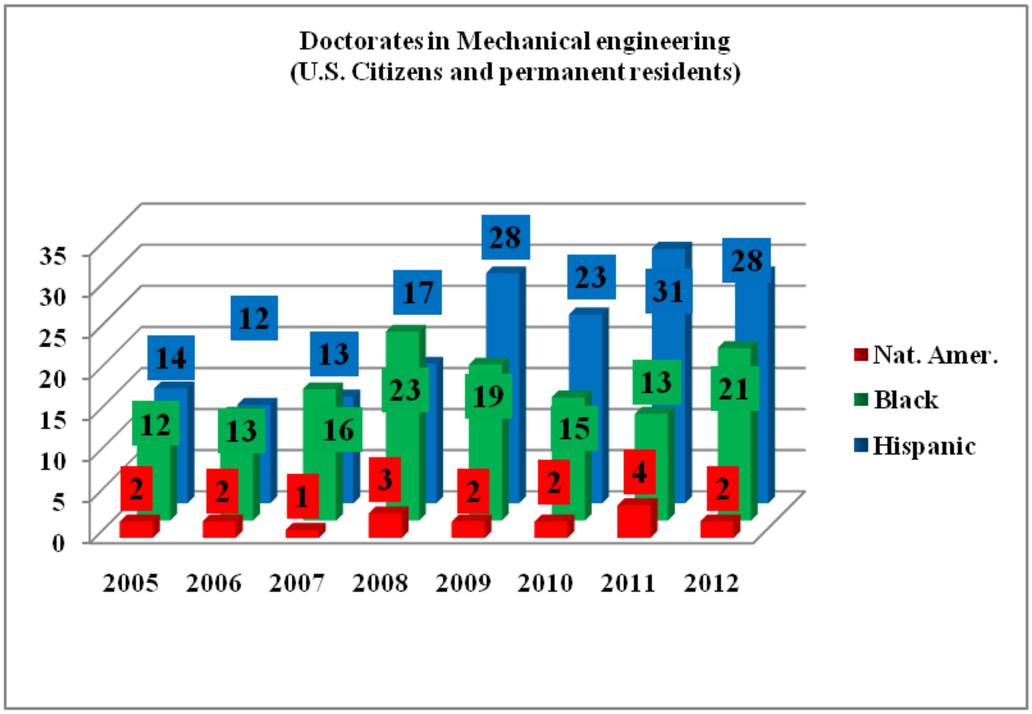


Materials engineering	U.S. citizens and permanent residents	White	Asian	Black	Hispanic	Nat. Amer.	Other	Temporary resident
2005	191	136	17	7	13	1	17	323
2006	242	163	38	11	12	0	18	369
2007	286	191	55	8	9	0	23	377
2008	284	209	27	13	7	1	27	381
2009	281	194	32	15	10	1	29	380
2010	316	208	43	18	19	1	27	337
2011	283	183	46	10	9	3	32	368
2012	363	253	56	14	14	1	25	352

U. S. Citizen and permanent resident doctoral recipients in Materials engineering.

(SOURCE: National Science Foundation, National Center for Science and Engineering Statistics, special tabulations of U.S. Department of Education, National Center for Education Statistics, Integrated Postsecondary Education Data System, Completions Survey, 2005–12. Prepared by M. D. Slaughter))

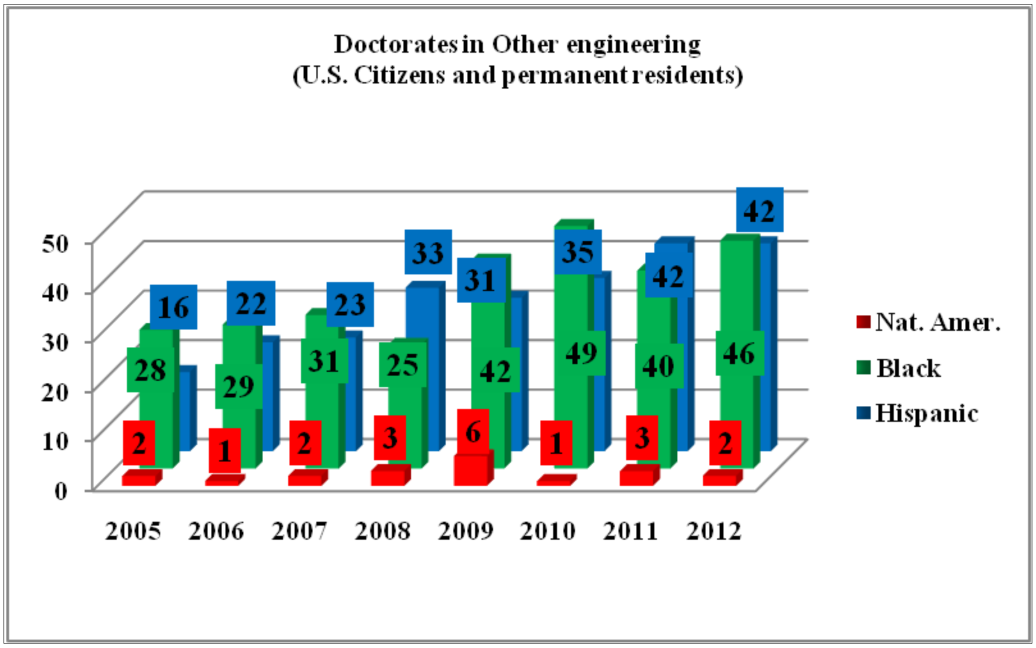
Table 12



Mechanical engineering	U.S. citizens and permanent residents	White	Asian	Black	Hispanic	Nat. Amer.	Other	Temporary resident
2005	338	242	42	12	14	2	26	625
2006	388	274	66	13	12	2	21	751
2007	376	265	52	16	13	1	29	762
2008	406	282	45	23	17	3	36	743
2009	472	320	50	19	28	2	53	714
2010	425	310	46	15	23	2	29	597
2011	505	343	59	13	31	4	55	667
2012	556	402	48	21	28	2	55	721

U. S. Citizen and permanent resident doctoral recipients in Mechanical engineering.
(SOURCE: N ational Sc ience Foundation, N ational C enter for S cience a nd E ngineering Statistics, special tabulations o f U .S. Department o f E ducation, N ational C enter for Education S tatistics, Integrated Postsecondary Education Data System, Completions Survey, 2005–12. Prepared by M. D. Slaughter))

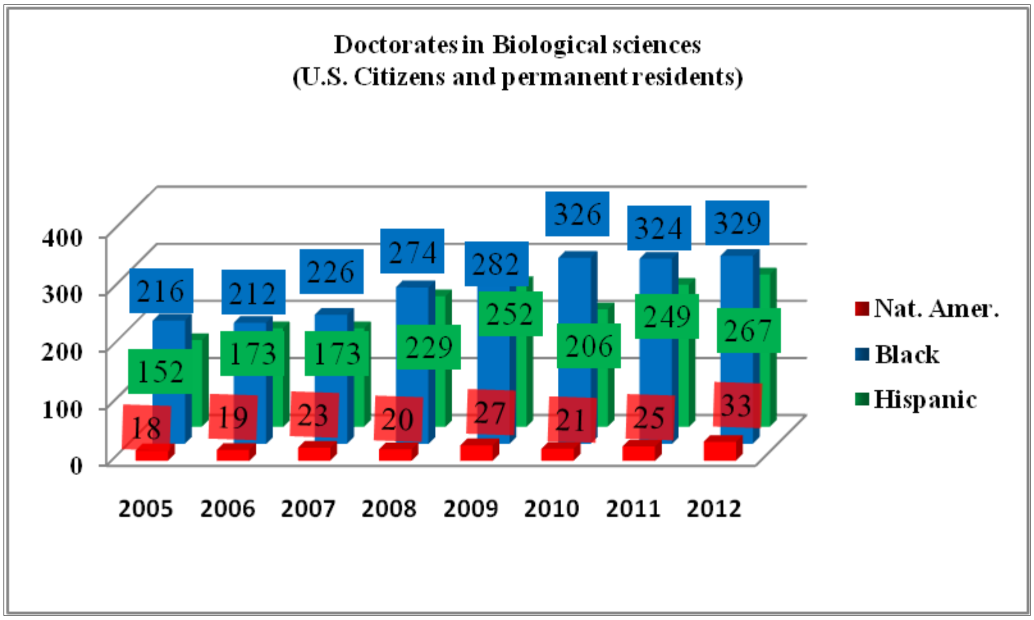
Table 13



Other engineering	U.S. citizens and permanent residents	White	Asian	Black	Hispanic	Nat. Amer.	Other	Temporary resident
2005	502	342	77	28	16	2	37	594
2006	608	393	110	29	22	1	53	634
2007	718	492	109	31	23	2	61	719
2008	811	545	136	25	33	3	69	769
2009	876	583	144	42	31	6	70	724
2010	955	620	145	49	35	1	105	715
2011	1,063	694	184	40	42	3	100	839
2012	1,065	708	162	46	42	2	105	827

U. S. Citizen and permanent resident doctoral recipients in Other engineering.
(SOURCE: N ational Sc ience Foundation, N ational C enter for S cience a nd E ngineering Statistics, special tabulations o f U .S. Department o f E ducation, N ational C enter for Education St atistics, Integrated Postsecondary Education Data System, Completions Survey, 2005–12. Prepared by M. D. Slaughter))

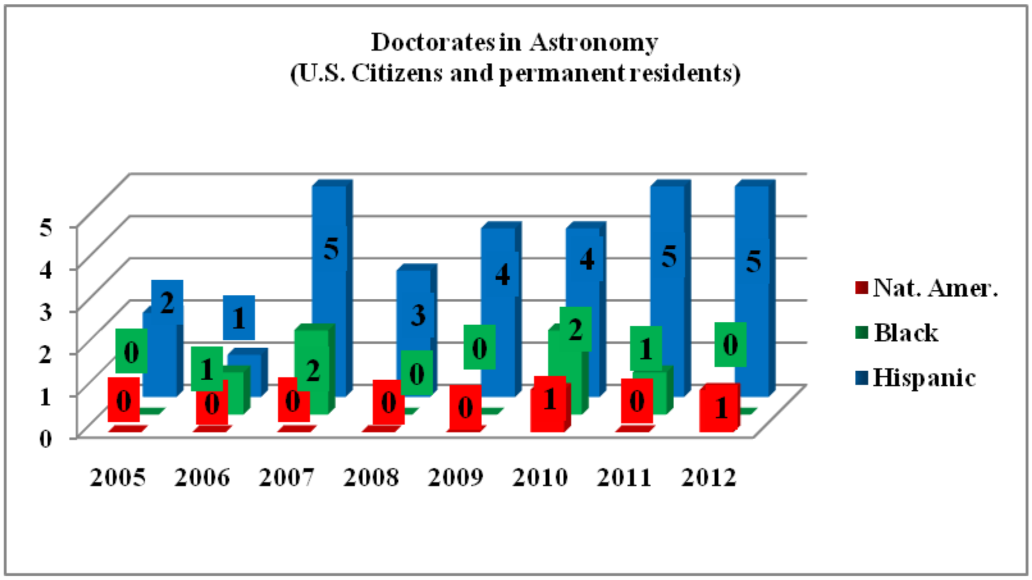
Table 14



Biological sciences	U.S. citizens and permanent residents	White	Asian	Black	Hispanic	Nat. Amer.	Other	Temporary resident
2005	4,118	3,172	489	159	186	16	221	393
2006	4,330	3,206	508	152	216	18	264	397
2007	4,713	3,426	563	173	226	23	302	425
2008	5,091	3,608	575	229	274	20	385	412
2009	5,310	3,782	567	252	282	27	400	428
2010	5,447	3,759	650	206	326	21	485	343
2011	5,513	3,787	608	249	324	25	520	393
2012	5,705	3,859	669	267	329	33	548	450

U. S. Citizen and permanent resident doctoral recipients in Biological sciences.
(SOURCE: N ational Sc ience Foundation, N ational C enter for S cience a nd E ngineering Statistics, special tabulations o f U .S. Department o f E ducation, N ational C enter for Education St atistics, Integrated Postsecondary Education Data System, Completions Survey, 2005–12. Prepared by M. D. Slaughter))

Table 15

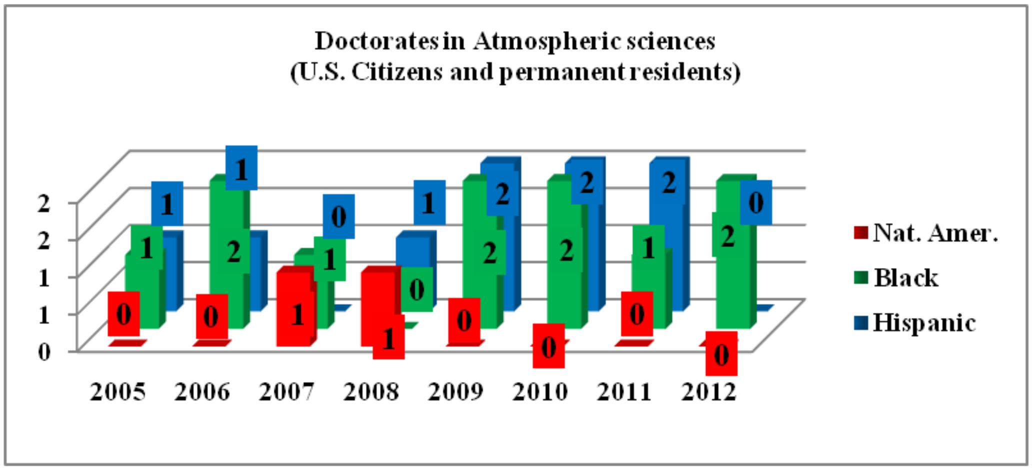


Astronomy	U.S. citizens and permanent residents	White	Asian	Black	Hispanic	Nat. Amer.	Other	Temporary resident
2005	73	62	6	0	2	0	3	42
2006	73	57	6	1	1	0	8	41
2007	89	63	6	2	5	0	13	39
2008	117	94	4	0	3	0	16	46
2009	98	85	3	0	4	0	6	45
2010	119	97	4	2	4	1	11	41
2011	108	84	4	1	5	0	14	58
2012	124	105	7	0	5	1	6	46

U. S. Citizen and permanent resident doctoral recipients in Astronomy.

(SOURCE: National Science Foundation, National Center for Science and Engineering Statistics, special tabulations of U.S. Department of Education, National Center for Education Statistics, Integrated Postsecondary Education Data System, Completions Survey, 2005–12. Prepared by M. D. Slaughter))

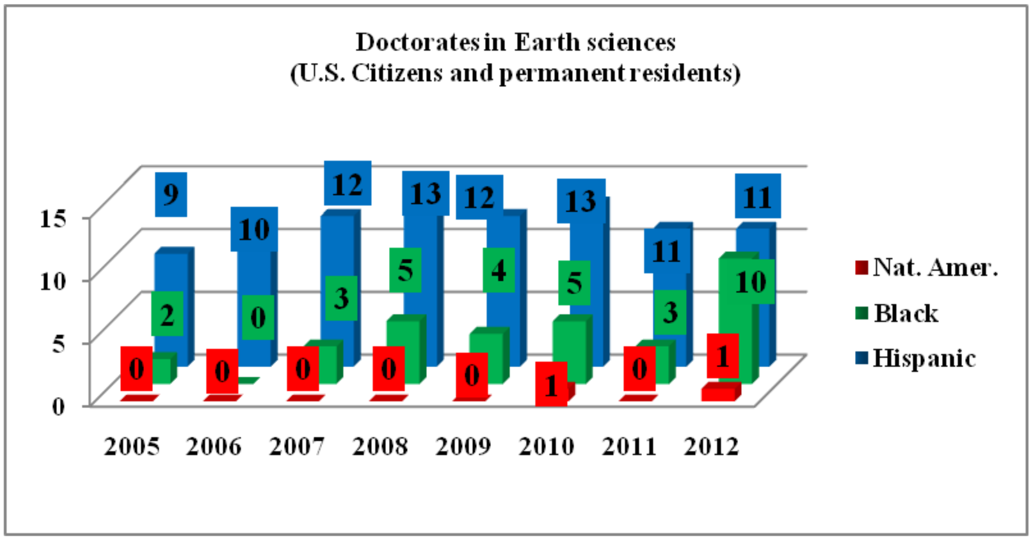
Table 16



Atmospheric sciences	U.S. citizens and permanent residents	White	Asian	Black	Hispanic	Nat. Amer.	Other	Temporary resident
2005	43	40	1	1	1	0	0	25
2006	46	36	6	2	1	0	1	32
2007	45	37	4	1	0	1	2	32
2008	54	43	6	0	1	1	3	42
2009	45	30	6	2	2	0	5	50
2010	48	39	1	2	2	0	4	39
2011	58	49	1	1	2	0	5	48
2012	68	61	1	2	0	0	4	42

U. S. Citizen and permanent resident doctoral recipients in Atmospheric sciences.
(SOURCE: National Science Foundation, National Center for Science and Engineering Statistics, special tabulations of U.S. Department of Education, National Center for Education Statistics, Integrated Postsecondary Education Data System, Completions Survey, 2005–12. Prepared by M. D. Slaughter))

Table 17

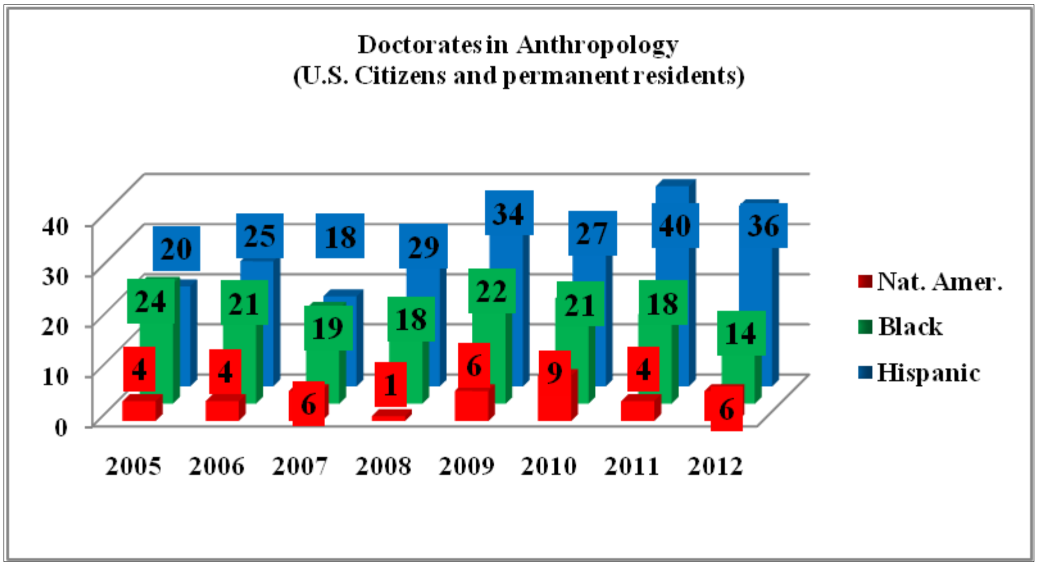


Earth sciences	U.S. citizens and permanent residents	White	Asian	Black	Hispanic	Nat. Amer.	Other	Temporary resident
2005	244	204	6	2	9	2	21	135
2006	296	258	16	0	10	0	12	134
2007	347	289	8	3	12	1	34	166
2008	302	235	12	5	13	2	35	167
2009	333	263	10	4	12	1	43	170
2010	350	280	11	5	13	1	40	146
2011	312	258	12	3	11	0	28	155
2012	339	274	13	10	11	1	30	158

U. S. Citizen and permanent resident doctoral recipients in Earth sciences.

(SOURCE: National Science Foundation, National Center for Science and Engineering Statistics, special tabulations of U.S. Department of Education, National Center for Education Statistics, Integrated Postsecondary Education Data System, Completions Survey, 2005–12. Prepared by M. D. Slaughter)

Table 18

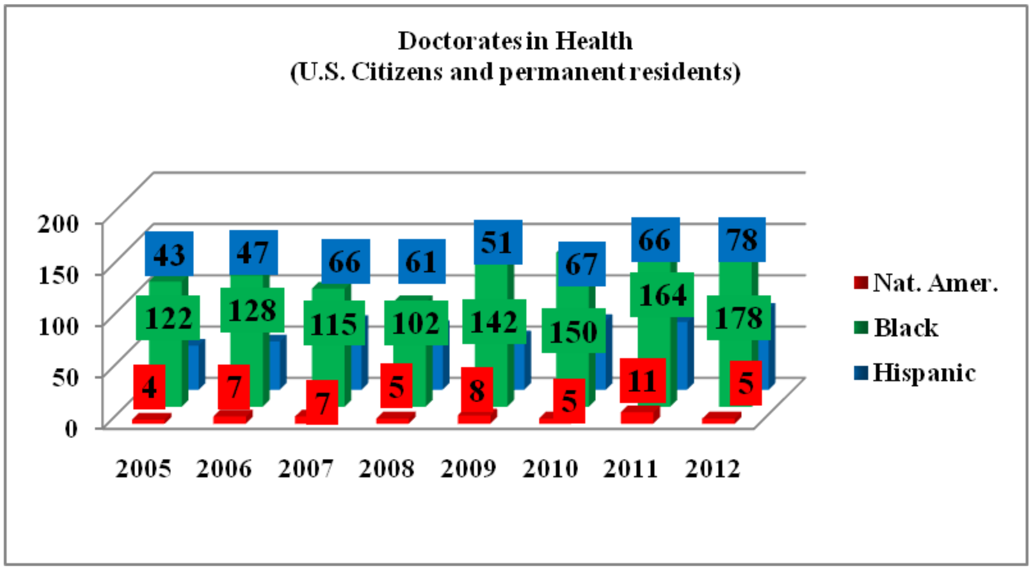


Anthropology	U.S. citizens and permanent residents	White	Asian	Black	Hispanic	Nat. Amer.	Other	Temporary resident
2005	392	296	17	24	20	4	31	67
2006	425	325	23	21	25	4	27	55
2007	433	330	23	19	18	6	37	86
2008	416	299	29	18	29	1	40	75
2009	431	308	18	22	34	6	43	96
2010	444	318	19	21	27	9	50	90
2011	505	365	24	18	40	4	54	91
2012	490	359	21	14	36	6	54	95

U. S. Citizen and permanent resident doctoral recipients in Anthropology.

(SOURCE: National Science Foundation, National Center for Science and Engineering Statistics, special tabulations of U.S. Department of Education, National Center for Education Statistics, Integrated Postsecondary Education Data System, Completions Survey, 2005–12. Prepared by M. D. Slaughter)

Table 19



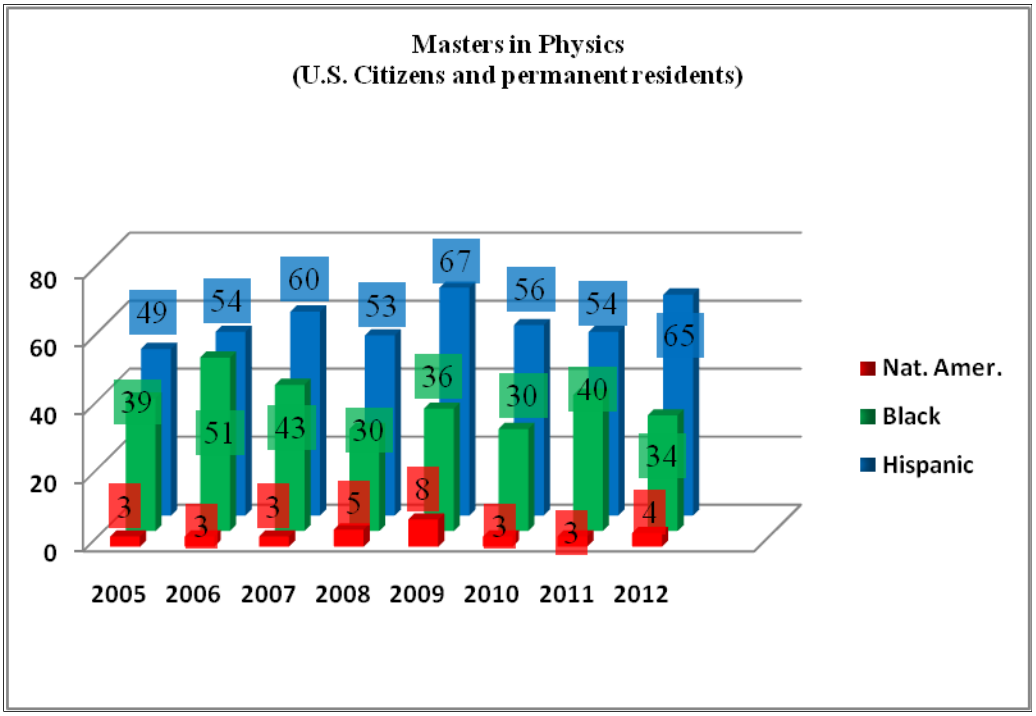
Health	U.S. citizens and permanent residents	White	Asian	Black	Hispanic	Nat. Amer.	Other	Temporary resident
2005	1,291	971	115	122	43	4	20	389
2006	1,373	1,034	120	128	47	7	25	404
2007	1,492	1,109	140	115	66	7	33	476
2008	1,498	1,153	140	102	61	5	16	460
2009	1,566	1,175	143	142	51	8	20	399
2010	1,572	1,133	165	150	67	5	20	413
2011	1,536	1,093	148	164	66	11	25	412
2012	1,696	1,203	170	178	78	5	32	479

U. S. Citizen and permanent resident doctoral recipients in Health.

(SOURCE: National Science Foundation, National Center for Science and Engineering Statistics, special tabulations of U.S. Department of Education, National Center for Education Statistics, Integrated Postsecondary Education Data System, Completions Survey, 2005–12. Prepared by M. D. Slaughter)

MASTER'S IN SELECTED FIELDS

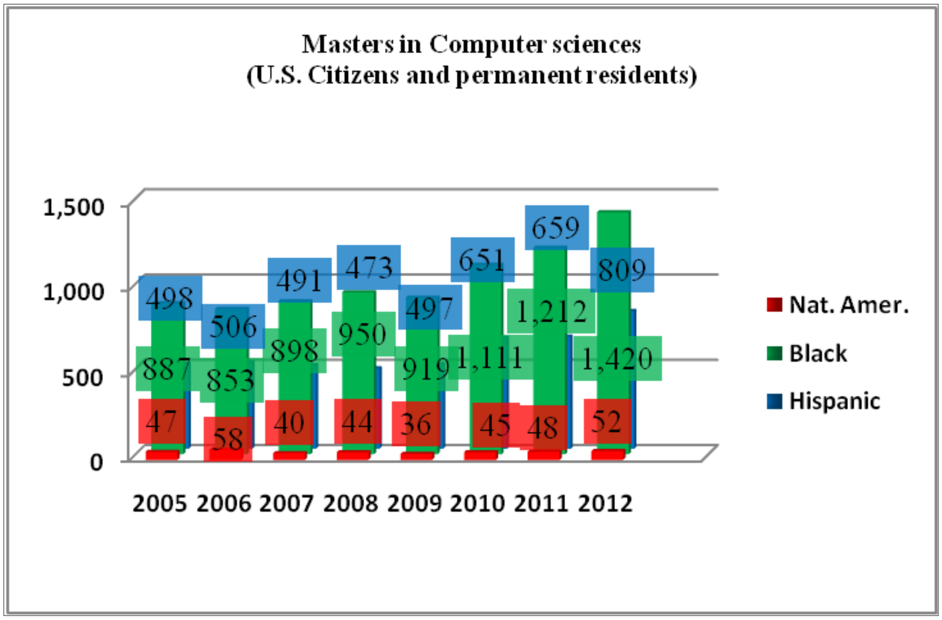
Table 20



Physics	U.S. citizens and permanent residents	White	Asian	Black	Hispanic	Nat. Amer.	Other	Temporary resident
2005	1,121	851	74	39	49	3	105	673
2006	1,175	883	78	51	54	3	105	678
2007	1,148	820	94	43	60	3	105	644
2008	1,138	838	78	30	53	5	105	661
2009	1,064	754	66	36	67	8	105	593
2010	1,184	855	93	30	56	3	105	626
2011	1,159	868	81	40	54	3	105	612
2012	1,191	901	74	34	65	4	105	688

U. S. Citizen and permanent resident Master's degrees recipients in Physics.
(SOURCE: N ational Sc ience Foundation, N ational C enter for S cience a nd E ngineering Statistics, special tabulations o f U .S. Department o f E ducation, N ational C enter for Education St atistics, Integrated Postsecondary Education Data System, Completions Survey, 2005–12. Prepared by M. D. Slaughter)

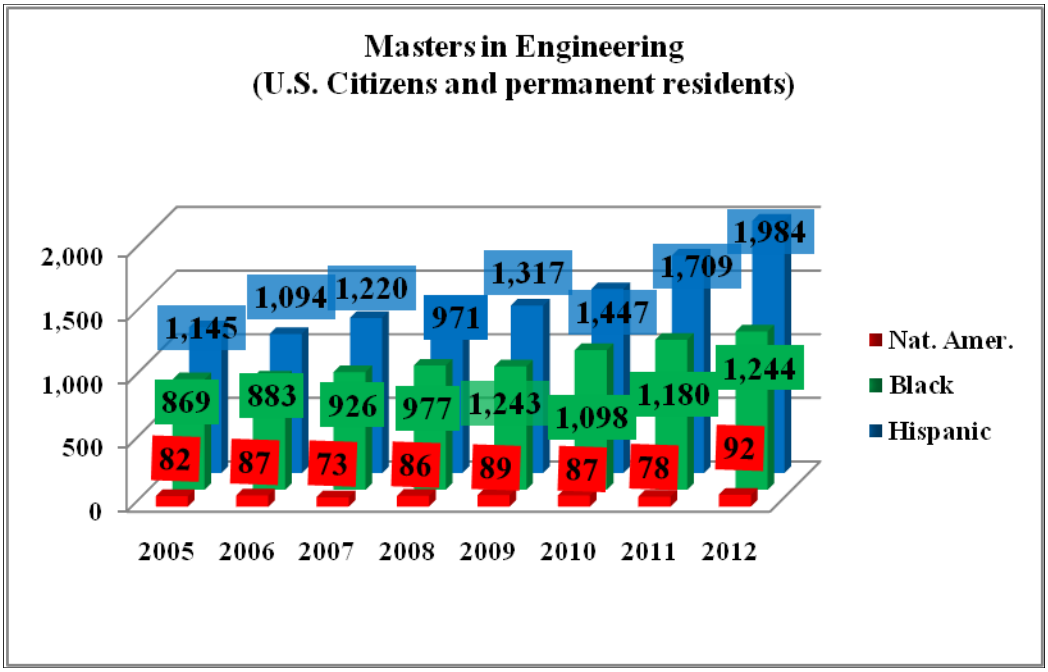
Table 21



Computer sciences	U.S. citizens and permanent residents	White	Asian	Black	Hispanic	Nat. Amer.	Other	Temporary resident
2005	10,975	5,818	2,244	887	498	47	1,481	7,514
2006	10,489	5,715	1,856	853	506	58	1,501	6,649
2007	10,027	5,463	1,754	898	491	40	1,381	6,287
2008	9,746	5,176	1,627	950	473	44	1,476	7,405
2009	9,641	5,080	1,477	919	497	36	1,632	8,347
2010	10,066	5,183	1,470	1,111	651	45	1,606	7,955
2011	10,786	5,553	1,646	1,212	659	48	1,668	8,733
2012	11,636	5,987	1,583	1,420	809	52	1,785	9,365

U. S. Citizen and permanent resident Master's degrees recipients in Computer sciences. (SOURCE: National Science Foundation, National Center for Science and Engineering Statistics, special tabulations of U.S. Department of Education, National Center for Education Statistics, Integrated Postsecondary Education Data System, Completions Survey, 2005–12. Prepared by M. D. Slaughter)

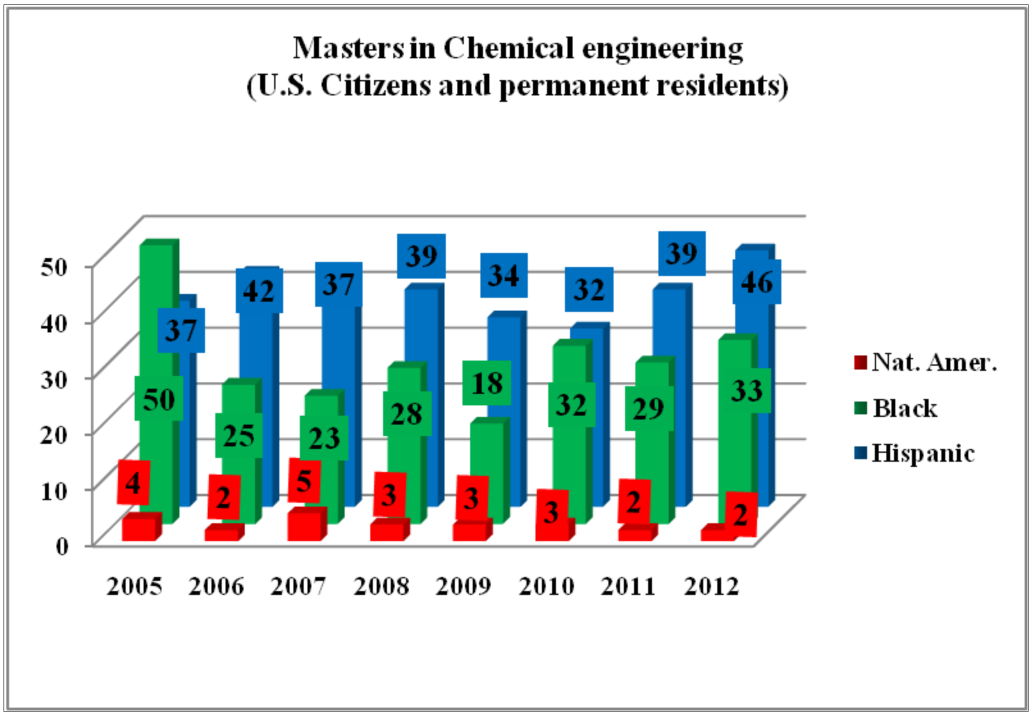
Table 22



Engineering	U.S. citizens and permanent residents	White	Asian	Black	Hispanic	Nat. Amer.	Other	Temporary resident
2005	19,034	12,198	3,094	869	1,145	82	1,646	14,865
2006	18,972	12,084	3,186	883	1,094	87	1,638	13,291
2007	19,276	11,949	3,355	926	1,220	73	1,753	11,660
2008	19,749	12,077	3,494	977	1,243	86	1,872	13,428
2009	20,940	12,428	3,929	971	1,317	89	2,206	15,570
2010	21,685	12,919	3,736	1,098	1,447	87	2,398	15,929
2011	23,895	14,579	3,961	1,180	1,709	78	2,388	17,387
2012	25,567	16,004	3,829	1,244	1,984	92	2,414	17,583

U. S. Citizen and permanent resident Master's degrees recipients in Engineering.
(SOURCE: National Science Foundation, National Center for Science and Engineering Statistics, special tabulations of U.S. Department of Education, National Center for Education Statistics, Integrated Postsecondary Education Data System, Completions Survey, 2005–12. Prepared by M. D. Slaughter)

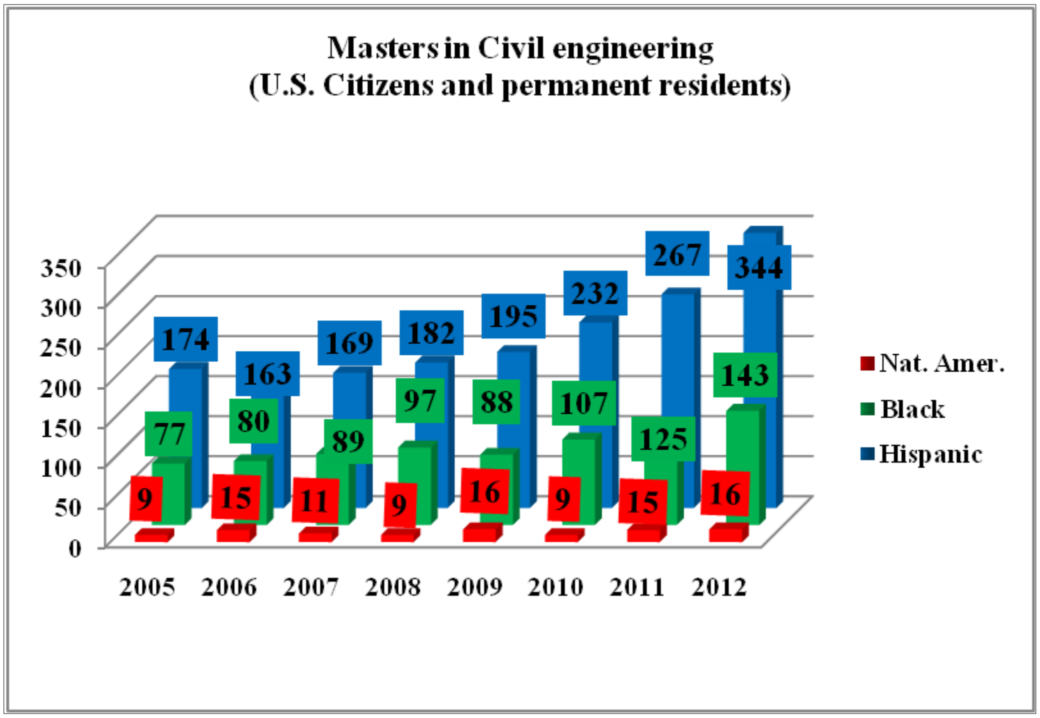
Table 23



Chemical engineering	U.S. citizens and permanent residents	White	Asian	Black	Hispanic	Nat. Amer.	Other	Temporary resident
2005	633	389	97	50	37	4	56	555
2006	643	426	101	25	42	2	47	481
2007	580	374	97	23	37	5	44	379
2008	504	307	81	28	39	3	46	433
2009	525	326	93	18	34	3	51	471
2010	584	357	101	32	32	3	59	467
2011	682	421	128	29	39	2	63	602
2012	740	452	141	33	46	2	66	655

U. S. Citizen and permanent resident Master's degrees recipients in Chemical engineering. (SOURCE: National Science Foundation, National Center for Science and Engineering Statistics, special tabulations of U.S. Department of Education, National Center for Education Statistics, Integrated Postsecondary Education Data System, Completions Survey, 2005–12. Prepared by M. D. Slaughter)

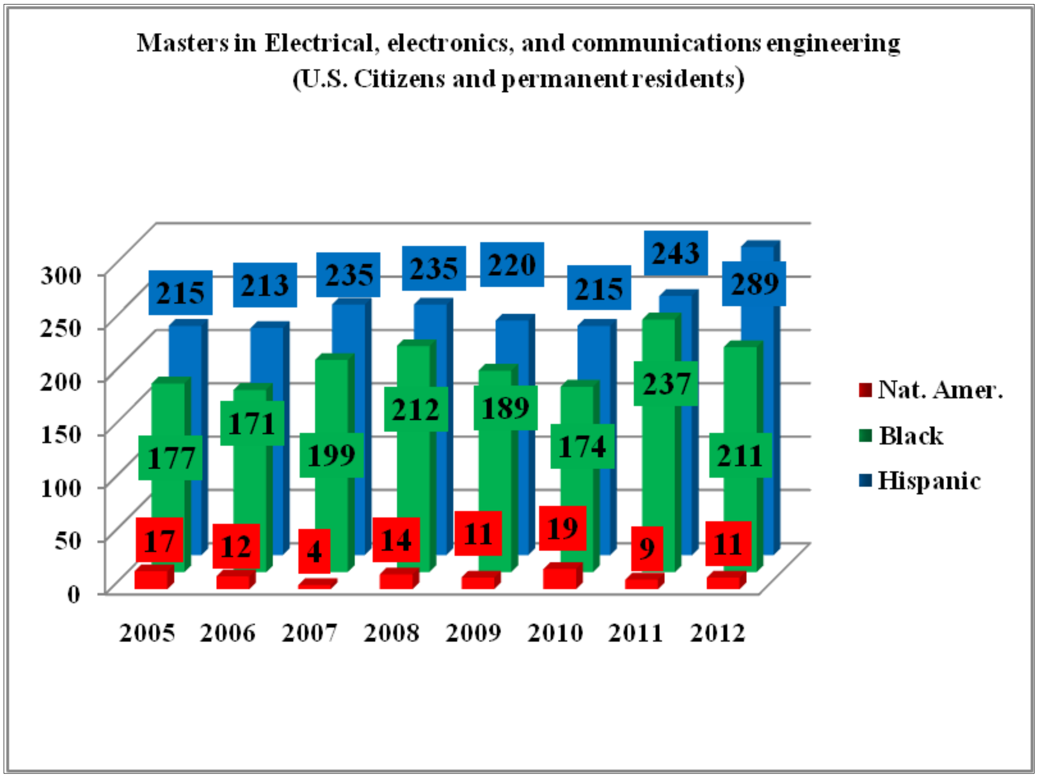
Table 24



Civil engineering	U.S. citizens and permanent residents	White	Asian	Black	Hispanic	Nat. Amer.	Other	Temporary resident
2005	2,542	1,826	267	77	174	9	189	1,321
2006	2,588	1,900	242	80	163	15	188	1,203
2007	2,469	1,733	274	89	169	11	193	1,036
2008	2,520	1,775	273	97	182	9	184	1,094
2009	2,685	1,835	277	88	195	16	274	1,148
2010	2,898	1,947	308	107	232	9	295	1,224
2011	3,529	2,428	430	125	267	15	264	1,363
2012	3,926	2,651	472	143	344	16	300	1,459

U. S. Citizen and permanent resident Master's degrees recipients in Civil engineering. (SOURCE: National Science Foundation, National Center for Science and Engineering Statistics, special tabulations of U.S. Department of Education, National Center for Education Statistics, Integrated Postsecondary Education Data System, Completions Survey, 2005–12. Prepared by M. D. Slaughter)

Table 25

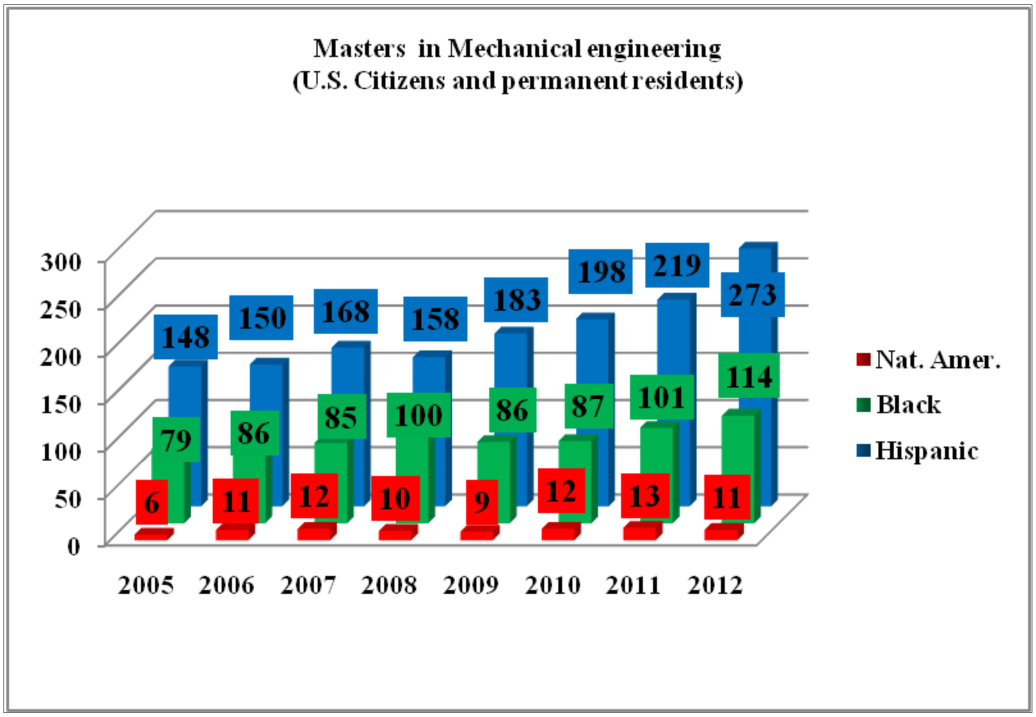


Electrical, electronics, and communications engineering	U.S. citizens and permanent residents	White	Asian	Black	Hispanic	Nat. Amer.	Other	Temporary resident
2005	3,813	2,050	974	177	215	17	380	5,258
2006	3,655	1,961	944	171	213	12	354	4,496
2007	3,705	1,885	1,016	199	235	4	366	4,090
2008	3,706	1,904	941	212	235	14	400	4,951
2009	3,498	1,841	794	189	220	11	443	5,706
2010	3,474	1,812	797	174	215	19	457	5,612
2011	3,720	1,915	895	237	243	9	421	5,994
2012	3,675	2,000	807	211	289	11	357	6,052

U. S. Citizen and permanent resident Master's degrees recipients in Electrical, electronics, and communications engineering.

(SOURCE: National Science Foundation, National Center for Science and Engineering Statistics, special tabulations of U.S. Department of Education, National Center for Education Statistics, Integrated Postsecondary Education Data System, Completions Survey, 2005–12. Prepared by M. D. Slaughter)

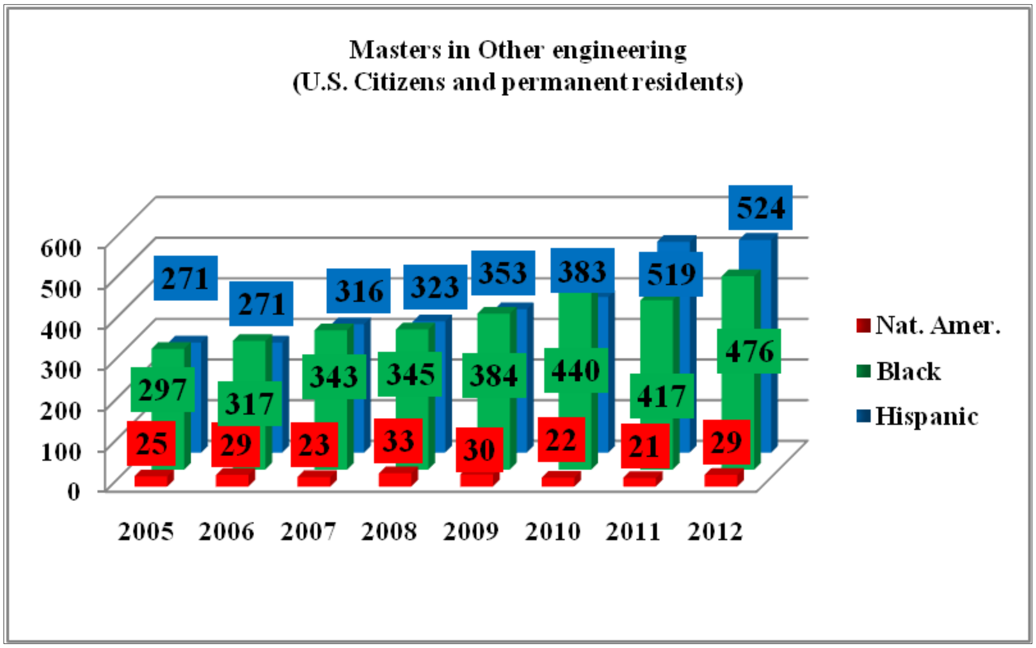
Table 26



Mechanical engineering	U.S. citizens and permanent residents	White	Asian	Black	Hispanic	Nat. Amer.	Other	Temporary resident
2005	2,763	1,993	321	79	148	6	216	1,884
2006	2,756	1,919	353	86	150	11	237	1,698
2007	2,798	1,962	339	85	168	12	232	1,505
2008	2,953	2,052	368	100	158	10	265	1,555
2009	2,858	1,977	357	86	183	9	246	1,775
2010	3,098	2,130	384	87	198	12	287	1,739
2011	3,642	2,554	464	101	219	13	291	2,175
2012	3,752	2,636	427	114	273	11	291	2,106

U. S. Citizen and permanent resident Master's degrees recipients in Mechanical engineering. (SOURCE: National Science Foundation, National Center for Science and Engineering Statistics, special tabulations of U.S. Department of Education, National Center for Education Statistics, Integrated Postsecondary Education Data System, Completions Survey, 2005–12. Prepared by M. D. Slaughter)

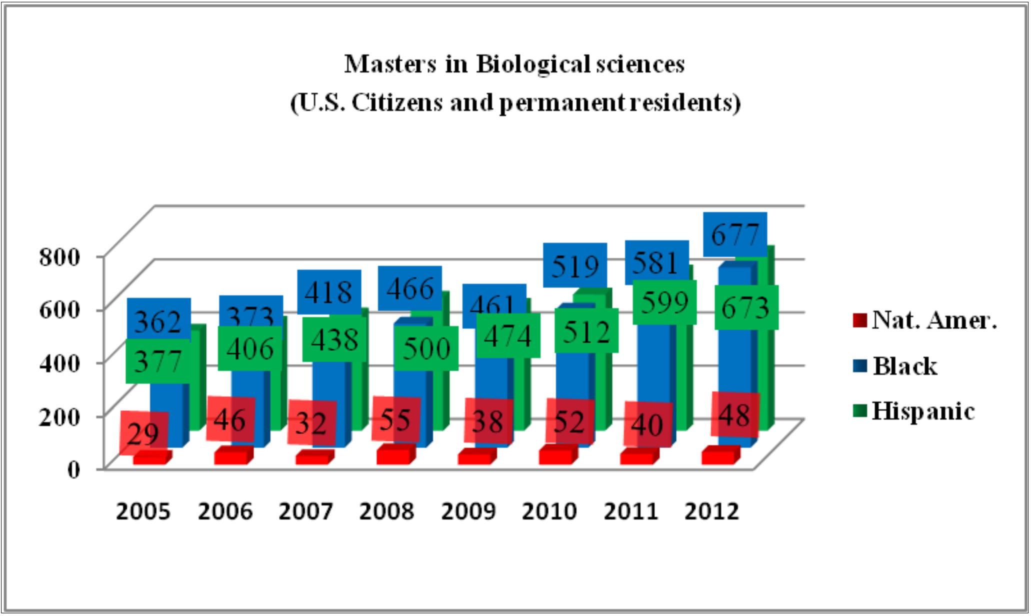
Table 27



Other engineering	U.S. citizens and permanent residents	White	Asian	Black	Hispanic	Nat. Amer.	Other	Temporary resident
2005	6,062	3,953	985	297	271	25	531	3,492
2006	6,156	3,890	1,107	317	271	29	542	3,410
2007	6,427	3,959	1,180	343	316	23	606	2,815
2008	6,799	4,011	1,395	345	323	33	692	3,268
2009	7,855	4,261	1,991	384	353	30	836	3,825
2010	7,656	4,278	1,689	440	383	22	844	4,141
2011	8,056	4,724	1,502	417	519	21	873	4,296
2012	8,776	5,336	1,451	476	524	29	960	4,314

U. S. Citizen and permanent resident Master's degrees recipients in Other engineering.
(SOURCE: N ational Sc ience Foundation, N ational C enter for S cience a nd Engineering S tatistics, s pecial tabulations o f U .S. Department o f E ducation, N ational C enter for Education St atistics, Integrated Postsecondary Education Data System, Completions Survey, 2005–12. Prepared by M. D. Slaughter)

Table 28

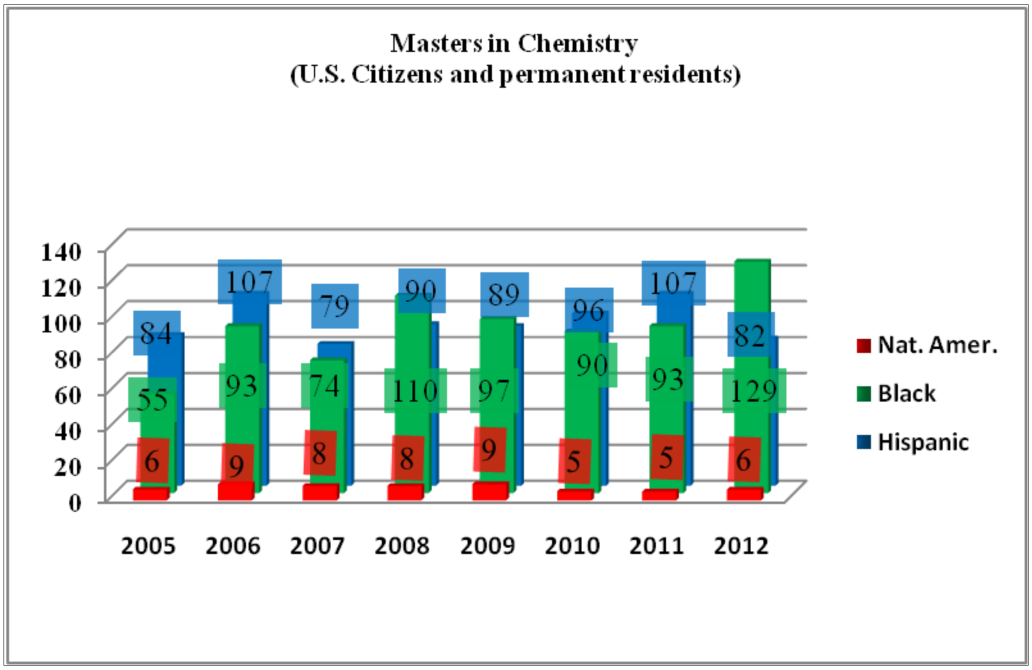


Biological sciences	U.S. citizens and permanent residents	White	Asian	Black	Hispanic	Nat. Amer.	Other	Temporary resident
2005	6,910	4,876	795	377	362	29	471	1,210
2006	7,430	5,248	820	406	373	46	537	1,288
2007	7,468	5,073	883	438	418	32	624	1,326
2008	8,100	5,242	977	500	466	55	860	1,465
2009	8,211	5,299	1,037	474	461	38	902	1,710
2010	8,878	5,594	1,245	512	519	52	956	1,790
2011	9,313	5,838	1,267	599	581	40	988	1,901
2012	10,265	6,438	1,442	673	677	48	987	2,048

U. S. Citizen and permanent resident Master's degrees recipients in Biological sciences.

(SOURCE: National Science Foundation, National Center for Science and Engineering Statistics, special tabulations of U.S. Department of Education, National Center for Education Statistics, Integrated Postsecondary Education Data System, Completions Survey, 2005–12. Prepared by M. D. Slaughter)

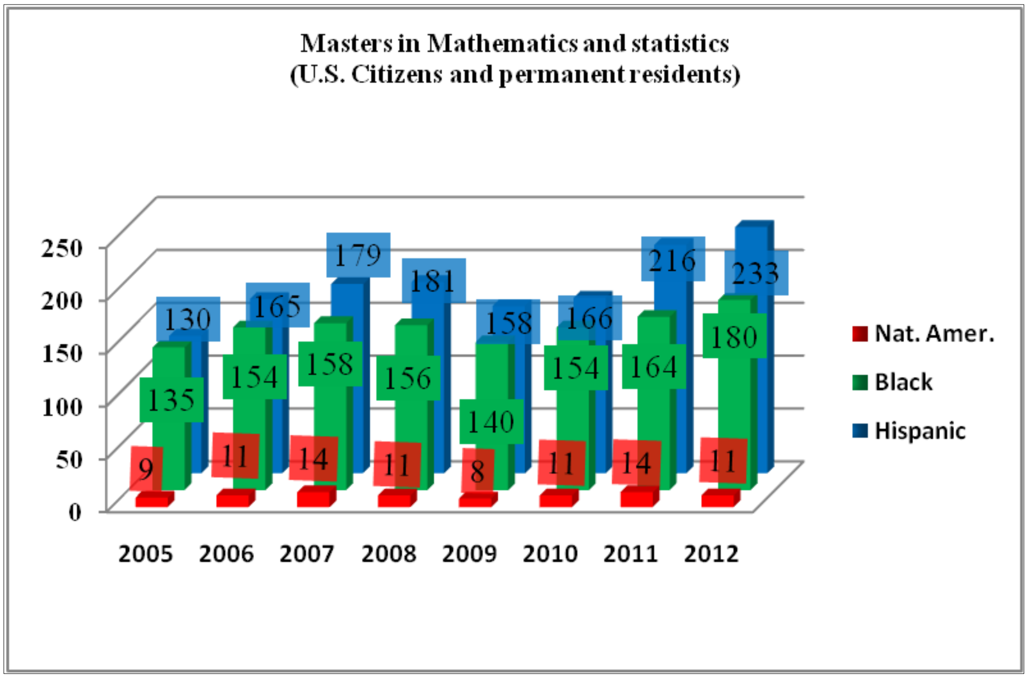
Table 29



Chemistry	U.S. citizens and permanent residents	White	Asian	Black	Hispanic	Nat. Amer.	Other	Temporary resident
2005	1,289	886	154	55	84	6	104	623
2006	1,396	963	137	93	107	9	87	701
2007	1,432	977	177	74	79	8	117	712
2008	1,524	1,032	154	110	90	8	130	712
2009	1,436	941	178	97	89	9	122	695
2010	1,465	926	186	90	96	5	162	710
2011	1,532	964	208	93	107	5	155	792
2012	1,627	1,110	174	129	82	6	126	866

U. S. Citizen and permanent resident Master's degrees recipients in Chemistry.
(SOURCE: National Science Foundation, National Center for Science and Engineering Statistics, special tabulations of U.S. Department of Education, National Center for Education Statistics, Integrated Postsecondary Education Data System, Completions Survey, 2005–12. Prepared by M. D. Slaughter)

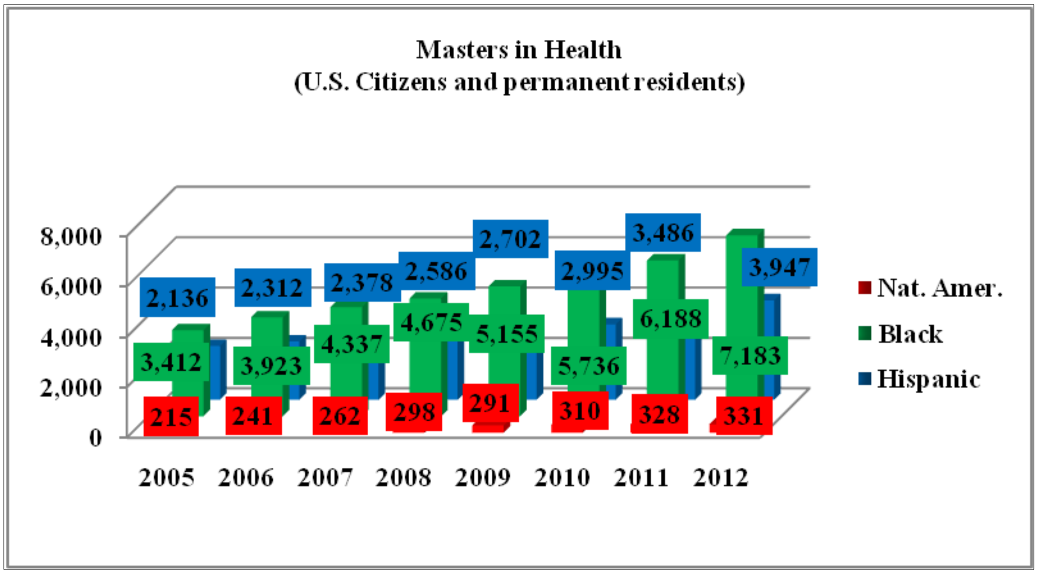
Table 30



Mathematics and statistics	U.S. citizens and permanent residents	White	Asian	Black	Hispanic	Nat. Amer.	Other	Temporary resident
2005	2,820	1,982	324	135	130	9	240	1,777
2006	3,084	2,115	396	154	165	11	243	1,806
2007	3,266	2,187	457	158	179	14	271	1,769
2008	3,268	2,192	416	156	181	11	312	1,884
2009	3,245	2,178	431	140	158	8	330	2,214
2010	3,480	2,322	459	154	166	11	368	2,478
2011	3,765	2,452	515	164	216	14	404	2,438
2012	3,952	2,604	505	180	233	11	419	2,722

U. S. Citizen and permanent resident Master's degrees recipients in Mathematics and statistics. (SOURCE: National Science Foundation, National Center for Science and Engineering Statistics, special tabulations of U.S. Department of Education, National Center for Education Statistics, Integrated Postsecondary Education Data System, Completions Survey, 2005–12. Prepared by M. D. Slaughter)

Table 31

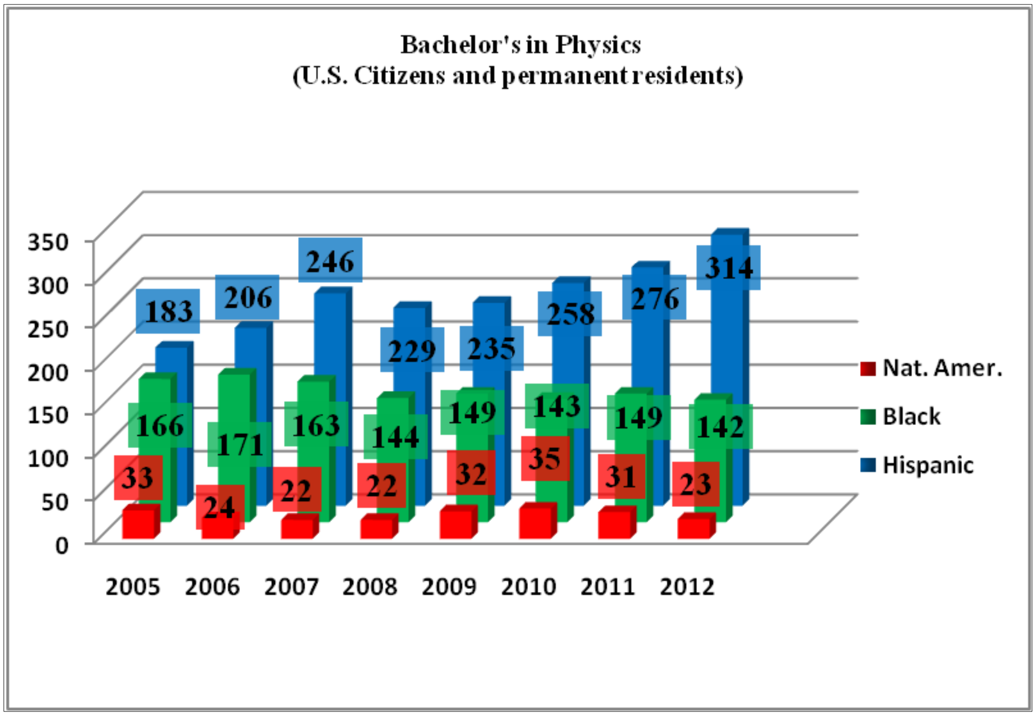


Health	U.S. citizens and permanent residents	White	Asian	Black	Hispanic	Nat. Amer.	Other	Temporary resident
2005	38,118	26,763	2,921	3,412	2,136	215	2,671	2,369
2006	41,449	28,491	3,061	3,923	2,312	241	3,421	2,822
2007	44,142	30,212	3,306	4,337	2,378	262	3,647	2,660
2008	46,829	31,804	3,354	4,675	2,586	298	4,112	2,613
2009	50,881	34,148	3,885	5,155	2,702	291	4,700	2,753
2010	54,344	35,846	4,201	5,736	2,995	310	5,256	3,049
2011	59,802	39,198	4,663	6,188	3,486	328	5,939	3,340
2012	66,327	43,084	5,236	7,183	3,947	331	6,546	3,451

U. S. Citizen and permanent resident Master's degrees recipients in Mathematics and statistics. (SOURCE: National Science Foundation, National Center for Science and Engineering Statistics, special tabulations of U.S. Department of Education, National Center for Education Statistics, Integrated Postsecondary Education Data System, Completions Survey, 2005–12. Prepared by M. D. Slaughter)

BACHELOR'S IN SELECTED FIELDS

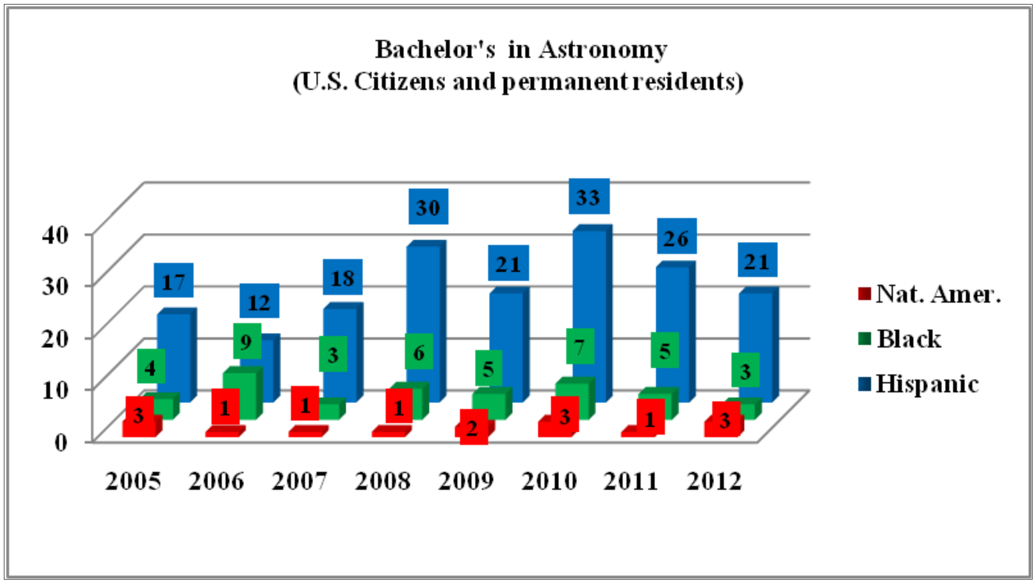
Table 32



Physics	U.S. citizens and permanent residents	White	Asian	Black	Hispanic	Nat. Amer.	Other	Temporary resident
2005	3,999	3,092	236	166	183	33	289	200
2006	4,323	3,333	281	171	206	24	308	243
2007	4,647	3,545	327	163	246	22	344	223
2008	4,647	3,572	307	144	229	22	373	229
2009	4,633	3,599	306	149	235	32	312	209
2010	4,793	3,636	310	143	258	35	411	207
2011	4,966	3,734	347	149	276	31	429	255
2012	5,231	3,917	382	142	314	23	453	326

U. S. Citizen and permanent resident Bachelor's degrees recipients in Physics.
(SOURCE: National Science Foundation, National Center for Science and Engineering Statistics, special tabulations of U.S. Department of Education, National Center for Education Statistics, Integrated Postsecondary Education Data System, Completions Survey, 2005–12. Prepared by M. D. Slaughter)

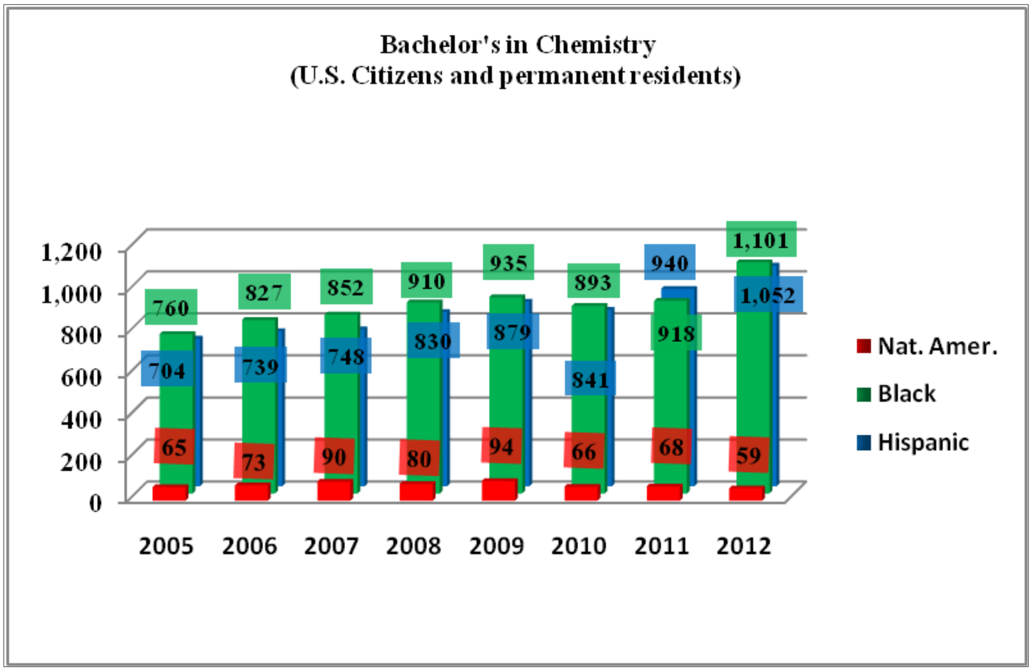
Table 33



Astronomy	U.S. citizens and permanent residents	White	Asian	Black	Hispanic	Nat. Amer.	Other	Temporary resident
2005	311	234	21	4	17	3	32	20
2006	353	269	37	9	12	1	25	13
2007	319	248	16	3	18	1	33	13
2008	330	251	21	6	30	1	21	16
2009	322	233	27	5	21	2	34	13
2010	375	260	36	7	33	3	36	13
2011	348	272	20	5	26	1	24	16
2012	384	291	33	3	21	3	33	8

U. S. Citizen and permanent resident Master's degrees recipients in Astronomy. (SOURCE: National Science Foundation, National Center for Science and Engineering Statistics, special tabulations of U.S. Department of Education, National Center for Education Statistics, Integrated Postsecondary Education Data System, Completions Survey, 2005–12. Prepared by M. D. Slaughter)

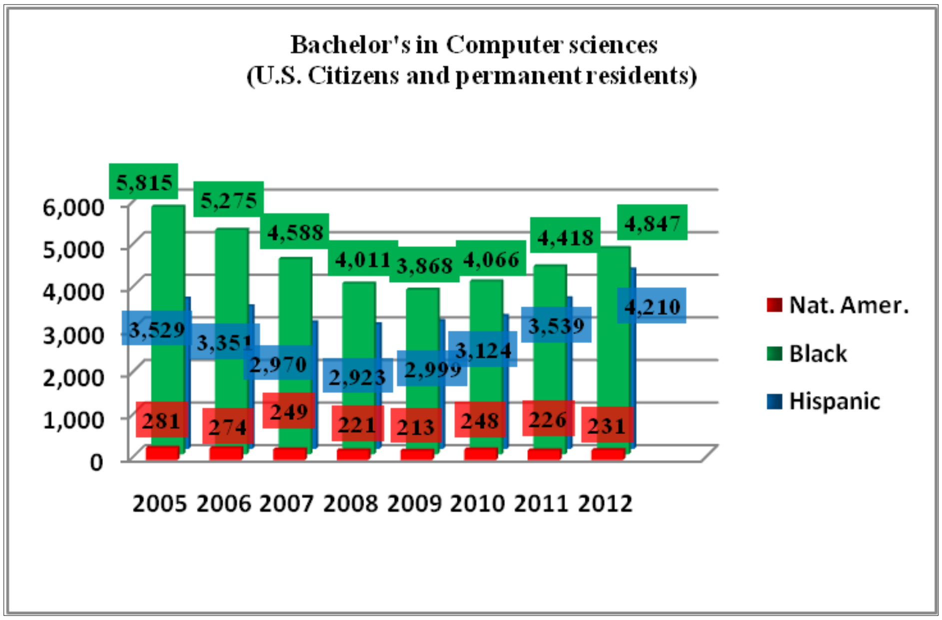
Table 34



Chemistry	U.S. citizens and permanent residents	White	Asian	Black	Hispanic	Nat. Amer.	Other	Temporary resident
2005	9,526	6,586	1,024	760	704	65	387	397
2006	10,421	7,023	1,267	827	739	73	492	466
2007	10,799	7,135	1,420	852	748	90	554	451
2008	11,364	7,322	1,596	910	830	80	626	468
2009	11,615	7,463	1,671	935	879	94	573	529
2010	11,791	7,560	1,726	893	841	66	705	547
2011	12,315	7,821	1,796	918	940	68	772	573
2012	13,115	8,181	1,877	1,101	1,052	59	845	599

U. S. Citizen and permanent resident Bachelor's degrees recipients in Chemistry.
(SOURCE: National Science Foundation, National Center for Science and Engineering Statistics, special tabulations of U.S. Department of Education, National Center for Education Statistics, Integrated Postsecondary Education Data System, Completions Survey, 2005–12. Prepared by M. D. Slaughter)

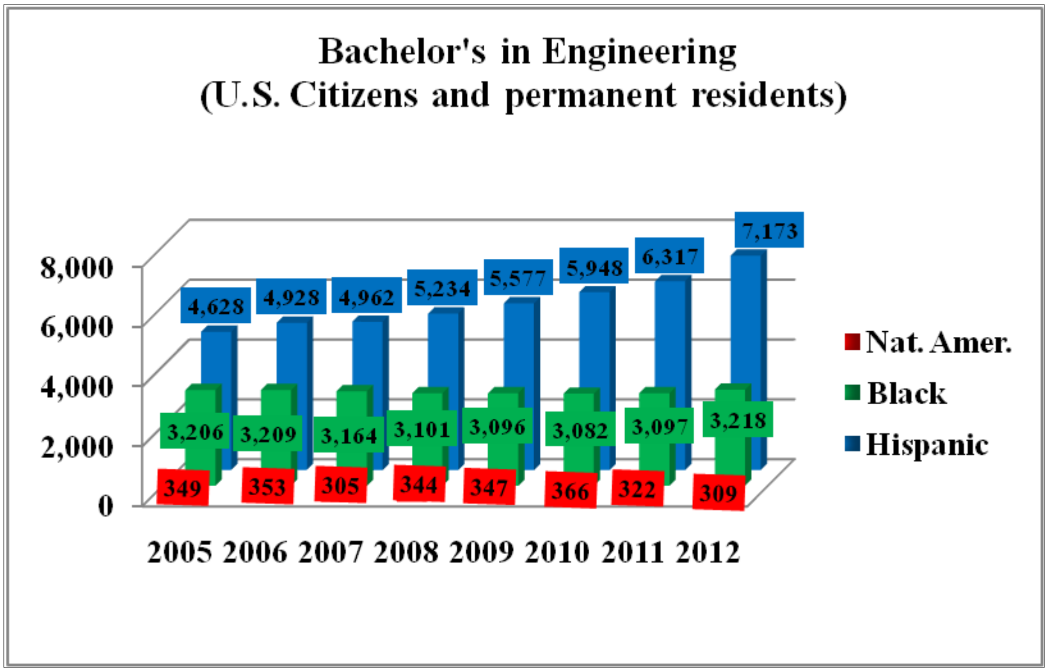
Table 35



Computer sciences	U.S. citizens and permanent residents	White	Asian	Black	Hispanic	Nat. Amer.	Other	Temporary resident
2005	10,975	5,818	2,244	887	498	47	1,481	7,514
2006	10,489	5,715	1,856	853	506	58	1,501	6,649
2007	10,027	5,463	1,754	898	491	40	1,381	6,287
2008	9,746	5,176	1,627	950	473	44	1,476	7,405
2009	9,641	5,080	1,477	919	497	36	1,632	8,347
2010	10,066	5,183	1,470	1,111	651	45	1,606	7,955
2011	10,786	5,553	1,646	1,212	659	48	1,668	8,733
2012	11,636	5,987	1,583	1,420	809	52	1,785	9,365

U. S. Citizen and permanent resident Bachelor's degrees recipients in Computer sciences. (SOURCE: National Science Foundation, National Center for Science and Engineering Statistics, special tabulations of U.S. Department of Education, National Center for Education Statistics, Integrated Postsecondary Education Data System, Completions Survey, 2005–12. Prepared by M. D. Slaughter)

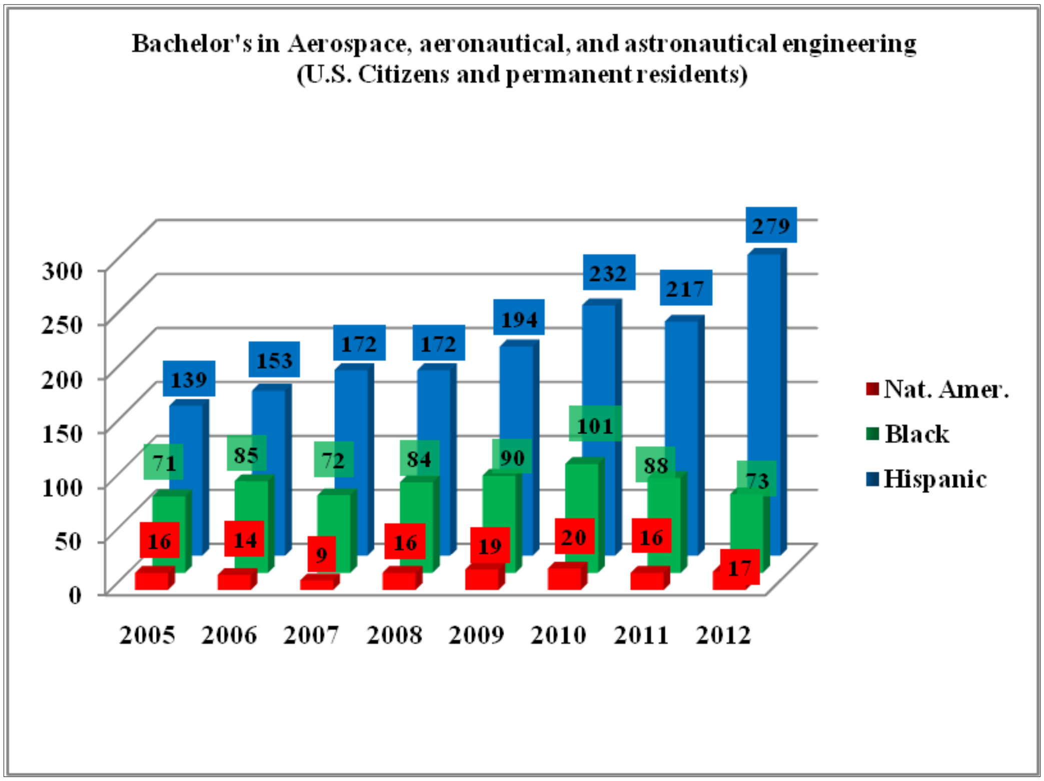
Table 36



Engineering	U.S. citizens and permanent residents	White	Asian	Black	Hispanic	Nat. Amer.	Other	Temporary resident
2005	61,412	42,191	8,211	3,206	4,628	349	2,827	4,740
2006	63,516	43,526	8,551	3,209	4,928	353	2,949	4,711
2007	63,885	43,980	8,466	3,164	4,962	305	3,008	4,389
2008	65,728	45,383	8,343	3,101	5,234	344	3,323	4,180
2009	66,529	45,647	8,266	3,096	5,577	347	3,596	4,071
2010	69,897	47,977	8,405	3,082	5,948	366	4,119	4,502
2011	72,848	49,401	8,775	3,097	6,317	322	4,936	5,251
2012	76,932	52,352	9,243	3,218	7,173	309	4,637	6,331

U. S. Citizen and permanent resident Bachelor's degrees recipients in Engineering.
(SOURCE: N ational Sc ience Foundation, National C enter for S cience and E ngineering St atistics, special tabulations o f U .S. Department o f E ducation, N ational C enter for E ducation St atistics, Integrated Postsecondary Education Data System, Completions Survey, 2005–12. Prepared by M. D. Slaughter)

Table 37

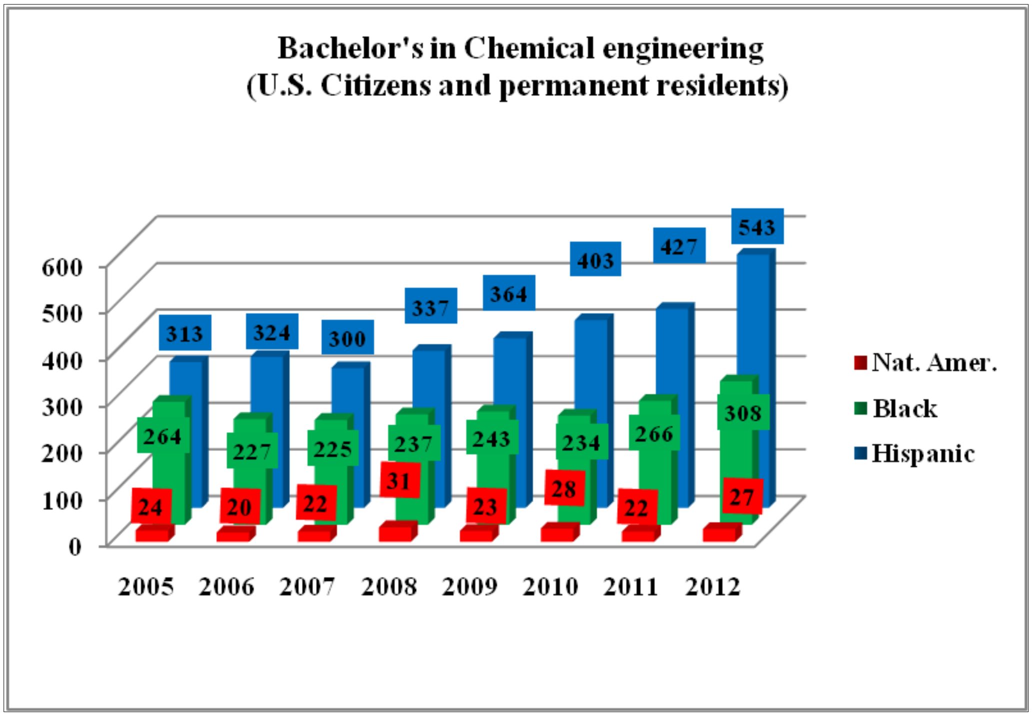


Aerospace, aeronautical, and astronautical engineering	U.S. citizens and permanent residents	White	Asian	Black	Hispanic	Nat. Amer.	Other	Temporary resident
2005	2,213	1,723	184	71	139	16	80	171
2006	2,606	2,005	223	85	153	14	126	147
2007	2,653	2,017	250	72	172	9	133	175
2008	2,783	2,088	278	84	172	16	145	151
2009	2,859	2,113	294	90	194	19	149	178
2010	2,990	2,155	309	101	232	20	173	217
2011	3,097	2,257	328	88	217	16	191	245
2012	3,278	2,379	348	73	279	17	182	267

U. S. Citizen and permanent resident Bachelor's degrees recipients in Aerospace, aeronautical, and astronautical engineering.

(SOURCE: N ational Sc ience Foundation, National C enter for S cience and E ngineering S tatistics, special tabulations o f U .S. D epartment o f E ducation, N ational C enter for E ducation S tatistics, I ntegrated Postsecondary Education Data System, Completions Survey, 2005–12. Prepared by M. D. Slaughter)

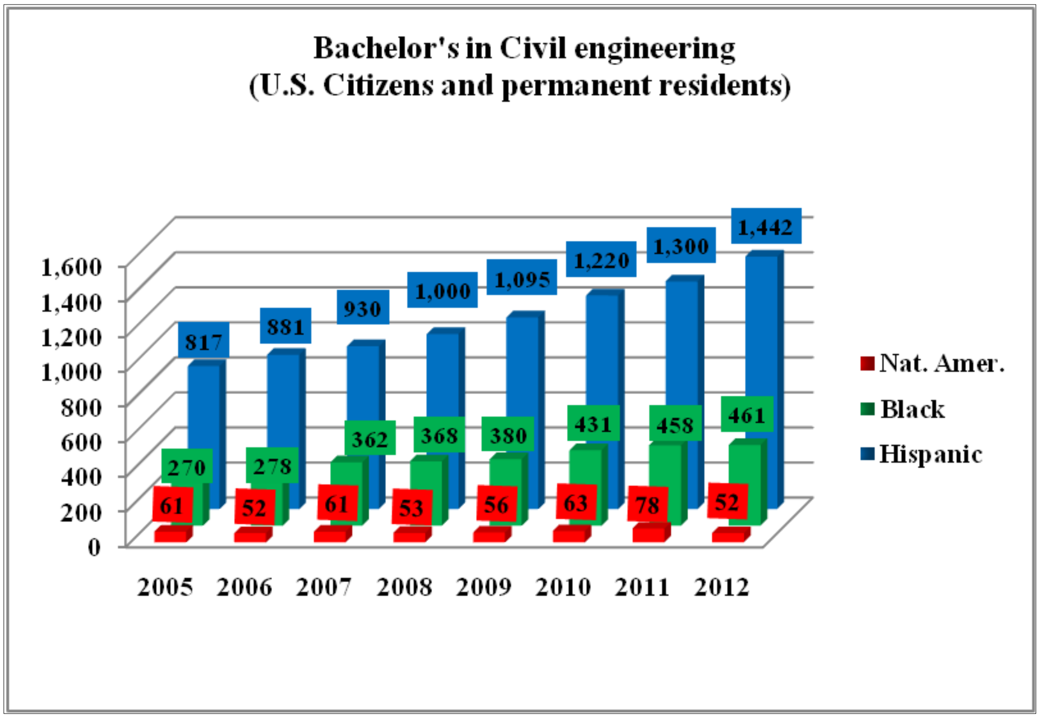
Table 38



Chemical engineering	U.S. citizens and permanent residents	White	Asian	Black	Hispanic	Nat. Amer.	Other	Temporary resident
2005	4,186	2,968	471	264	313	24	146	301
2006	4,098	2,824	537	227	324	20	166	357
2007	4,214	2,867	626	225	300	22	174	357
2008	4,544	3,063	661	237	337	31	215	375
2009	4,776	3,219	708	243	364	23	219	361
2010	5,425	3,630	849	234	403	28	281	413
2011	5,947	4,066	839	266	427	22	327	469
2012	6,551	4,313	992	308	543	27	368	625

U. S. Citizen and permanent resident Bachelor's degrees recipients in Chemical engineering. (SOURCE: National Science Foundation, National Center for Science and Engineering Statistics, special tabulations of U.S. Department of Education, National Center for Education Statistics, Integrated Postsecondary Education Data System, Completions Survey, 2005–12. Prepared by M. D. Slaughter)

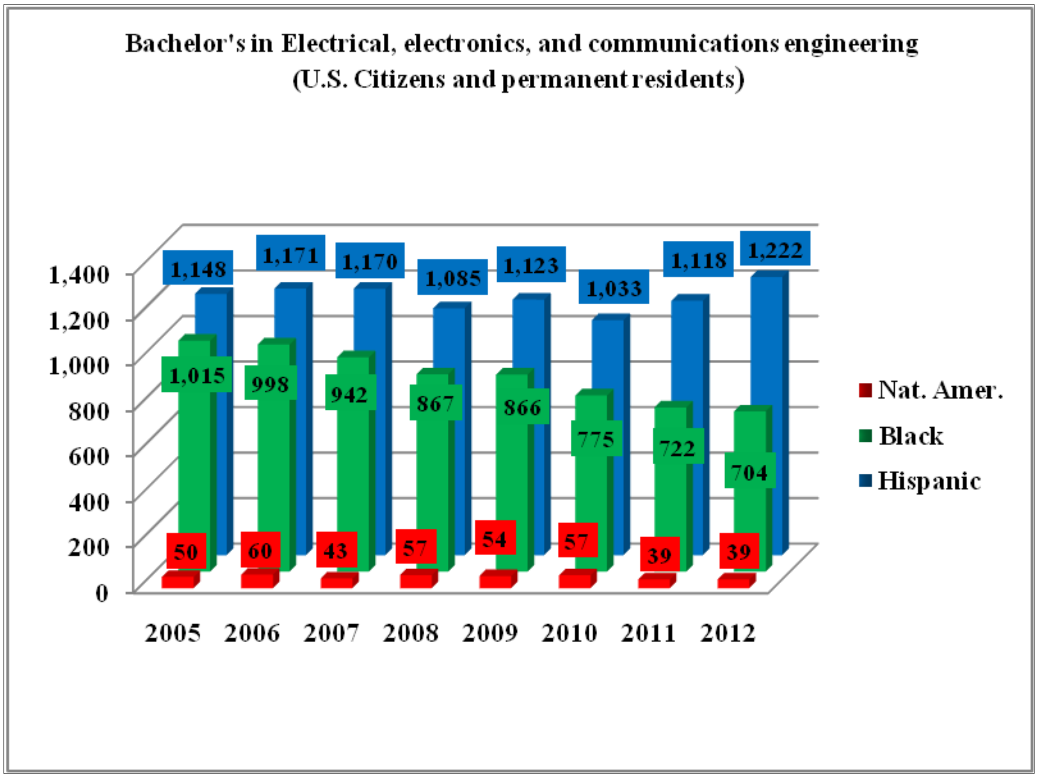
Table 39



Civil engineering	U.S. citizens and permanent residents	White	Asian	Black	Hispanic	Nat. Amer.	Other	Temporary resident
2005	8,162	6,142	537	270	817	61	335	296
2006	9,017	6,714	715	278	881	52	377	307
2007	9,632	7,039	842	362	930	61	398	297
2008	10,331	7,517	903	368	1,000	53	490	344
2009	10,711	7,601	1,002	380	1,095	56	577	330
2010	11,166	7,817	978	431	1,220	63	657	441
2011	12,314	8,505	1,171	458	1,300	78	802	502
2012	12,380	8,646	1,123	461	1,442	52	656	610

U. S. Citizen and permanent resident Bachelor's degrees recipients in Civil engineering.
(SOURCE: National Science Foundation, National Center for Science and Engineering Statistics, special tabulations of U.S. Department of Education, National Center for Education Statistics, Integrated Postsecondary Education Data System, Completions Survey, 2005–12. Prepared by M. D. Slaughter)

Table 40

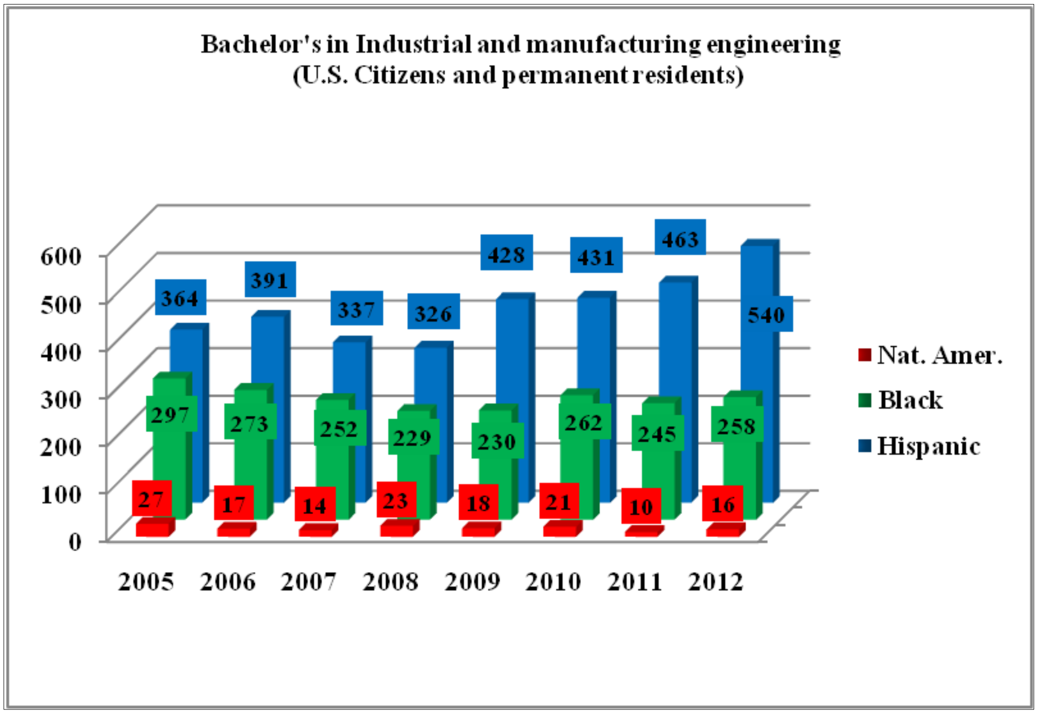


Electrical, electronics, and communications engineering	U.S. citizens and permanent residents	White	Asian	Black	Hispanic	Nat. Amer.	Other	Temporary resident
2005	12,917	7,137	2,875	1,015	1,148	50	692	1,525
2006	12,676	6,967	2,790	998	1,171	60	690	1,561
2007	11,998	6,691	2,520	942	1,170	43	632	1,387
2008	11,404	6,474	2,294	867	1,085	57	627	1,230
2009	10,733	6,015	1,980	866	1,123	54	695	1,150
2010	10,551	6,056	1,879	775	1,033	57	751	1,142
2011	10,403	5,850	1,901	722	1,118	39	773	1,376
2012	10,754	6,186	1,908	704	1,222	39	695	1,601

U. S. Citizen and permanent resident Bachelor's degrees recipients in Electrical, electronics, and communications engineering.

(SOURCE: National Science Foundation, National Center for Science and Engineering Statistics, special tabulations of U.S. Department of Education, National Center for Education Statistics, Integrated Postsecondary Education Data System, Completions Survey, 2005–12. Prepared by M. D. Slaughter)

Table 41

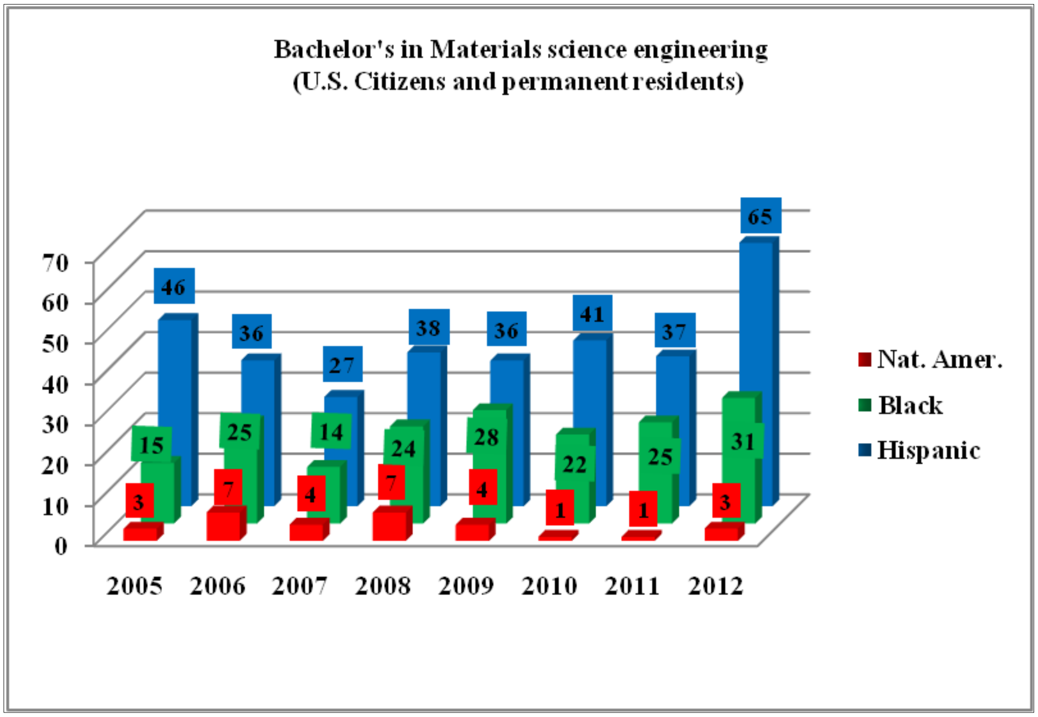


Industrial and manufacturing engineering	U.S. citizens and permanent residents	White	Asian	Black	Hispanic	Nat. Amer.	Other	Temporary resident
2005	3,541	2,353	352	297	364	27	148	395
2006	3,462	2,312	362	273	391	17	107	428
2007	3,154	2,107	333	252	337	14	111	375
2008	3,160	2,148	315	229	326	23	119	406
2009	3,510	2,346	360	230	428	18	128	369
2010	3,741	2,491	343	262	431	21	193	433
2011	3,840	2,475	390	245	463	10	257	443
2012	4,094	2,678	395	258	540	16	207	578

U. S. Citizen and permanent resident Bachelor's degrees recipients in Industrial and manufacturing engineering.

(SOURCE: National Science Foundation, National Center for Science and Engineering Statistics, special tabulations of U.S. Department of Education, National Center for Education Statistics, Integrated Postsecondary Education Data System, Completions Survey, 2005–12. Prepared by M. D. Slaughter)

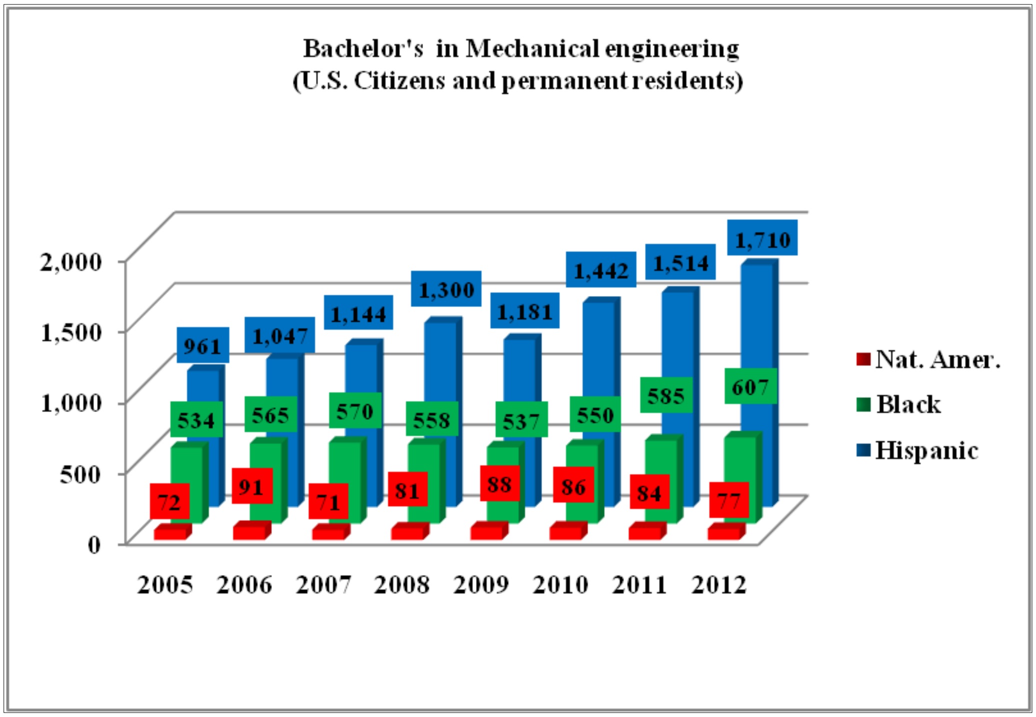
Table 42



Materials science engineering	U.S. citizens and permanent residents	White	Asian	Black	Hispanic	Nat. Amer.	Other	Temporary resident
2005	721	521	95	15	46	3	41	37
2006	775	536	144	25	36	7	27	39
2007	758	546	133	14	27	4	34	42
2008	880	632	130	24	38	7	49	36
2009	842	581	131	28	36	4	62	59
2010	925	665	148	22	41	1	48	60
2011	908	651	135	25	37	1	59	65
2012	1,058	721	150	31	65	3	88	74

U. S. Citizen and permanent resident Bachelor's degrees recipients in Materials science engineering. (SOURCE: National Science Foundation, National Center for Science and Engineering Statistics, special tabulations of U.S. Department of Education, National Center for Education Statistics, Integrated Postsecondary Education Data System, Completions Survey, 2005–12. Prepared by M. D. Slaughter)

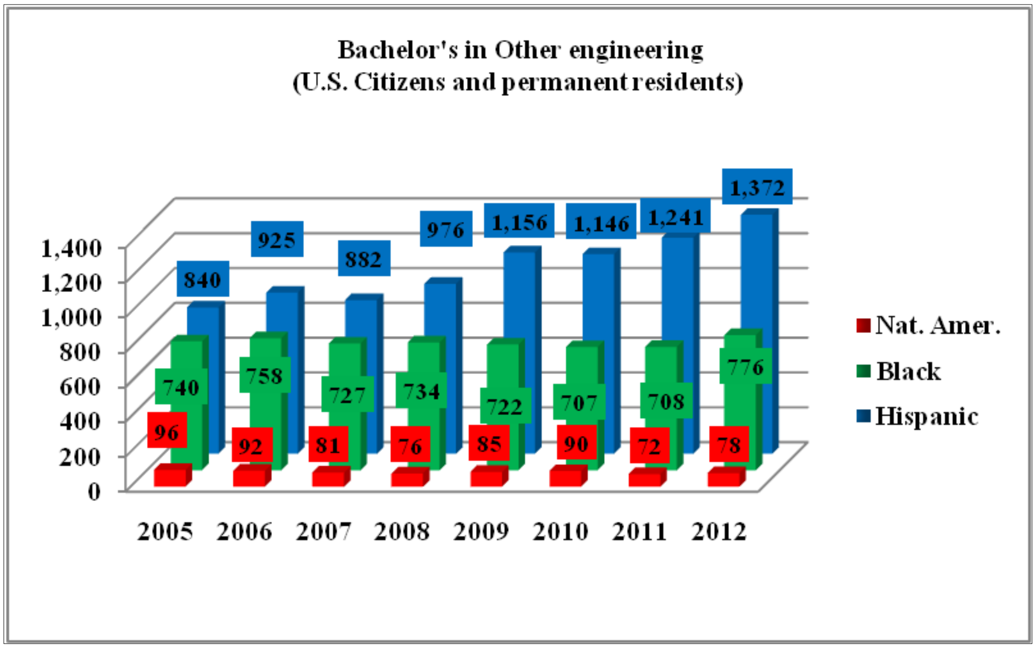
Table 43



Mechanical engineering	U.S. citizens and permanent residents	White	Asian	Black	Hispanic	Nat. Amer.	Other	Temporary resident
2005	14,165	10,875	1,077	534	961	72	646	646
2006	15,399	11,733	1,244	565	1,047	91	719	649
2007	16,098	12,174	1,410	570	1,144	71	729	711
2008	16,872	12,608	1,483	558	1,300	81	842	714
2009	16,838	12,677	1,482	537	1,181	88	873	713
2010	17,980	13,363	1,535	550	1,442	86	1,004	799
2011	18,510	13,503	1,588	585	1,514	84	1,236	878
2012	19,667	14,342	1,707	607	1,710	77	1,224	1,115

U. S. Citizen and permanent resident Bachelor's degrees recipients in Mechanical engineering. (SOURCE: National Science Foundation, National Center for Science and Engineering Statistics, special tabulations of U.S. Department of Education, National Center for Education Statistics, Integrated Postsecondary Education Data System, Completions Survey, 2005–12. Prepared by M. D. Slaughter)

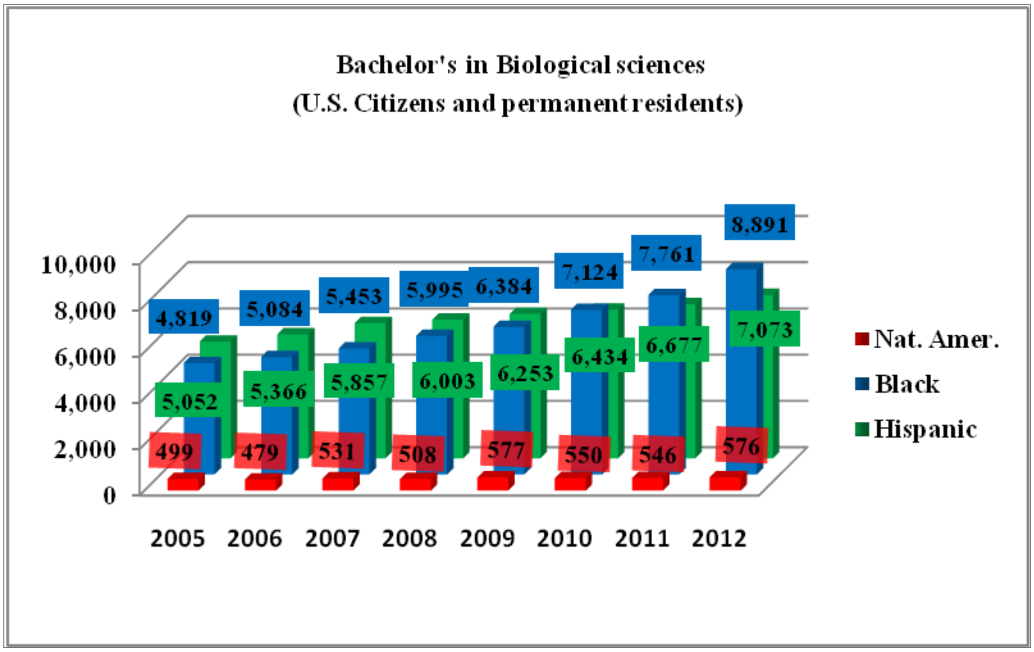
Table 44



Other engineering	U.S. citizens and permanent residents	White	Asian	Black	Hispanic	Nat. Amer.	Other	Temporary resident
2005	15,507	10,472	2,620	740	840	96	739	1,369
2006	15,483	10,435	2,536	758	925	92	737	1,223
2007	15,378	10,539	2,352	727	882	81	797	1,045
2008	15,754	10,853	2,279	734	976	76	836	924
2009	16,260	11,095	2,309	722	1,156	85	893	911
2010	17,119	11,800	2,364	707	1,146	90	1,012	997
2011	17,829	12,094	2,423	708	1,241	72	1,291	1,273
2012	19,150	13,087	2,620	776	1,372	78	1,217	1,461

U. S. Citizen and permanent resident Bachelor's degrees recipients in Other engineering. (SOURCE: National Science Foundation, National Center for Science and Engineering Statistics, special tabulations of U.S. Department of Education, National Center for Education Statistics, Integrated Postsecondary Education Data System, Completions Survey, 2005–12. Prepared by M. D. Slaughter)

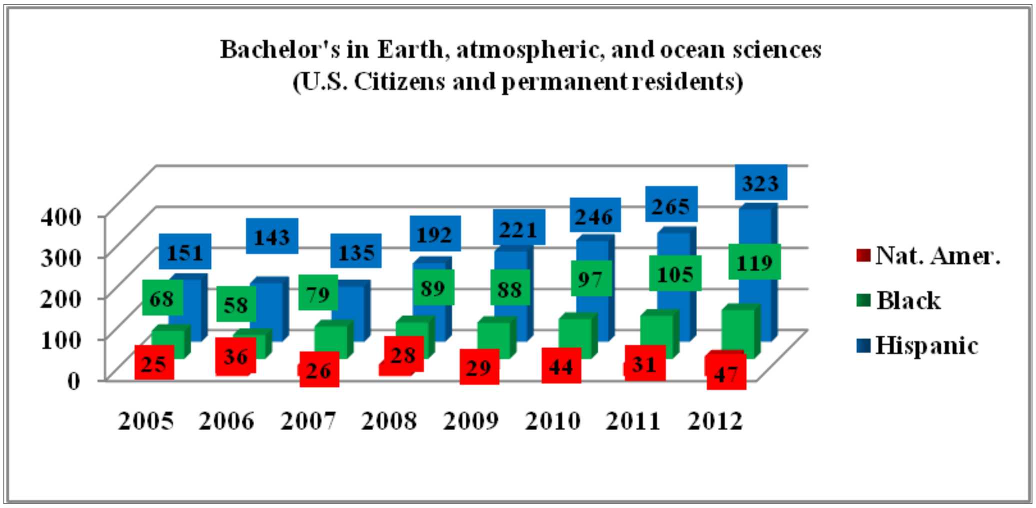
Table 45



Biological sciences	U.S. citizens and permanent residents	White	Asian	Black	Hispanic	Nat. Amer.	Other	Temporary resident
2005	6,910	4,876	795	377	362	29	471	1,210
2006	7,430	5,248	820	406	373	46	537	1,288
2007	7,468	5,073	883	438	418	32	624	1,326
2008	8,100	5,242	977	500	466	55	860	1,465
2009	8,211	5,299	1,037	474	461	38	902	1,710
2010	8,878	5,594	1,245	512	519	52	956	1,790
2011	9,313	5,838	1,267	599	581	40	988	1,901
2012	10,265	6,438	1,442	673	677	48	987	2,048

U. S. Citizen and permanent resident Bachelor's degrees recipients in Biological sciences. (SOURCE: National Science Foundation, National Center for Science and Engineering Statistics, special tabulations of U.S. Department of Education, National Center for Education Statistics, Integrated Postsecondary Education Data System, Completions Survey, 2005–12. Prepared by M. D. Slaughter)

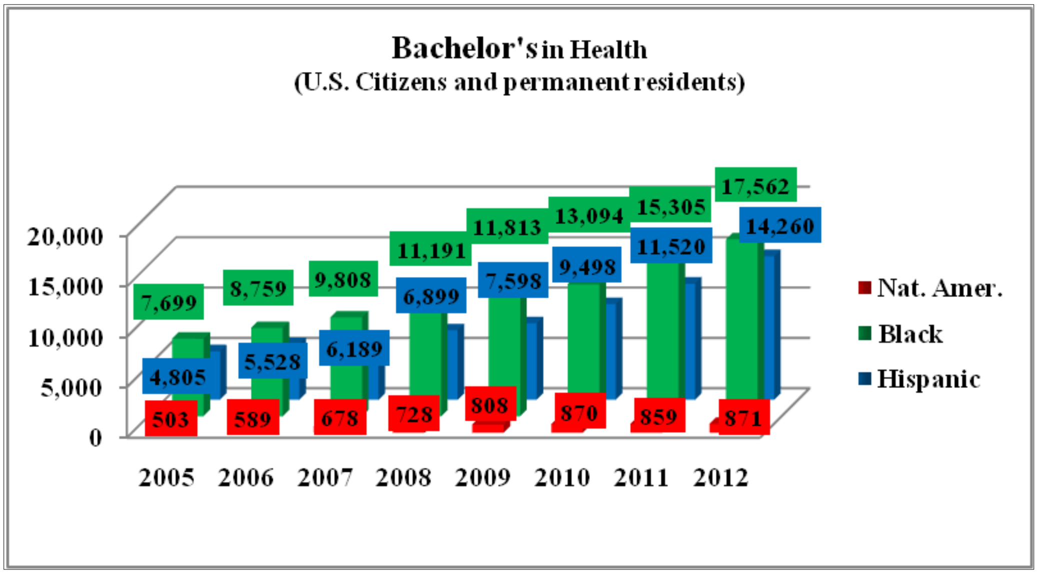
Table 46



Earth, atmospheric, and ocean sciences	U.S. citizens and permanent residents	White	Asian	Black	Hispanic	Nat. Amer.	Other	Temporary resident
2005	3,879	3,366	86	68	151	25	183	80
2006	3,911	3,360	92	58	143	36	222	76
2007	4,019	3,474	106	79	135	26	199	58
2008	4,244	3,565	121	89	192	28	249	70
2009	4,460	3,718	143	88	221	29	261	82
2010	4,698	3,879	158	97	246	44	274	104
2011	5,177	4,256	156	105	265	31	364	122
2012	5,749	4,713	193	119	323	47	354	116

U. S. Citizen and permanent resident Bachelor's degrees recipients in Earth, atmospheric, and ocean sciences. (SOURCE: National Science Foundation, National Center for Science and Engineering Statistics, special tabulations of U.S. Department of Education, National Center for Education Statistics, Integrated Postsecondary Education Data System, Completions Survey, 2005–12. Prepared by M. D. Slaughter)

Table 47

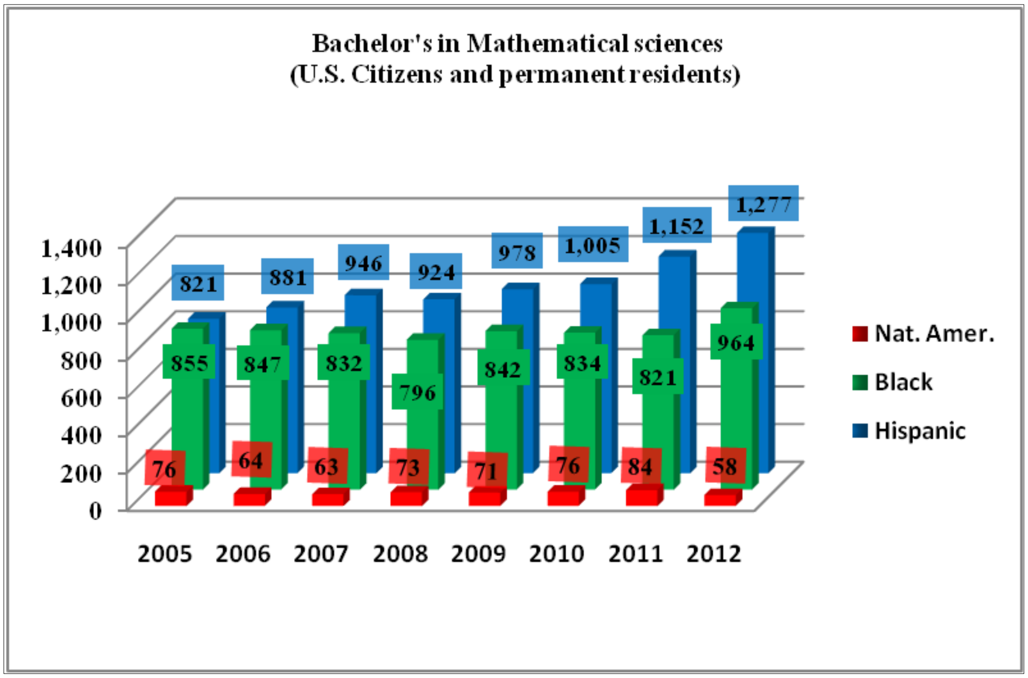


Health	U.S. citizens and permanent residents	White	Asian	Black	Hispanic	Nat. Amer.	Other	Temporary resident
2005	73,522	53,244	3,519	7,699	4,805	503	3,752	1,031
2006	84,068	60,333	4,354	8,759	5,528	589	4,505	1,458
2007	93,573	66,300	5,080	9,808	6,189	678	5,518	1,862
2008	103,983	72,556	6,051	11,191	6,899	728	6,558	1,684
2009	112,648	77,740	7,056	11,813	7,598	808	7,633	1,910
2010	124,096	83,669	7,796	13,094	9,498	870	9,169	1,892
2011	140,262	92,730	8,647	15,305	11,520	859	11,201	1,957
2012	160,250	104,044	10,663	17,562	14,260	871	12,850	2,170

U. S. Citizen and permanent resident Bachelor's degrees recipients in Health.

(SOURCE: N ational Sc ience Foundation, National C enter for S cience and E ngineering S tatistics, special tabulations o f U .S. D epartment o f E ducation, N ational C enter for E ducation S tatistics, I ntegrated Postsecondary Education Data System, Completions Survey, 2005–12. Prepared by M. D. Slaughter)

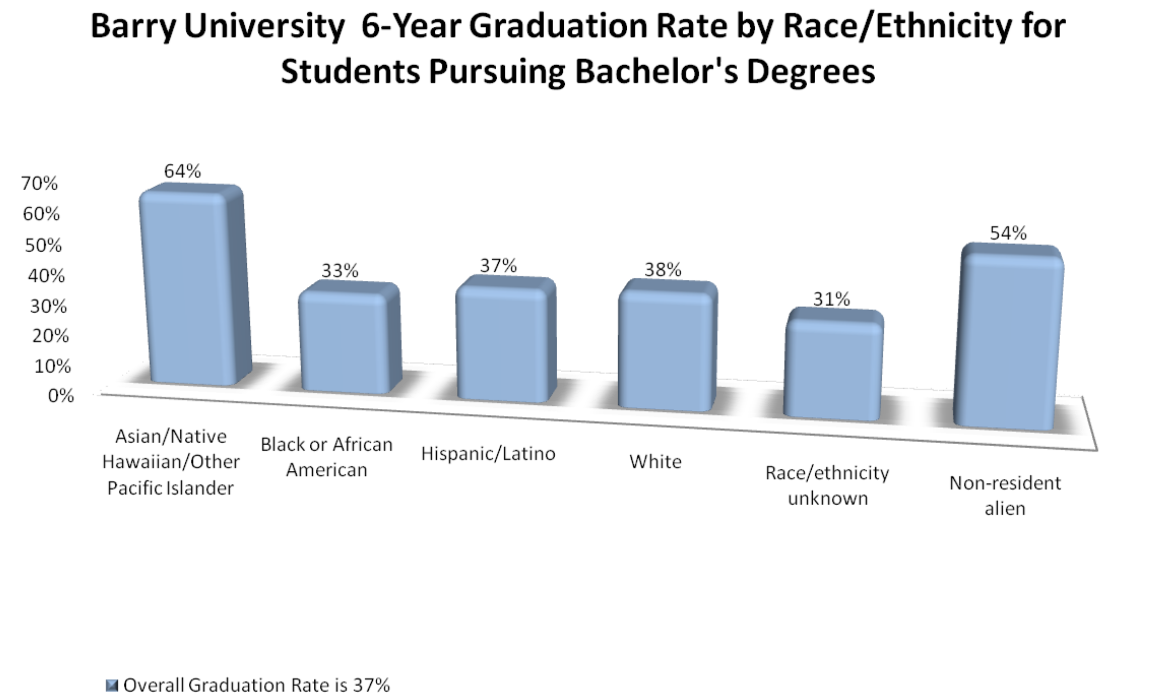
Table 48



Mathematical sciences	U.S. citizens and permanent residents	White	Asian	Black	Hispanic	Nat. Amer.	Other	Temporary resident
2005	14,055	10,144	1,419	855	821	76	740	761
2006	14,501	10,452	1,447	847	881	64	810	809
2007	14,841	10,731	1,439	832	946	63	830	710
2008	15,079	10,875	1,512	796	924	73	899	762
2009	15,369	10,913	1,565	842	978	71	1,000	839
2010	15,824	11,173	1,630	834	1,005	76	1,106	1,008
2011	16,665	11,628	1,842	821	1,152	84	1,138	1,356
2012	17,929	12,575	1,883	964	1,277	58	1,172	1,890

U. S. Citizen and permanent resident Bachelor's degrees recipients in Mathematical sciences. (SOURCE: N ational Sc ience Foundation, National C enter for S cience and E ngineering St atistics, special tabulations o f U .S. Department o f E ducation, N ational C enter for E ducation S tatistics, Integrated Postsecondary Education Data System, Completions Survey, 2005–12. Prepared by M. D. Slaughter)

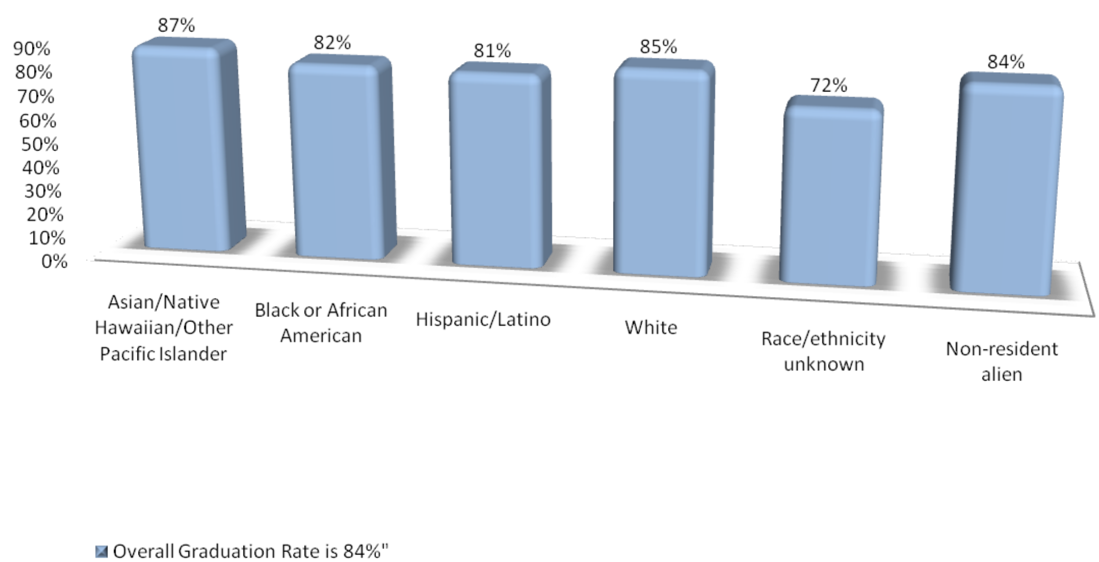
Selected 6-Year Bachelor's Degrees Graduation Rate Charts



Percentage of Full-Time, First-Time Students Who Began Their Studies in Fall 2007 and Received a Degree or Award Within 150% of "Normal Time" (Fall 2013) to Completion for Their Program

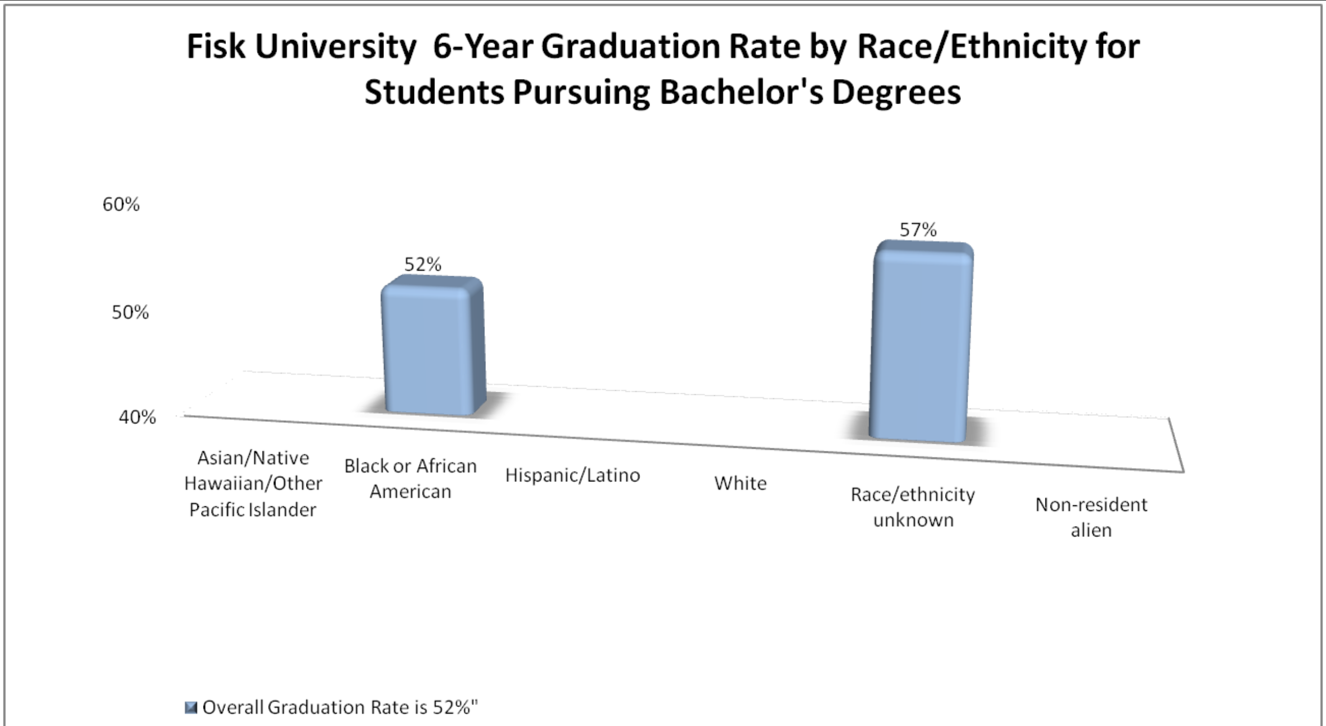
Source: National Center for Educational Statistics. (Prepared by M. D. Slaughter)

Boston University 6-Year Graduation Rate by Race/Ethnicity for Students Pursuing Bachelor's Degrees



Percentage of Full-Time, First-Time Students Who Began Their Studies in Fall 2007 and Received a Degree or Award Within 150% of "Normal Time" (Fall 2013) to Completion for Their Program

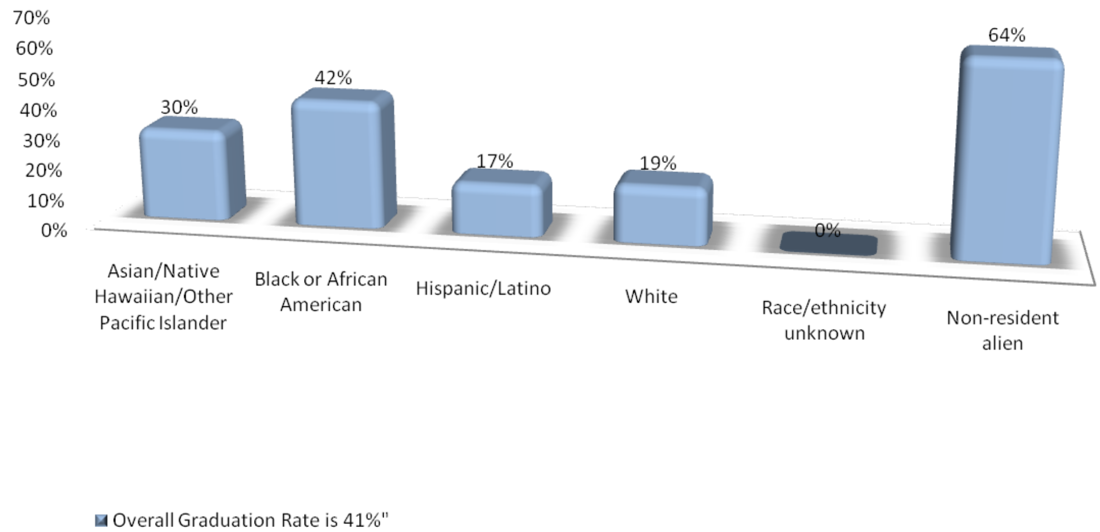
Source: National Center for Educational Statistics. (Prepared by M. D. Slaughter)



Percentage of Full-Time, First-Time Students Who Began Their Studies in Fall 2007 and Received a Degree or Award Within 150% of "Normal Time" (Fall 2013) to Completion for Their Program

Source: National Center for Educational Statistics. (Prepared by M. D. Slaughter)

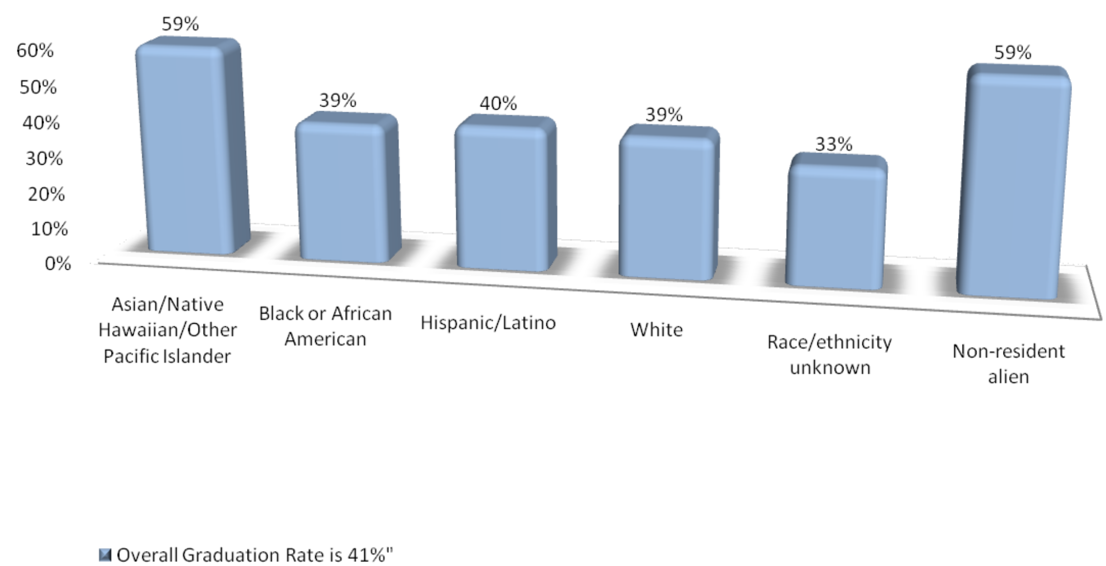
Florida Agricultural and Mechanical University 6-Year Graduation Rate by Race/Ethnicity for Students Pursuing Bachelor's Degrees



Percentage of Full-Time, First-Time Students Who Began Their Studies in Fall 2007 and Received a Degree or Award Within 150% of "Normal Time" (Fall 2013) to Completion for Their Program

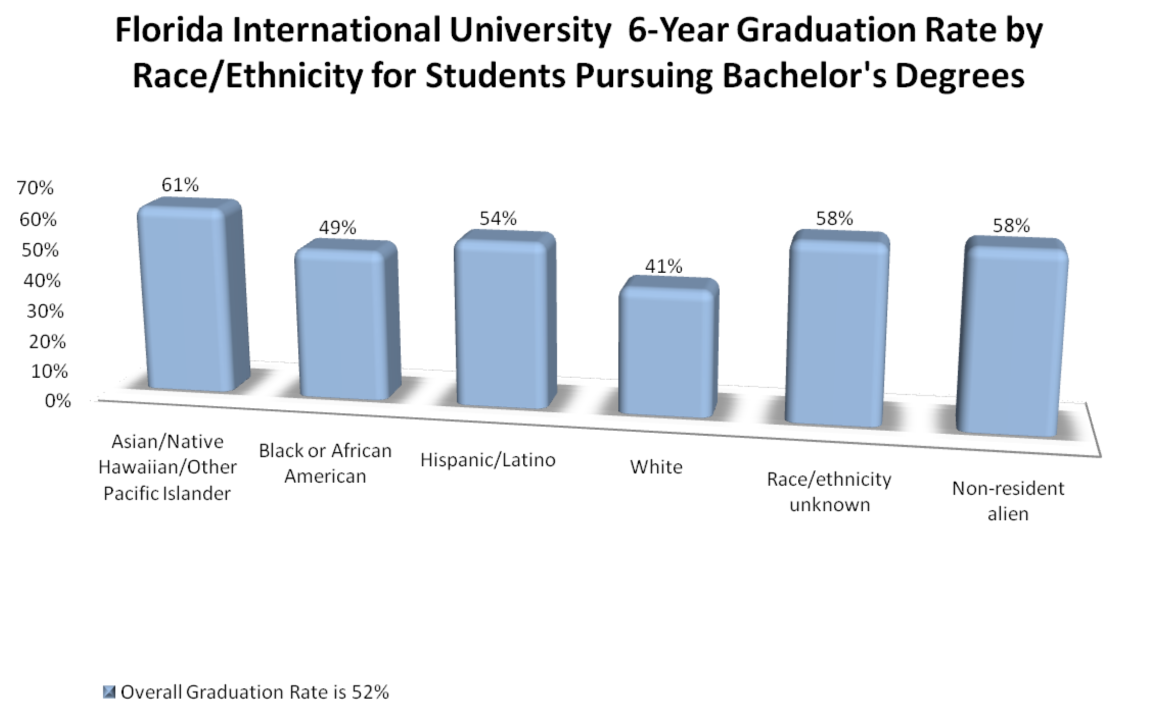
Source: National Center for Educational Statistics. (Prepared by M. D. Slaughter)

Florida Atlantic University 6-Year Graduation Rate by Race/Ethnicity for Students Pursuing Bachelor's Degrees



Percentage of Full-Time, First-Time Students Who Began Their Studies in Fall 2007 and Received a Degree or Award Within 150% of "Normal Time" (Fall 2013) to Completion for Their Program

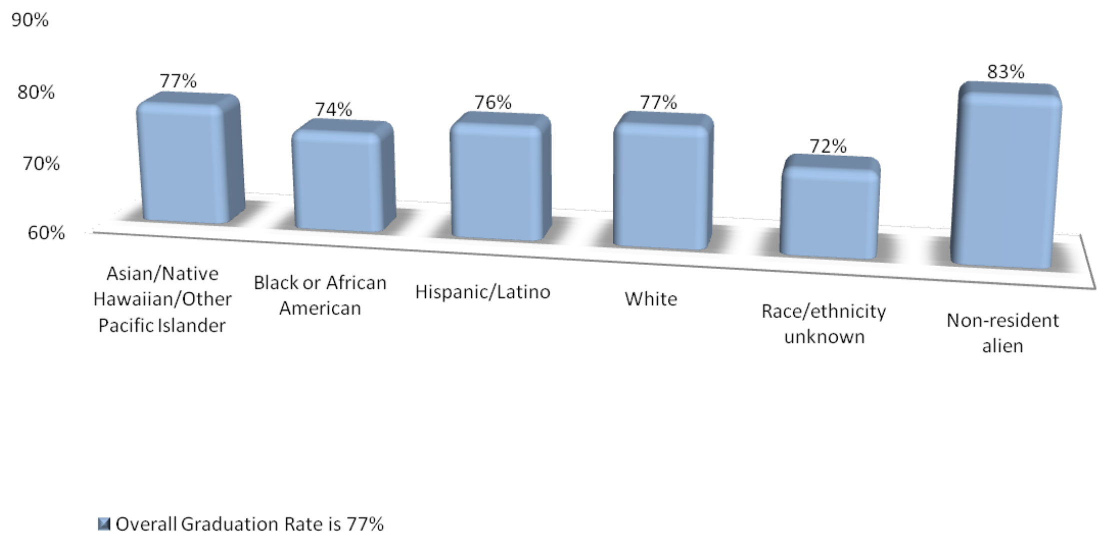
Source: National Center for Educational Statistics. (Prepared by M. D. Slaughter)



Percentage of Full-Time, First-Time Students Who Began Their Studies in Fall 2007 and Received a Degree or Award Within 150% of "Normal Time" (Fall 2013) to Completion for Their Program

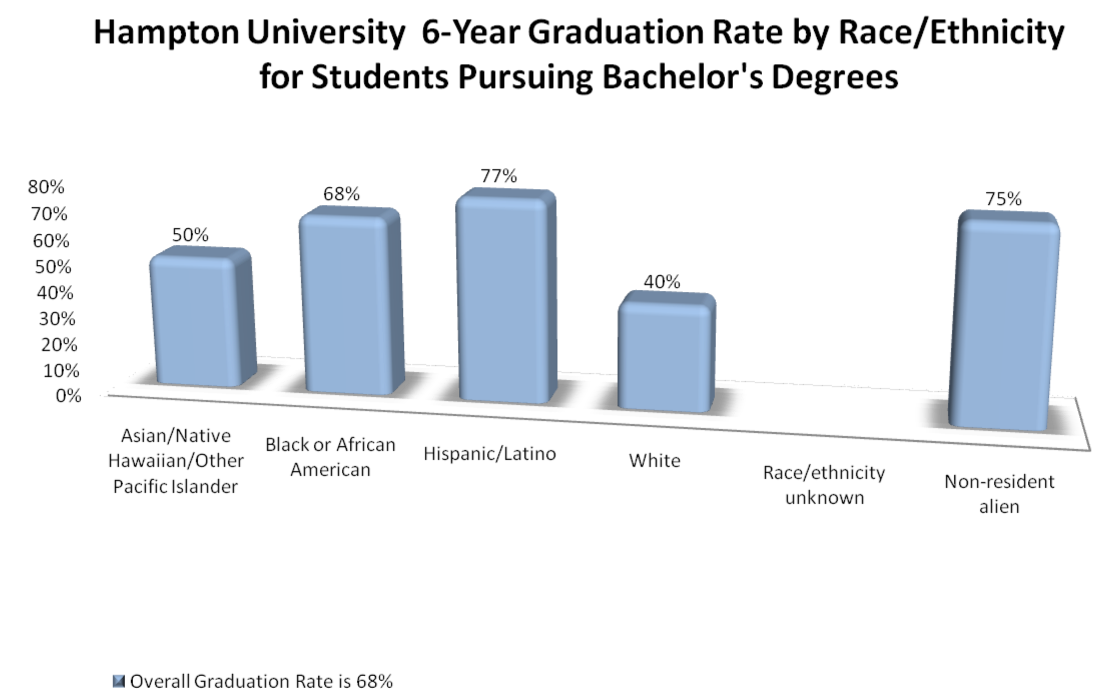
Source: National Center for Educational Statistics. (Prepared by M. D. Slaughter)

Florida State University 6-Year Graduation Rate by Race/Ethnicity for Students Pursuing Bachelor's Degrees



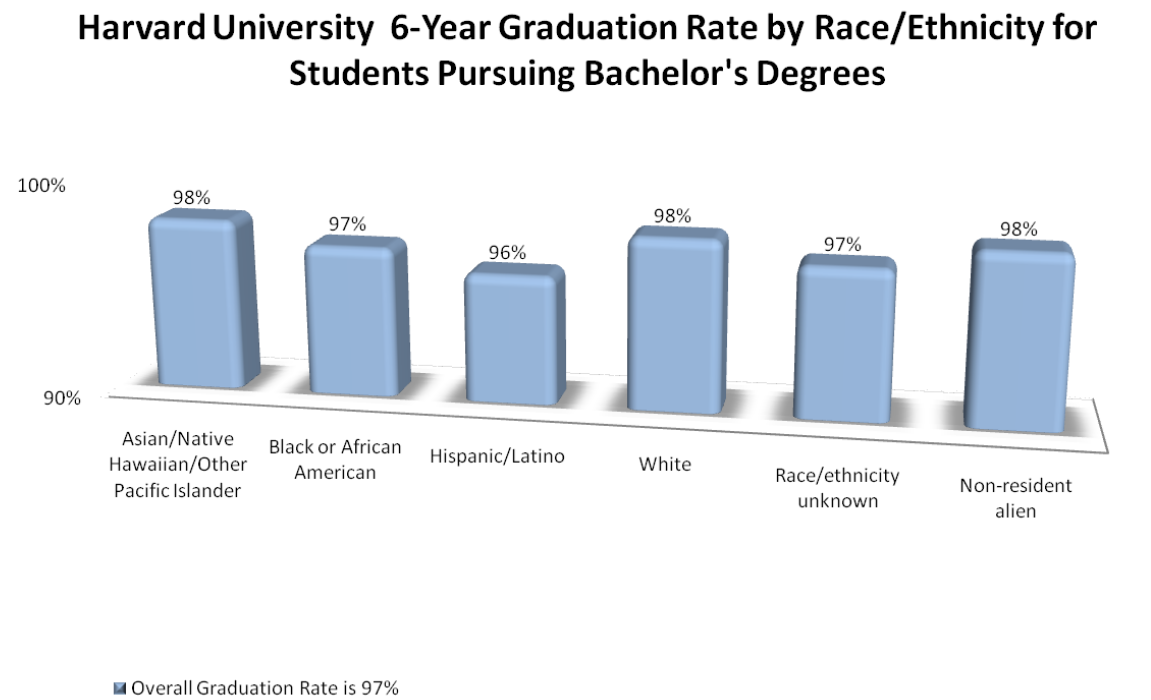
Percentage of Full-Time, First-Time Students Who Began Their Studies in Fall 2007 and Received a Degree or Award Within 150% of "Normal Time" (Fall 2013) to Completion for Their Program

Source: National Center for Educational Statistics. (Prepared by M. D. Slaughter)



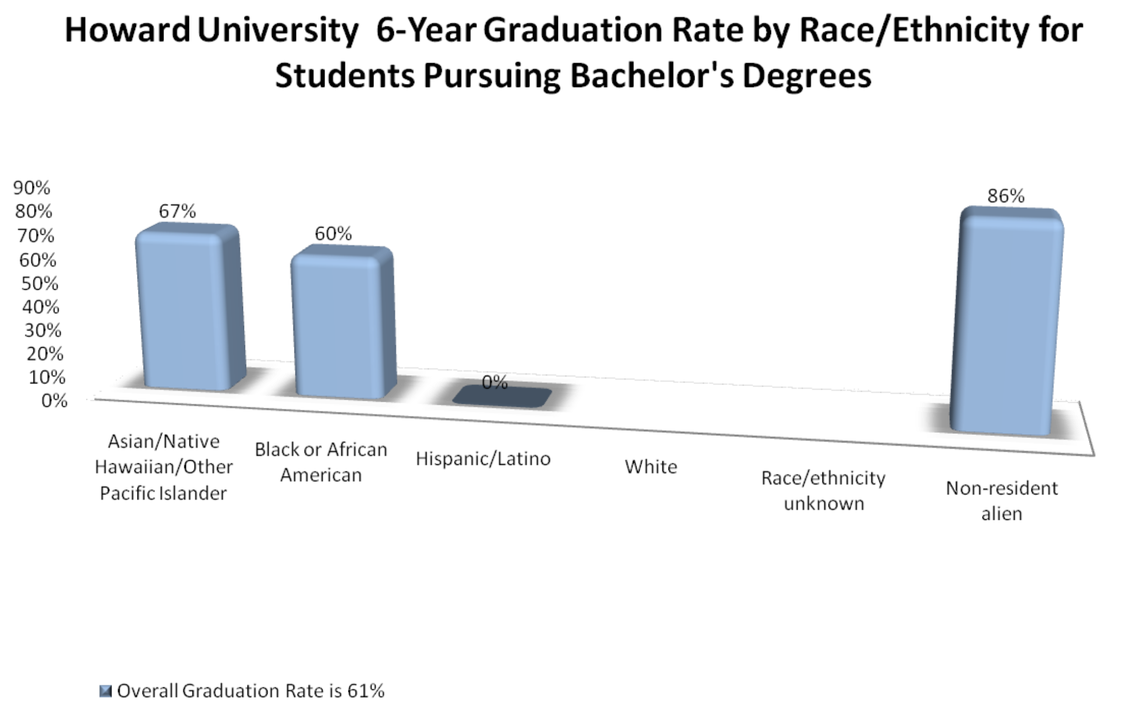
Percentage of Full-Time, First-Time Students Who Began Their Studies in Fall 2007 and Received a Degree or Award Within 150% of "Normal Time" (Fall 2013) to Completion for Their Program

Source: National Center for Educational Statistics. (Prepared by M. D. Slaughter)



Percentage of Full-Time, First-Time Students Who Began Their Studies in Fall 2007 and Received a Degree or Award Within 150% of "Normal Time" (Fall 2013) to Completion for Their Program

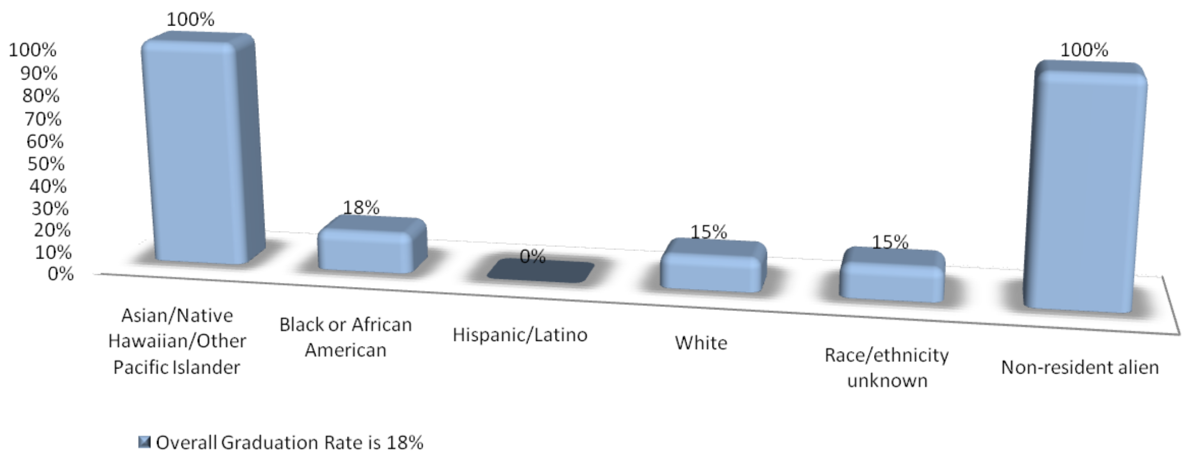
Source: National Center for Educational Statistics. (Prepared by M. D. Slaughter)



Percentage of Full-Time, First-Time Students Who Began Their Studies in Fall 2007 and Received a Degree or Award Within 150% of "Normal Time" (Fall 2013) to Completion for Their Program

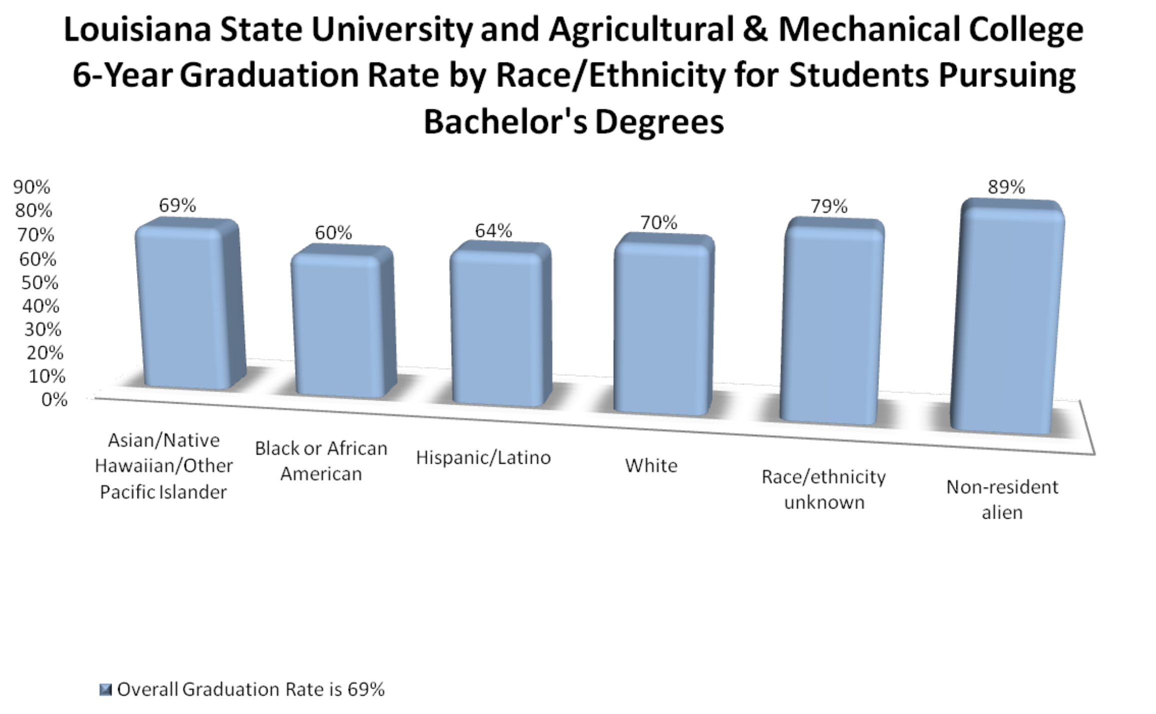
Source: National Center for Educational Statistics. (Prepared by M. D. Slaughter)

Kentucky State University 6-Year Graduation Rate by Race/Ethnicity for Students Pursuing Bachelor's Degrees



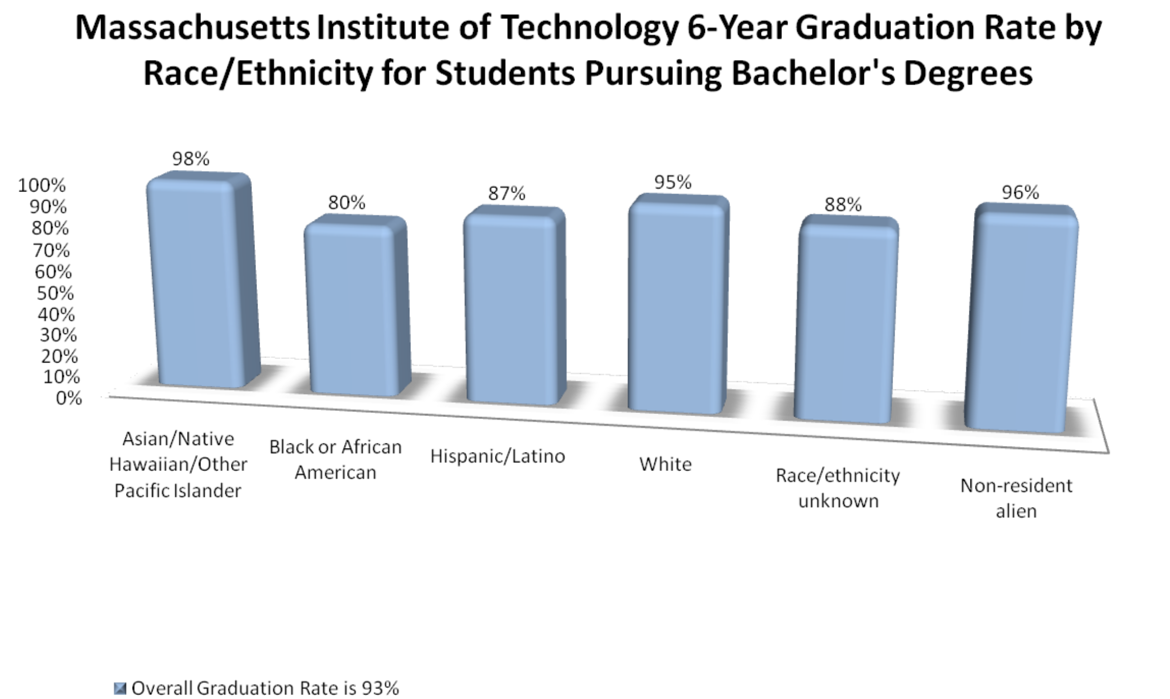
Percentage of Full-Time, First-Time Students Who Began Their Studies in Fall 2007 and Received a Degree or Award Within 150% of "Normal Time" (Fall 2013) to Completion for Their Program

Source: National Center for Educational Statistics. (Prepared by M. D. Slaughter)



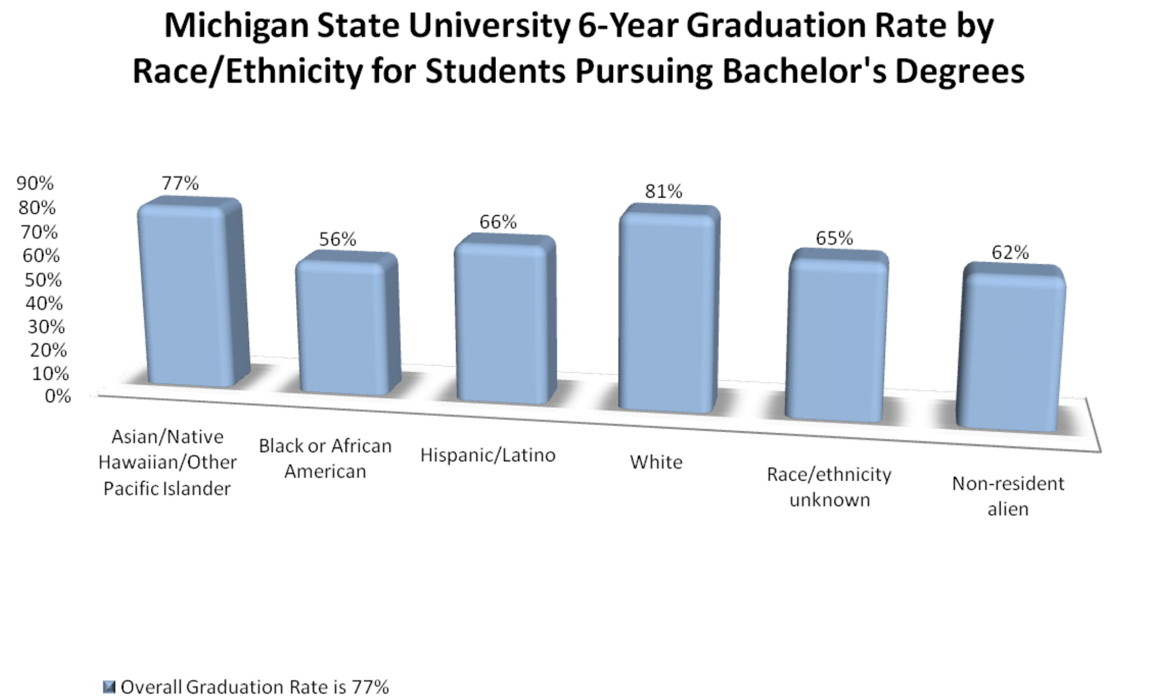
Percentage of Full-Time, First-Time Students Who Began Their Studies in Fall 2007 and Received a Degree or Award Within 150% of "Normal Time" (Fall 2013) to Completion for Their Program

Source: National Center for Educational Statistics. (Prepared by M. D. Slaughter)



Percentage of Full-Time, First-Time Students Who Began Their Studies in Fall 2007 and Received a Degree or Award Within 150% of "Normal Time" (Fall 2013) to Completion for Their Program

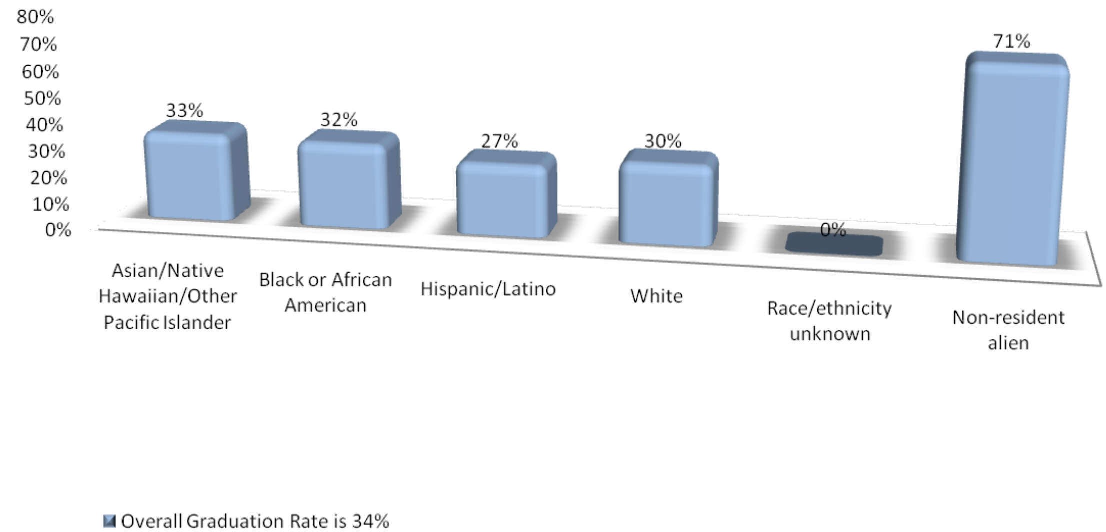
Source: National Center for Educational Statistics. (Prepared by M. D. Slaughter)



Percentage of Full-Time, First-Time Students Who Began Their Studies in Fall 2007 and Received a Degree or Award Within 150% of "Normal Time" (Fall 2013) to Completion for Their Program

Source: National Center for Educational Statistics. (Prepared by M. D. Slaughter)

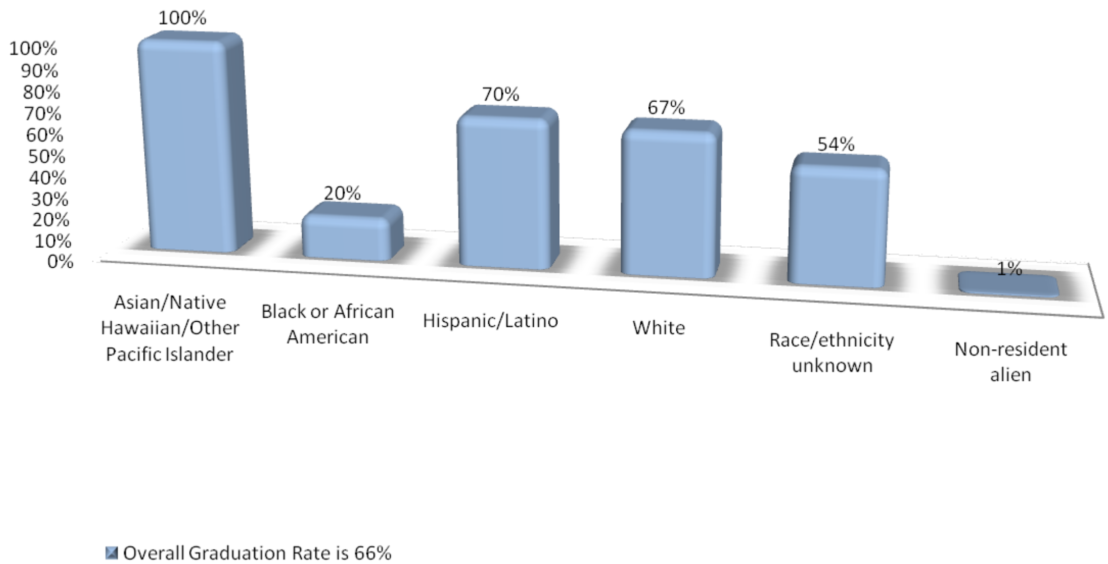
Morgan State University 6-Year Graduation Rate by Race/Ethnicity for Students Pursuing Bachelor's Degrees



Percentage of Full-Time, First-Time Students Who Began Their Studies in Fall 2007 and Received a Degree or Award Within 150% of "Normal Time" (Fall 2013) to Completion for Their Program

Source: National Center for Educational Statistics. (Prepared by M. D. Slaughter)

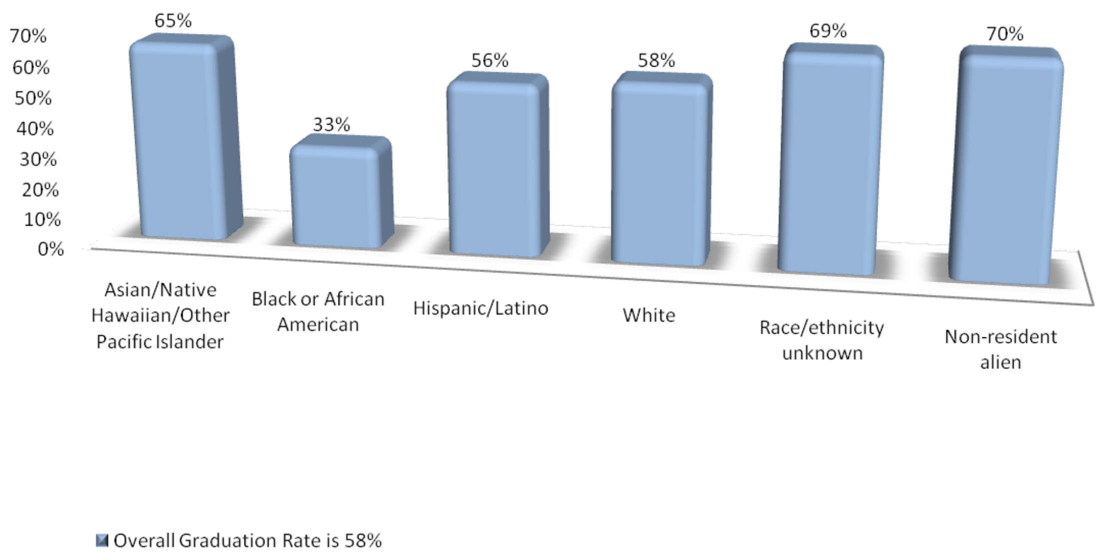
New College of Florida 6-Year Graduation Rate by Race/Ethnicity for Students Pursuing Bachelor's Degrees



Percentage of Full-Time, First-Time Students Who Began Their Studies in Fall 2007 and Received a Degree or Award Within 150% of "Normal Time" (Fall 2013) to Completion for Their Program

Source: National Center for Educational Statistics. (Prepared by M. D. Slaughter)

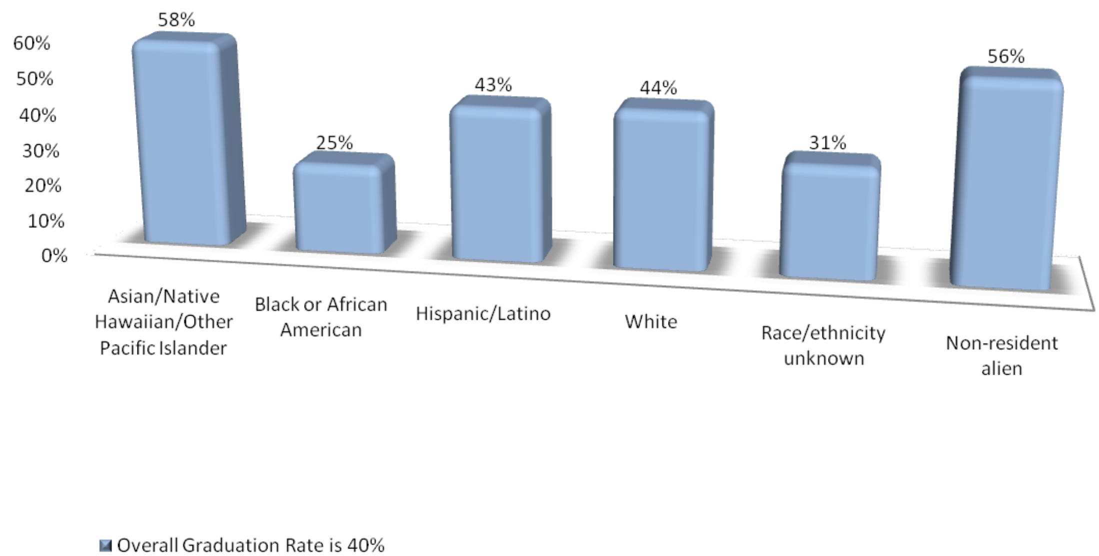
New Jersey Institute of Technology 6-Year Graduation Rate by Race/Ethnicity for Students Pursuing Bachelor's Degrees



Percentage of Full-Time, First-Time Students Who Began Their Studies in Fall 2007 and Received a Degree or Award Within 150% of "Normal Time" (Fall 2013) to Completion for Their Program

Source: National Center for Educational Statistics. (Prepared by M. D. Slaughter)

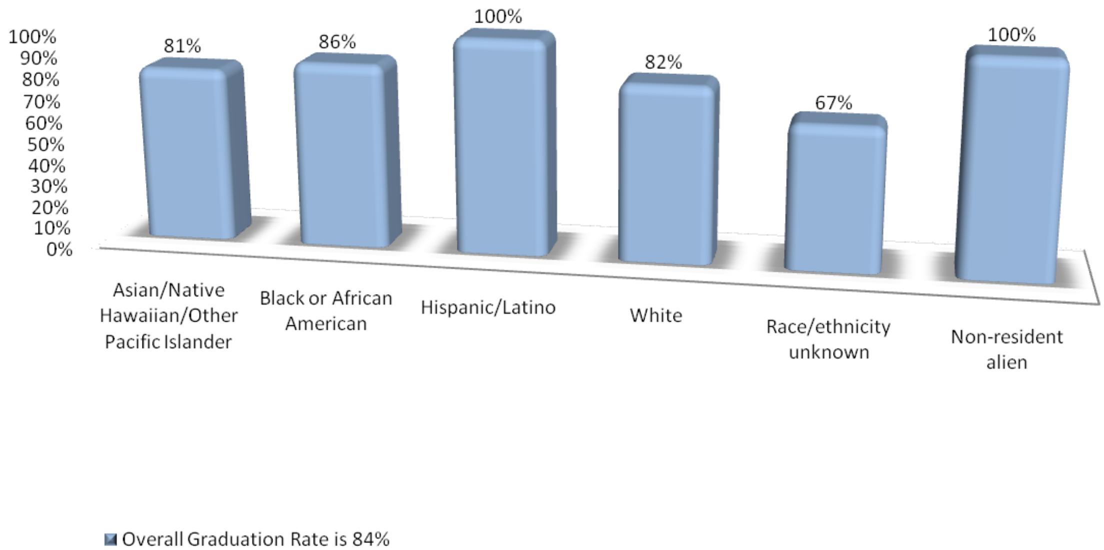
Nova Southeastern University 6-Year Graduation Rate by Race/Ethnicity for Students Pursuing Bachelor's Degrees



Percentage of Full-Time, First-Time Students Who Began Their Studies in Fall 2007 and Received a Degree or Award Within 150% of "Normal Time" (Fall 2013) to Completion for Their Program

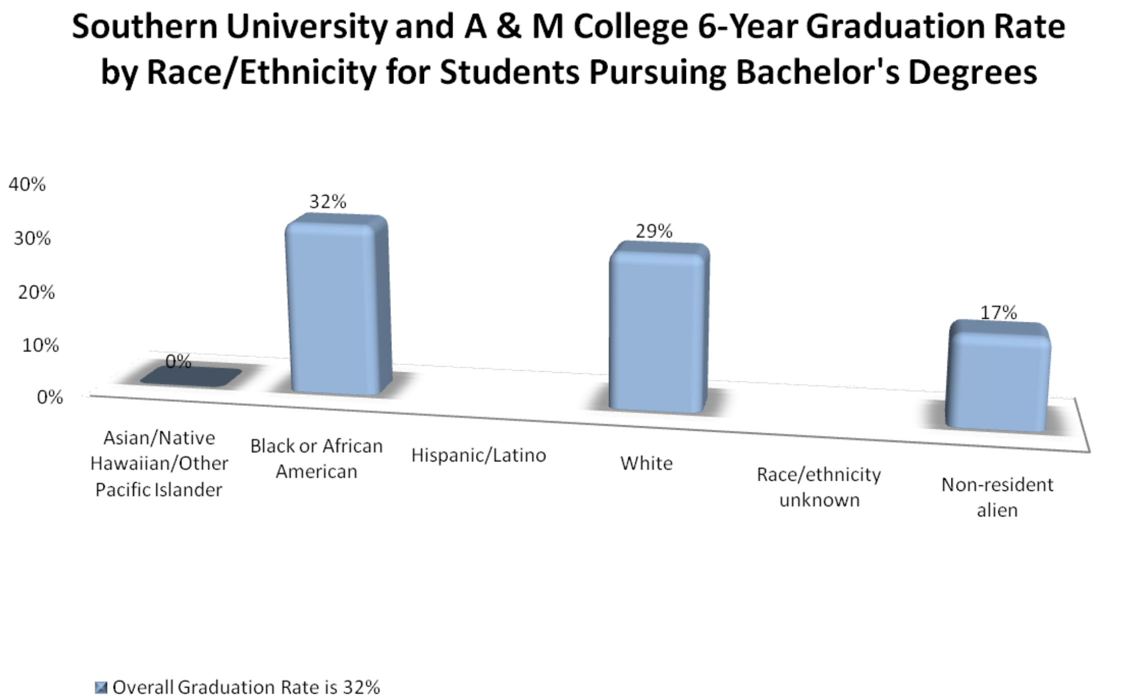
Source: National Center for Educational Statistics. (Prepared by M. D. Slaughter)

Scripps College 6-Year Graduation Rate by Race/Ethnicity for Students Pursuing Bachelor's Degrees



Percentage of Full-Time, First-Time Students Who Began Their Studies in Fall 2007 and Received a Degree or Award Within 150% of "Normal Time" (Fall 2013) to Completion for Their Program

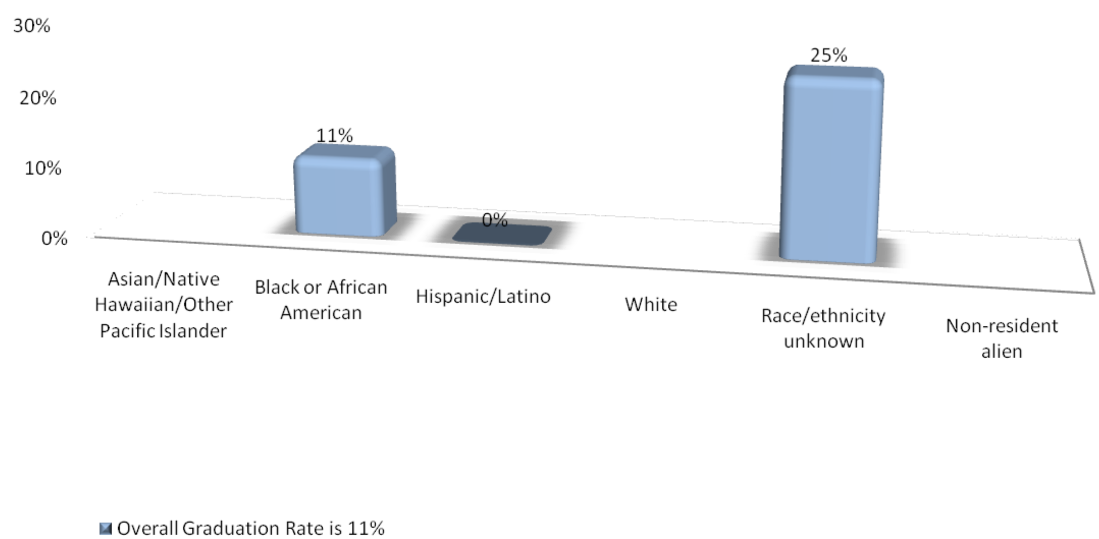
Source: National Center for Educational Statistics. (Prepared by M. D. Slaughter)



Percentage of Full-Time, First-Time Students Who Began Their Studies in Fall 2007 and Received a Degree or Award Within 150% of "Normal Time" (Fall 2013) to Completion for Their Program

Source: National Center for Educational Statistics. (Prepared by M. D. Slaughter)

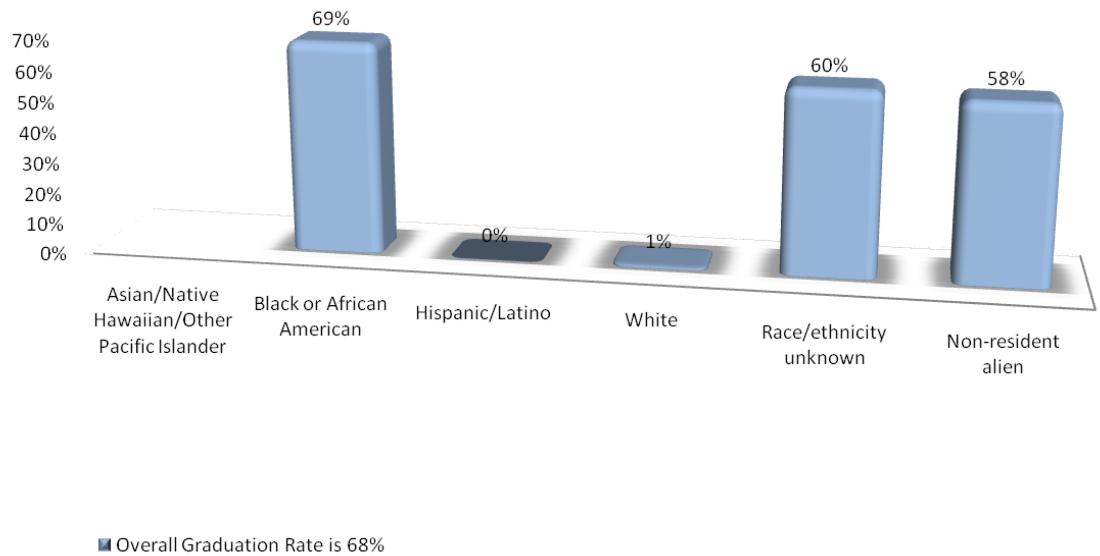
Southern University at New Orleans 6-Year Graduation Rate by Race/Ethnicity for Students Pursuing Bachelor's Degrees



Percentage of Full-Time, First-Time Students Who Began Their Studies in Fall 2007 and Received a Degree or Award Within 150% of "Normal Time" (Fall 2013) to Completion for Their Program

Source: National Center for Educational Statistics. (Prepared by M. D. Slaughter)

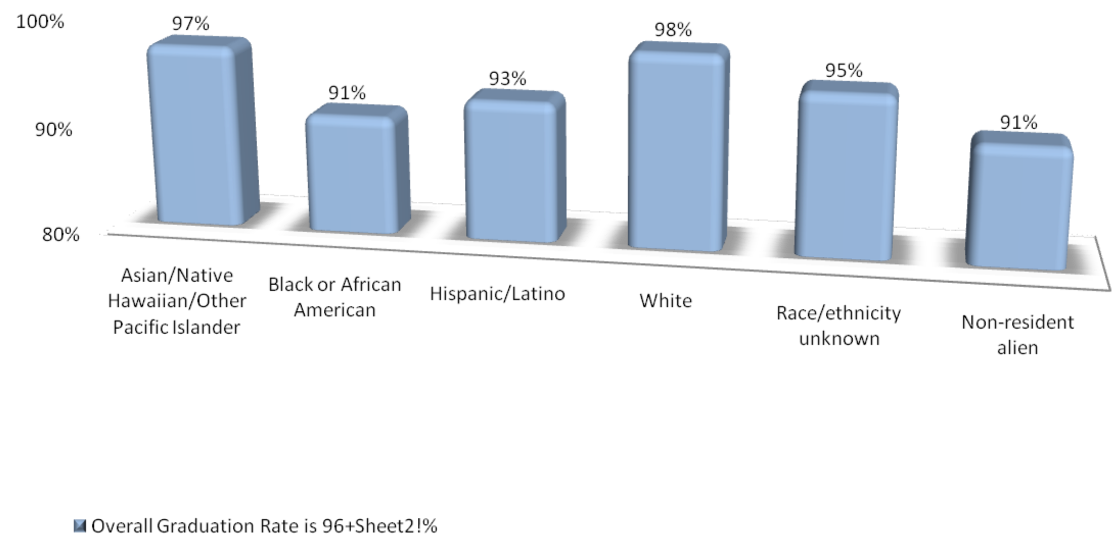
Spelman College 6-Year Graduation Rate by Race/Ethnicity for Students Pursuing Bachelor's Degrees



Percentage of Full-Time, First-Time Students Who Began Their Studies in Fall 2007 and Received a Degree or Award Within 150% of "Normal Time" (Fall 2013) to Completion for Their Program

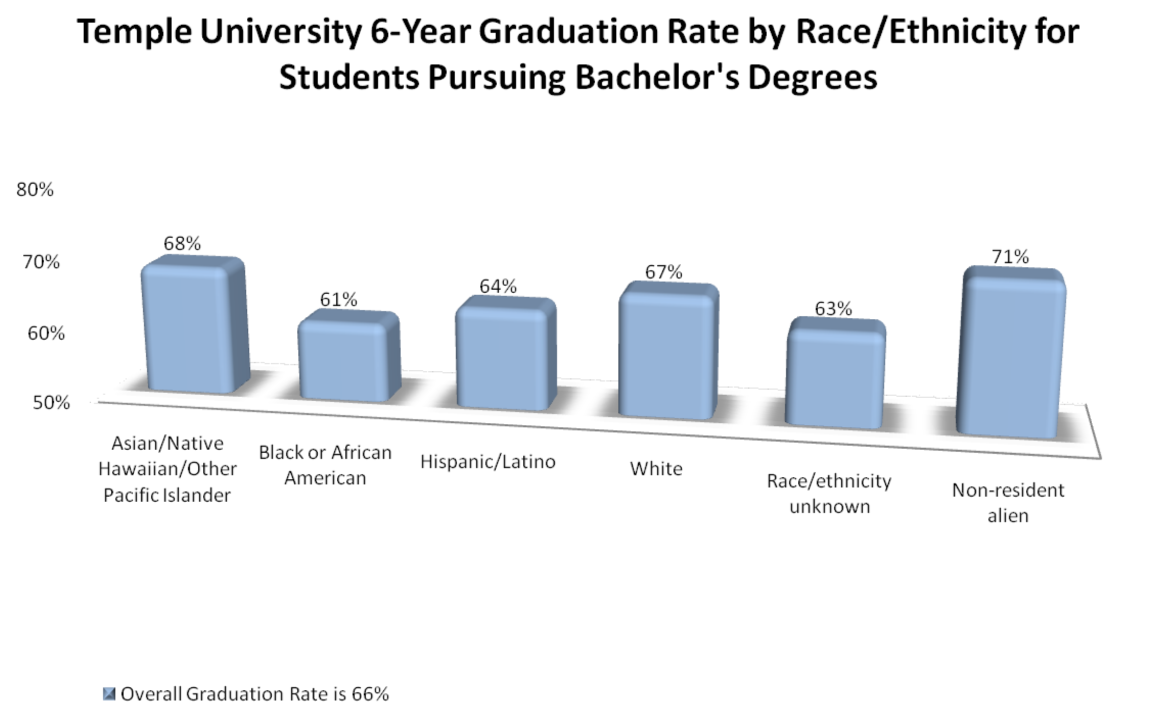
Source: National Center for Educational Statistics. (Prepared by M. D. Slaughter)

Stanford University 6-Year Graduation Rate by Race/Ethnicity for Students Pursuing Bachelor's Degrees



Percentage of Full-Time, First-Time Students Who Began Their Studies in Fall 2007 and Received a Degree or Award Within 150% of "Normal Time" (Fall 2013) to Completion for Their Program

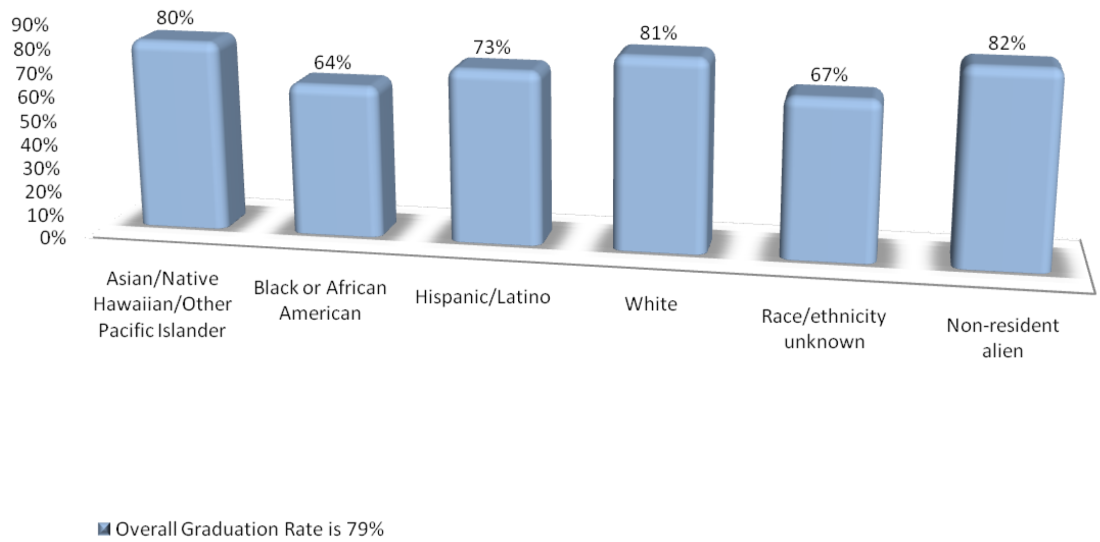
Source: National Center for Educational Statistics. (Prepared by M. D. Slaughter)



Percentage of Full-Time, First-Time Students Who Began Their Studies in Fall 2007 and Received a Degree or Award Within 150% of "Normal Time" (Fall 2013) to Completion for Their Program

Source: National Center for Educational Statistics. (Prepared by M. D. Slaughter)

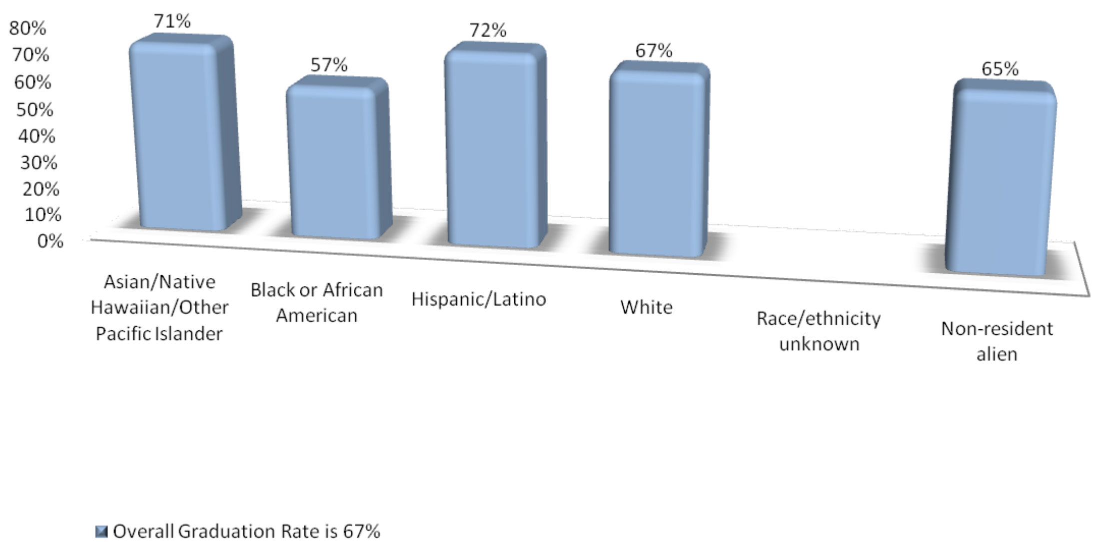
Texas A & M University-College Station 6-Year Graduation Rate by Race/Ethnicity for Students Pursuing Bachelor's Degrees



Percentage of Full-Time, First-Time Students Who Began Their Studies in Fall 2007 and Received a Degree or Award Within 150% of "Normal Time" (Fall 2013) to Completion for Their Program

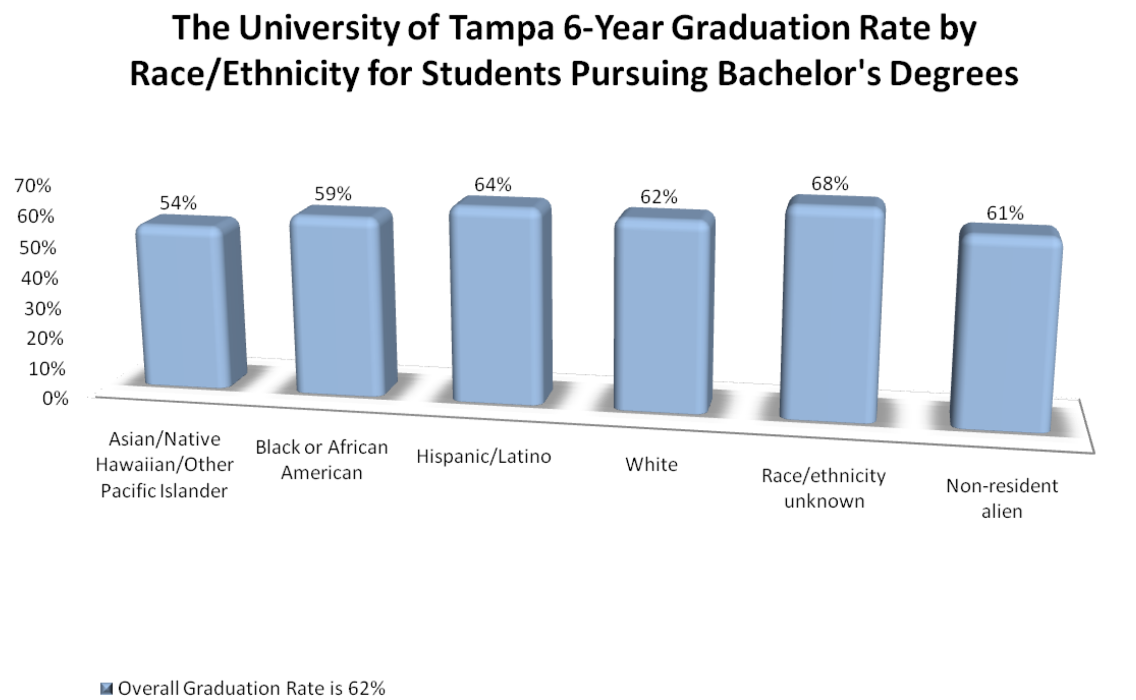
Source: National Center for Educational Statistics. (Prepared by M. D. Slaughter)

The University of Alabama 6-Year Graduation Rate by Race/Ethnicity for Students Pursuing Bachelor's Degrees



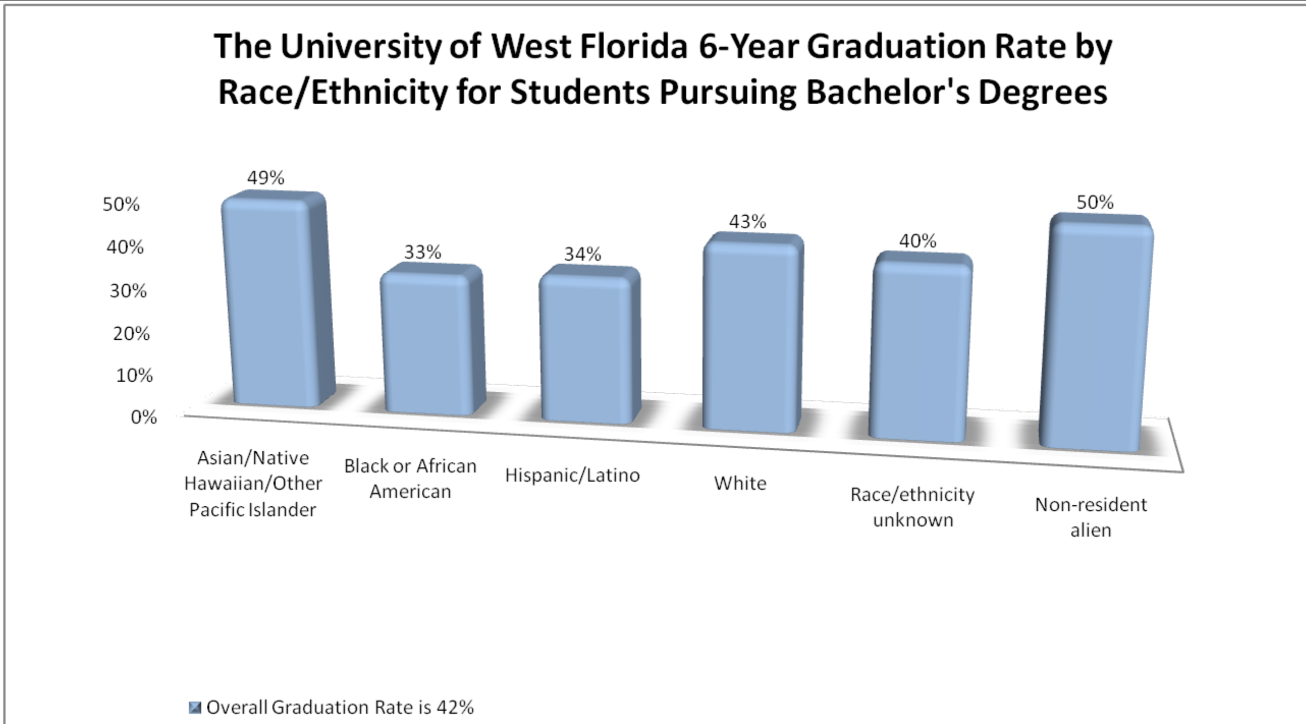
Percentage of Full-Time, First-Time Students Who Began Their Studies in Fall 2007 and Received a Degree or Award Within 150% of "Normal Time" (Fall 2013) to Completion for Their Program

Source: National Center for Educational Statistics. (Prepared by M. D. Slaughter)



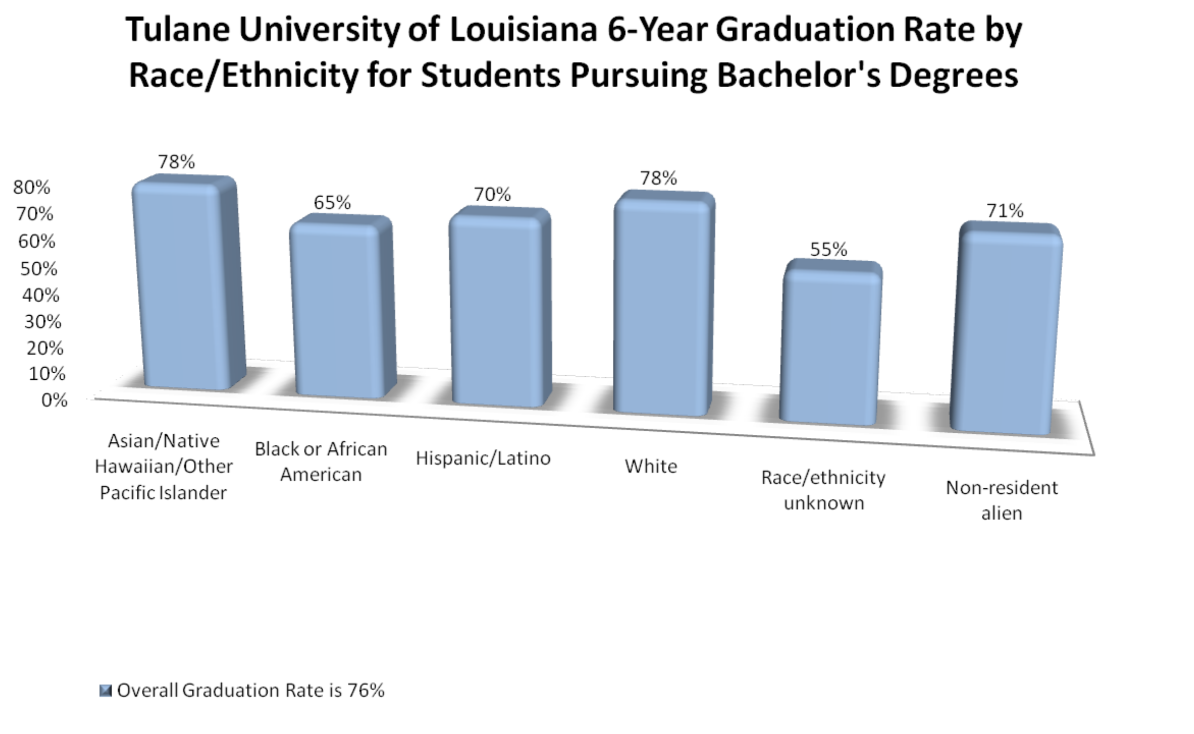
Percentage of Full-Time, First-Time Students Who Began Their Studies in Fall 2007 and Received a Degree or Award Within 150% of "Normal Time" (Fall 2013) to Completion for Their Program

Source: National Center for Educational Statistics. (Prepared by M. D. Slaughter)



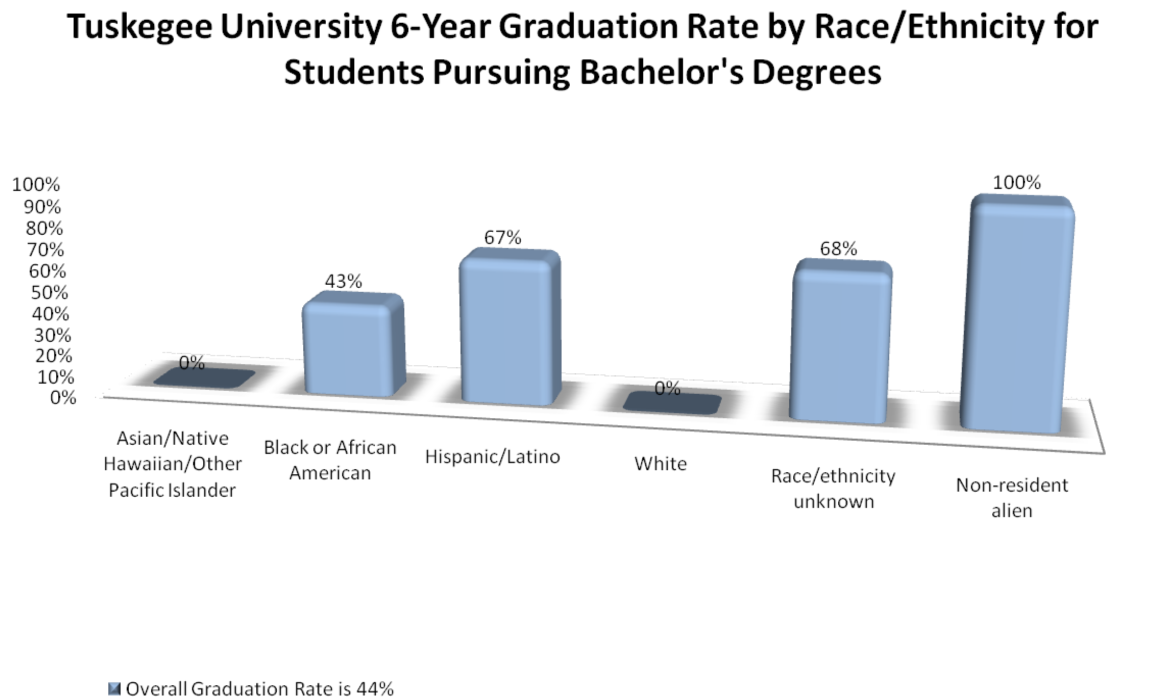
Percentage of Full-Time, First-Time Students Who Began Their Studies in Fall 2007 and Received a Degree or Award Within 150% of "Normal Time" (Fall 2013) to Completion for Their Program

Source: National Center for Educational Statistics. (Prepared by M. D. Slaughter)



Percentage of Full-Time, First-Time Students Who Began Their Studies in Fall 2007 and Received a Degree or Award Within 150% of "Normal Time" (Fall 2013) to Completion for Their Program

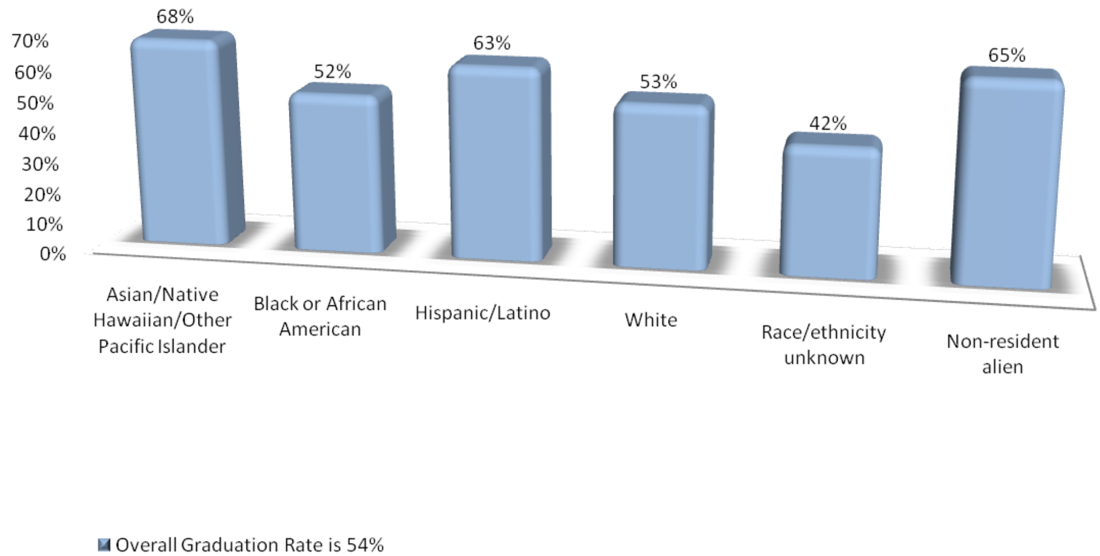
Source: National Center for Educational Statistics. (Prepared by M. D. Slaughter)



Percentage of Full-Time, First-Time Students Who Began Their Studies in Fall 2007 and Received a Degree or Award Within 150% of "Normal Time" (Fall 2013) to Completion for Their Program

Source: National Center for Educational Statistics. (Prepared by M. D. Slaughter)

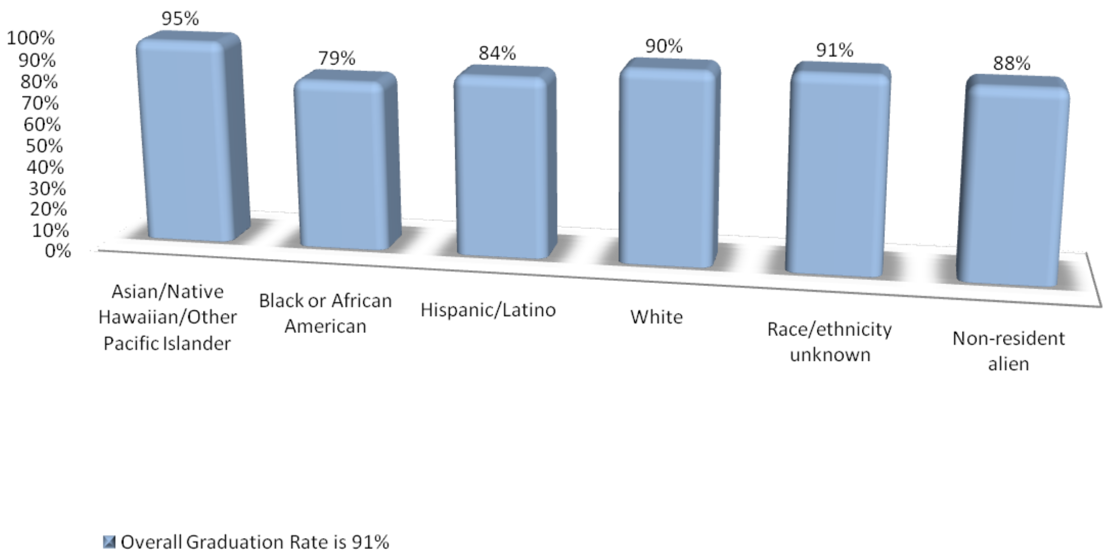
University of Alabama at Birmingham 6-Year Graduation Rate by Race/Ethnicity for Students Pursuing Bachelor's Degrees



Percentage of Full-Time, First-Time Students Who Began Their Studies in Fall 2007 and Received a Degree or Award Within 150% of "Normal Time" (Fall 2013) to Completion for Their Program

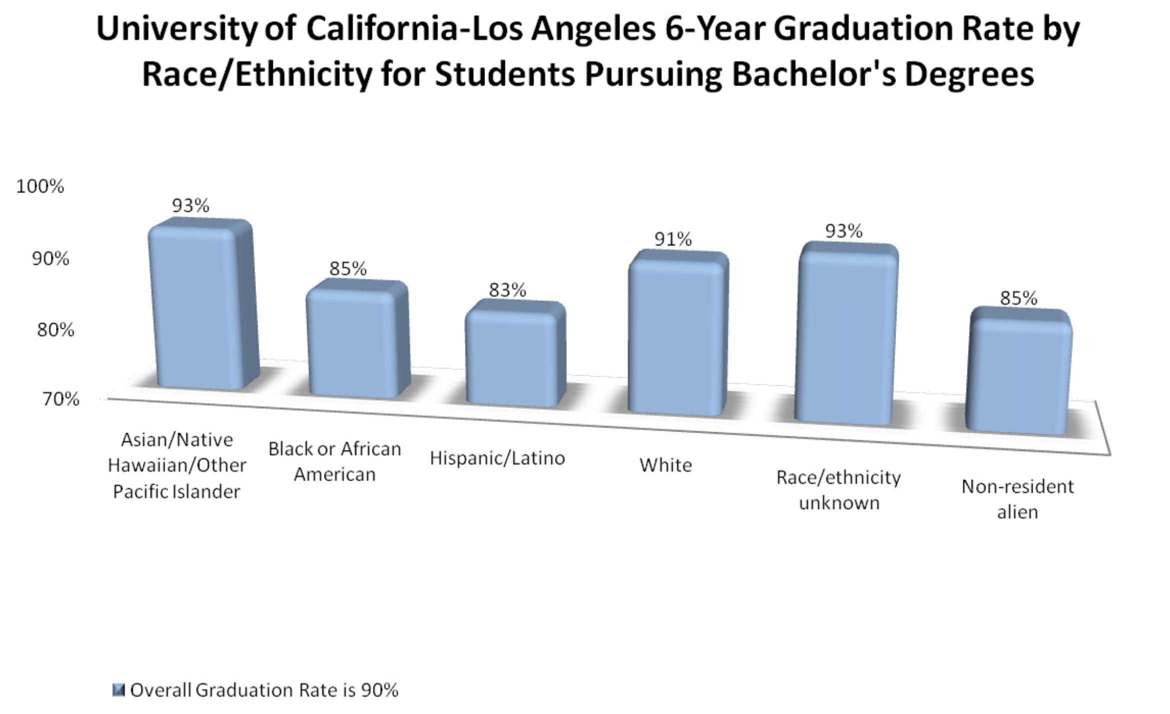
Source: National Center for Educational Statistics. (Prepared by M. D. Slaughter)

University of California-Berkeley 6-Year Graduation Rate by Race/Ethnicity for Students Pursuing Bachelor's Degrees



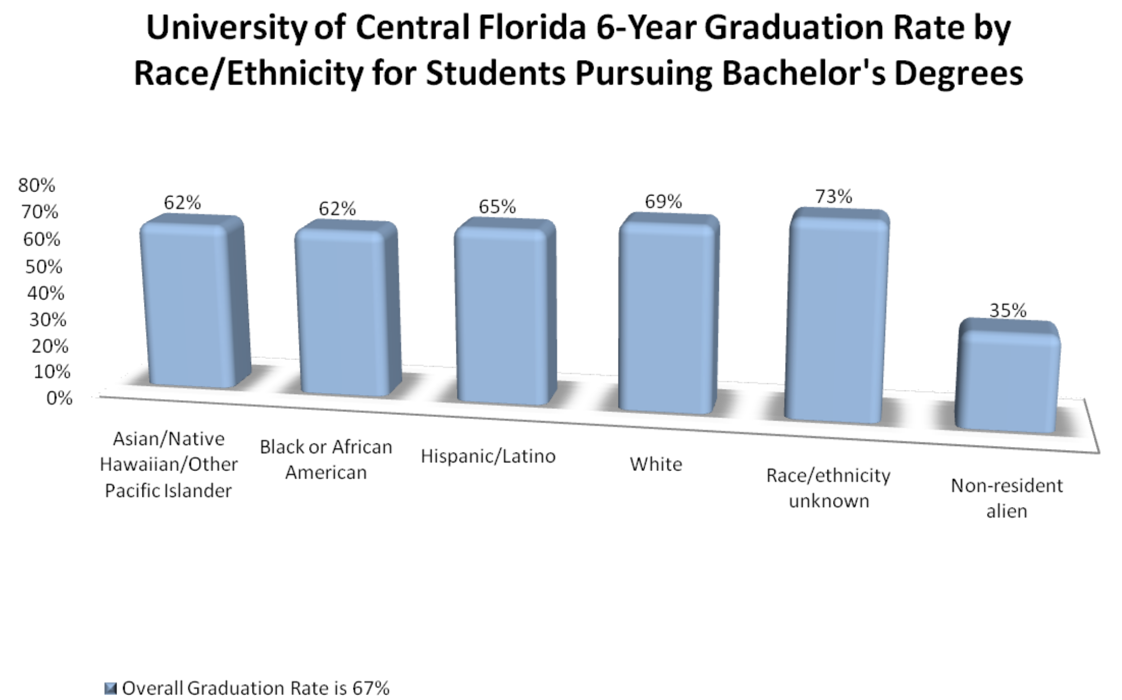
Percentage of Full-Time, First-Time Students Who Began Their Studies in Fall 2007 and Received a Degree or Award Within 150% of "Normal Time" (Fall 2013) to Completion for Their Program

Source: National Center for Educational Statistics. (Prepared by M. D. Slaughter)



Percentage of Full-Time, First-Time Students Who Began Their Studies in Fall 2007 and Received a Degree or Award Within 150% of "Normal Time" (Fall 2013) to Completion for Their Program

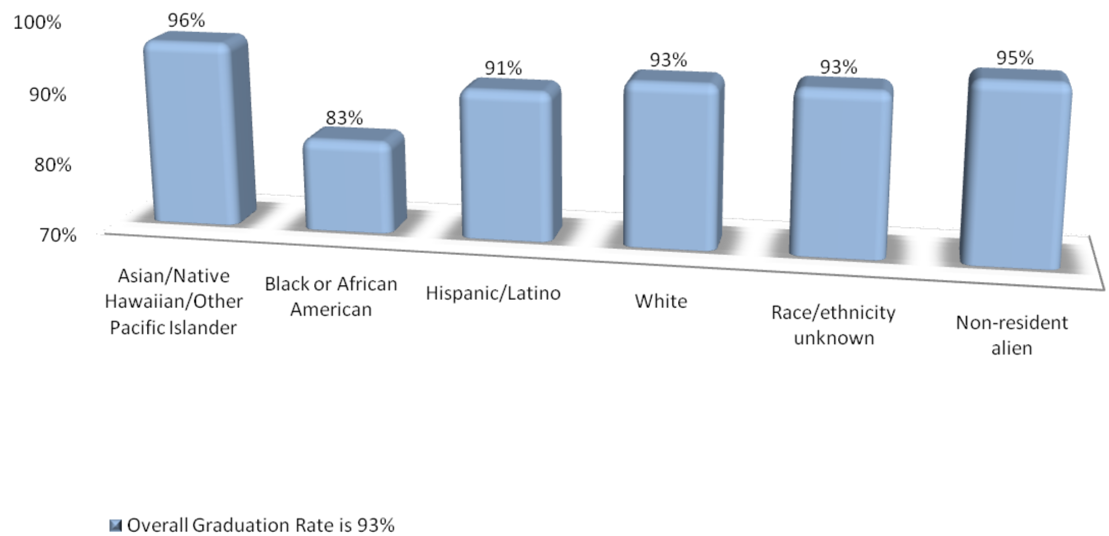
Source: National Center for Educational Statistics. (Prepared by M. D. Slaughter)



Percentage of Full-Time, First-Time Students Who Began Their Studies in Fall 2007 and Received a Degree or Award Within 150% of "Normal Time" (Fall 2013) to Completion for Their Program

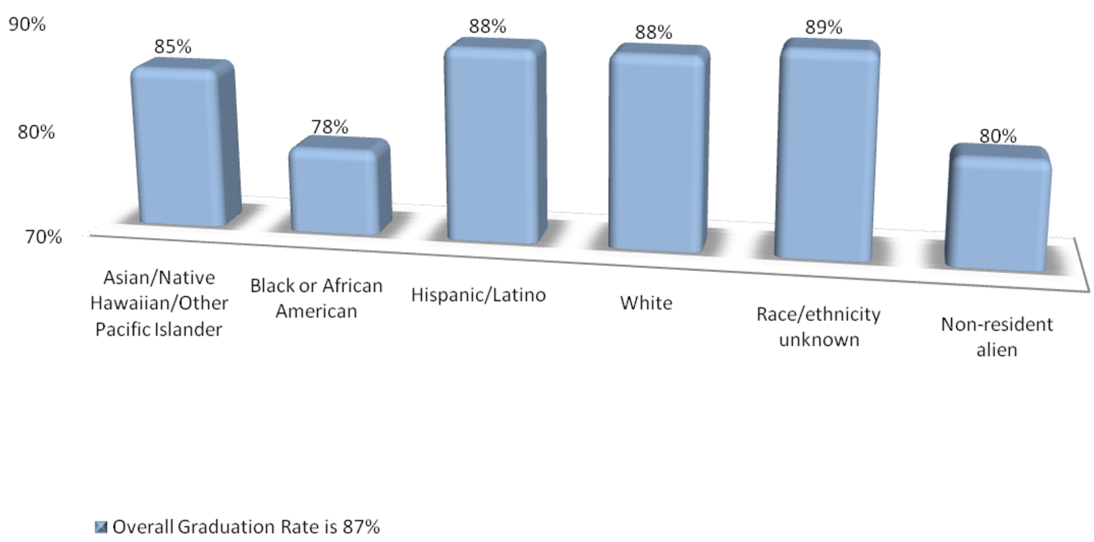
Source: National Center for Educational Statistics. (Prepared by M. D. Slaughter)

University of Chicago 6-Year Graduation Rate by Race/Ethnicity for Students Pursuing Bachelor's Degrees



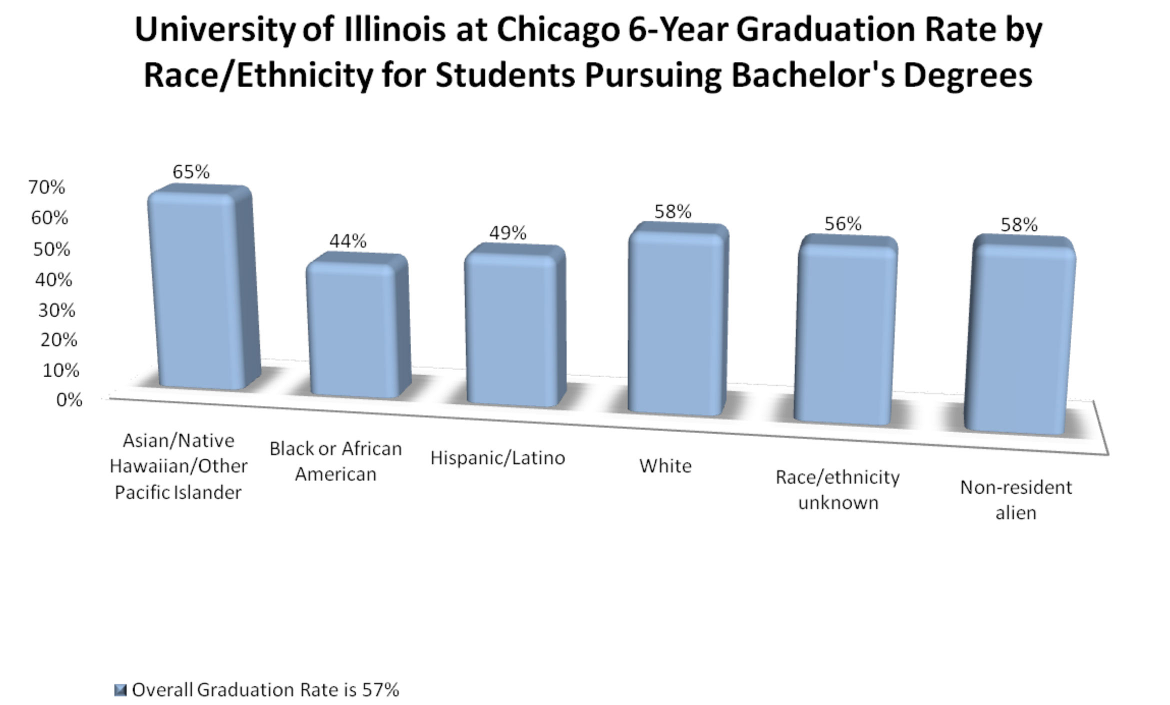
Percentage of Full-Time, First-Time Students Who Began Their Studies in Fall 2007 and Received a Degree or Award Within 150% of "Normal Time" (Fall 2013) to Completion for Their Program
Source: National Center for Educational Statistics. (Prepared by M. D. Slaughter)

University of Florida 6-Year Graduation Rate by Race/Ethnicity for Students Pursuing Bachelor's Degrees



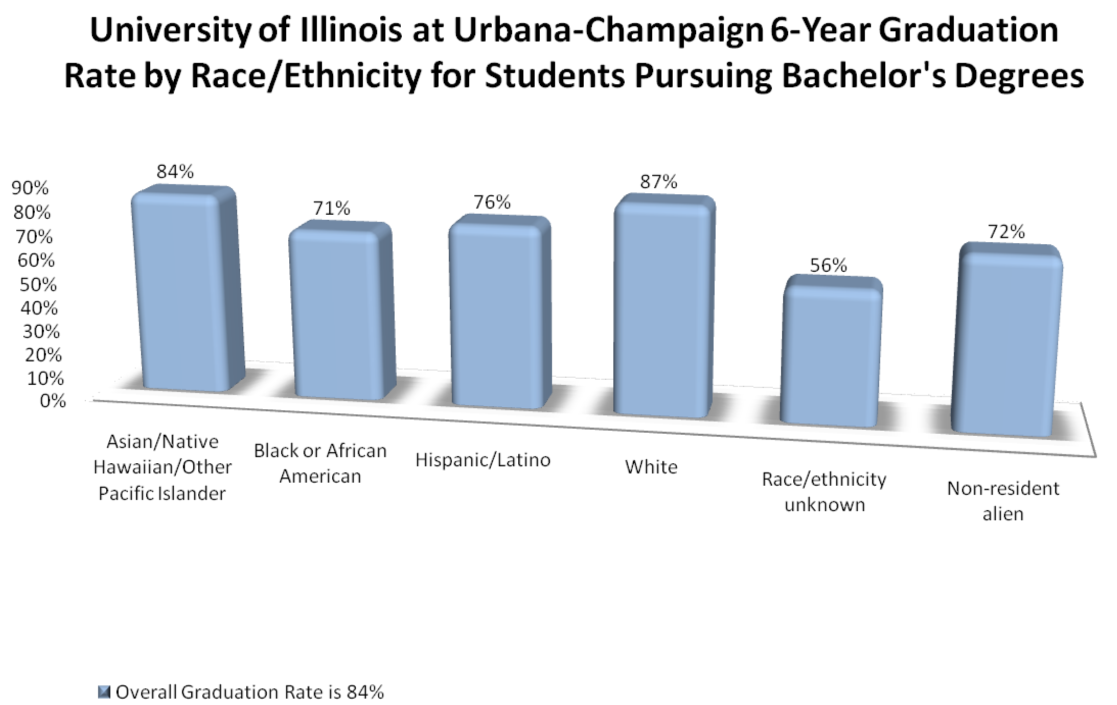
Percentage of Full-Time, First-Time Students Who Began Their Studies in Fall 2007 and Received a Degree or Award Within 150% of "Normal Time" (Fall 2013) to Completion for Their Program

Source: National Center for Educational Statistics. (Prepared by M. D. Slaughter)



Percentage of Full-Time, First-Time Students Who Began Their Studies in Fall 2007 and Received a Degree or Award Within 150% of "Normal Time" (Fall 2013) to Completion for Their Program

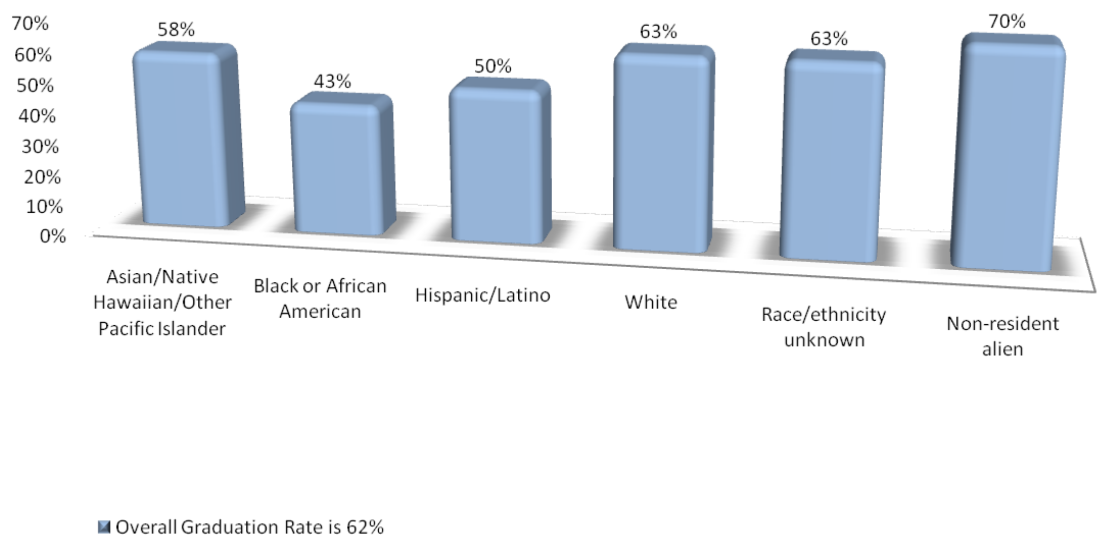
Source: National Center for Educational Statistics. (Prepared by M. D. Slaughter)



Percentage of Full-Time, First-Time Students Who Began Their Studies in Fall 2007 and Received a Degree or Award Within 150% of "Normal Time" (Fall 2013) to Completion for Their Program

Source: National Center for Educational Statistics. (Prepared by M. D. Slaughter)

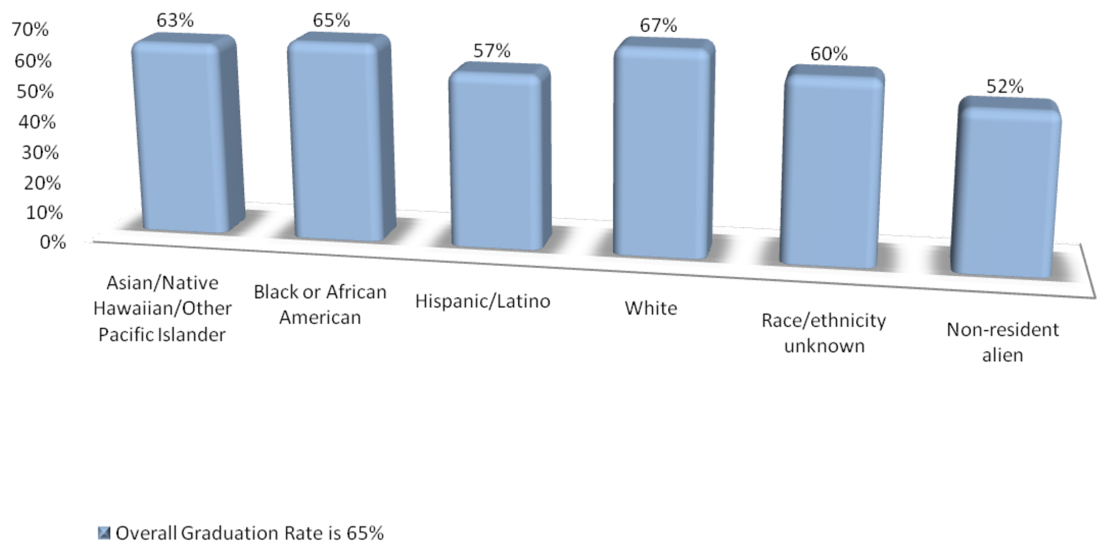
University of Kentucky 6-Year Graduation Rate by Race/Ethnicity for Students Pursuing Bachelor's Degrees



Percentage of Full-Time, First-Time Students Who Began Their Studies in Fall 2007 and Received a Degree or Award Within 150% of "Normal Time" (Fall 2013) to Completion for Their Program

Source: National Center for Educational Statistics. (Prepared by M. D. Slaughter)

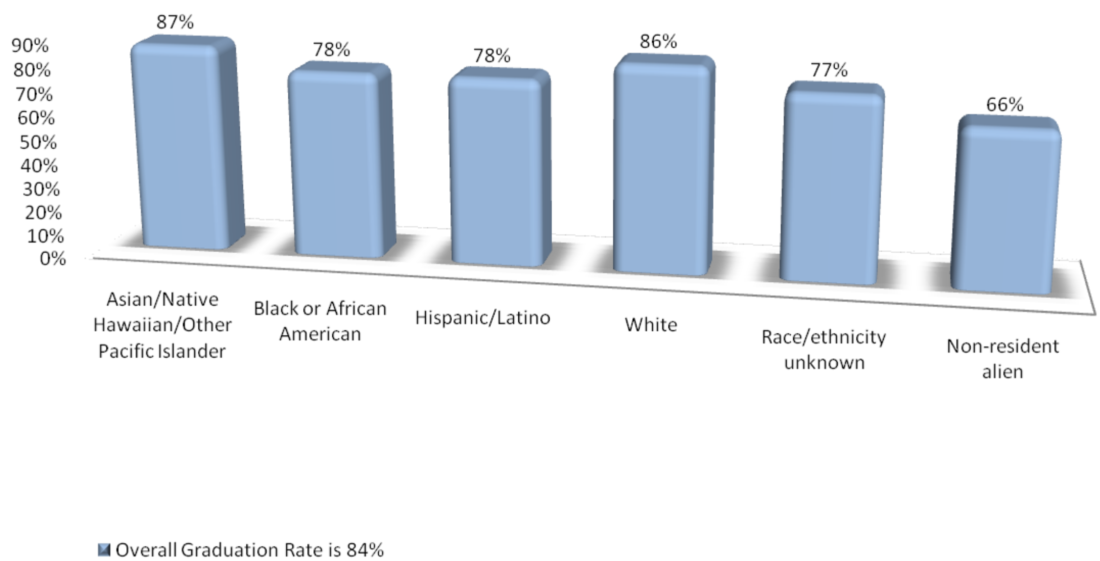
University of Maryland-Baltimore County 6-Year Graduation Rate by Race/Ethnicity for Students Pursuing Bachelor's Degrees



Percentage of Full-Time, First-Time Students Who Began Their Studies in Fall 2007 and Received a Degree or Award Within 150% of "Normal Time" (Fall 2013) to Completion for Their Program

Source: National Center for Educational Statistics. (Prepared by M. D. Slaughter)

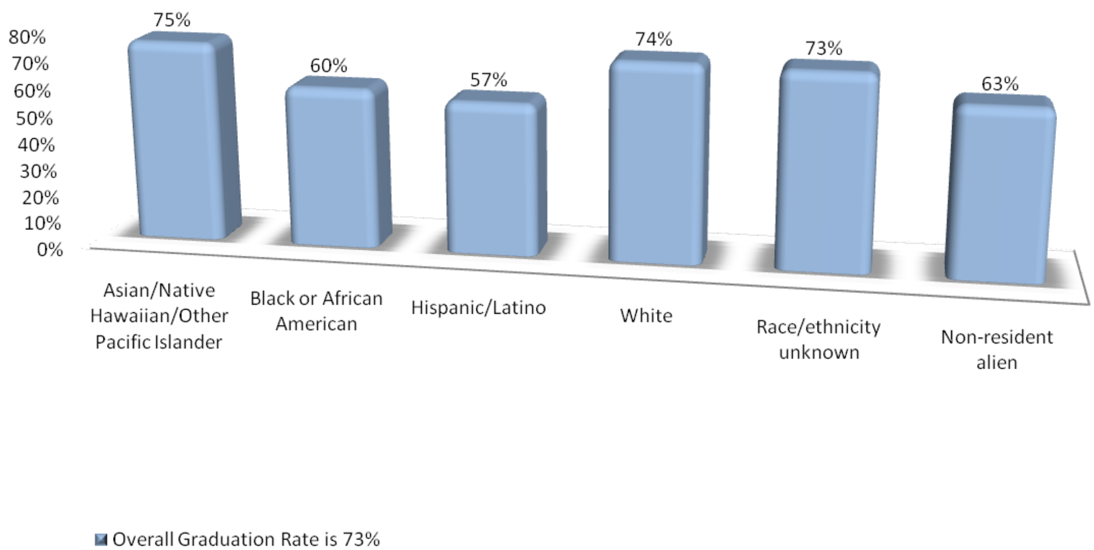
University of Maryland-College Park 6-Year Graduation Rate by Race/Ethnicity for Students Pursuing Bachelor's Degrees



Percentage of Full-Time, First-Time Students Who Began Their Studies in Fall 2007 and Received a Degree or Award Within 150% of "Normal Time" (Fall 2013) to Completion for Their Program

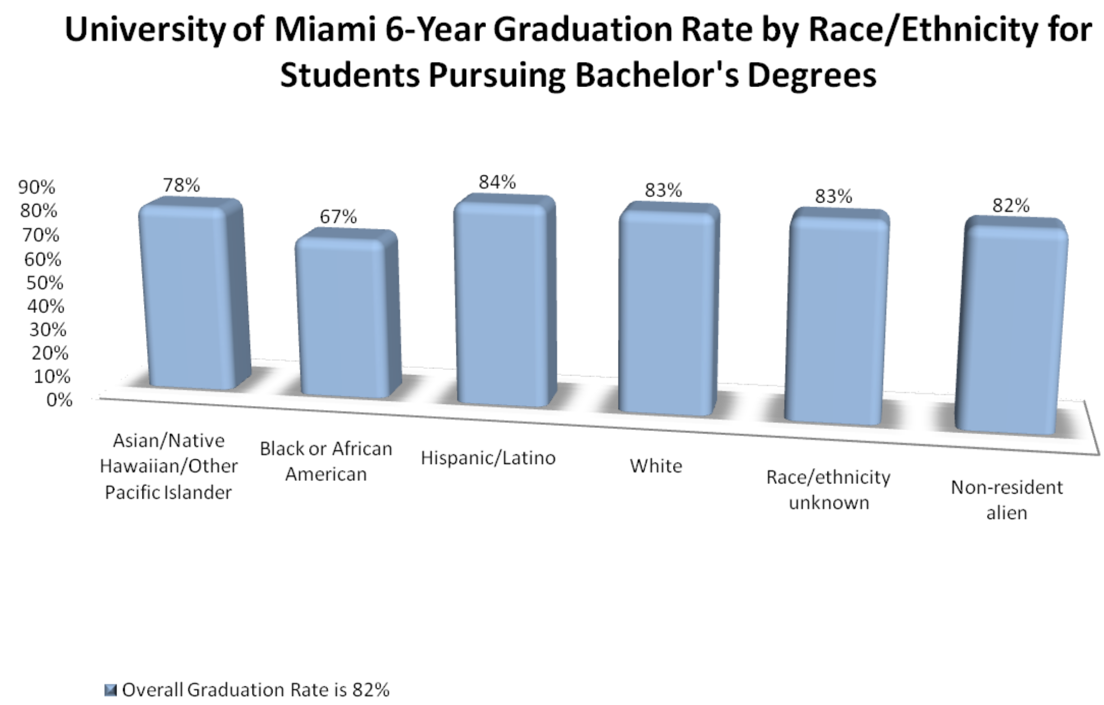
Source: National Center for Educational Statistics. (Prepared by M. D. Slaughter)

University of Massachusetts-Amherst 6-Year Graduation Rate by Race/Ethnicity for Students Pursuing Bachelor's Degrees



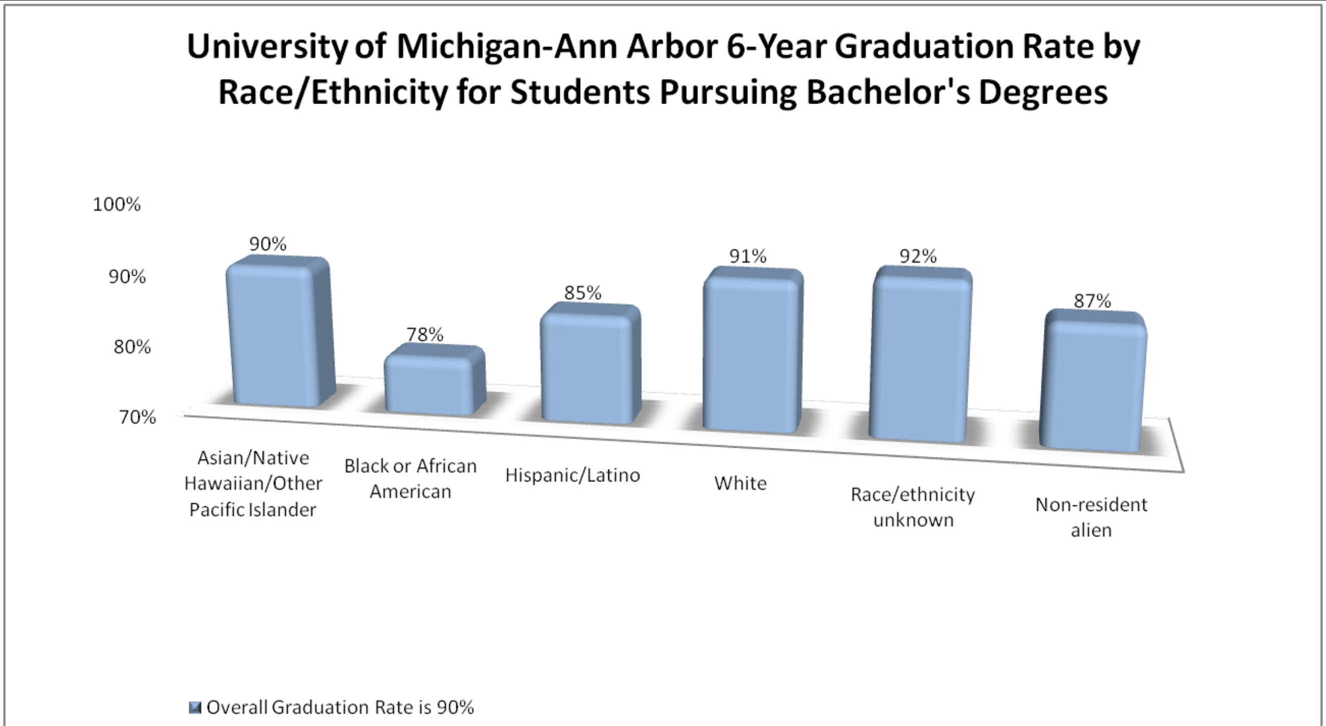
Percentage of Full-Time, First-Time Students Who Began Their Studies in Fall 2007 and Received a Degree or Award Within 150% of "Normal Time" (Fall 2013) to Completion for Their Program

Source: National Center for Educational Statistics. (Prepared by M. D. Slaughter)



Percentage of Full-Time, First-Time Students Who Began Their Studies in Fall 2007 and Received a Degree or Award Within 150% of "Normal Time" (Fall 2013) to Completion for Their Program

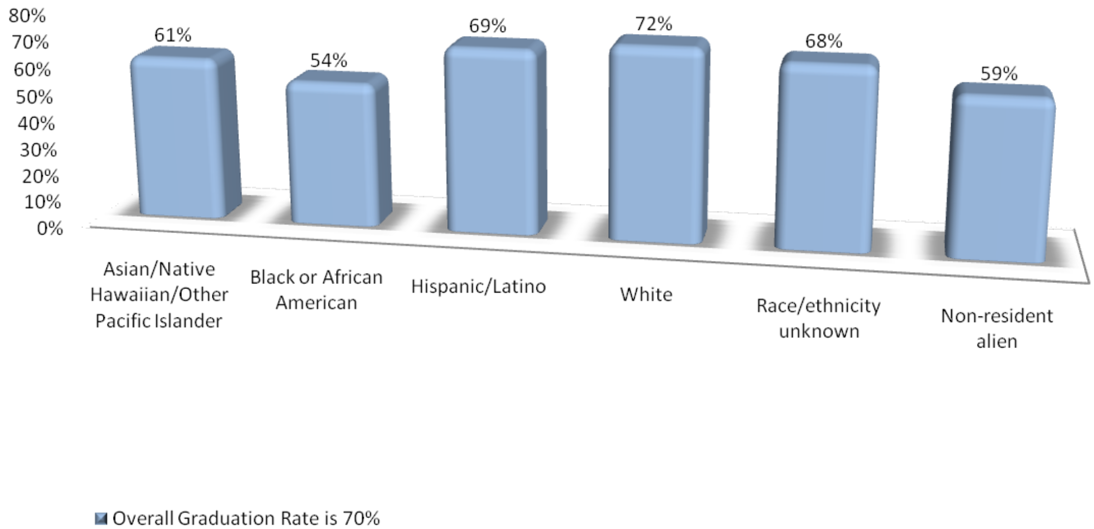
Source: National Center for Educational Statistics. (Prepared by M. D. Slaughter)



Percentage of Full-Time, First-Time Students Who Began Their Studies in Fall 2007 and Received a Degree or Award Within 150% of "Normal Time" (Fall 2013) to Completion for Their Program

Source: National Center for Educational Statistics. (Prepared by M. D. Slaughter)

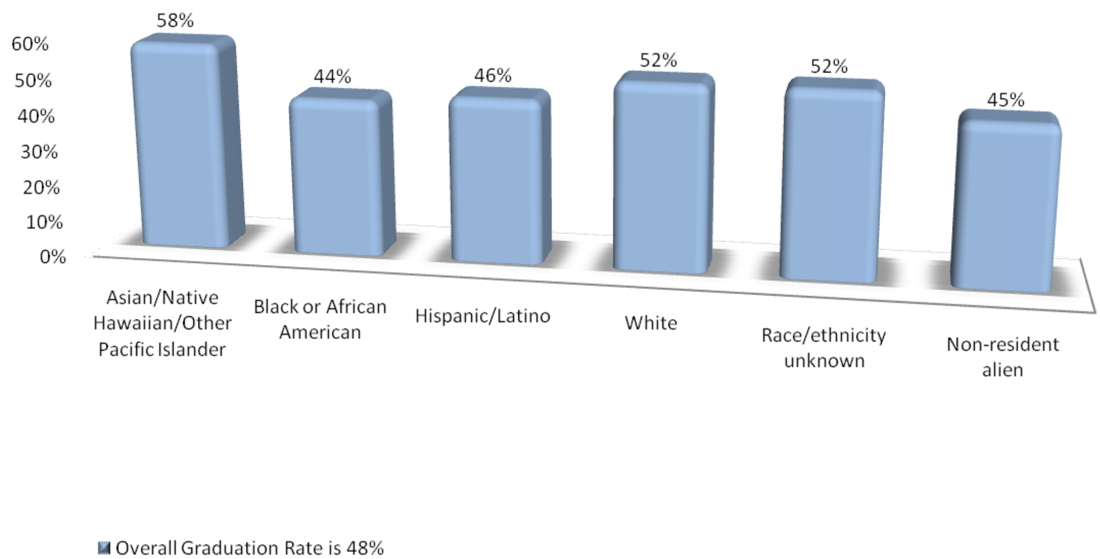
University of Missouri-Columbia 6-Year Graduation Rate by Race/Ethnicity for Students Pursuing Bachelor's Degrees



Percentage of Full-Time, First-Time Students Who Began Their Studies in Fall 2007 and Received a Degree or Award Within 150% of "Normal Time" (Fall 2013) to Completion for Their Program

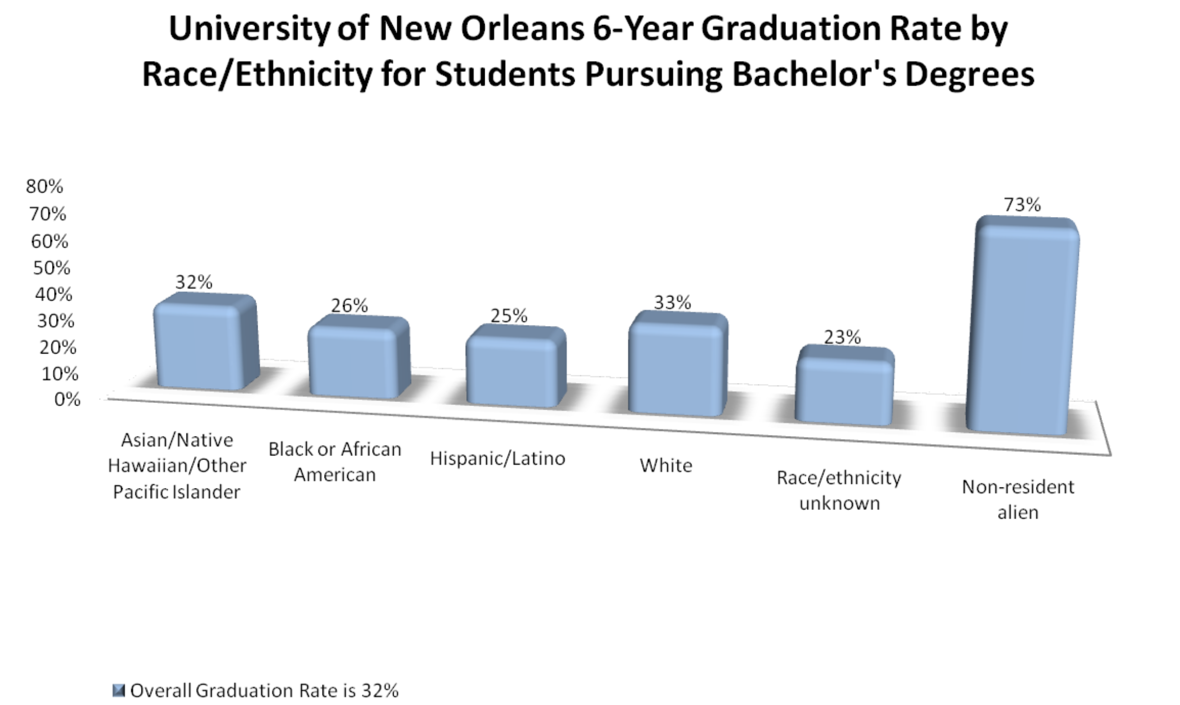
Source: National Center for Educational Statistics. (Prepared by M. D. Slaughter)

University of New Mexico-Main Campus 6-Year Graduation Rate by Race/Ethnicity for Students Pursuing Bachelor's Degrees

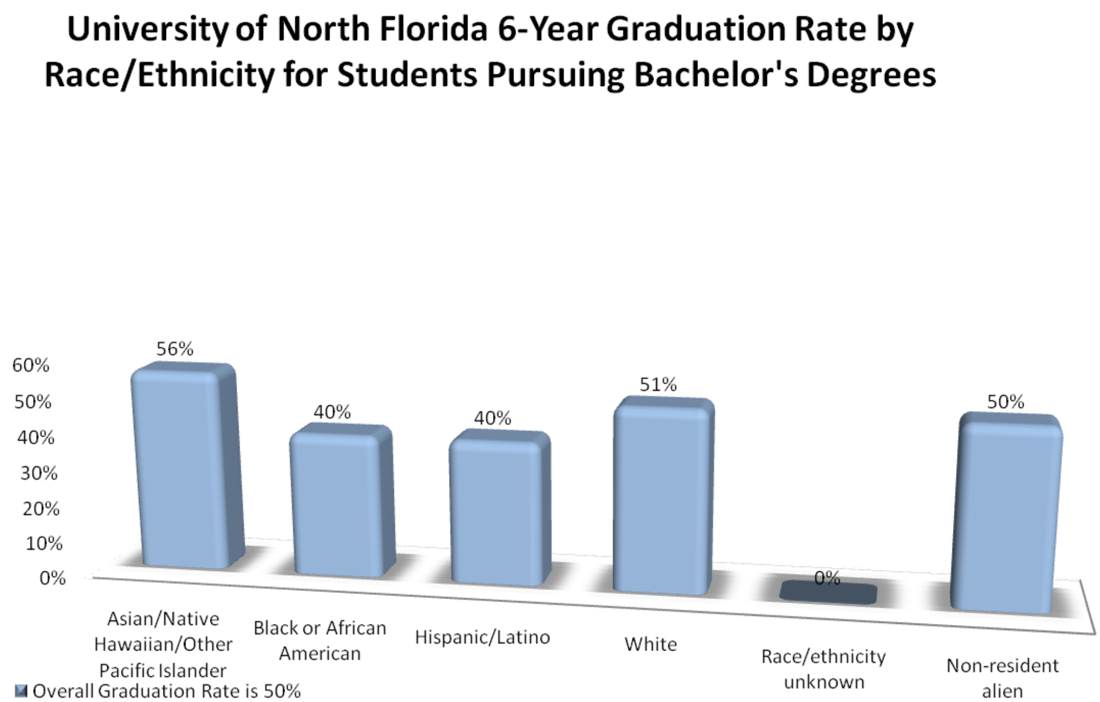


Percentage of Full-Time, First-Time Students Who Began Their Studies in Fall 2007 and Received a Degree or Award Within 150% of "Normal Time" (Fall 2013) to Completion for Their Program

Source: National Center for Educational Statistics. (Prepared by M. D. Slaughter)

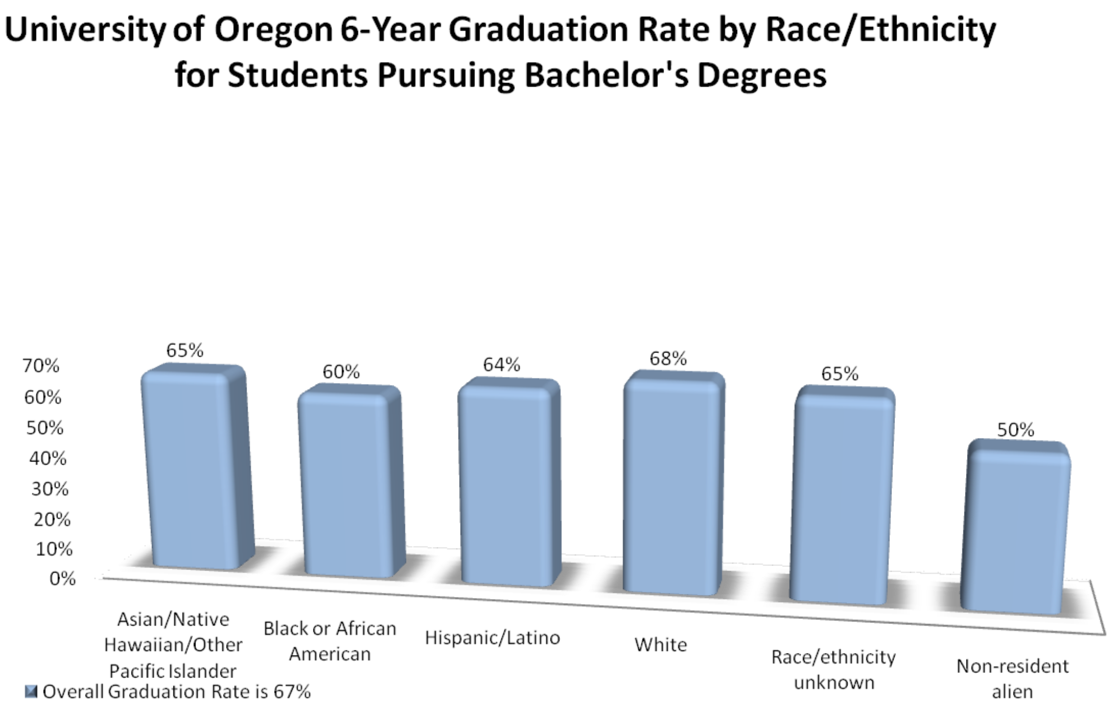


Percentage of Full-Time, First-Time Students Who Began Their Studies in Fall 2007 and Received a Degree or Award Within 150% of "Normal Time" (Fall 2013) to Completion for Their Program
Source: National Center for Educational Statistics. (Prepared by M. D. Slaughter)



Percentage of Full-Time, First-Time Students Who Began Their Studies in Fall 2007 and Received a Degree or Award Within 150% of "Normal Time" (Fall 2013) to Completion for Their Program

Source: National Center for Educational Statistics. (Prepared by M. D. Slaughter)



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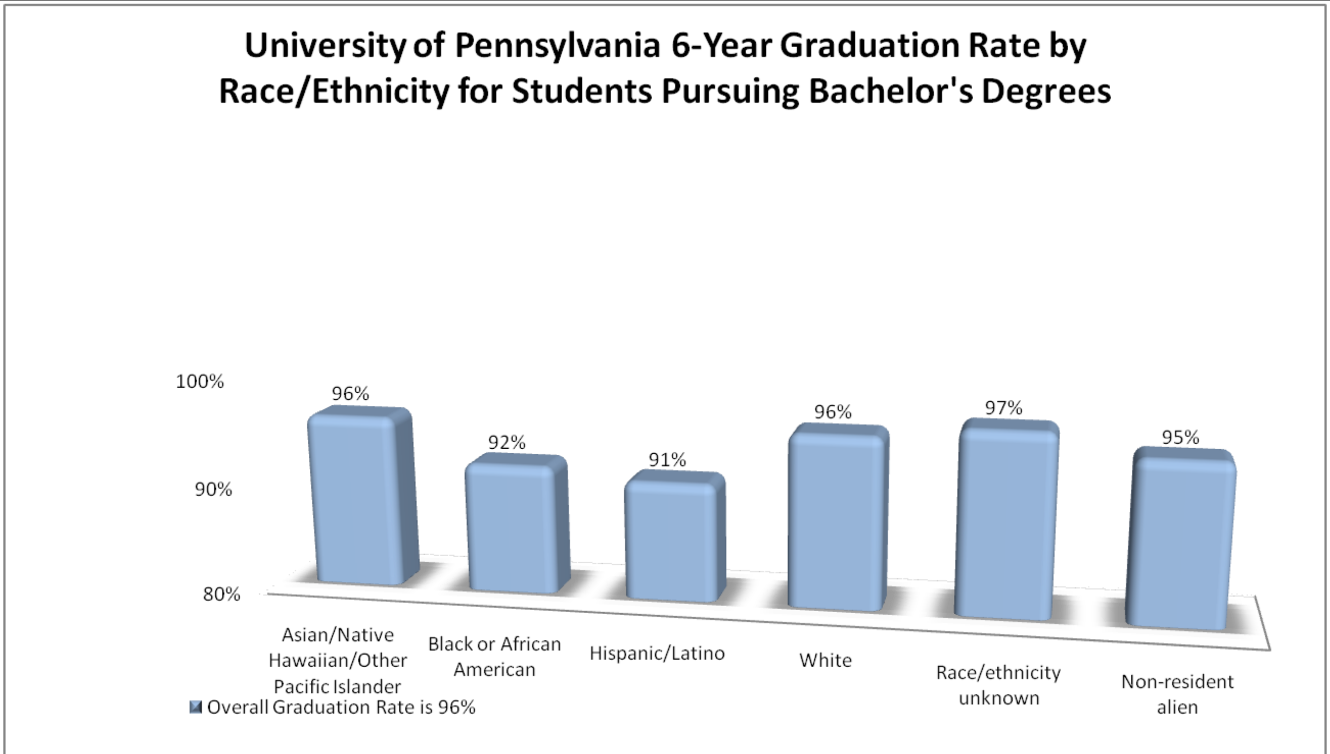
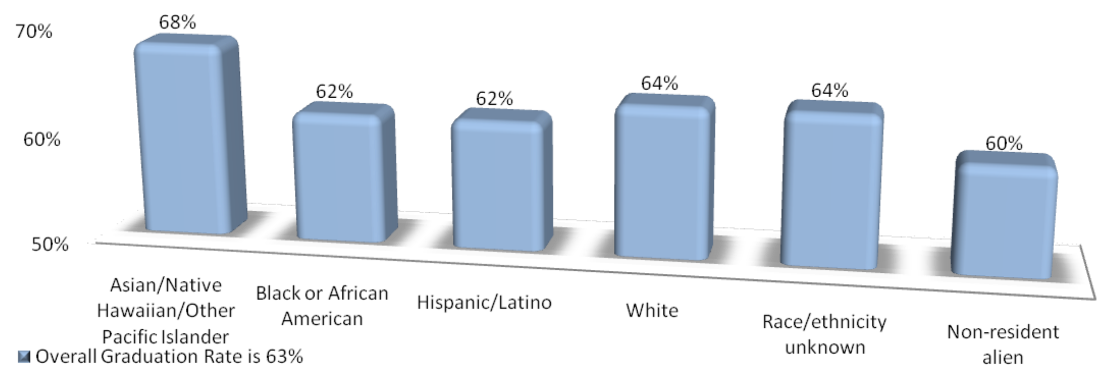
Source: National Center for Educational Statistics. (Prepared by M. D. Slaughter)



Percentage of Full-Time, First-Time Students Who Began Their Studies in Fall 2007 and Received a Degree or Award Within 150% of "Normal Time" (Fall 2013) to Completion for Their Program

Source: National Center for Educational Statistics. (Prepared by M. D. Slaughter)

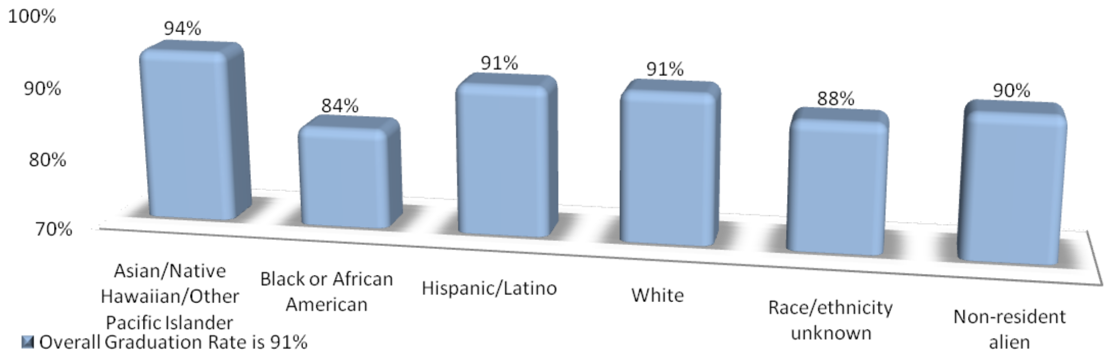
University of South Florida-Main Campus 6-Year Graduation Rate by Race/Ethnicity for Students Pursuing Bachelor's Degrees



Percentage of Full-Time, First-Time Students Who Began Their Studies in Fall 2007 and Received a Degree or Award Within 150% of "Normal Time" (Fall 2013) to Completion for Their Program

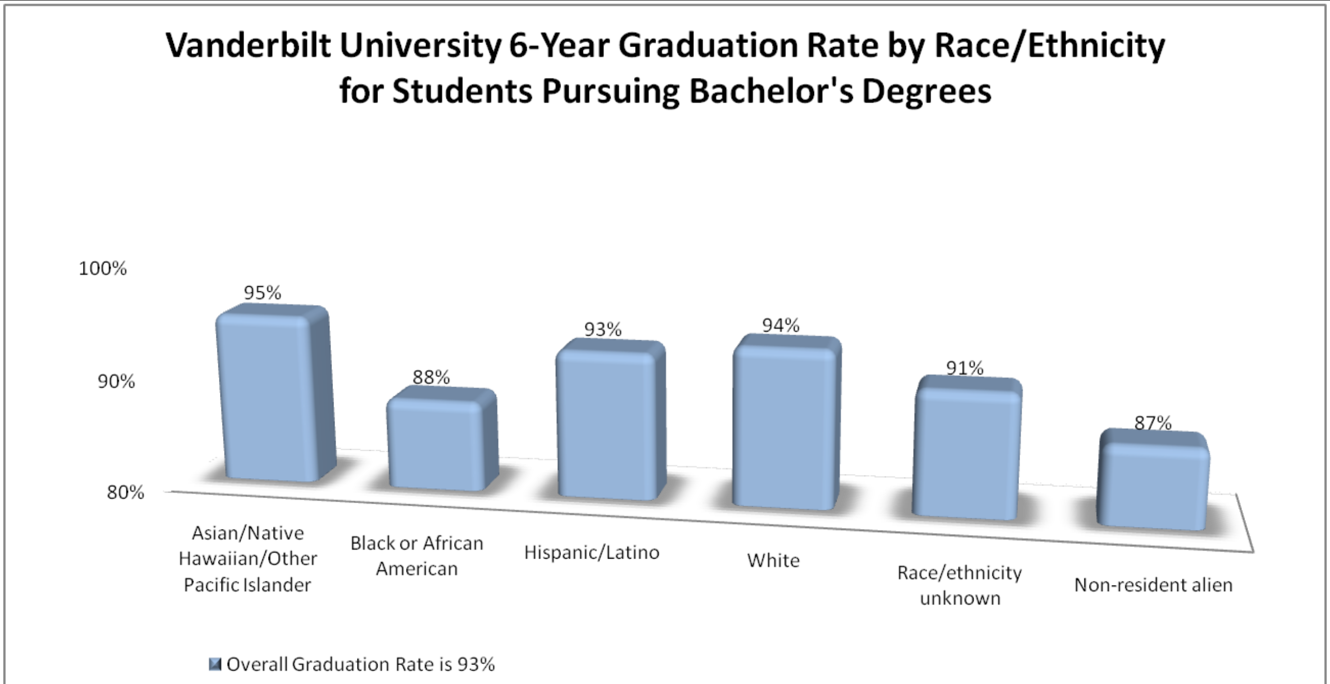
Source: National Center for Educational Statistics. (Prepared by M. D. Slaughter)

University of Southern California 6-Year Graduation Rate by Race/Ethnicity for Students Pursuing Bachelor's Degrees



Percentage of Full-Time, First-Time Students Who Began Their Studies in Fall 2007 and Received a Degree or Award Within 150% of "Normal Time" (Fall 2013) to Completion for Their Program

Source: National Center for Educational Statistics. (Prepared by M. D. Slaughter)



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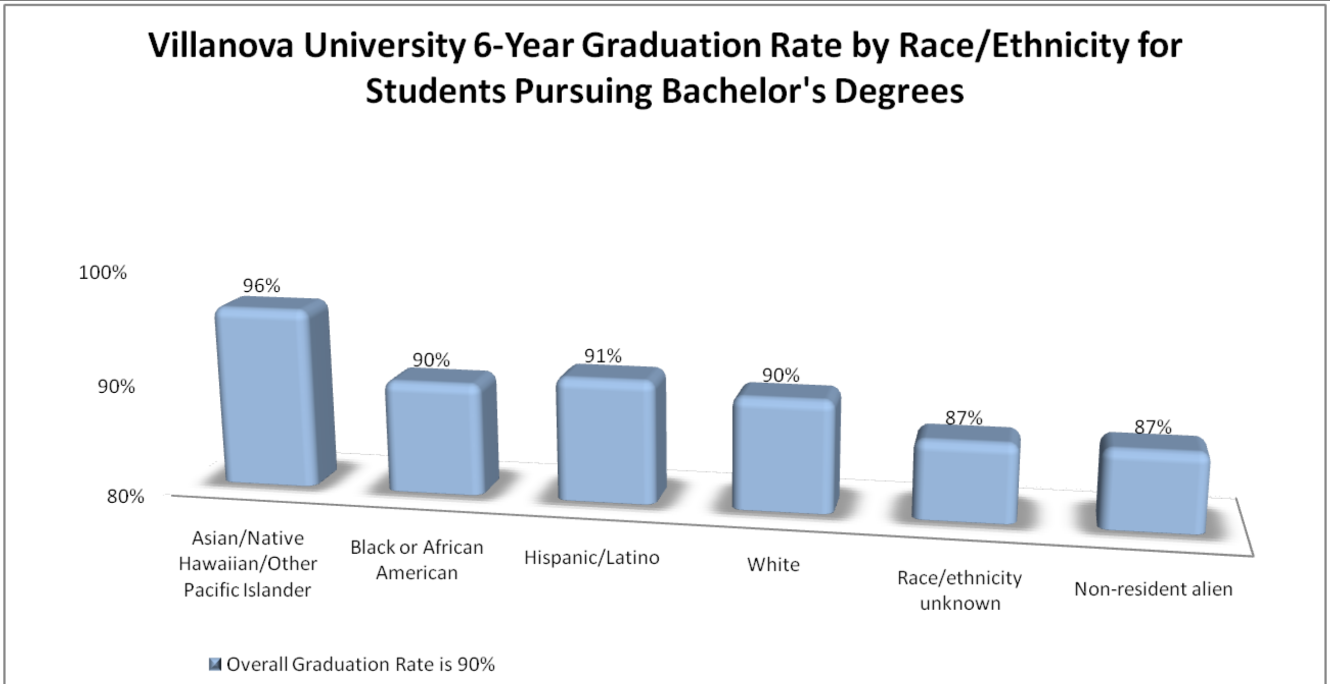
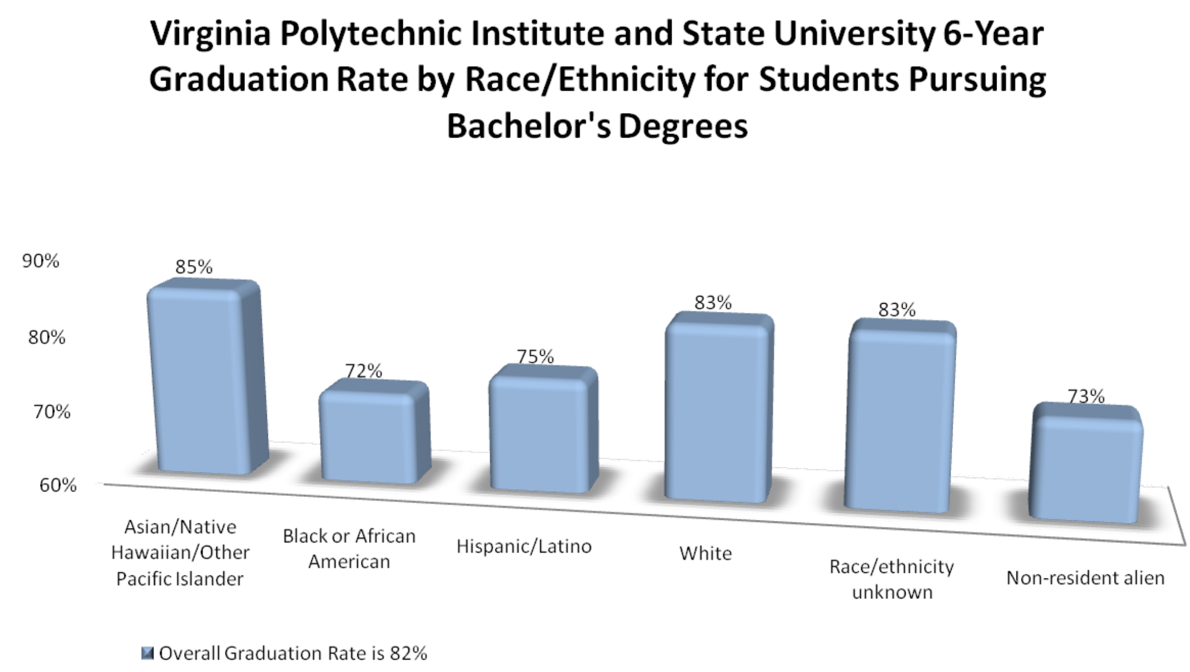
Source: National Center for Educational Statistics. (Prepared by M. D. Slaughter)



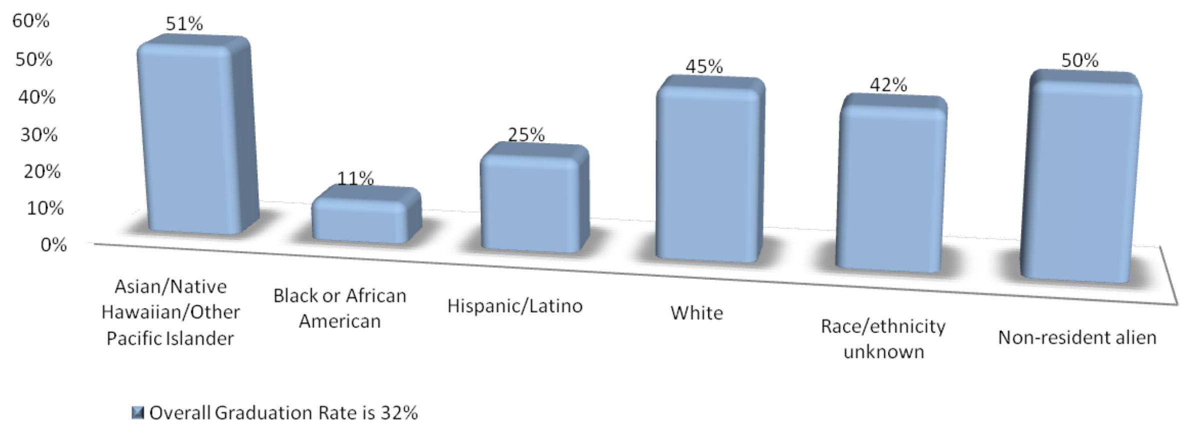
Percentage of Full-Time, First-Time Students Who Began Their Studies in Fall 2007 and Received a Degree or Award Within 150% of "Normal Time" (Fall 2013) to Completion for Their Program

Source: National Center for Educational Statistics. (Prepared by M. D. Slaughter)



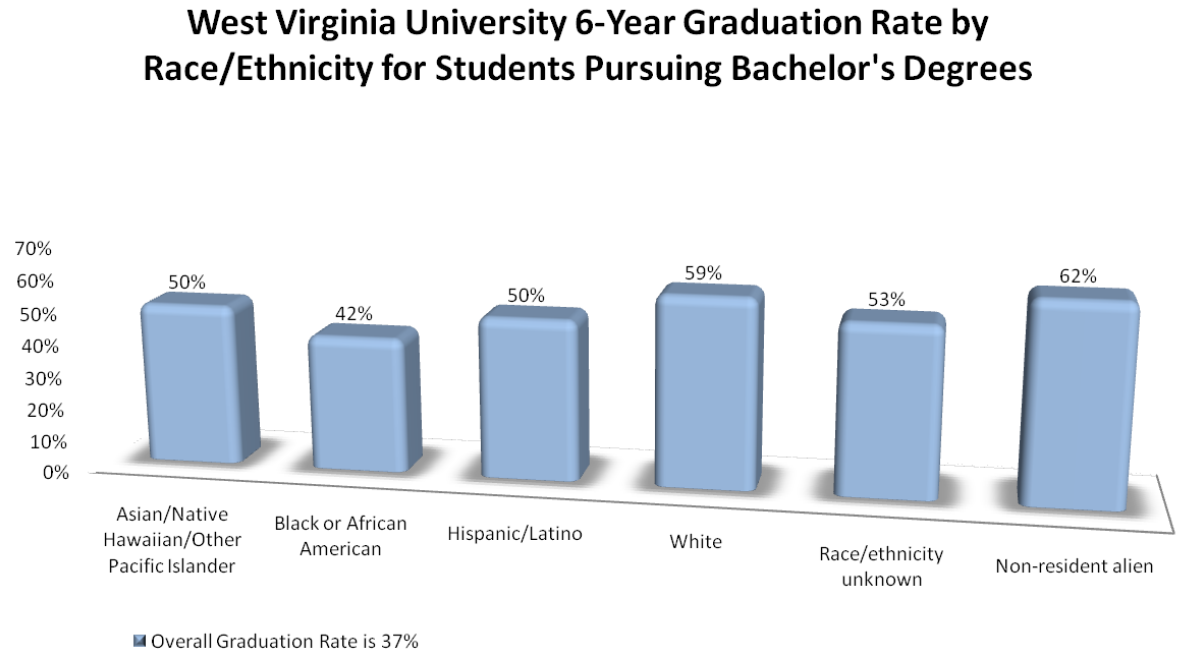
Percentage of Full-Time, First-Time Students Who Began Their Studies in Fall 2007 and Received a Degree or Award Within 150% of "Normal Time" (Fall 2013) to Completion for Their Program
Source: National Center for Educational Statistics. (Prepared by M. D. Slaughter)

Wayne State University 6-Year Graduation Rate by Race/Ethnicity for Students Pursuing Bachelor's Degrees



Percentage of Full-Time, First-Time Students Who Began Their Studies in Fall 2007 and Received a Degree or Award Within 150% of "Normal Time" (Fall 2013) to Completion for Their Program

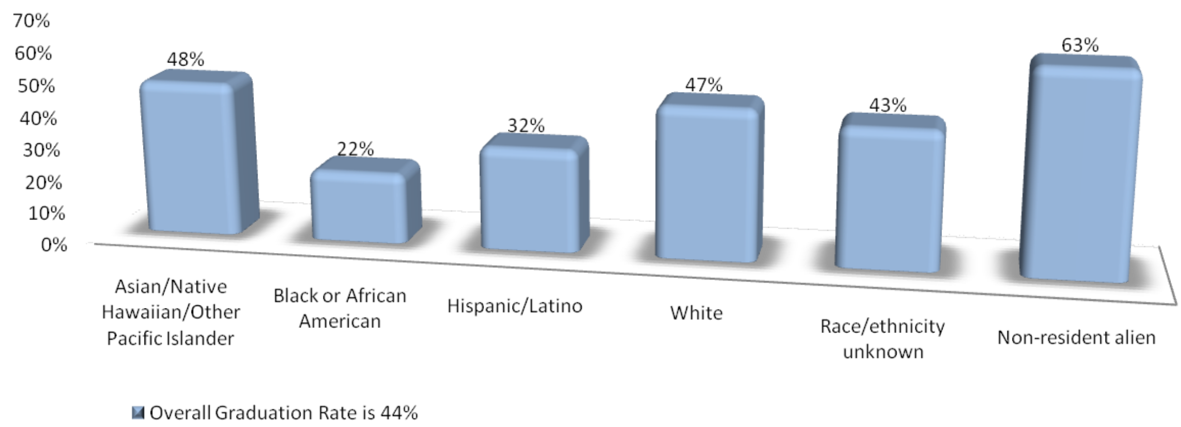
Source: National Center for Educational Statistics. (Prepared by M. D. Slaughter)



Percentage of Full-Time, First-Time Students Who Began Their Studies in Fall 2007 and Received a Degree or Award Within 150% of "Normal Time" (Fall 2013) to Completion for Their Program

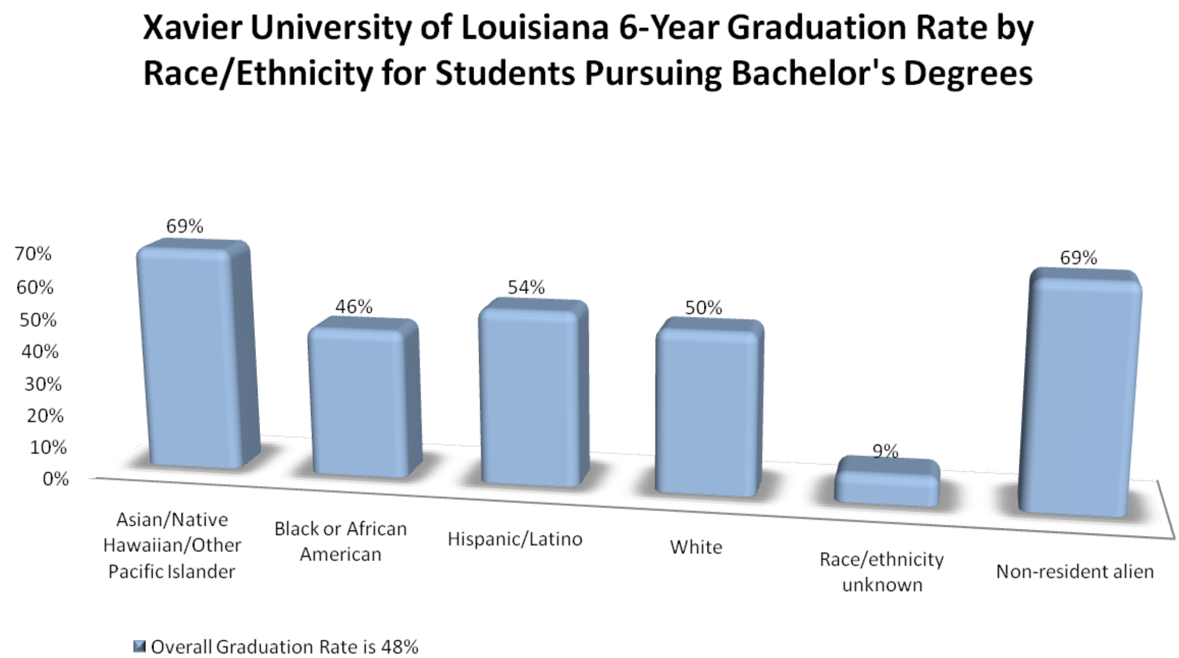
Source: National Center for Educational Statistics. (Prepared by M. D. Slaughter)

Western Kentucky University 6-Year Graduation Rate by Race/Ethnicity for Students Pursuing Bachelor's Degrees



Percentage of Full-Time, First-Time Students Who Began Their Studies in Fall 2007 and Received a Degree or Award Within 150% of "Normal Time" (Fall 2013) to Completion for Their Program

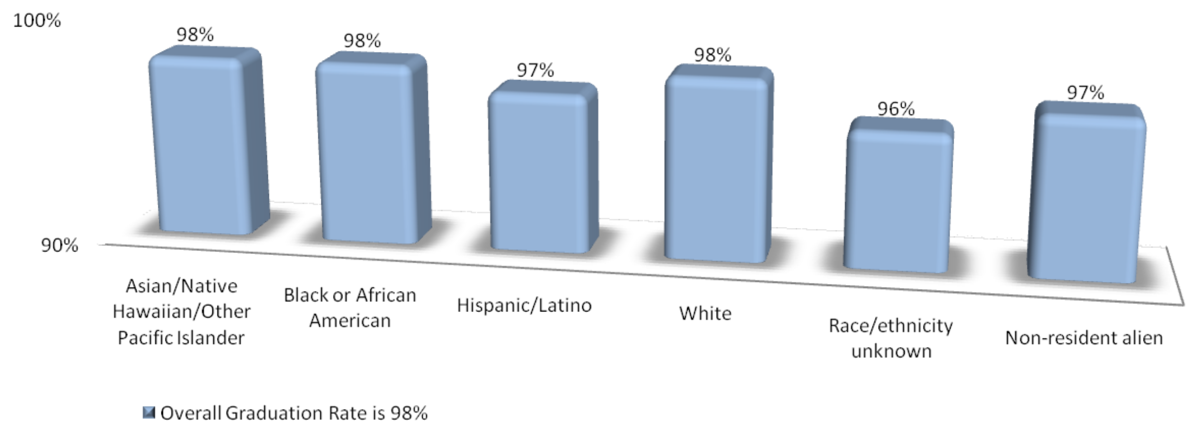
Source: National Center for Educational Statistics. (Prepared by M. D. Slaughter)



Percentage of Full-Time, First-Time Students Who Began Their Studies in Fall 2007 and Received a Degree or Award Within 150% of "Normal Time" (Fall 2013) to Completion for Their Program

Source: National Center for Educational Statistics. (Prepared by M. D. Slaughter)

Yale University 6-Year Graduation Rate by Race/Ethnicity for Students Pursuing Bachelor's Degrees



Percentage of Full-Time, First-Time Students Who Began Their Studies in Fall 2007 and Received a Degree or Award Within 150% of "Normal Time" (Fall 2013) to Completion for Their Program

Source: National Center for Educational Statistics. (Prepared by M. D. Slaughter)

Status of Underrepresented Minorities in Science, Technology, Engineering, and Mathematics (STEM)—UPDATES: April 20, 2019
Collection by Dr. Milton Dean Slaughter
Affiliate Professor of Physics, Florida International University

The following updates are presented in support of the Executive Summary and the suggested University Organization Unit Program (UOUP) solution to increase significantly the number of STEM undergraduate and graduate degrees earned by underrepresented minorities and women at the nation-wide level.

"Culturally inclusive STEM education", a Letter published in
Science 20 Oct 2017, Vol. 358, Issue 6361, pp. 312-313, DOI: 10.1126/science.aaq0358, by
Amanda J. Zellmer, Department of Biology, Occidental College, Los Angeles, CA 90041, zellmer@oxy.edu and
Aleksandra Sherman, Department of Cognitive Science, Occidental College, Los Angeles, CA 90041, asherman@oxy.edu

Two very relevant quotes from this Letter in Science magazine:

"Fewer National Institutes of Health (NIH) grants are awarded to black scientists (*1*) and to female scientists (*2*) relative to their white male counterparts; biomedical research is biased toward diseases afflicting white men (*3*). The idea that science is separate from social and cultural issues is flawed and alienates women and underrepresented minorities (*4*). To diversify science, we must systematically incorporate culturally inclusive practices into higher-education science, technology, engineering, and mathematics (STEM) classrooms."

"Despite the evidence of their success (*7*), culturally inclusive teaching practices are not systematically used across the STEM curriculum in higher education. We thus recommend a major pedagogical shift in STEM education that will require broad faculty buy-in and institutional support. To facilitate the use of culturally relevant STEM teaching materials at a large scale throughout undergraduate STEM education, such syllabi should be archived in repositories housed by professional societies, and textbook programs should shift STEM teaching beyond the traditional approach. Faculty training is also critical."

Update Introduction

AIP American Institute of Physics
REPORT
A publication of the AIP Statistical Research Center www.aip.org/statistics

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January 2019

Women in Physics and Astronomy, 2019

By Anne Marie Porter and Rachel Ivie

Highlights

- In 2017, women earned 21% of physics bachelors' degrees and 20% of physics doctorates. In that same year, women earned 33% of astronomy bachelors' degrees and 40% of astronomy doctorates.
- In recent years (2007–2017), the percentage of women earning a bachelor's degree in physics and astronomy has not changed over time. However, the percentage of women enrolling in physics graduate programs and earning a physics doctorate has continued to rise.
- In 2017, there were 21 physics departments at four-year institutions that awarded 40% or more of their bachelors' degrees to women, and 21 physics departments that awarded 30% or more of their doctorates to women. There were 13 women's colleges offering a physics bachelors' degree program in 2017.
- In 2013, 46% of high school physics students were young women, and this percentage has remained stable since 2003. In addition, 37% of high school teachers were women, and this percentage has grown over time.
- In 2014, 16% of physics faculty members and 19% of astronomy faculty members were women. In 2016, 26% of newly hired physics faculty members and 40% of newly hired astronomy faculty members were women. The percentage of faculty members who are women is increasing over time.
- In 2014, women occupied only 10% of full professor positions, but this is due to women earning fewer doctoral degrees in the past. When comparing the percentage of women employed as professors with past doctorate completions, there were as many women in full professor positions as expected, and more women in assistant and associate positions than expected.
- African-American and Hispanic women remain under-represented in physics and astronomy. However, the number of Hispanic women earning physics and astronomy degrees is growing rapidly over time, while the number of African-American women has not shown similar growth.
- Gender differences in salary emerge mid-career. For recent physics graduates, there were no gender differences in salary one year after graduation; however, men had 10% higher salaries than women 10–15 years after graduating with a physics doctorate.

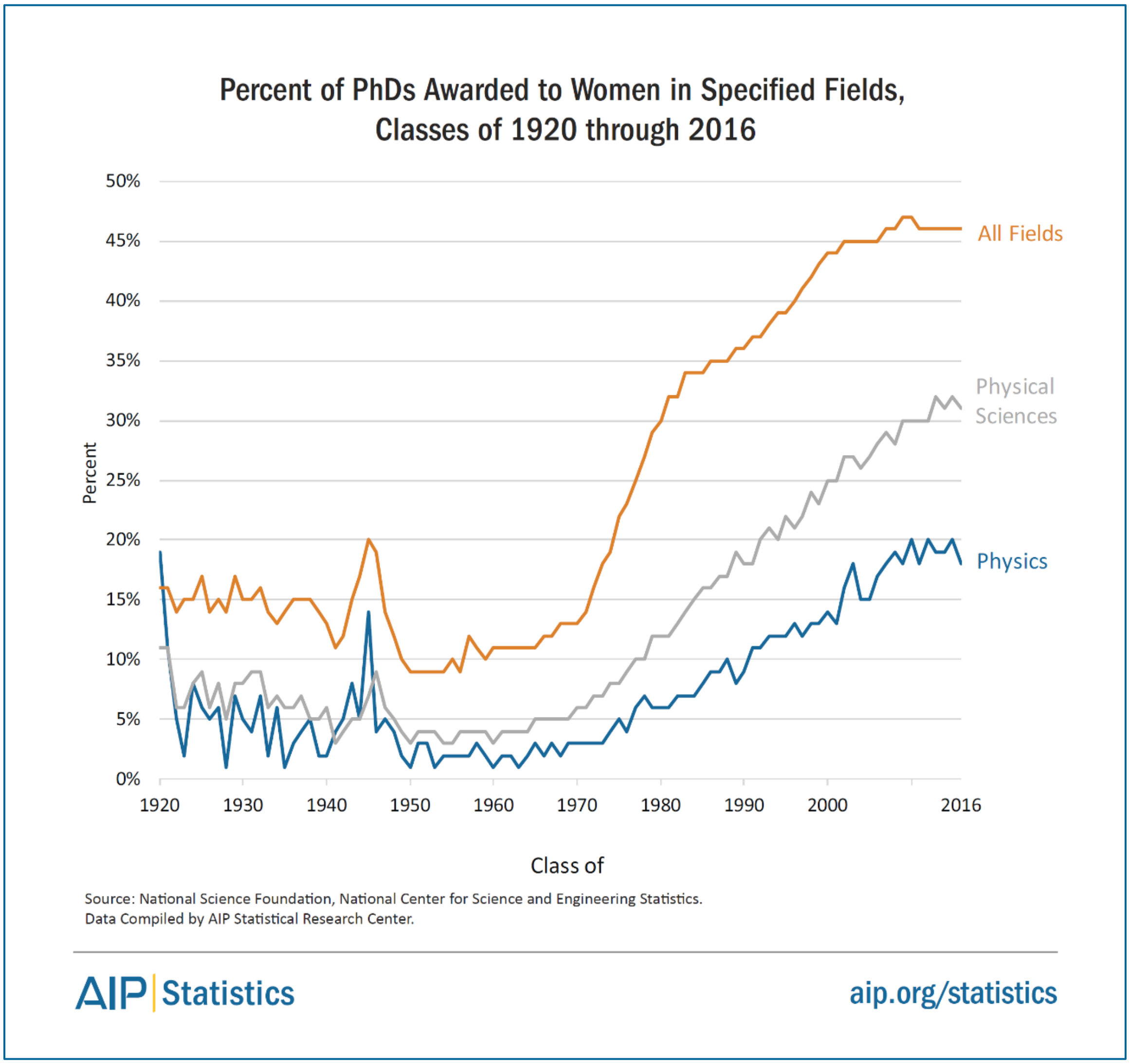
- Compared to men, women reported that their careers progress more slowly and that they received fewer career resources and opportunities. In addition, women were more likely to make career compromises for family reasons.

The authors wish to thank our colleagues from the Statistical Research Center at the American Institute of Physics for assisting with the analyses in this report: Starr Nicholson, Patrick Mulvey, Jack Pold, John Tyler, and Susan White.

Introduction

The participation of women in physics has greatly increased since the 1920s (**Figure 1**); however, the proportion of women among physics students and faculty members is still below that of other disciplines. Women earn over 50% of all bachelor's degrees (National Center for Education Statistics, 2016), but women earn only 21% of physics and 33% of astronomy bachelors' degrees.

Figure 1



This report will provide a comprehensive overview of the representation and participation of women in physics and astronomy fields. This report has three main goals:

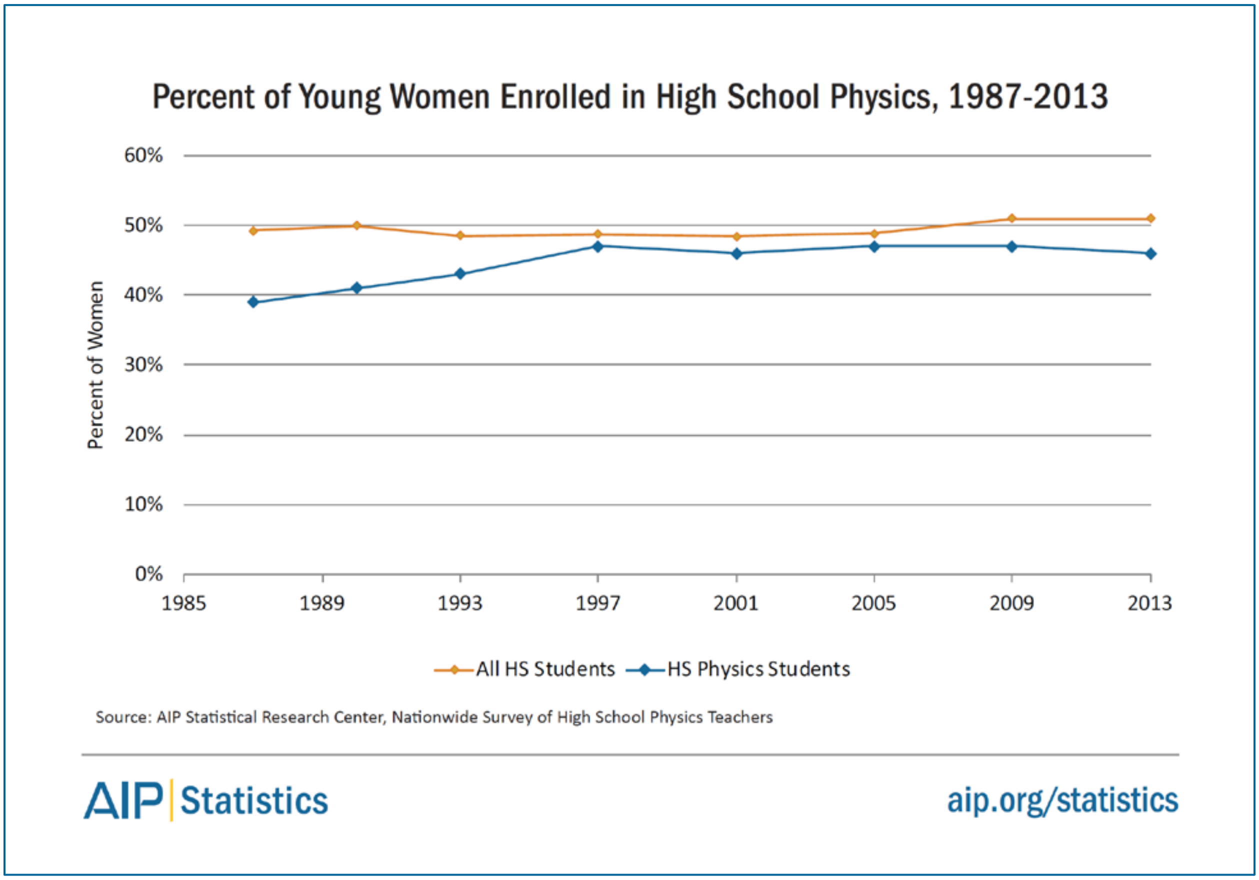
1) To describe the representation of women in high school physics enrollment, physics and astronomy degree completions, and faculty employment. Data are graphically displayed over many years, but the emphasis in our discussion is placed on changes in the most recent decade. In addition, we will examine the representation of minority women at these levels.
2) To compare employment outcomes for men and women with physics and astronomy degrees by exploring potential gender differences in salary, job satisfaction, career opportunities, career resources, and family influences.
3) To identify points of attrition for women in physics and astronomy between postsecondary education and faculty employment. For example, we will examine the percentage of attrition at the faculty member level based on women's past doctorate degree production.

In this report, we used physics and astronomy data collected by the Statistical Research Center at the American Institute of Physics. We obtained data on students from the Enrollments and Degrees Survey and data on faculty members from the Academic Workforce Survey and the Faculty Member Survey. Data on other academic fields were obtained from the Integrated Postsecondary Education Data System (National Center for Education Statistics [NCES], 2016), and the Survey of Earned Doctorates (National Science Foundation [NSF], 2016).

Students and Degrees

High school students. In 2013, we estimate that 1.38 million students were enrolled in high school physics courses. While the number of young women enrolled in high school physics courses has grown, so has the number of young men. Thus, the percentage of young women in physics courses has remained stable around 46% since 1997 (**Figure 2**; White and Tesfaye, 2014).

Figure 2



During high school, many young women participated in Advanced Placement (AP) physics programs. The AP Program offered four physics exams in 2017: Physics 1, Physics 2, Physics C: Mechanics, and Physics C: Electricity and Magnetism. Physics 1 and 2 are algebra-based courses, and Physics C courses are calculus-based. **Figure 3** shows the number and percentage of young women who participated in the four AP physics exams. Around 160,000 students participated in Physics 1 exams, and 40% of test-takers were young women (The College Board, 2017). Around 90,000 students participated in the other three exams, and between 24-28% of Physics 2 and Physics C test-takers were young women. Although the representation of young women among Physics 1 exam-takers was higher than the other exams, the percentage earning a "passing" score (3 or higher) was lower (**Figure 4**). 30% of young women passed the Physics 1 exam, compared to 48% of young men. However, in the other exams, there was a smaller difference between the percentage of young women and young men who passed the exams.

Figure 3

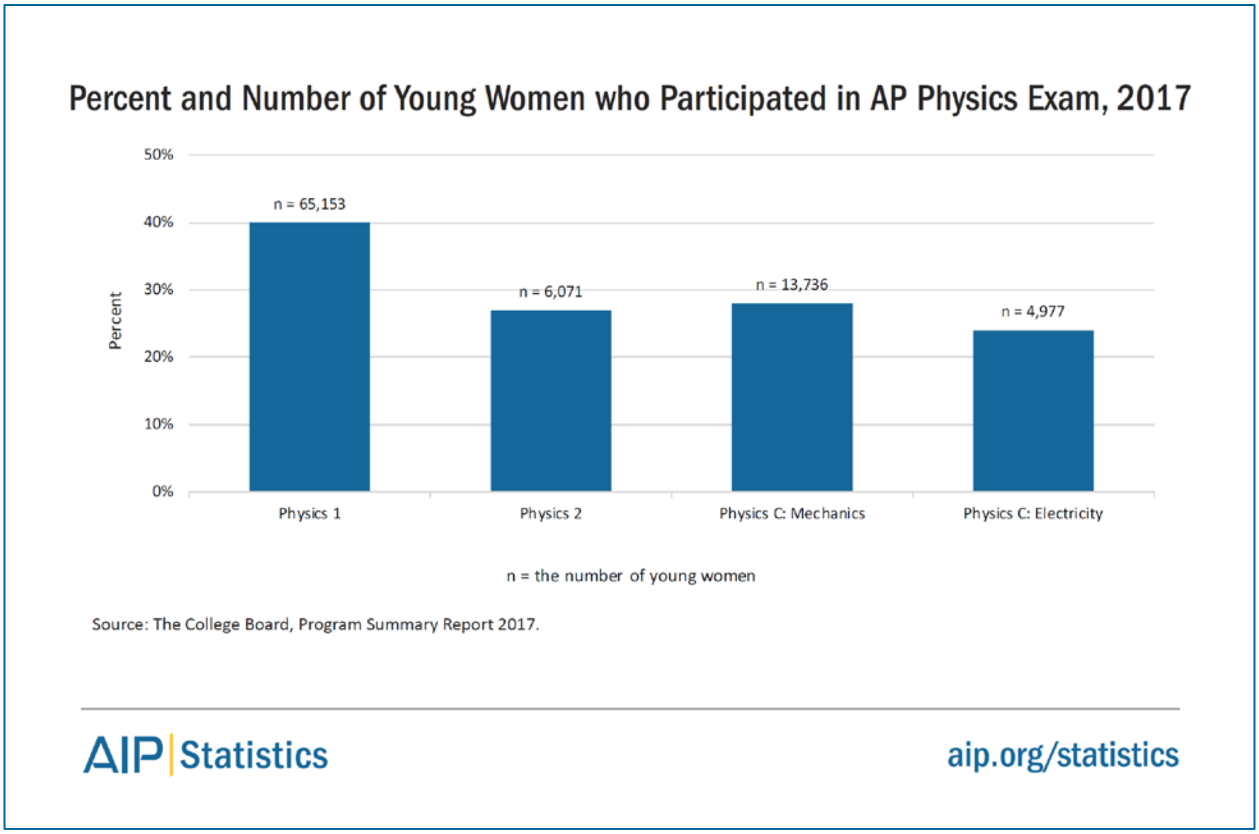
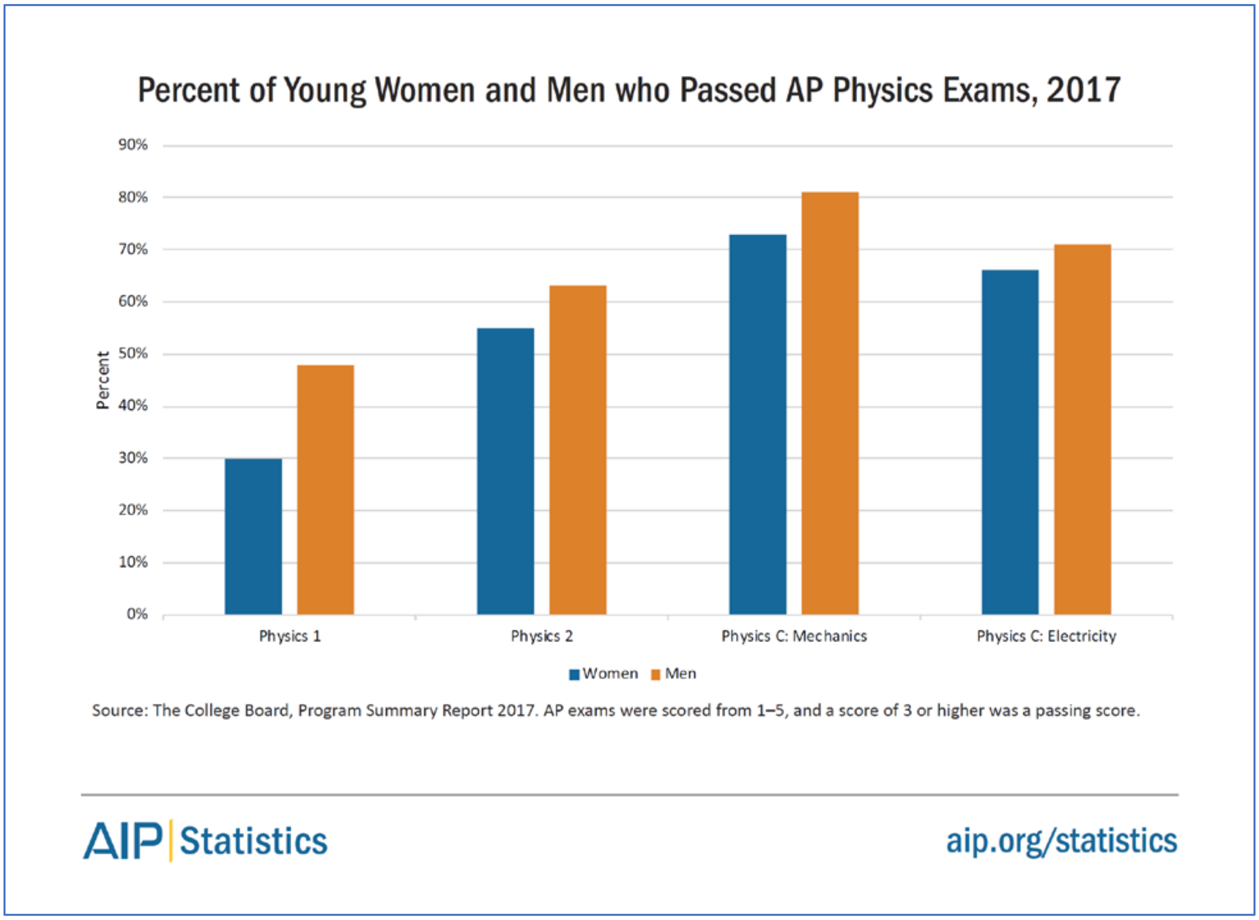

Percent and Number of Young Women who Participated in AP Physics Exam, 2017
50%
40%
30%
20%
10%
0%
Percent
n = 65,153
n = 6,071
n = 13,736
n = 4,977
Physics 1
Physics 2
Physics C: Mechanics
Physics C: Electricity
n = the number of young women
Source: The College Board, Program Summary Report 2017.
AIP Statistics
aip.org/statistics

Figure 4



Bachelor's degrees. Women remain under-represented among physics bachelor's degree recipients. According to our 2017 Enrollments and Degrees Survey, over 8,500 students were awarded bachelor's degrees in physics, and 21% of degrees were earned by women. Although the number of women earning physics bachelor's degrees has steadily increased over the last decade (**Figure 5**), the percentage of women has not increased (**Figure 6**). Since the percentage of women has shown little change between 2007–2017, bachelor's degree completion is increasing at similar rates for men and women.

Figure 5

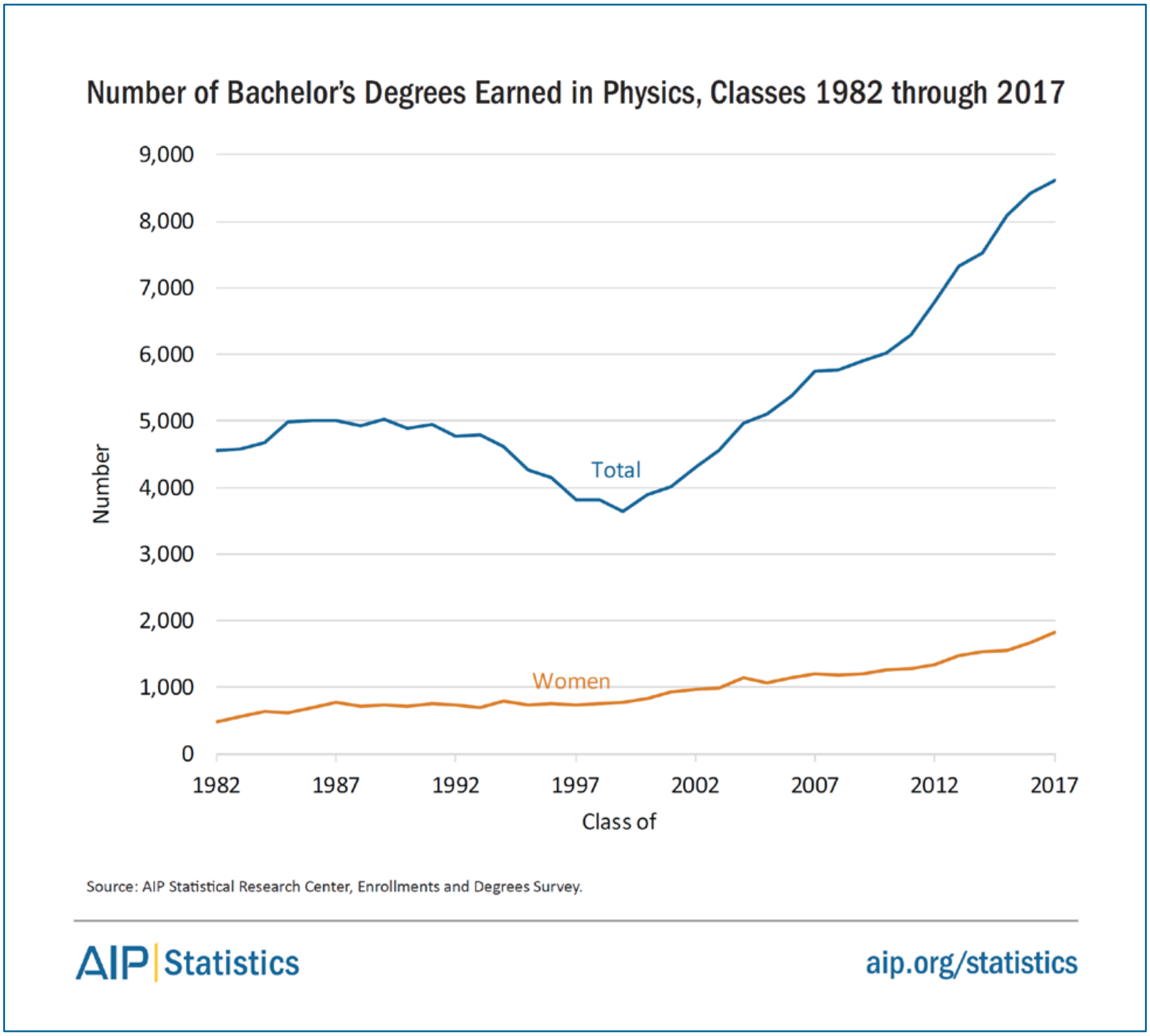
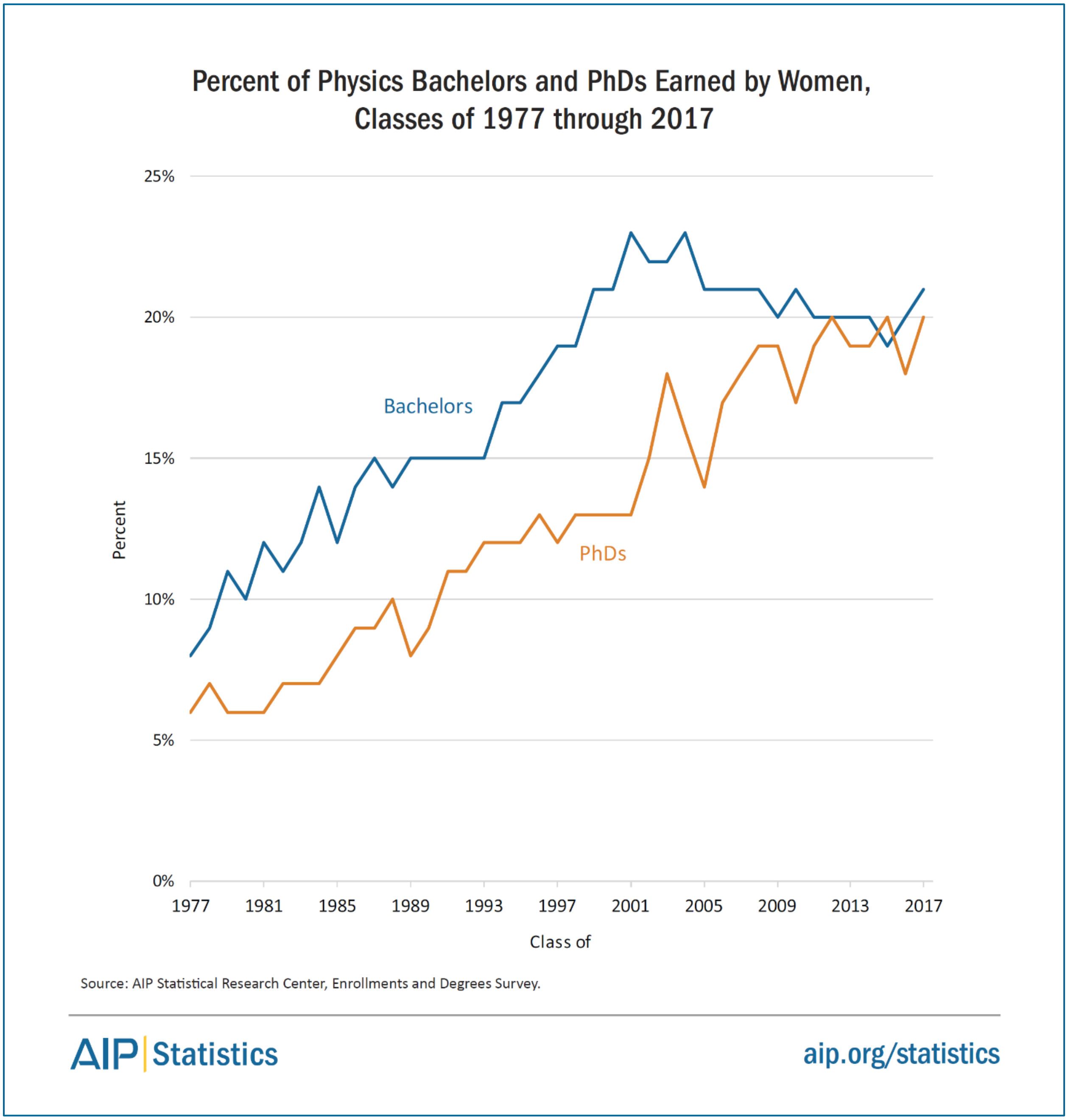
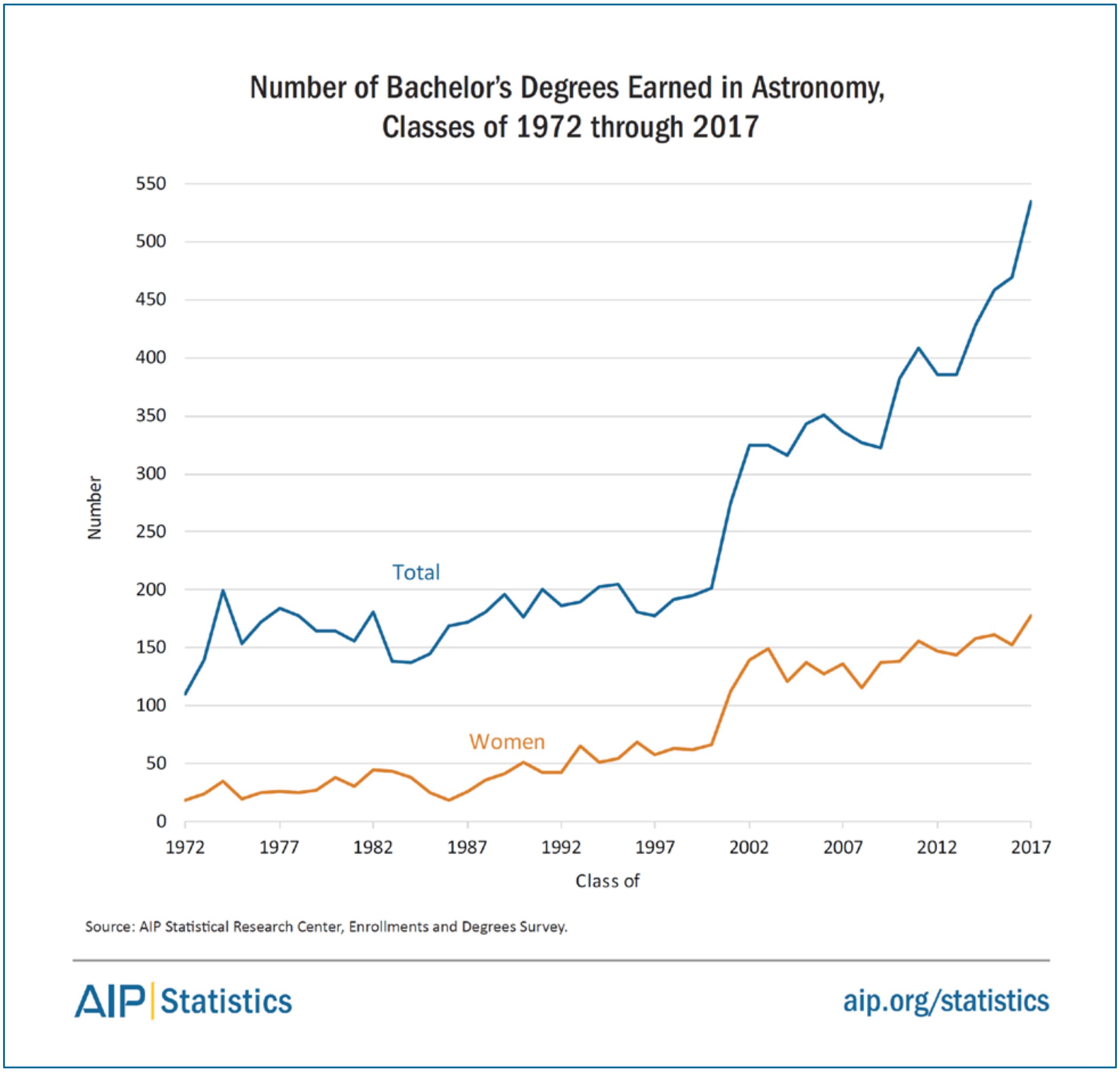

Number of Bachelor's Degrees Earned in Physics, Classes 1982 through 2017
9,000
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
Number
Total
Women
1982
1987
1992
1997
2002
2007
2012
2017
Class of
Source: AIP Statistical Research Center, Enrollments and Degrees Survey.
AIP Statistics
aip.org/statistics

Figure 6



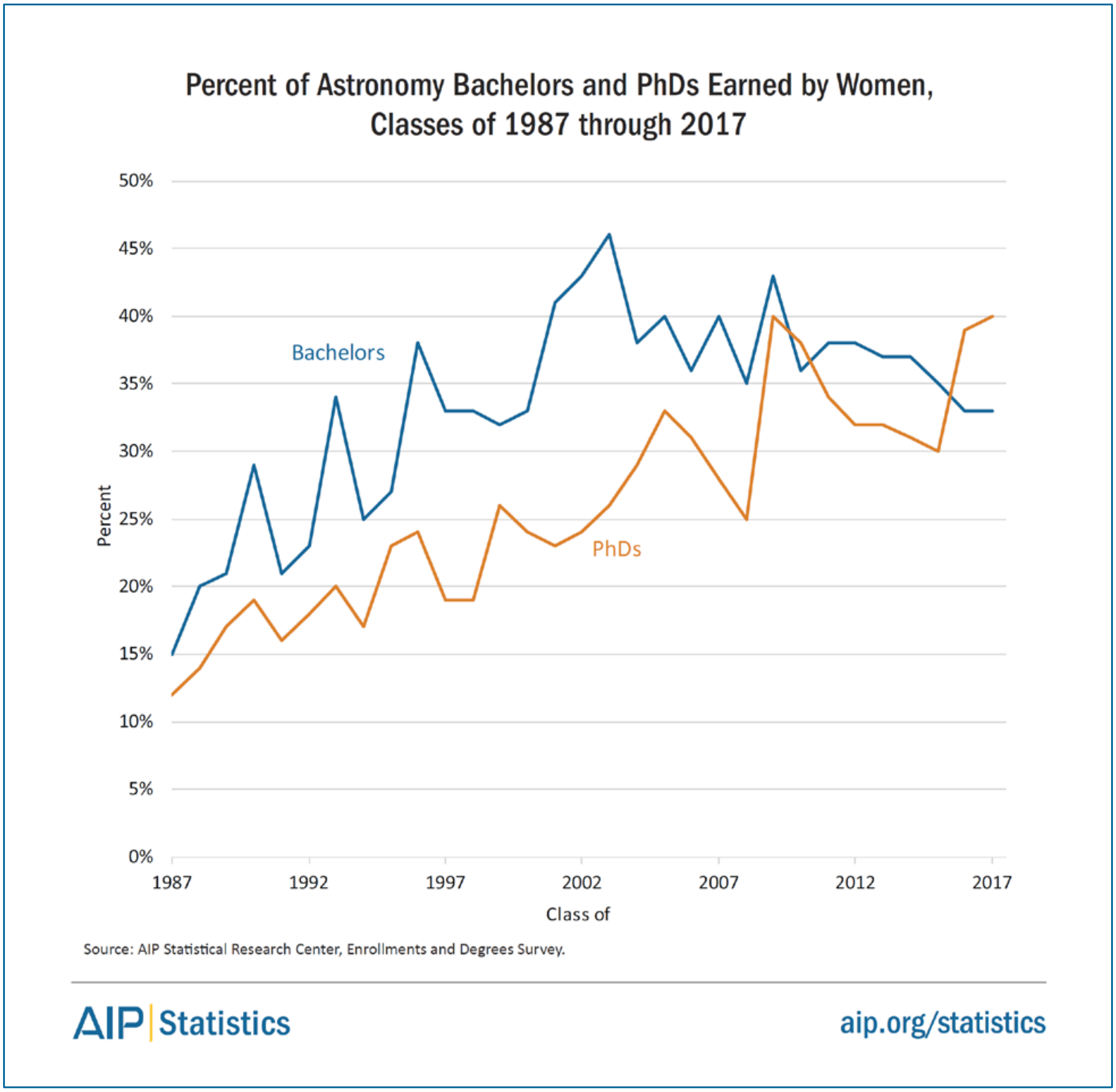
The representation of women in astronomy is higher than in physics. In 2017, over 500 astronomy undergraduates were awarded bachelor's degrees, and 33% of these degrees were earned by women (**Figure 7**). While the number of women earning astronomy degrees has steadily increased between 2007–2017 (**Figure 8**), the number of men earning degrees has shown greater increases. Therefore, the total percentage of women earning astronomy bachelor's degrees has decreased in recent years (33% in 2017 compared to 40% in 2007).

Figure 7



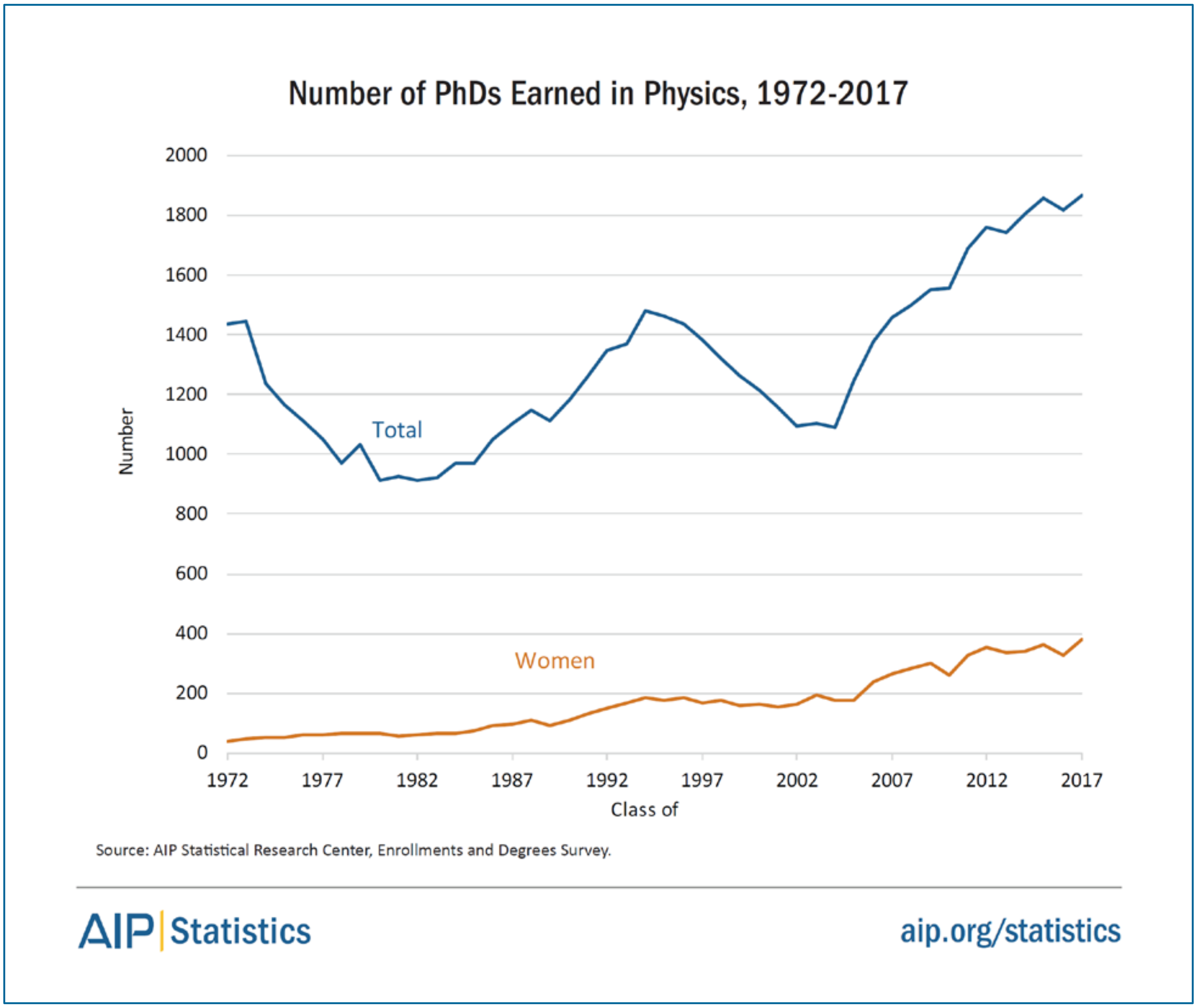
Number of Bachelor's Degrees Earned in Astronomy,
Classes of 1972 through 2017
Number
Total
Women
550
500
450
400
350
300
250
200
150
100
50
0
1972
1977
1982
1987
1992
1997
2002
2007
2012
2017
Class of
Source: AIP Statistical Research Center, Enrollments and Degrees Survey.
AIP Statistics
aip.org/statistics

Figure 8



Doctoral programs and degrees. The percentage of women earning physics doctorates and enrolling in doctoral programs has increased in recent years. In 2017, over 1,800 doctorates were awarded in physics (**Figure 9**) and 20% of these were earned by women (compared to 18% in 2007; **Figure 6**). Among first-year physics graduate students, 22% were women (compared to 18% in 2007; **Figure 10**).

Figure 9



Number of PhDs Earned in Physics, 1972-2017
2000
1800
1600
1400
1200
1000
800
600
400
200
0
Number
Total
Women
1972
1977
1982
1987
1992
1997
2002
2007
2012
2017
Class of
Source: AIP Statistical Research Center, Enrollments and Degrees Survey.
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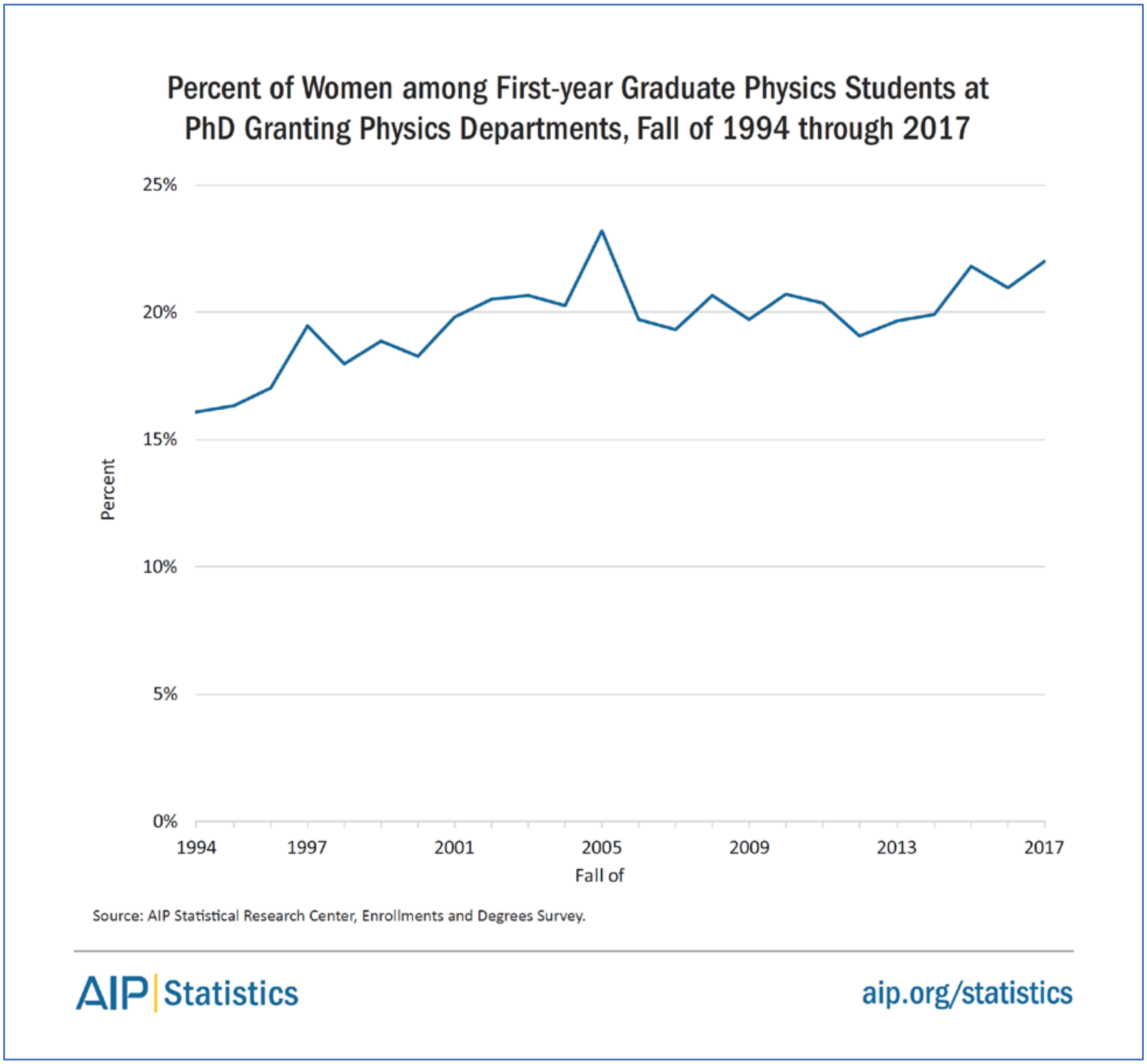
Figure 10



As with bachelor's degrees, the representation of women earning astronomy doctoral degrees and enrolling in graduate school was higher than in physics, and the percentage of women in astronomy at the doctoral level has increased in recent years. In 2017, 186 astronomy doctorates were awarded (**Figure 11**), and women earned 40% of doctoral degrees (compared to 28% in 2007; **Figure 8**). Women were also 40% of first-year astronomy graduate students (compared to 36% in 2007; **Figure 12**).

Figure 11

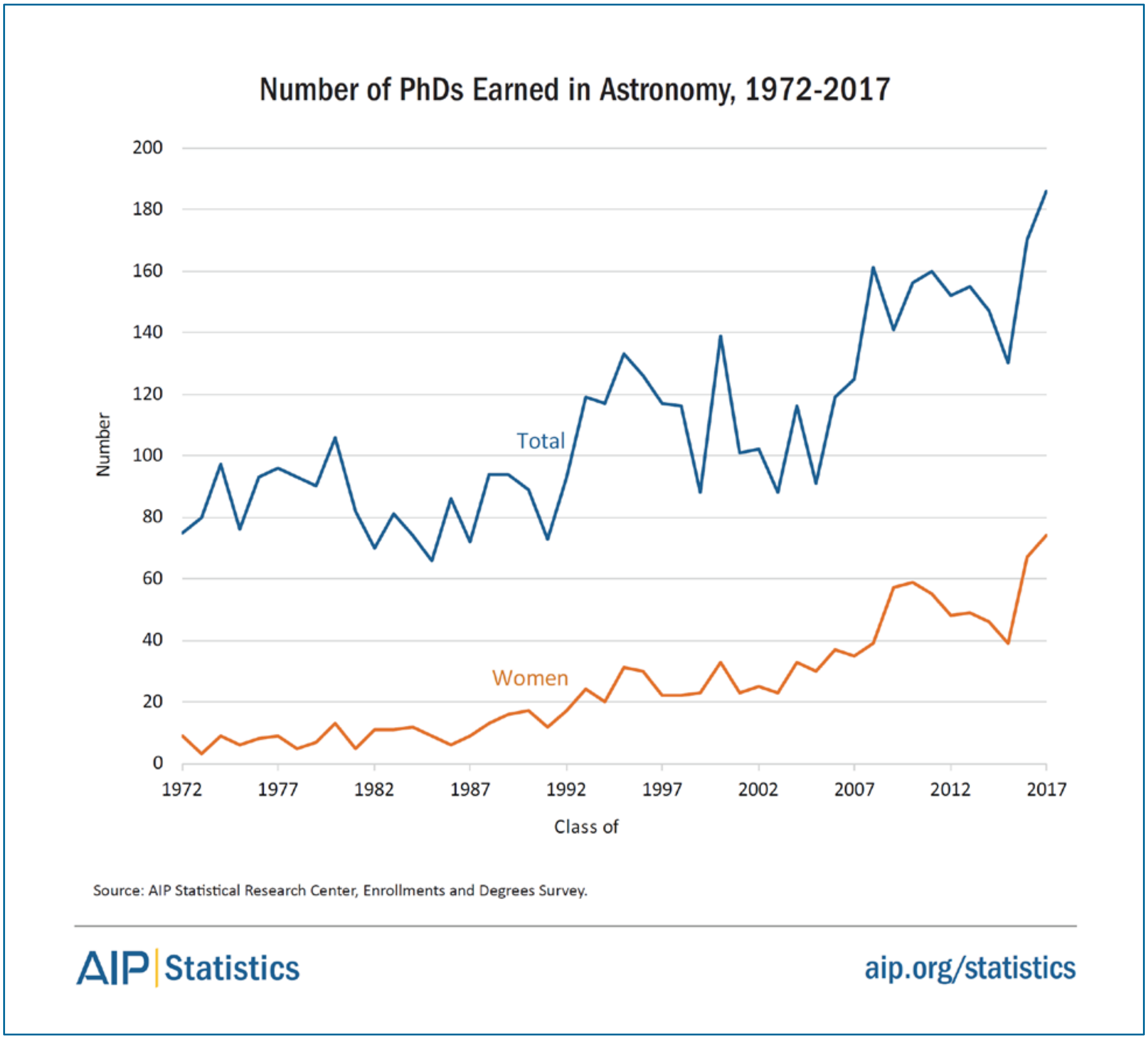
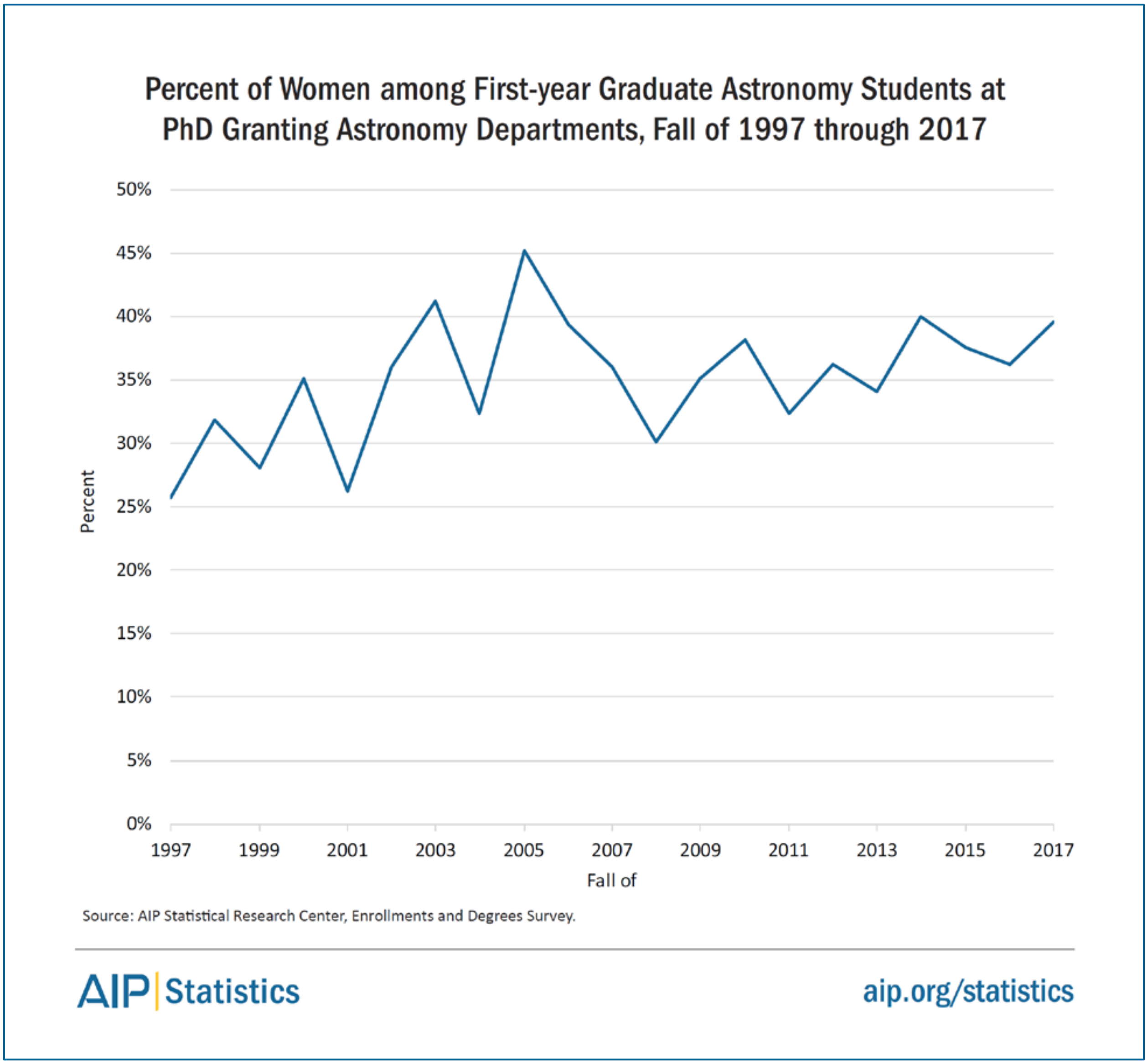

Number of PhDs Earned in Astronomy, 1972-2017
Number
Total
Women
0
20
40
60
80
100
120
140
160
180
200
1972
1977
1982
1987
1992
1997
2002
2007
2012
2017
Class of
Source: AIP Statistical Research Center, Enrollments and Degrees Survey.
AIP Statistics
aip.org/statistics

Figure 12



STEM field comparisons. Women are under-represented in physics and astronomy, but this is not true for all fields in STEM (Science, Technology, Engineering, and Math). **Figures 13 and 14** show the percentage of women who earned bachelor's and doctoral degrees across STEM fields between 1984 and 2016. At both degree levels, biological science and chemistry have the highest percentage of women, while physics, computer science, and engineering fields have the lowest (NCES, 2016; NSF, 2016). Astronomy has a higher percentage than physics, but still has a lower percentage compared to biological science, chemistry, and, at the bachelor's level, mathematics. Overall, this demonstrates a gap in women's representation between physics, astronomy, and many other STEM fields, and this gap has not changed in recent years.

Figure 13

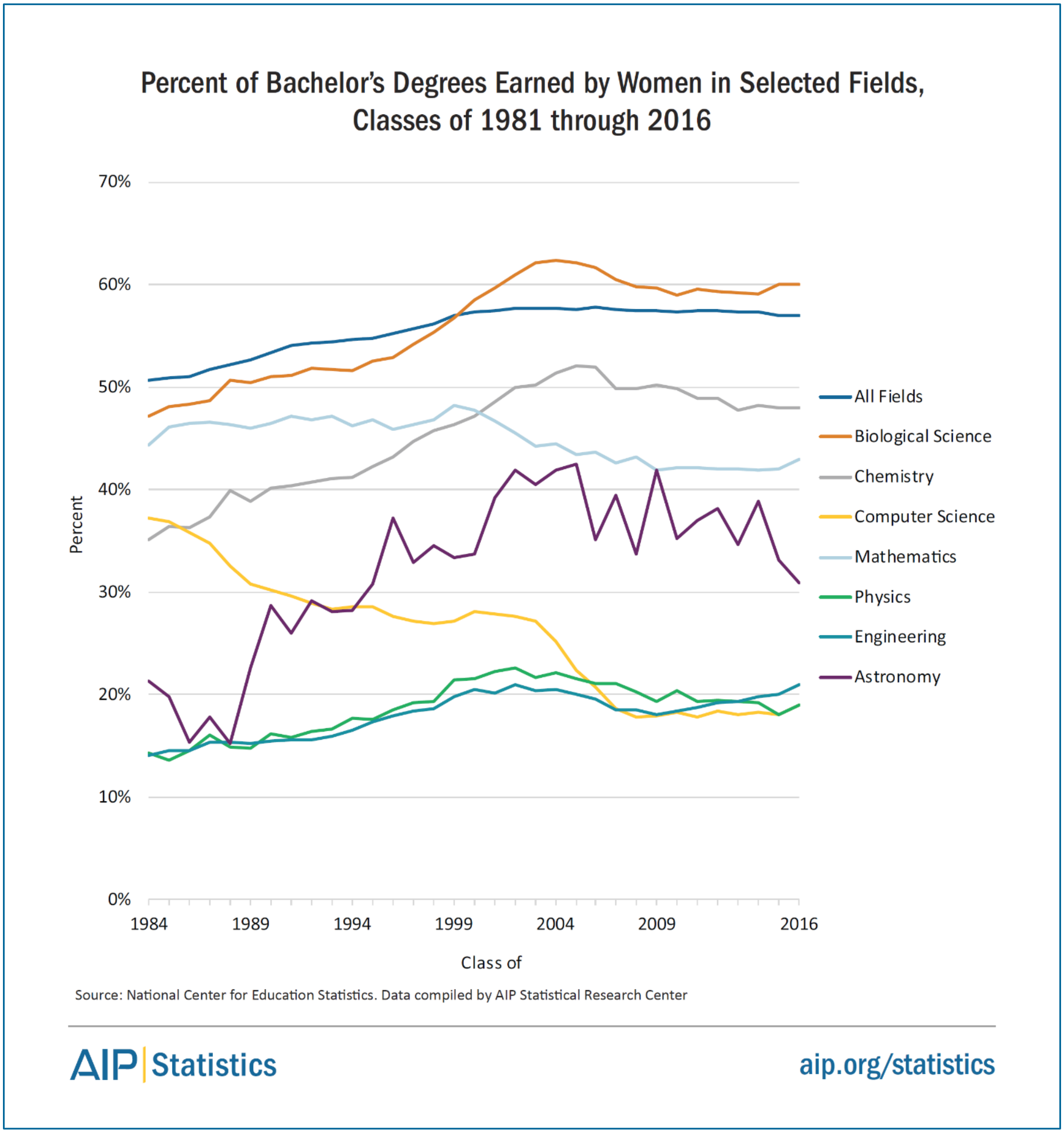
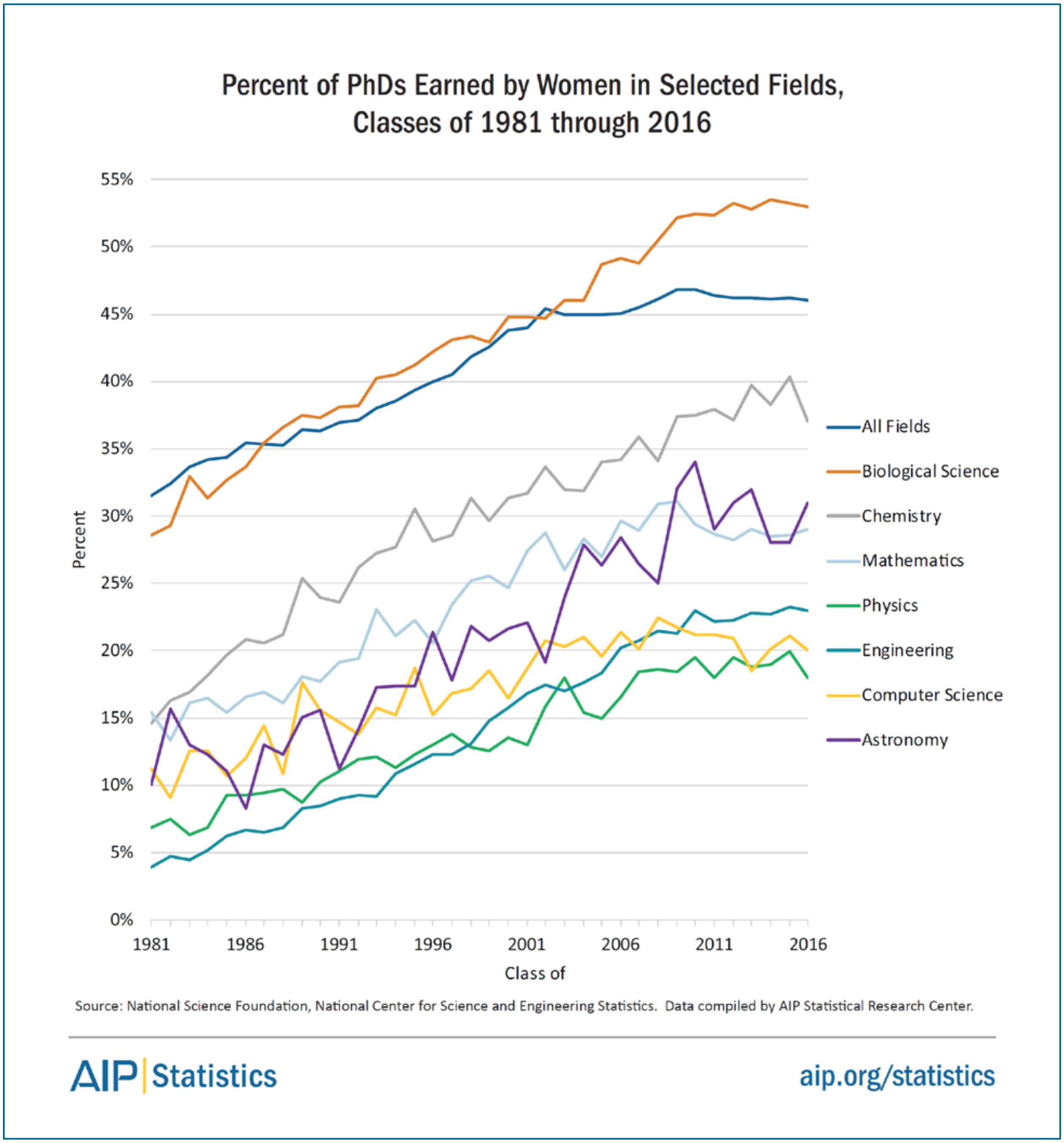

Percent of Bachelor's Degrees Earned by Women in Selected Fields, Classes of 1981 through 2016
70%
60%
50%
40%
30%
20%
10%
0%
Percent
1984
1989
1994
1999
2004
2009
2016
Class of
All Fields
Biological Science
Chemistry
Computer Science
Mathematics
Physics
Engineering
Astronomy
Source: National Center for Education Statistics. Data compiled by AIP Statistical Research Center
AIP Statistics
aip.org/statistics

Figure 14



Physics departments. Some physics departments in the United States award more physics degrees to women than others. **Table 1** lists the 21 physics departments at four-year institutions that awarded 40% or more of their bachelor's degrees to women between 2013 and 2017. These departments were mostly located at small private colleges, liberal arts colleges, or Historically Black Colleges and Universities (HBCUs). **Table 2** lists the 21 physics departments at four-year institutions that awarded 30% or more of their doctoral degrees to women between 2013 and 2017. These departments were mostly located at large public universities. To be included on either list, physics departments must have awarded at least 5 bachelor's or doctorate degrees to women between 2013–2017 and must have consistently provided data on gender and degree completions in the Enrollment and Degrees Survey. This survey has a response rate of over 90% each year.

Table 1

Physics Departments Awarding at Least 40% of Bachelor's Degrees to Women, Classes of 2013 through 2017

Adrian College (MI)	Providence College (RI)
Alfred University (NY)	Rollins College (FL)
American University (DC)	Saginaw Valley State University (MI)
Brooklyn College (CUNY)	Siena College (NY)
Claremont Colleges (CA)	Southern Nazarene University (OK)
Florida Inst of Technology	Saint Michael's College (VT)
Grambling State University (LA)	U of Hawaii, Hilo
Howard University (DC)	U of Richmond (VA)
Jackson State University (MS)	Wagner College (NY)
McDaniel College (MD)	Xavier U of Louisiana
Mount Holyoke College (MA)	

Source: AIP Statistical Research Center, Enrollments and Degrees Survey.
To be included on this list, departments needed to have at least 5 women graduates between 2013–2017 and needed to consistently provide gender and completions data in our annual surveys.

AIP | Statistics aip.org/statistics

Table 2

Physics Departments Awarding 30% of More of PhD Degrees to Women, Classes of 2013 through 2017

College of William & Mary (VA)	Tufts University (MA)
Drexel U (PA)	University at Albany (SUNY)
Emory U (GA)	University of Alaska, Fairbanks
Harvard U-Applied Sci (MA)	University of California, Santa Cruz
Kansas State University	University of Denver (CO)
Lehigh University (PA)	University of Houston (TX)
New Mexico Inst of Mining & Tech	University of Maryland, Baltimore County
New Mexico State University	University of Michigan, Ann Arbor-Applied Phys
Old Dominion University (VA)	University of New Hampshire
Portland State University (OR)	University of Notre Dame (IN)
Stanford University (CA)	

Source: AIP Statistical Research Center, Enrollments and Degrees Survey.
To be included on this list, departments needed to have at least 5 women graduates between 2013–2017 and needed to consistently provide gender and completions data in our annual surveys.

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Table 3 lists the 13 women's colleges that awarded a physics bachelor's degree or higher in 2017. Of all physics bachelor's degrees awarded to women in 2017, 4% were awarded from women's colleges.

Table 3

Women's Colleges that Award at Least a Bachelor's Degree in Physics, 2017

Agnes Scott College (GA)
Barnard College (NY)
Bryn Mawr College (PA)
Mary Baldwin University (VA)
Mount Holyoke College (MA)
Notre Dame of Maryland University
Saint Mary's College (IN)
Simmons College (MA)
Smith College (MA)
Spelman College (GA)
Stern College for Women (NY)
Sweet Briar College (VA)
Wellesley College (MA)

Source: AIP Statistical Research Center, Enrollments and Degrees Survey.

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Teachers and Faculty Members

Although women continue to be under-represented among physics and astronomy teachers and faculty members, the number of women teaching physics at US high schools, universities, and colleges continues to grow over time. About 27,000 high school teachers taught at least one physics course in 2013 (White & Tesfaye, 2014), and about 37% of teachers were women (compared to 29% in 2001). The 2014 Academic Workforce Survey found that there were over 9,000 faculty members working in physics departments and 600 in astronomy departments. Overall, women were 16% of faculty members in physics departments (compared to 10% in 2002) and 19% of faculty members in astronomy departments (compared to 14% in 2003; **Tables 4 and 5**).

Academic rank. There is a steady increase in the percentage of women at different academic ranks in both physics and astronomy departments (**Tables 4 and 5**). In physics departments, more women were represented at adjunct and assistant ranks in 2014, and in astronomy departments, more women were represented at assistant and associate ranks. Although a smaller percentage of women were full professors in both fields, this is likely due to fewer women earning physics and astronomy doctorates in the past. It takes a number of years to transition from assistant to full professor status. Based on the percentage of women among assistant professors in 2014, we expect the percentage of women among full professors to increase over time as junior faculty gain experience and progress through the ranks. We take a closer look at these expectations in “The Pipeline” section of this report.

Table 4

Percent of Faculty Members Who Are Women in Physics Departments, 2002-2014

Academic Rank	2002	2006	2010	2014
	%	%	%	%
Full Professor	5	6	8	10
Associate Professor	11	14	15	18
Assistant Professor	16	17	22	23
Instructor/Adjunct	16	19	21	23
Other Ranks	15	12	18	20
Overall	**10**	**12**	**14**	**16**

Source: AIP Statistical Research Center, Academic Workforce Survey

AIP Statistics aip.org/statistics

Table 5

Percent of Faculty Members Who Are Women in Astronomy Departments, 2003-2014

Academic Rank	2003	2006	2010	2014
	%	%	%	%
Full Professor	10	11	15	15
Associate Professor	23	24	22	29
Assistant Professor	23	28	30	29
Instructor/Adjunct	15	15	*	19
Other Ranks	15	21	17	22
Overall	**14**	**17**	**19**	**19**

* too few to calculate

Source: AIP Statistical Research Center, Academic Workforce Survey

AIP Statistics aip.org/statistics

Physics departments. The number and representation of women has increased across all physics departments between 2002 and 2014 (**Table 6**). When examining departments based on the highest physics degree granted in 2014, PhD departments had the lowest percentage of women, but had the largest number of women. Over 700 women were faculty members in PhD departments, and 14% of faculty members in these departments were women. Departments that offer a bachelor's degree as the highest physics degree had the highest overall percentage of women. These departments employed over 600 women, and 20% of faculty members were women. There are very few departments in which a master's is the highest degree granted, which explains why they have the least number of women. These departments employed over 100 women, and women represented 18% of faculty members.

Table 6

Number and Percent of Faculty Members in Physics Departments Who are Women by Highest Degree Granted, 2002-2014

Highest Degree Granted	2002	2006	2010	2014	
	%	%	%	Number	%
PhD	7	10	12	757	14
Master's	13	14	15	145	18
Bachelor's	14	15	17	656	20

Source: AIP Statistical Research Center, Academic Workforce Survey

AIP Statistics aip.org/statistics

Ninety-five percent of departments that granted physics PhDs in 2014 employed women in full, associate, or assistant professor positions (**Figure 15**). Departments offering a bachelor's or master's as the highest physics degree were less likely to have women faculty members, probably due to smaller department sizes and fewer professorial positions compared to PhD departments (White and Ivie, 2013). Therefore, this data should not be taken as evidence that physics departments granting bachelor's or master's degrees are biased against women.

Figure 15

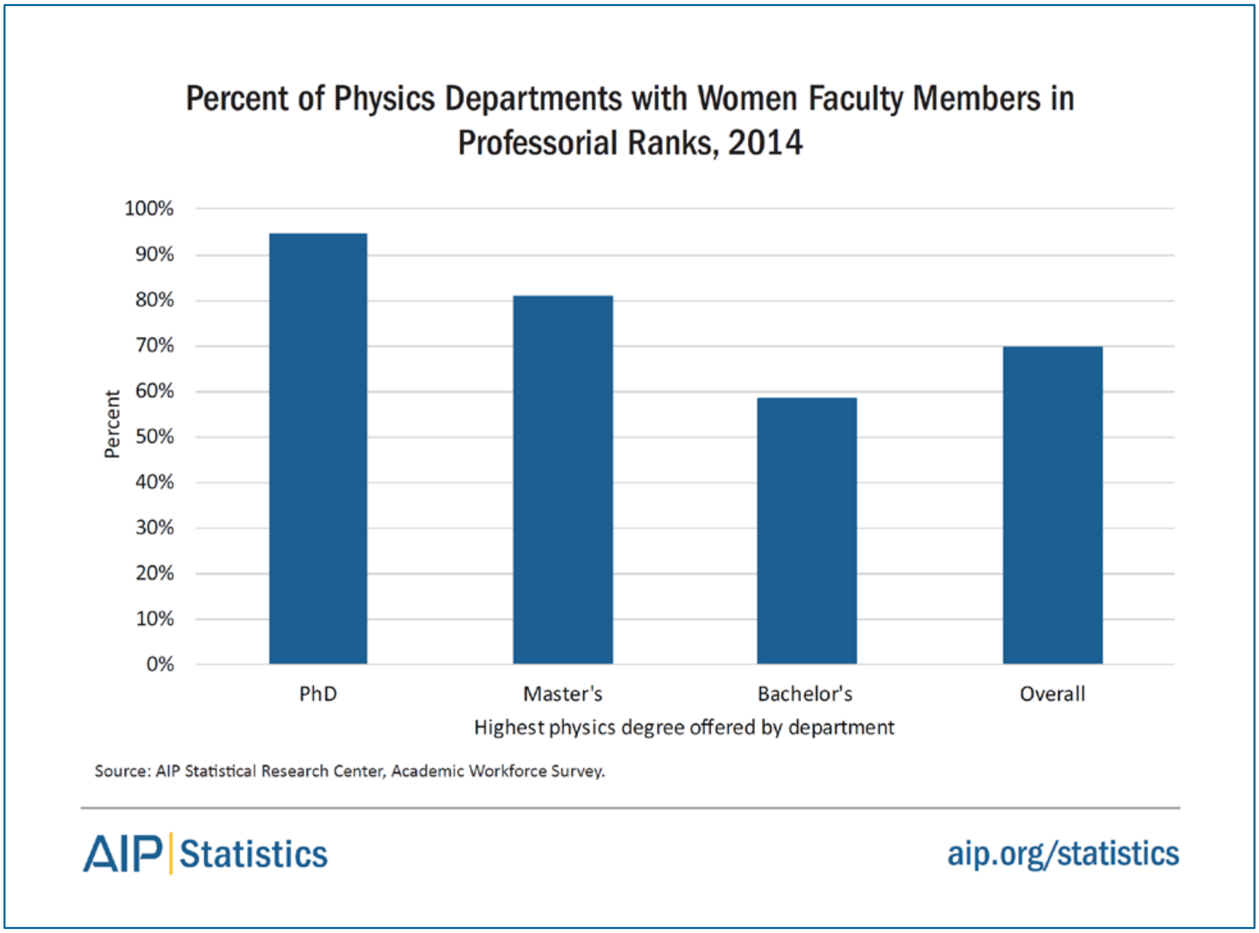

Figure 16 shows how the representation of women in PhD departments has progressed over time. In 2002, over 20% of PhD departments had no women in professorial ranks, but by 2014, this dropped to around 5%. Also, as of 2014, 14% of PhD departments had six or more women in professorial positions, which was very rare in 2002. **Table 7** lists the PhD-granting departments with six or more women in professorial ranks. The list includes any departments that responded to the 2014 Academic Workforce survey and provided gender data (91% response rate).

Figure 16

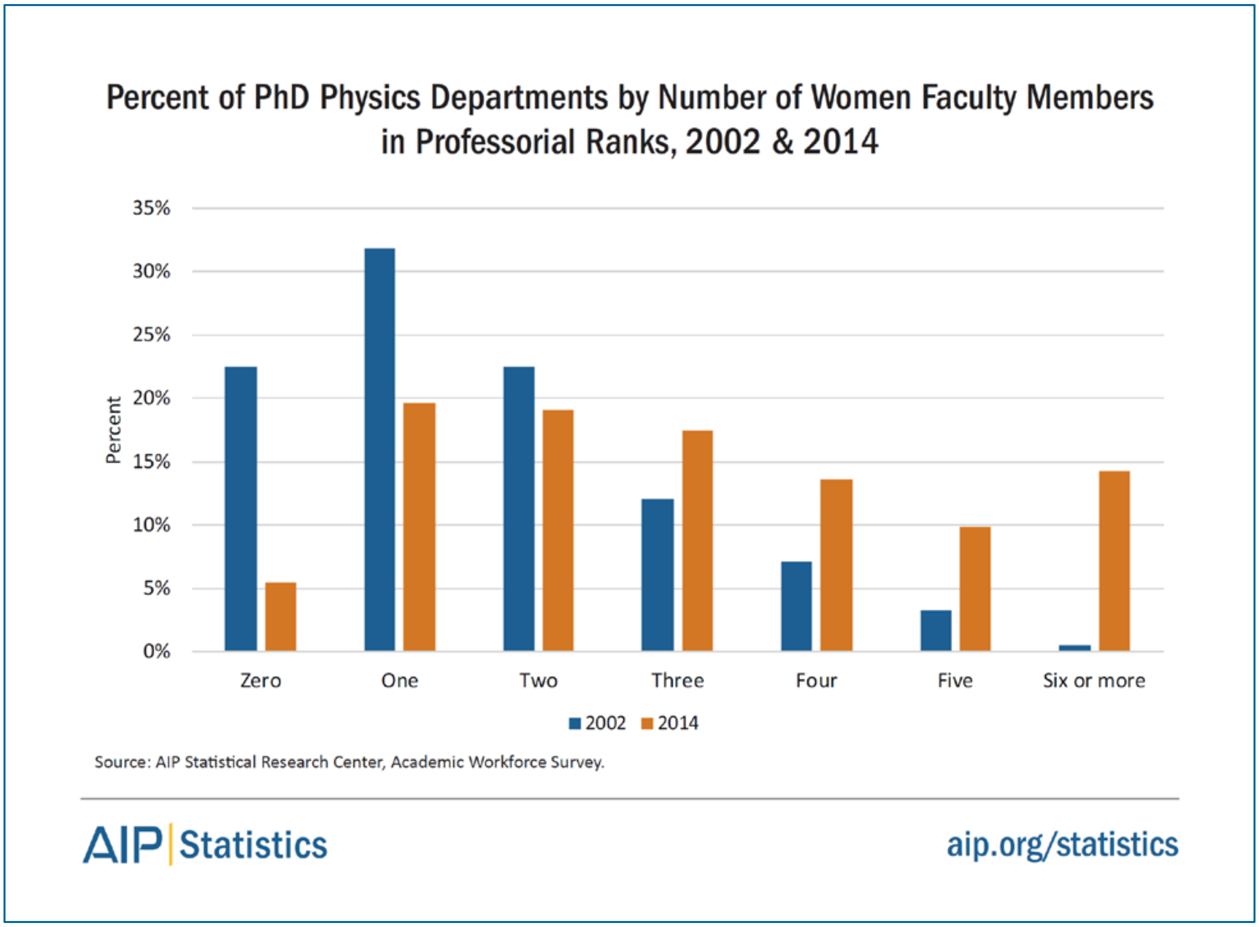
Percent of PhD Physics Departments by Number of Women Faculty Members in Professorial Ranks, 2002 & 2014
35%
30%
25%
20%
15%
10%
5%
0%
Percent
Zero
One
Two
Three
Four
Five
Six or more
2002
2014
Source: AIP Statistical Research Center, Academic Workforce Survey.
AIP Statistics
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Table 7

PhD-granting Physics Departments with Six or More Women in Professional Ranks, 2014

George Mason University (VA)	University of California, Los Angeles
Harvard University (MA)	University of California, Riverside
North Carolina State University	University of California, Santa Barbara
The Ohio State University	University of Illinois, Urbana-Champaign
Pennsylvania State University	University of Michigan, Ann Arbor
Purdue University (IN)	University of Minnesota, Minneapolis
Rutgers University (NJ)	University of Missouri, Columbia
Stanford University (CA)	University of New Hampshire
SUNY Stony Brook University (NY)	University of North Carolina, Chapel Hill
Temple University (PA)	University of Pennsylvania
University of California, Berkeley	University of Washington
University of California, Davis	University of Wisconsin, Madison
University of California, Irvine	

Source: AIP Statistical Research Center, Academic Workforce Survey

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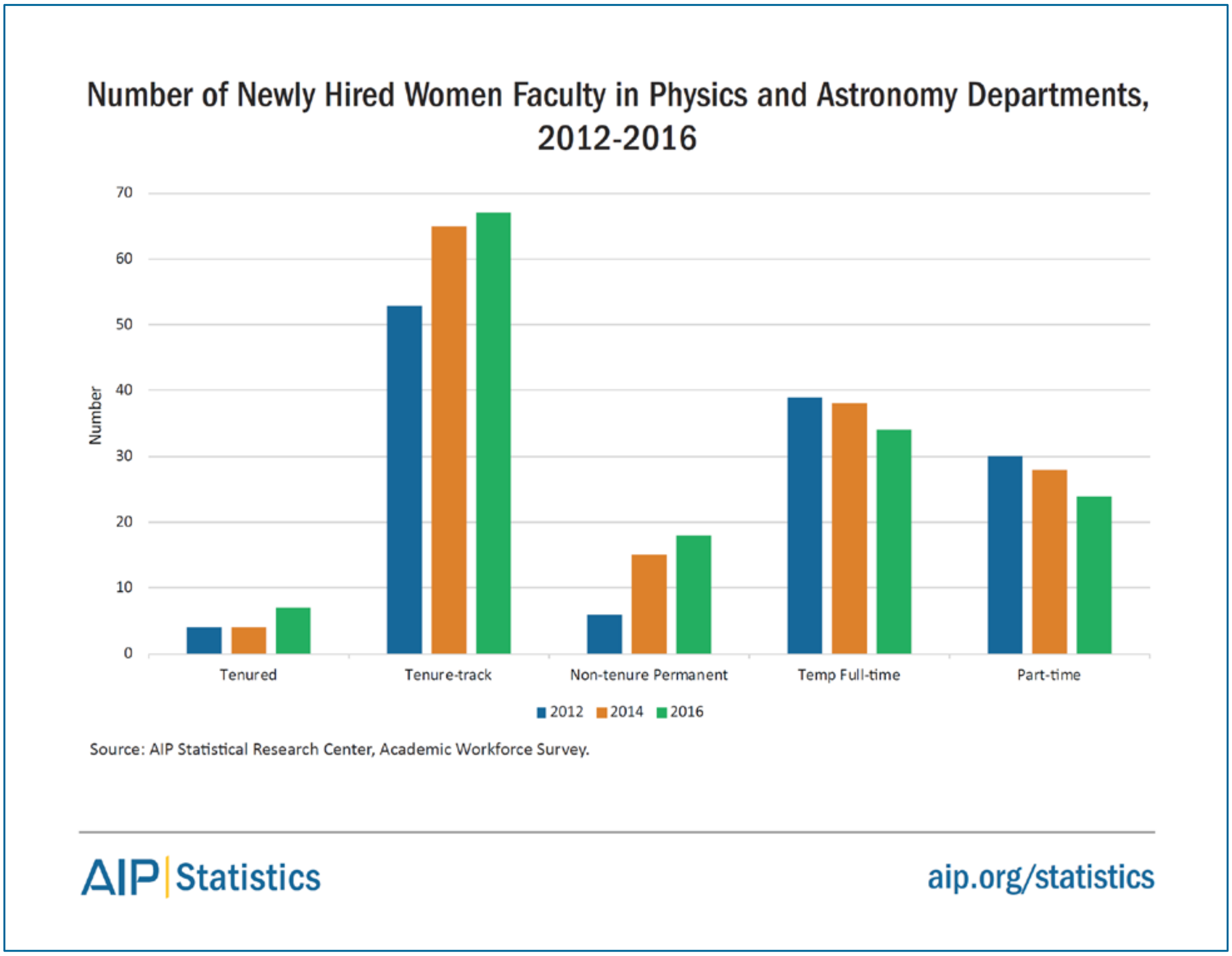
Astronomy departments. There were 37 astronomy departments in 2014, and the overwhelming majority of them granted PhDs. Due to the small number of departments granting bachelor's or master's degrees as the highest astronomy degrees, we are unable to compare the representation of women in astronomy departments by highest degree granted.

New faculty hires. In our 2016 Academic Workforce Survey, 567 new faculty members were hired in physics departments, and 26% of new hires were women. Astronomy departments hired 25 new faculty members, and 10 were women. For both fields, the greatest number of women were hired into tenure-track positions, and over time, the number of women hired into tenured, tenure-track, and permanent positions has increased (**Figure 17**). Although the greatest number of women are in tenure-track positions, the greatest percentage of women were in non-tenure-track positions. In 2016, women were hired into 32% of non-tenure-track permanent positions, 29% of temporary positions, 28% of part-time positions, and 23% of tenure-track positions.

Figure 17

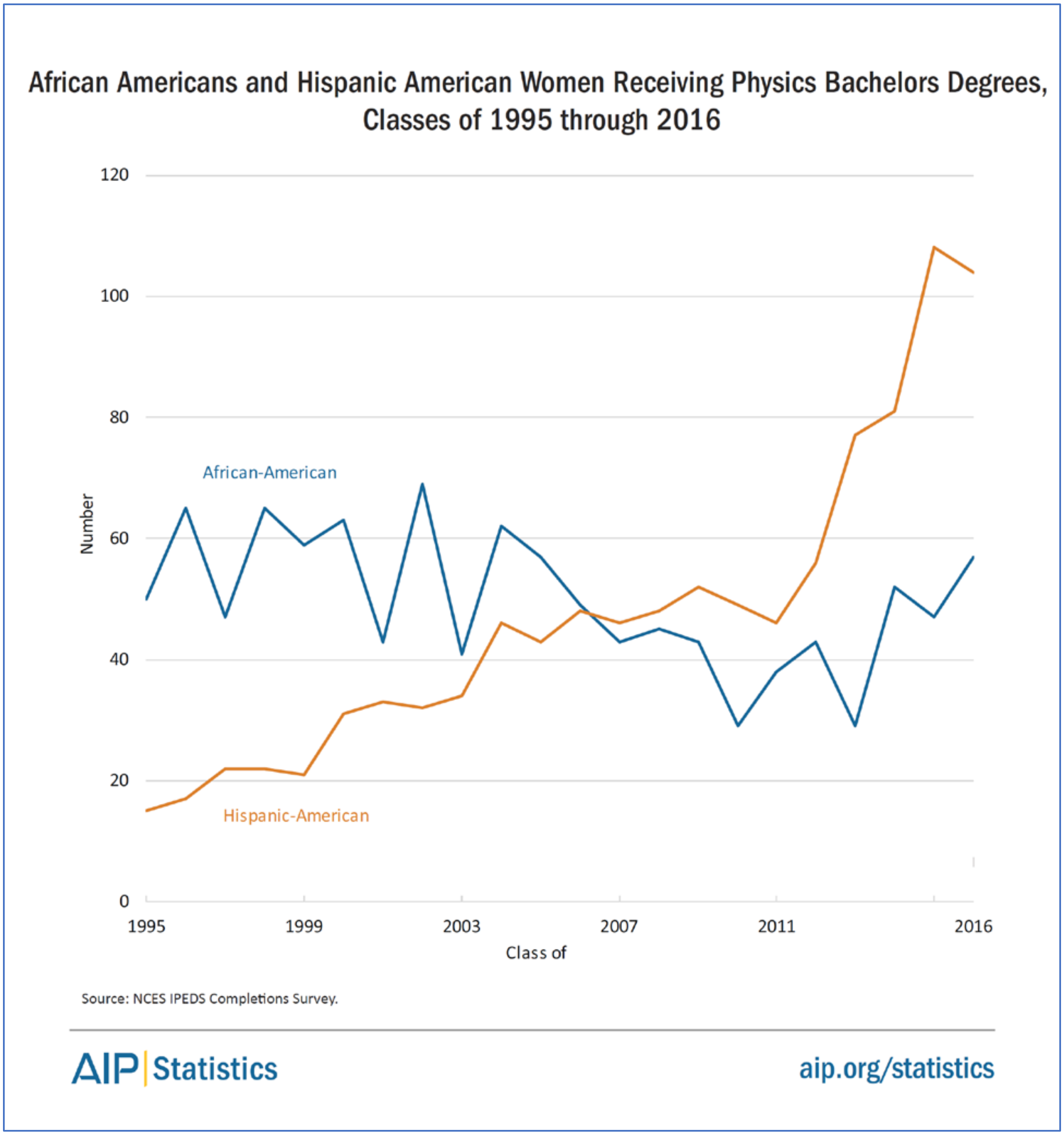


Minority Women

Hispanic and African-American women remain under-represented in physics and astronomy. According to the most recent census data (United States Census Bureau, 2010), 13% of women in the United States are African-American and 16% of women are Hispanic. When we examined the percentage of minority women earning physics and astronomy degrees in 2016, the representation of African-American and Hispanic women was much lower than the general population of the United States.

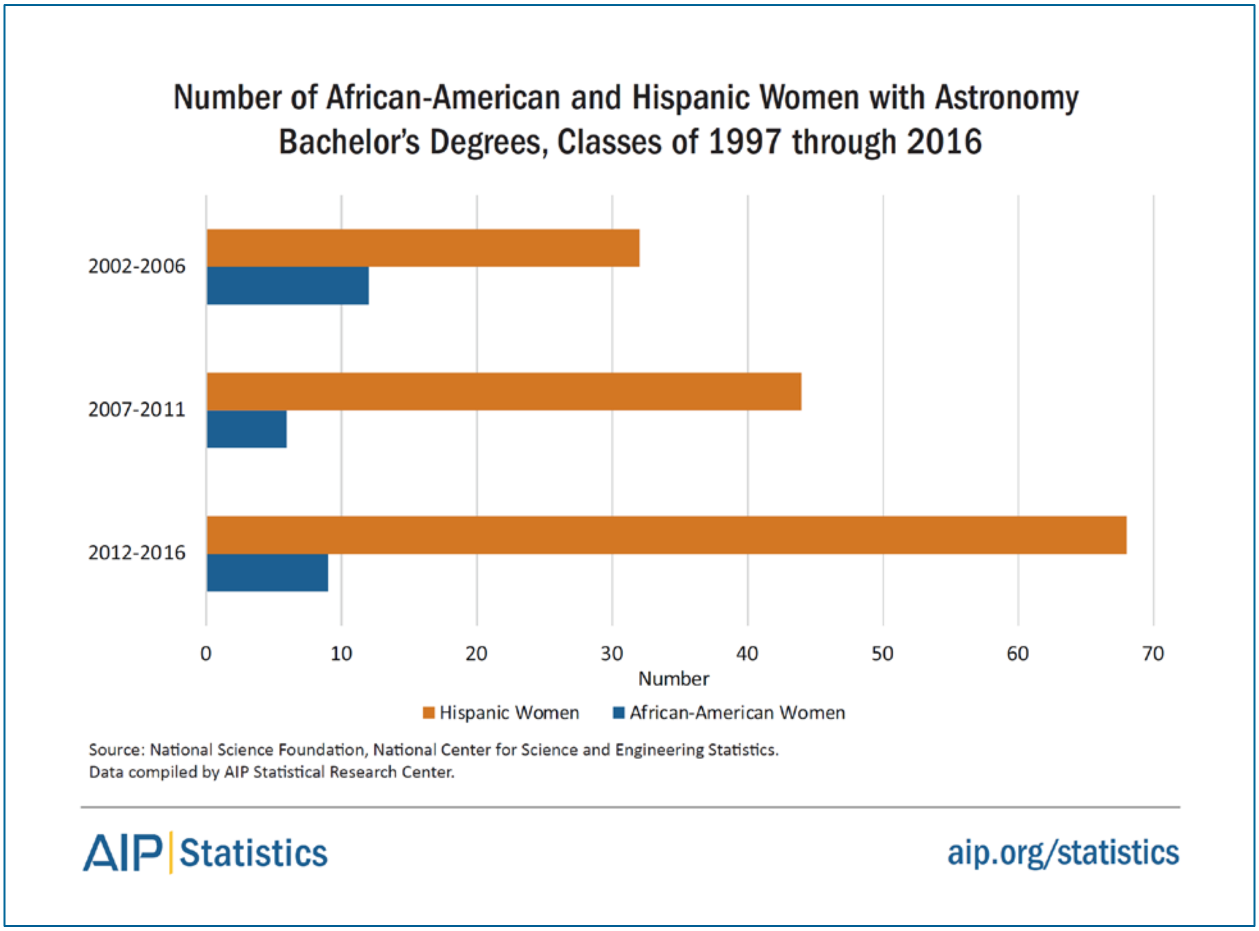
Bachelor's degrees. In 2016, 7% of women who earned bachelor's degrees in physics were Hispanic and 4% were African-American (NCES, 2016). In recent years, the number of Hispanic women with physics bachelor's degrees has doubled, while the number of African-American women generally has not increased (**Figure 18**).

Figure 18



African-American women were also under-represented among astronomy bachelor's degree recipients; however, Hispanic women were better represented. In 2016, 3% of women who earned astronomy bachelor's degrees were African-American, and 13% were Hispanic. Since 2002, the number of Hispanic women earning astronomy degrees has doubled (**Figure 19**). Astronomy graduates were grouped in 4–year intervals to protect individuals from being identified.

Figure 19

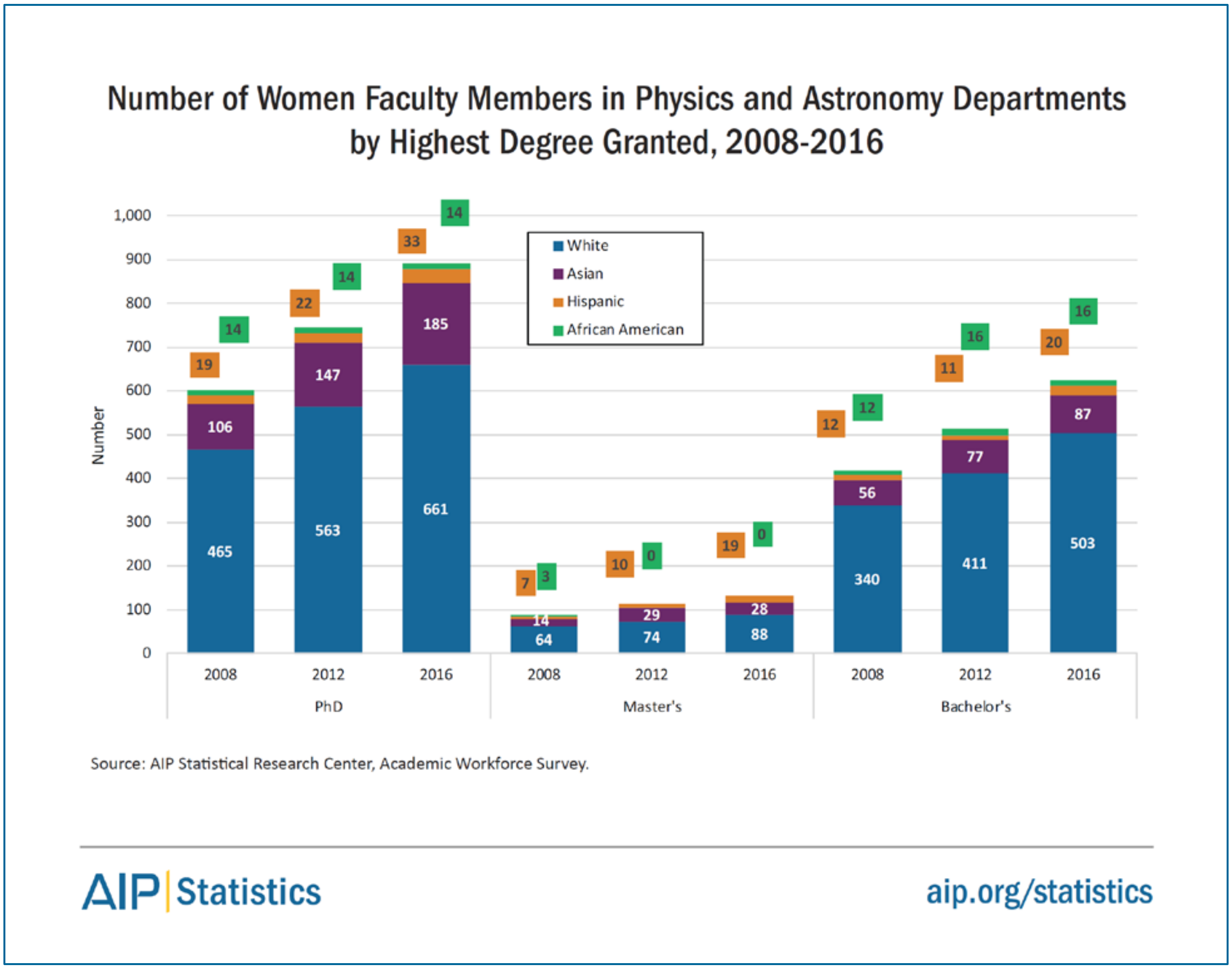


There is a limitation to consider when discussing African-American women and their representation among bachelor's degree recipients. In 2011, NCES began allowing respondents to check multiple races within their survey, and respondents who checked "two or more" races were categorized as "other" rather than African-American, even if one of their choices was African-American. When examining the NCES bachelor's degree data (**Figure 18**), there is a slight decrease in the percentage of African-American women after 2011, which might be due to the change in classification. Data on African-American women and bachelor's degree completion should be interpreted with caution when using NCES survey results.

Doctoral degrees. In 2016, 5% of women who earned physics doctorates were Hispanic, and 3% were African-American (NSF, 2016). In that same year, 4% of women who earned an astronomy doctorate were Hispanic, and 2% were African-American. Due to the small number of Hispanic and African-American women with doctorates, the NSF did make data from previous years available to protect individuals from being identified.

Faculty members. In physics and astronomy departments, African-American and Hispanic women continue to be under-represented among academic faculty members (**Figure 20**). The 2016 Academic Workforce Survey showed that African-American women were only 2% of all women faculty members in PhD departments, 3% of women faculty members in bachelor's-only departments, and there were no African-American women in master's-only departments. Hispanic women were 4% of women faculty members in PhD departments, 3% of women faculty members in bachelor's-only departments, and 14% of women faculty members in master's-only departments. The number of Hispanic women in faculty positions is growing over time, but the number of African-American women in faculty positions has shown little or no growth since 2008.

Figure 20



Summary. In physics and astronomy, both African-American and Hispanic women remain under-represented among degree recipients and academic department employees. However, the number of Hispanic women is growing rapidly over time, while the number of African-American women has not grown. Future interventions are needed to find ways that encourage and retain the participation of African-American women in physics and astronomy fields.

Employment

There were over 250,000 jobs in the physical sciences in 2015 (Bureau of Labor Statistics, 2017), and the number of physical science jobs is predicted to grow by 6.7% between 2014 and 2024. As physical science jobs become more available, degree recipients in physics and astronomy are pursuing both academic and non-academic career paths. For example, the 2015 Survey of Doctorate Recipients (NSF, 2015) showed that 39% of physics doctorates work for private businesses and 37% work for four-year academic institutions. Instead of solely focusing on women employed in academia, we wanted to examine career outcomes for women working across all employment sectors, which includes four-year institutions, two-year colleges, K-12 education, government, and private industry.

This section of the report used data from several different surveys. The AIP Follow-up Surveys of Physics Bachelor's and PhDs contacted physics graduates from the classes of 2015 and 2016 one year after graduation. The 2011 AIP PhD Plus 10 Survey collected data from physics doctorate recipients 10 to 15 years after graduation. The Longitudinal Study of Astronomy Graduate Students, a partnership of AIP and the American Astronomical Society and funded by NSF Award 1347723, collected data from the same group of individuals in 2007–08, 2012–13, and in 2015–16. Lastly, the 2010 Global Survey of Physicists, a partnership of AIP and the Women's Working Group of the International Union of Pure and Applied Physics, collected data from physicists in over 130 countries.

We analyzed gender differences in salary, job satisfaction, career opportunities, doctoral advisor ratings, and family influences. Linear or logistic regression analyses were used to analyze gender differences. In the analyses, we controlled for several employment factors, so any results are attributable to gender differences and not to other factors. Our models controlled for: age, time since receiving a degree, job sector, full or part-time job status, 9 or 12-month salary schedule, and postdoc completion (doctorate analyses only). In analyses with the data from the 2010 Global Survey of Physicists, we also controlled for each country's level of development based on classifications from the United Nations.

Career satisfaction. According to our Follow-up Surveys of Physics Bachelor's and PhDs, women and men who graduated in 2015–16 reported similar levels of satisfaction in their current jobs (**Table 8**). One year after graduating, there were no gender differences in overall job satisfaction, advancement opportunities, job security, level of responsibilities, level of intellectual challenge, and appropriateness of job for their degrees. In conclusion, this suggests that men and women are similarly satisfied with their current jobs immediately after graduation.

Table 8

Gender Differences in Job Satisfaction Outcomes

Level of Satisfaction	Survey Source	Gender Difference
Overall satisfaction	Follow-up Surveys of Physics Bachelor's and PhDs, 2015–16	No significant difference
Intellectual challenge	Follow-up Surveys of Physics Bachelor's and PhDs, 2015–16	No significant difference
Job salary	Follow-up Surveys of Physics Bachelor's and PhDs, 2015–16	No significant difference
Job security	Follow-up Surveys of Physics Bachelor's and PhDs, 2015–16	No significant difference
Advancement opportunities	Follow-up Surveys of Physics Bachelor's and PhDs, 2015–16	No significant difference
Level of responsibility	Follow-up Surveys of Physics Bachelor's and PhDs, 2015–16	No significant difference
Appropriate for degree	Follow-up Surveys of Physics Bachelor's and PhDs, 2015–16	No significant difference

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Salary. We found no evidence of salary differences for men and women one year after graduating with a physics bachelor's or doctoral degree in 2015–16 (**Table 9**). This only includes recent graduates who entered the workforce directly and excludes those who went to graduate school or took postdocs. When we looked at doctoral recipients 10 to 15 years after graduation in 2011, we found that men earned 10% more than women, even controlling for other factors that could make a difference in salary. In the 2007–2016 Longitudinal Study of Astronomy Graduate Students, we found no gender differences in salary for astronomy doctoral recipients as of 2015–16.

Table 9

Gender Differences in Salary Amounts at Various Career Stages

Salary Amount	Survey Source	Gender Difference
Early career physics salaries (1 year after graduation)	Follow-up Surveys of Physics Bachelor's and PhDs, 2015–16	No significant difference
Early and mid-career astronomy salaries (1–8 years after graduation)	Longitudinal Study of Astronomy Graduate Students, 2007–2016	No Significant difference
Mid-career physics salaries (10–15 years after graduation)	PhD Plus 10 Survey, 2011	**Men had 10% higher salary**

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Career opportunities. We examined several indicators of career opportunities and advancement among physics degree recipients including promotions, publications, career activities, and perceived resources (**Table 10**). In our 2011 PhD Plus 10 Survey, men and women had similar numbers of promotions and publications 10 to 15 years after graduation. However, the time to promotion is longer for women in some circumstances. For example, our 2014 Faculty Member Survey data showed that time to promotion to full professor was one year longer for women (for more information on this analysis, see "The Pipeline" section of this report).

Using data from our 2010 Global Survey of Physicists, we found that men reported engaging in more career advancing opportunities than women, even after accounting for differences in age, employment sector, and the development level of their countries. Men were more likely to present at a conference as an invited speaker, become an editor for an academic journal, become a manager, and supervise graduate students. During their careers, women also perceived that they did not receive enough job resources. Compared to men, women were more likely to report not having enough funding, lab equipment, lab space, and employees.

Table 10

Gender Differences in Career Opportunities, Advancement, and Resources

Career Opportunities and Resources	Survey Source	Gender Differences
Number of promotions	PhD Plus 10 Survey, 2011	No significant difference
Number of publications	PhD Plus 10 Survey, 2011	No significant difference
Gave a talk as an invited speaker	Global Survey of Physicists, 2010	**Men were 45% more likely**
Acted as a manager	Global Survey of Physicists, 2010	**Men were 33% more likely**
Acted as a journal editor	Global Survey of Physicists, 2010	**Men were 27% more likely**
Supervised undergraduate students	Global Survey of Physicists, 2010	No significant difference
Supervised graduate students	Global Survey of Physicists, 2010	**Men were 32% more likely**
Had enough funding	Global Survey of Physicists, 2010	**Men were 53% more likely**
Had enough equipment	Global Survey of Physicists, 2010	**Men were 36% more likely**
Had enough office space	Global Survey of Physicists, 2010	No significant difference
Had enough lab space	Global Survey of Physicists, 2010	**Men were 15% more likely**
Had enough employees	Global Survey of Physicists, 2010	**Men were 36% more likely**

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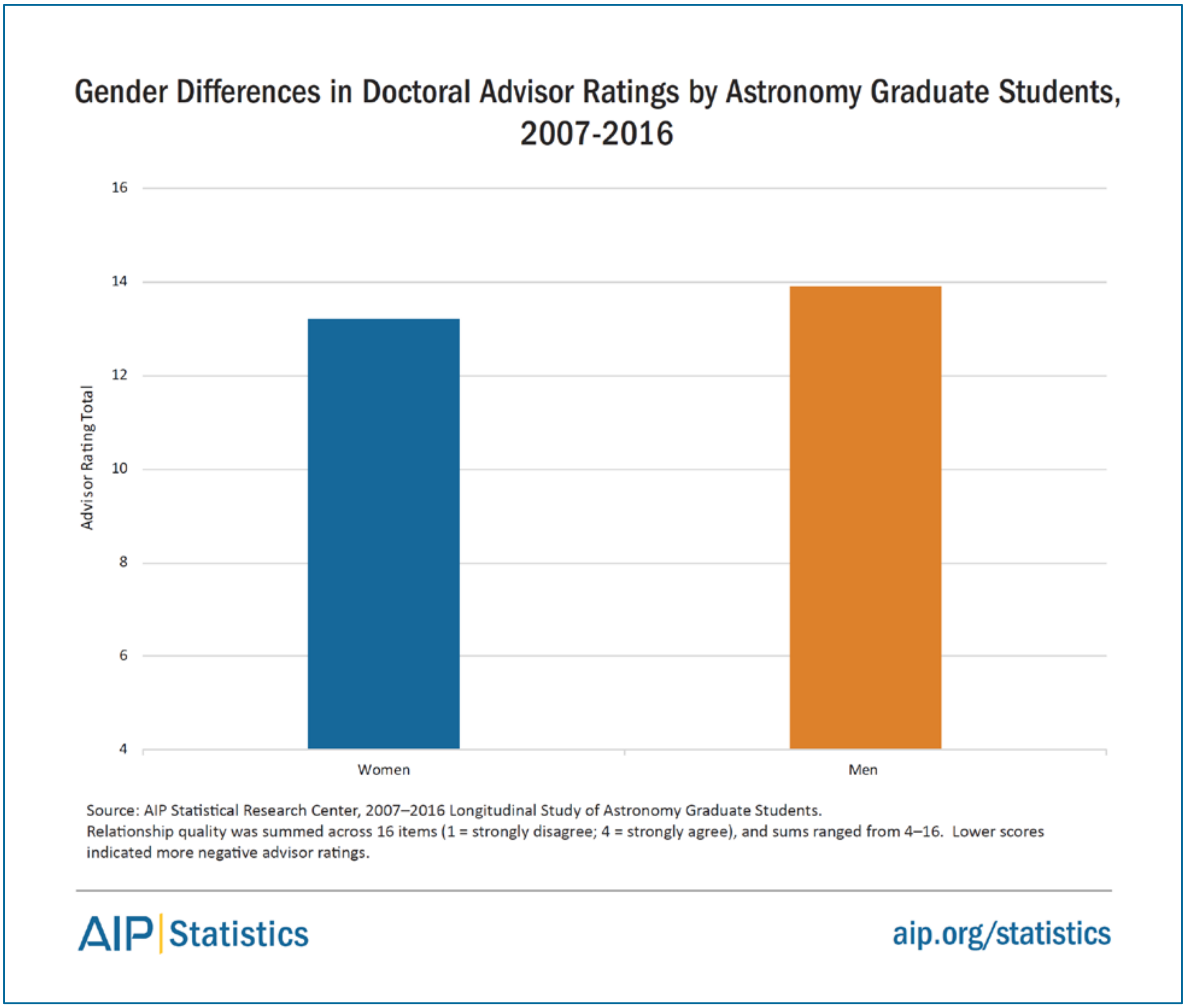
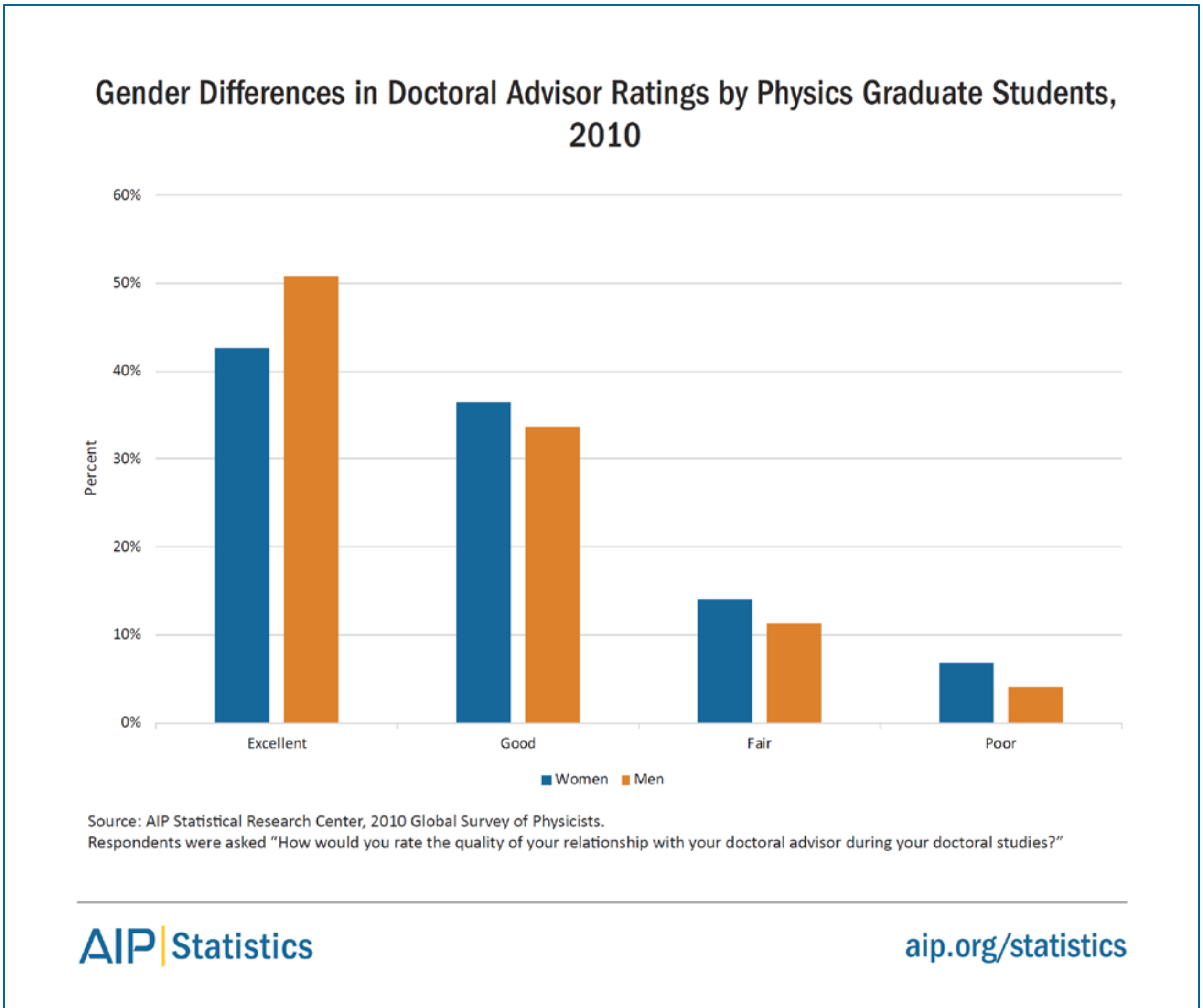
Careers and doctoral advisors. Doctoral advisors can have an important influence on women's careers after graduation. In a previous study using our 2007–2016 astronomy data, although all graduate students rated their advisors positively overall, women graduate students reported significantly less positive advisor ratings (**Figure 21**; Ivie, White, & Chu, 2016). In the same study, we found that women who reported more negative doctoral advisor ratings were more likely to leave the astronomy field after graduation than men.

Figure 21



There were similar findings when analyzing data from 2010 Global Survey of Physicists. Although most men and women rated their doctoral advisors positively (either "excellent" or "good"), women graduate students reported significantly less positive advisor ratings (**Figure 22**). Specifically, more men reported their doctoral advisor as "excellent," while more women reported their doctoral advisor relationship as "good," "fair," or "poor."

Figure 22



Careers and family. Among physics and astronomy graduates, women's careers were more impacted by their family lives than men's (**Table 11**). Women were more likely to relocate or decline a job offer because of their spouse's needs, and women were more likely to experience a break in their career for family reasons. Women also made more compromises to balance their career and family life. Women were more likely to choose less demanding schedules, change employers, or become stay-at-home parents.

Table 11

Gender Differences in Career Compromises for Family Reasons

Career Compromises	Survey Source	Gender Difference
Relocated for a spouse	Longitudinal Study of Astronomy Graduate Students, 2007–2016	**Women were 204% more likely**
Declined job for a spouse	PhD Plus 10 Survey, 2011	**Women were 346% more likely**
Had a career break for family reasons	Global Survey of Physicists, 2010	**Women were 400% more likely**
Became a stay-at-home parent	Global Survey of Physicists, 2010	**Women were 463% more likely**
Chose a less demanding or more flexible schedule	Global Survey of Physicists, 2010	**Women were 111% more likely**
Changed employers or field of employment	Global Survey of Physicists, 2010	**Women were 40% more likely**
Spent less time at work	Global Survey of Physicists, 2010	**Women were 104% more likely**

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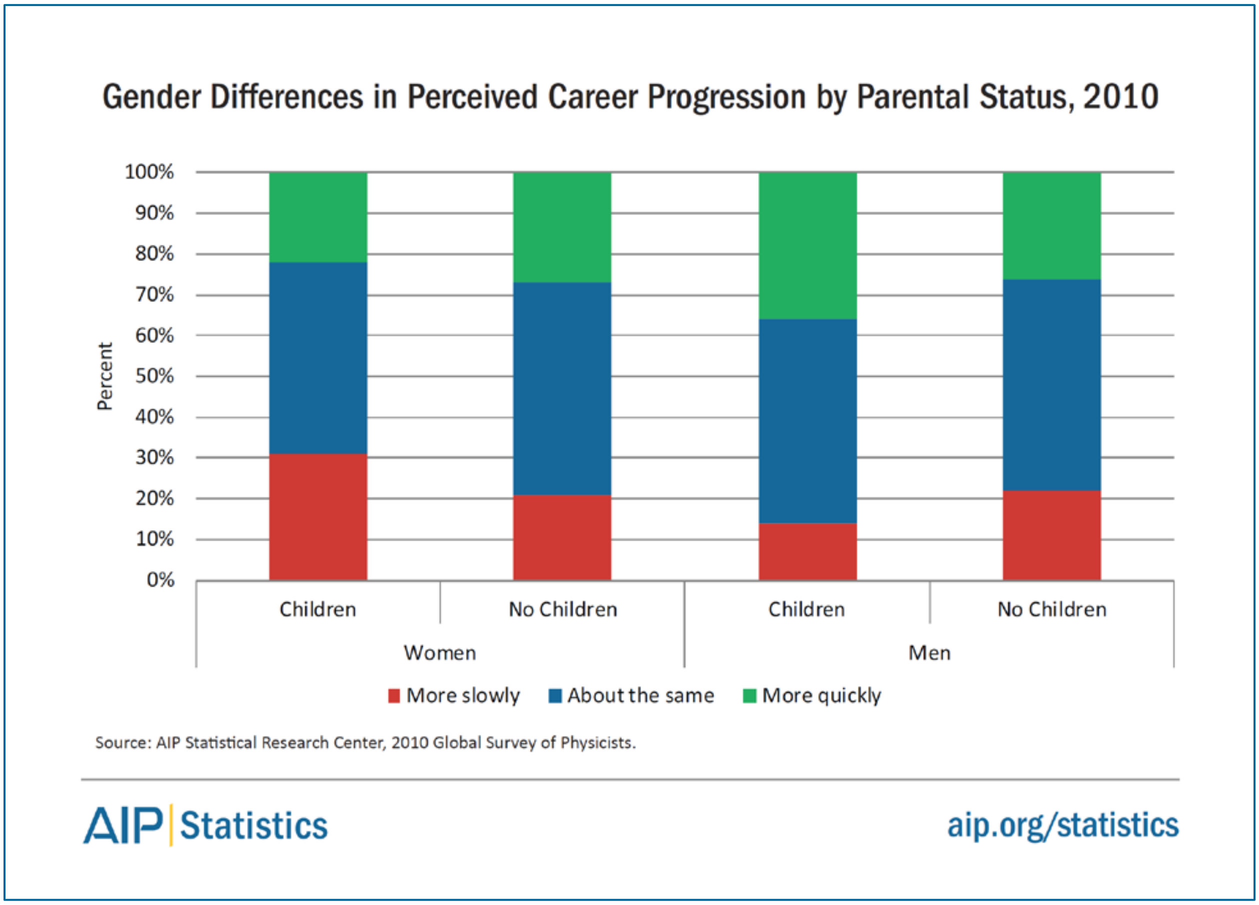
Family influences also impacted women's career progression. Compared to women without children and to men with or without children, women with children reported slower perceived career progress (**Figure 23**).

Figure 23



Summary. We found no gender differences in salary or job satisfaction for graduates one year after earning a physics bachelor's or doctoral degree. However, gender differences emerged when examining mid-career physicists with doctoral degrees. Ten years after earning a physics doctorate, women earned a 10% lower salary than men, which might be due to differences in career opportunities and family influences. As careers progressed, women experienced slower career growth, participated in fewer career advancing opportunities, and reported having fewer job resources. Women were also more likely to make career compromises for family reasons such as limiting their time at work, relocating, or becoming a stay-at-home parent. Gender differences in career opportunities, career resources, and work-life balance seem to limit women from reaching their full career potential.

The Pipeline: Retention of Women between Education to Employment

Across all stages of physics participation included in this report, women's representation seemingly decreases with each step in the process. In 2013, 46% of women were enrolled in high school physics, but women earned just 21% of physics bachelor's degrees and 20% of physics doctorate degrees in 2017. In physics departments in 2014, 16% of physics faculty were women and 10% were full-professors. This can appear to be a decrease of 25 percentage points in women's participation between high school and bachelor's degree completion, and a decrease of 4 percentage points between women's doctorate completion and obtaining faculty positions. However, the statistics in this report are from a small window of time (2013–2017), and to properly assess attrition or "leaks" in the pipeline, we must compare recent data with appropriate points in the past. For example, we cannot expect 20% of women to be full professors in recent years if, in the past, women earned a smaller percentage of doctorates.

High school to bachelor's degrees. In 2013, 46% of high school physics students were young women, and in 2017, women earned 21% of bachelor's degrees. Although enrolling in high school physics does not necessarily indicate an interest in becoming a physics major in college, the low percentage of physics bachelor's degrees earned by women indicates a drop-off point for women between high school physics and college graduation. We need more data to understand whether this drop occurs before or during undergraduate education.

Bachelor's degrees to doctoral programs. Next, we will examine the transition between earning a physics bachelor's degree and enrolling in a physics doctoral program. Since over 90% of women who earned bachelor's degrees were US citizens, we only compared women with US citizenship. According to our first-year graduate student survey, most students took no break or a one-year break between undergraduate and graduate education. In the 2016–17 academic year, women with US citizenship earned 20% of bachelor's degrees in physics. In the Fall of 2017, 21% of first year doctoral students with US citizenship were women. This demonstrates that there are no gender differences in attrition during this transition.

***Doctoral program completion**.* During their doctoral studies, the middle 50% of students took 5–7 years to earn their physics doctoral degrees. Between 2010 and 2012, 20% of first-year graduate students were women, and in 2017, women earned 20% of physics doctorates. Thus, there appears to be no gender differences in attrition during graduate programs.

The analysis on graduate program attrition included women who were US citizens and foreign women. Foreign women accounted for about 50% of the women enrolled in 2010–12 doctoral programs and about 50% of women earning doctoral degrees in 2017. Neither women with US citizenship or women with foreign citizenship showed any attrition during graduate school.

***Doctorate degrees to faculty positions**.* Lastly, we will examine the transition between earning a physics doctorate and becoming a physics professor (**Table 12**). Based on results from our 2014 Faculty Member Survey, we examined the length of time since doctoral completion for all women who were assistant, associate, and full professors. There was a wide range of graduation years for women who were full professors. The middle 50% of women graduated between 1980 and 1994. During those years, women earned 8% of physics doctorates. Ten percent of full professors in physics department were women in 2014, and thus, women were represented at a higher rate than expected in physics departments.

We found similar trends for associate and assistant professors. The middle 50% of women who were associate professors graduated between 1995 and 2003. During this period women earned 13% of physics doctorates. In 2014, 18% of associate professors in physics departments were women, which was 5 percentage points higher than expected. Finally, we found that the middle 50% of women who were assistant professors graduated between 2005 and 2010, and women earned 17% of doctorate degrees during that time. In 2014, 23% of assistant professors in physics departments were women, which was 6 percentage points higher than expected.

Table 12

Percent of Women among Physics Faculty Members in 2014 and among PhD Recipients in Previous Years

Academic Rank	Middle 50% of Dates Received PhD	Average % PhDs Earned by Women in Previous Years	% Women Faculty in 2014
Full professor	1980–1994	8	10
Associate professor	1995–2003	13	18
Assistant professor	2005–2010	17	23

Source: AIP Statistical Research Center, 2014 Academic Workforce Survey provided data on the percent of women faculty, and 2016 Faculty Member Survey provided data on PhD earning dates and percent of women earning PhDs in previous years.

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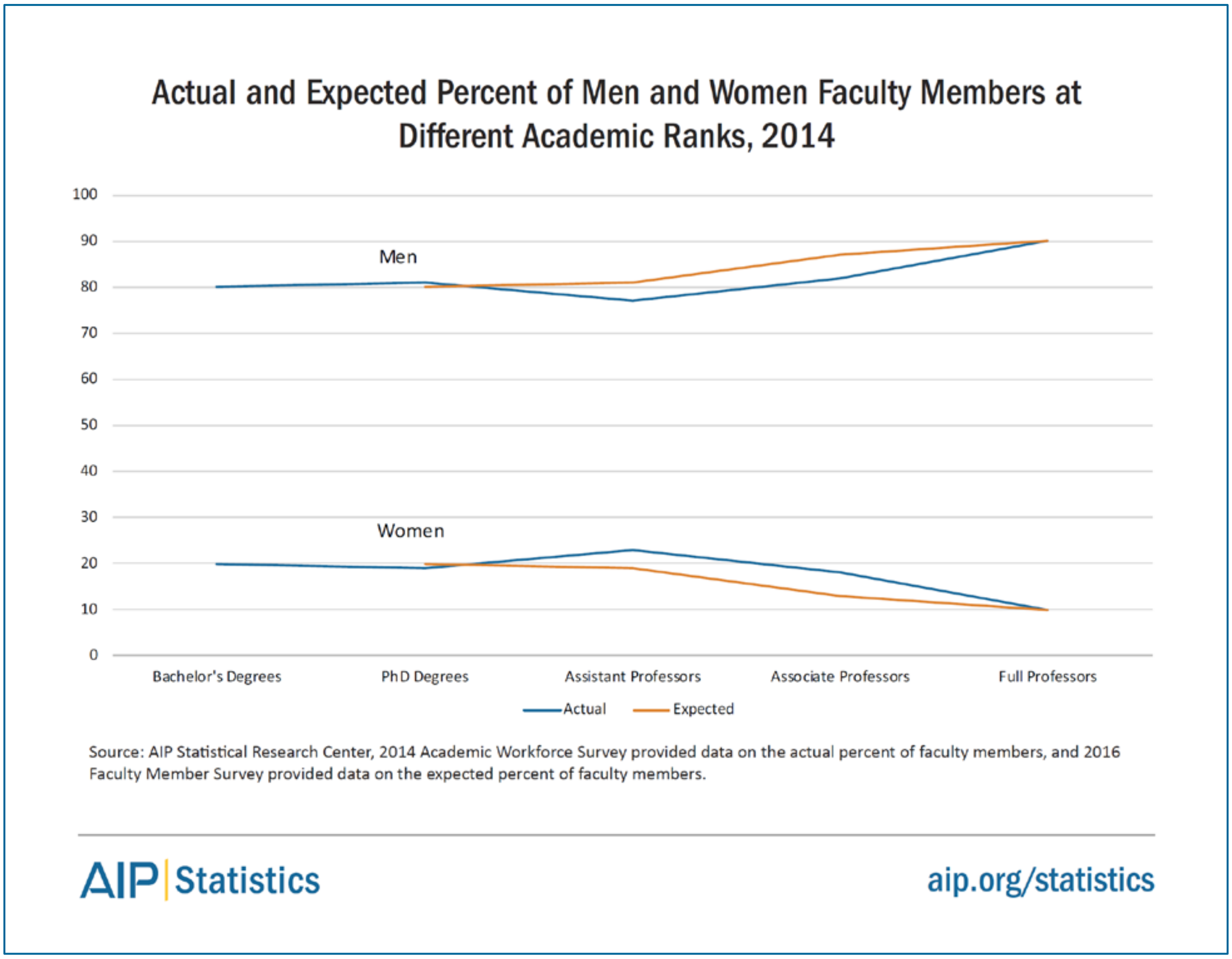
Figure 24 compares the actual and expected percentage of men and women at each academic rank in 2014. Based on the percentage of past doctorate completions, there were as many women in full professor positions as expected, and more women in assistant and associate professor positions than expected. This demonstrates that there is no attrition for women between doctorate completion and employment in professorship positions.

Figure 24



So why are women more represented than expected in physics departments? There are several potential explanations for this. First, past research shows that physics departments may be aware of the under-representation of women among faculty members and make efforts to hire more women. In 2003, although 14% of physics doctorates were women, 20% of job offers went to women (National Research Council of the National Academies, 2010). Second, in our 2011 PhD Plus 10 survey data, a significantly greater percentage of men with physics doctorates worked in industry settings compared to women. If more men transition into industry after graduating, this might explain why the representation of women in academia is higher than expected.

***Limitations*.** There is one limitation to our faculty member pipeline analysis. The analysis assumes that men and women take the same amount of time to obtain professorship positions. However, men and women may not advance at the same rate. We conducted a linear regression analysis comparing the years until professorship positions between men and women, controlling for their postdoc experience and the type of academic department (**Table 13**). There were no gender differences in the time it took to become an assistant or associate professor. However, the time to promotion to full professor for women was, on average, one year longer than for men. This suggests that women may stay at the associate professor level longer than men, and future research should investigate potential explanations for this finding.

Table 13

Years Since Degree Across Professorial Ranks for Men and Women, 2014

Academic Rank	Men	Women
Full Professor	15 years	16 years
Associate Professor	10 years	10 years
Assistant Professor	5 years	5 years

Source: AIP Statistical Research Center, 2016 Faculty Member Survey.

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Attrition in astronomy. In astronomy, we examined women's transitions between earning bachelor's degrees, entering graduate school, and doctoral completion. As with physics, most students did not take a break or took a one-year break between their undergraduate and graduate education. In the 2016–17 academic year, women earned 33% of astronomy bachelor's degrees, and in the Fall of 2017, 40% of first-year astronomy doctoral students were women. It is possible that a greater percentage of students entering astronomy doctoral programs are women, but this comparison is not exact because most astronomy graduate students earn a bachelor's degree outside astronomy. Based on our 2015–16 Follow-up Survey of Astronomy PhDs, around 60% of women in astronomy graduate programs received their bachelor's degree in other STEM majors. Therefore, comparisons made between the percent of bachelor's recipients and graduate students in astronomy should be interpreted with caution.

In astronomy graduate programs, the middle 50% of students took 6–7 years to graduate. In 2010–12, 37% of first year graduate students were women, and women earned 40% of doctoral degrees in 2017. This suggests that, proportionally, more women completed graduate school in astronomy than men.

We do not have the data to perform pipeline analyses for astronomy at the faculty member level. Therefore, we are unable to examine the expected proportion of astronomy faculty who are women based on past degree completions.

Summary. In conclusion, there is no evidence of attrition for women in physics and astronomy between undergraduate degree completion, graduate degree completion, and obtaining faculty positions. Furthermore, women are more represented in associate and assistant professor positions in physics than expected. Women may decrease their participation in physics between high school and completing their undergraduate degrees, but more data is needed to understand this transition.

Conclusions

The participation of women in physics and astronomy has grown substantially over the last few decades, but the representation of women in physics and astronomy is still low compared to other academic fields. Although women receive over 50% of academic degrees (NCES, 2016), women earned only 21% of physics bachelor's degrees and 20% of physics doctorates in 2017. The representation of women in astronomy is still higher than physics. In 2017, women earned 33% of astronomy bachelors' degrees and 40% of astronomy doctorates. In the last decade, the percentage of women earning doctoral degrees in physics and astronomy has continued to grow, while the percentage of women earning bachelor's degrees has changed very little.

Fortunately, women are not leaving physics between completing their undergraduate education and obtaining faculty employment. Based on our pipeline analysis, the percentage of women employed in faculty positions matches the percentage of women who received doctorates in the past. If this pattern remains consistent, we predict that the representation of women among physics and astronomy faculty should increase over time since more women are receiving doctorates in recent years. Women may still experience attrition between high school physics enrollment and bachelor's degree completion; however, more data is needed to determine whether this attrition occurs before or during undergraduate education.

When we examined employment outcomes of women with physics and astronomy degrees, we found several gender differences in mid-career employment. In early stages of physics careers, men and women have similar salaries and levels of job satisfaction. However, in later stages of physics careers, men receive a 10% higher salary than women, and women report having fewer career resources and career opportunities. In addition, women with children report slower career progression and make more career compromises for family reasons (e.g. relocating, working fewer hours, leaving their jobs). The challenges women experience with career resources, opportunities, and family responsibilities seem to negatively impact their career potential.

Lower representation and participation of women, minorities, and other groups in education and employment can impact progress in physics and astronomy fields. Research suggests that diverse teams can lead to increased creativity and productivity (Smith-Doerr, Alegria, & Sacco, 2017) because there can be more exchanges of unique ideas and experiences and increased access to diverse social networks for information gathering and dissemination. Therefore, physics and astronomy should continue to encourage the representation and participation of women and other groups who can offer unique and diverse perspectives within the scientific community.

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Women in Physics and Astronomy 2019

By Anne Marie Porter

Published: January 2019

A product of the Statistical Research Center of the American Institute of Physics

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BEYOND REPRESENTATION: DATA TO IMPROVE THE SITUATION OF WOMEN AND MINORITIES IN PHYSICS AND ASTRONOMY

Rachel Ivie

Statistical Research Center

SED
Survey of Earned Doctorates

NATIONAL SCIENCE FOUNDATION
DECEMBER 2018

2017
Doctorate Recipients from U.S. Universities

National Center for Science and Engineering Statistics
Directorate for Social, Behavioral and Economic Sciences

ABOUT THIS REPORT

The Survey of Earned Doctorates, the data source for this report, is an annual census of individuals who receive research doctoral degrees from accredited U.S. academic institutions. The survey is sponsored by six federal agencies: National Science Foundation (NSF), National Institutes of Health, Department of Education, National Endowment for the Humanities, Department of Agriculture, and National Aeronautics and Space Administration. These data are reported in several publications from NSF's National Center for Science and Engineering Statistics. The most comprehensive and widely cited publication is this report, *Doctorate Recipients from U.S. Universities*.

This report calls attention to major trends in doctoral education, organized into themes highlighting important questions about doctorate recipients. Online, the reader is invited to explore trends in greater depth through detailed data tables and interactive graphics (https://www.nsf.gov/statistics/sed/). Technical notes and related resources are provided to aid in interpreting the data, and report content is available for downloading.
An interactive data tool is also available at https://ncsesdata.nsf.gov/ids/sed.

2017
Doctorate Recipients from U.S. Universities

National Center for Science and Engineering Statistics
Directorate for Social, Behavioral and Economic Sciences

NATIONAL SCIENCE FOUNDATION • DECEMBER 2018 • NSF 19-301

WHY IS THIS IMPORTANT?

The American system of doctoral education is widely considered to be among the world's best, as evidenced by the large and growing number of international students over time—many of them among the top students in their countries—who choose to pursue the doctoral degree at U.S. universities. But the continued preeminence of U.S. doctoral education is not assured. Other nations, recognizing the contributions doctorate recipients make to economies and cultures, are investing heavily in doctoral education. The world's brightest students, including U.S. citizens, may go elsewhere for the doctoral degree, and they may begin careers elsewhere as well. Monitoring the number of degrees awarded in science and engineering fields is an important part of the mission of the National Center for Science and Engineering Statistics within the National Science Foundation. The Survey of Earned Doctorates and this report contribute toward that goal.

Annual counts of doctorate recipients from U.S. universities are measures of the incremental investment in human resources devoted to science, engineering, research, and scholarship, and they can serve as leading indicators of the capacity for knowledge creation and innovation in various domains. The changing characteristics of this population over time—including the increased representation of women, minorities, and foreign nationals; emergence of new fields of study; time it takes to complete doctoral study; expansion of the postdoctoral pool; academic employment opportunities after graduation; and patterns of postgraduate interstate mobility—reflect political, economic, social, technological, and demographic trends and events. Understanding the connections between these larger forces and the number and characteristics of doctorate recipients is necessary to make informed improvements in this country's doctoral education system.

Doctorate recipients begin careers in large and small organizations, teach in universities, and start new businesses. Doctoral education develops human resources that are critical to a nation's progress—scientists, engineers, researchers, and scholars who create and share new knowledge and new ways of thinking that lead, directly and indirectly, to innovative products, services, and works of art. In doing so, they contribute to a nation's economic growth, cultural development, and rising standard of living.

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WHO EARNS A U.S. DOCTORATE?

Each new cohort of doctorate recipients augments the supply of prospective scientists, engineers, researchers, and scholars. Data on the demographic composition of these cohorts reveal changes in the presence of underrepresented groups.

Overall trends

The number of research doctorate degrees awarded by U.S. institutions in 2017 declined slightly to 54,664, according to the Survey of Earned Doctorates (SED). Over time, the number of doctorates awarded shows a strong upward trend—average annual growth of 3.3%—punctuated by periods of slow growth and even decline.

Since the SED began collecting data in 1957, the number of research doctorates awarded in science and engineering (S&E) fields has exceeded the number of non-S&E doctorates, and the gap has widened. From 1977 to 2017, the number of S&E doctorate recipients has more than doubled, while the number of non-S&E doctorates awarded in 2017 was slightly lower than the 1977 count. As a result, the proportion of S&E doctorates climbed from 58% in 1977 to 76% in 2017 (figure A).

Citizenship

Overview

In 2017, the number of S&E doctorates awarded to temporary visa holders was 14,166, a decline of 159 from 2016. Overall growth was still up 77% since 1998 and 9% since 2008. The proportion of S&E doctorates awarded to temporary visa holders peaked at 41% in 2007 but has held steady at around 36% since 2011 (figure B).

In comparison, the number of S&E doctorates awarded to U.S. citizens and permanent residents grew 2% from 2016 to 2017 but experienced a slower growth overall (32% since 1998 and 29% since 2008), although from a larger base.

Countries or economies of foreign citizenship

The number of doctorate recipients on temporary visas is highly concentrated in a few countries of origin. In the past decade, 10 countries accounted for 71% of the doctorates awarded to temporary visa holders, and the top three countries—China, India, and South Korea—accounted for over half (54%) (figure C).

Sex

Citizenship

Since 2002, women have earned a slim majority of all doctorates awarded to U.S. citizens and permanent residents and more than 31% of those awarded to temporary visa holders. From 1998 to 2007, the share of female doctorate recipients grew from 47% to 51% among U.S. citizens and permanent residents and from 26% to 35% among temporary visa holders. Since 2007, the shares of female doctorates in both citizenship categories have changed little. Overall, 46% of all doctorates in 2017 were awarded to women (figure D).

Field of study

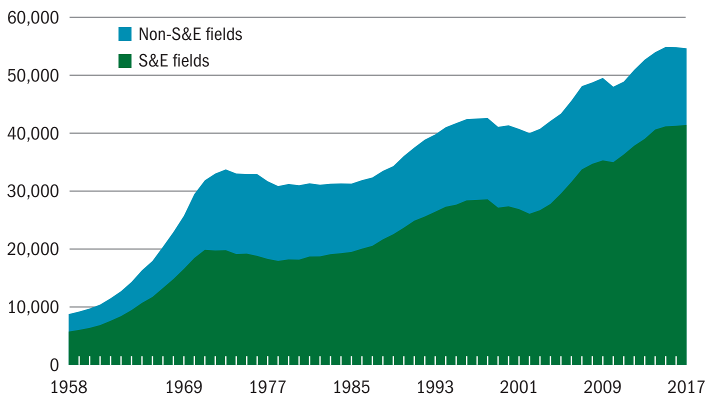
Most of the growth in the number of doctorates earned by both men and women has been in S&E fields. From 1998 to 2017, the number of female doctorate recipients in S&E fields increased by 73%, far more than the 30% growth in the number of male S&E doctorates. Women's share of S&E doctorates awarded increased from 36% in 1998 to 42% in 2009, and it has remained stable since then.

In non-S&E fields, 58% of doctorates were awarded to women in 2017, a share that has changed little since 2007. The number of female non-S&E doctorate recipients has slightly increased over the past 20 years, whereas the number of male doctorates in those fields has declined (figure E).

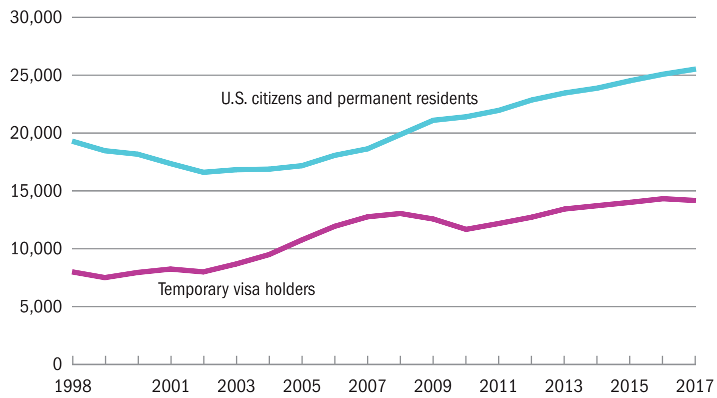
Race and ethnicity

Participation in doctoral education by underrepresented minorities who are U.S. citizens or permanent residents is increasing, though from a small base. From 2008 to 2017, the number of doctorates awarded to blacks or African Americans increased by 23%, and the number of Hispanic or Latino doctorate recipients increased by 43%. As a result, the proportion of doctorates earned by each group during this period grew from 6% to 7%. The proportion of American Indian or Alaska Native doctorate recipients has remained under 1% (figure F).

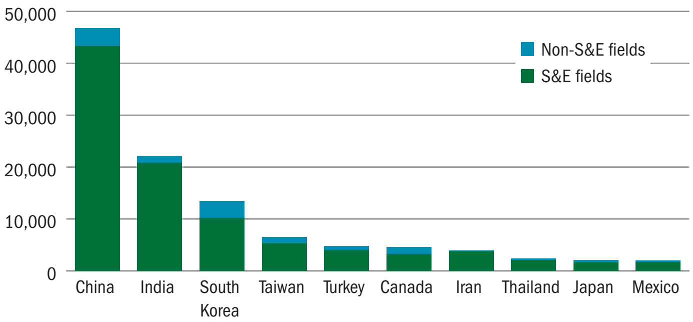
A **Doctorates awarded by U.S. colleges and universities: 1958–2017**



B **Doctorates awarded in S&E fields, by citizenship: 1998–2017**

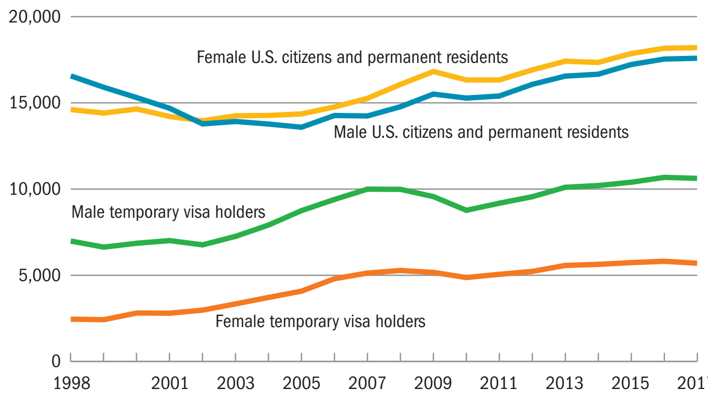


C **Top 10 countries or economies of foreign citizenship for U.S. doctorate recipients with temporary visas: 2008–17**

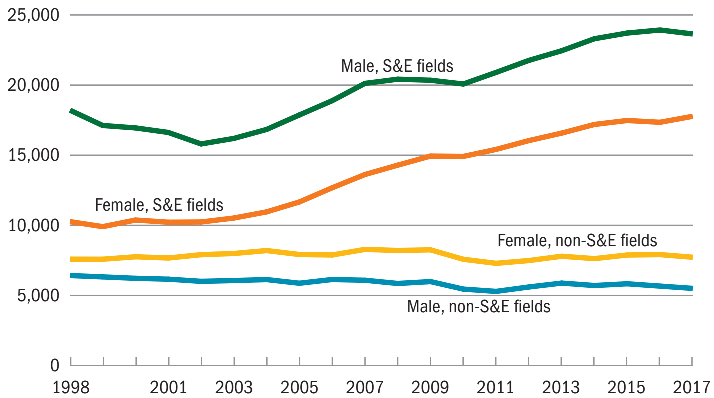


NOTE: China includes Hong Kong.

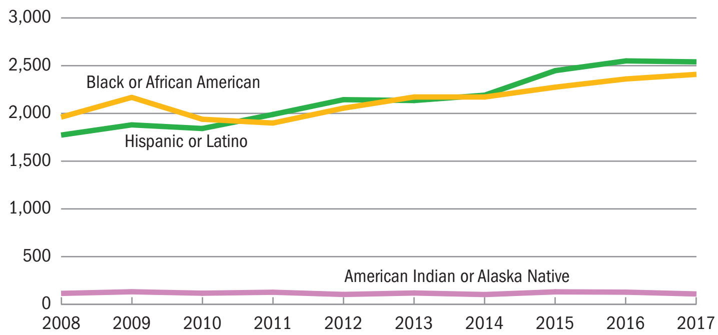
D **Sex and citizenship of U.S. doctorate recipients: 1998–2017**



E **Sex and field of study of U.S. doctorate recipients: 1998–2017**



F **Doctorates earned by underrepresented minority U.S. citizens and permanent residents: 2008–17**



NOTE: Hispanic or Latino may be any race.

WHICH FIELDS ATTRACT STUDENTS?

As researchers expand their understanding of the world, new fields of study emerge and existing fields change. Observing which fields of study are attracting growing proportions of students can provide early insight into where future research breakthroughs may occur.

Field of study trends

S&E

Doctorates in science and engineering (S&E) fields are a growing share of all doctorates awarded. Overall, S&E doctorates accounted for 76% of all doctorates awarded in 2017, a substantially larger share than 10 years and 20 years earlier (71% and 67%, respectively). Every broad S&E field except for psychology and social sciences increased both its number and share of doctorates over the past 2 decades. Psychology and social sciences increased in the number of doctorate recipients, but its share of all doctorates declined. Engineering had the largest growth of S&E fields in the past 20 years (figure A).

Non-S&E

Within non-S&E fields, the number of doctorates awarded in education has declined over the past 2 decades, leading to a large, steady drop in the relative share of doctorates in that field. The number of humanities and arts doctorates remained fairly stable during this period, but the field's relative share of doctorates fell almost 3 percentage points. The number of doctorates in other non-S&E fields, such as business management and communication, increased but their share remained fairly level (figure B).

Temporary visa holders

The share of doctorates awarded to temporary visa holders increased in every broad field of study over the past 20 years. In 2017, temporary visa holders earned the majority of doctorates awarded in engineering and in mathematics and computer sciences (figure C).

Minority U.S. citizens and permanent residents

Among minority U.S. citizens and permanent residents, doctorate recipients of different racial or ethnic backgrounds are more heavily represented in some fields of study than in others. In 2017, Asians earned more doctorates than other racial and ethnic minority groups in life sciences, physical sciences and earth sciences, mathematics and computer sciences, and engineering. Blacks or African Americans were the largest U.S. minority population in education. Hispanics or Latinos earned a larger share of doctorates in psychology and social sciences and in humanities and arts than did any other minority group (figure D).

Women

Field of study

Women's share of doctorates awarded has grown over the past 2 decades in all broad fields of study. In 2017, women earned the majority of doctorates awarded in life sciences, psychology and social sciences, education, and humanities and arts.

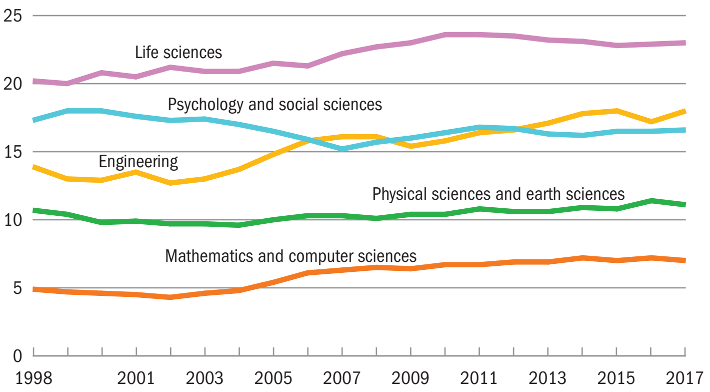
Though women earned about a fourth of the 2017 doctorates awarded in engineering and in mathematics and computer sciences and a third of the doctorates in physical sciences and earth sciences, their relative shares of doctorates awarded in those fields has been growing. From 1998 to 2017, women's share has nearly doubled in engineering (from 13% to 25%) and grown considerably in life sciences (from 46% to 55%) and in physical sciences and earth sciences (from 25% to 33%). Growth in mathematics and computer sciences and in psychology and social sciences has been more modest (from 22% to 25% and from 55% to 59%, respectively) (figure E).

Growing subfields

The subfields of doctoral study showing the largest relative growth in numbers of female doctorate recipients over the past decade have been materials science engineering and other engineering; geosciences, atmospheric sciences, and ocean sciences; and agricultural sciences and natural resources. Over the same period, the number of women doctorate recipients declined in education research (figure F).

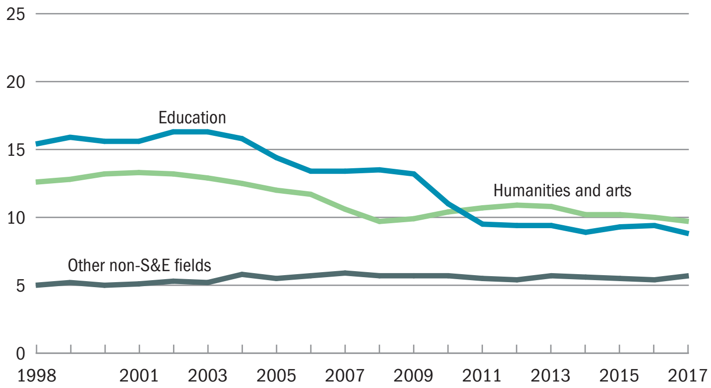
A Doctorates awarded in S&E broad fields of study: 1998–2017

Percent



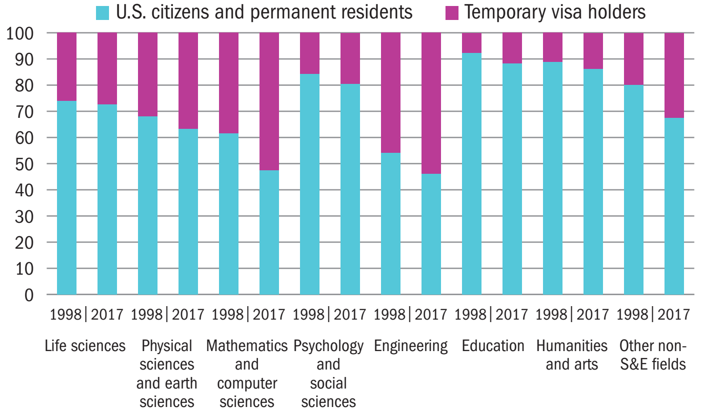
B Doctorates awarded in non-S&E broad fields of study: 1998–2017

Percent

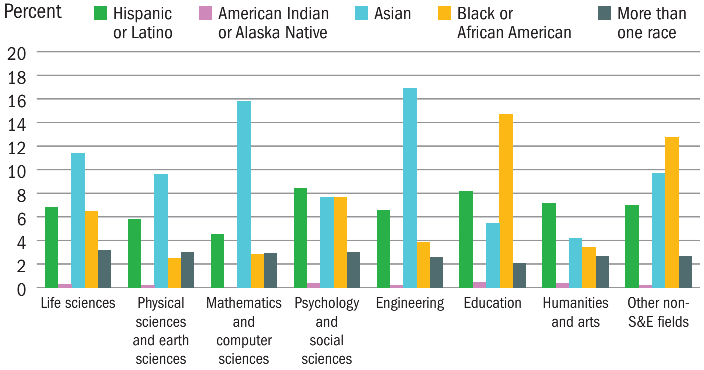


C Doctorates awarded, by citizenship and broad field of study: 1998 and 2017

Percent



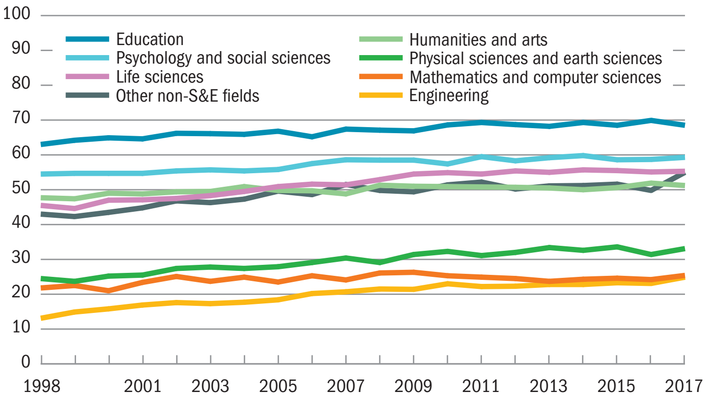
D Doctorates awarded to minority U.S. citizens and permanent residents, by race, ethnicity, and broad field of study: 2017



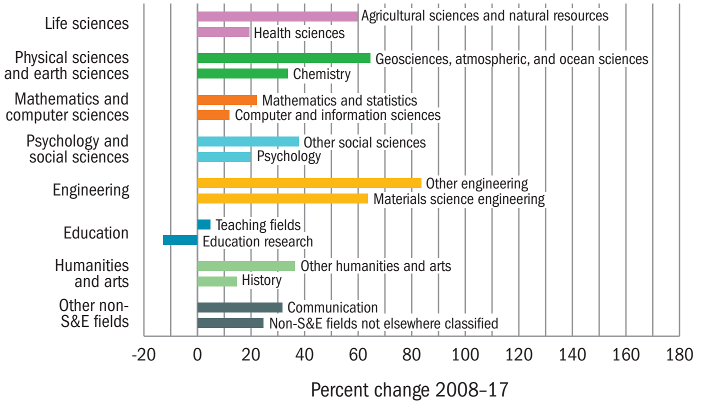
NOTE: Hispanic or Latino may be any race.

E Share of doctorates awarded to women, by broad field of study: 1998–2017

Percent



F Fastest changing fields of study for female U.S. doctorate recipients, by broad field of study: 2008–17



WHAT INFLUENCES THE PATH TO THE DOCTORATE?

Some paths to the doctoral degree are less traveled and some are more difficult to navigate, owing to a variety of influences that shape doctoral study. These paths may lead to different postgraduate destinations.

Parental education

Overview

The parents of recent doctorate recipients are better educated than the parents of earlier cohorts of doctorate recipients. The share of doctorate recipients from families in which neither parent has earned more than a high school diploma declined in the past 20 years. Meanwhile, the share from families in which at least one parent has earned a bachelor's degree or at least one parent has an advanced degree continued to climb (figure A).

Race and ethnicity

The pattern of rising parental educational attainment is visible among all races and ethnicities for doctorate recipients who are U.S. citizens and permanent residents. Nonetheless, doctorate recipients from underrepresented minority groups are less likely to have at least one parent with a bachelor's degree than are Asian or white doctorate recipients.

In 2017, more than 70% of doctorate recipients who were Asian or white came from families having at least one parent who had a bachelor's degree or higher, compared to just over half of doctorate recipients who were black or African American, American Indian or Alaska Native, or Hispanic or Latino (figure B).

Sources of financial support

Overview

Research assistantships are the most frequent primary source of financial support for all doctorate recipients, followed by fellowships or grants and teaching assistantships. Sixteen percent of doctoral students rely primarily on their own resources—loans, personal savings, personal earnings, and the earnings or savings of their spouse, partner, or family—to finance their graduate studies, and 5% relied on such other sources as employer reimbursement and foreign support (figure C).

Field of study

The primary sources of financial support used by doctorate recipients vary by field of study. In 2017, research assistantships were the most common primary source of financial support for doctorate recipients in engineering, physical sciences and earth sciences, life sciences, and mathematics and computer sciences. In mathematics and computer sciences, teaching assistantships were almost as frequent as research assistantships. Both fellowships or grants and teaching assistantships were the most common sources for doctoral students in humanities and arts. Nearly half of the doctorate recipients in education relied on their own resources as their primary source of support. In psychology and social sciences, similar proportions of doctorate recipients reported fellowships or grants, teaching assistantships, and their own resources as their primary source of financial support (figure D).

Education-related debt

The amount of education-related debt incurred by doctorate recipients during graduate school is an indicator of the availability of financial support. In 2017, large majorities (71% and above) of those in physical sciences and earth sciences, mathematics and computer sciences, engineering, and life sciences reported holding no debt related to their graduate education when they were awarded the doctorate. In psychology and social sciences, humanities and arts, and other non-science and engineering (non-S&E) fields, that proportion dropped to around half.

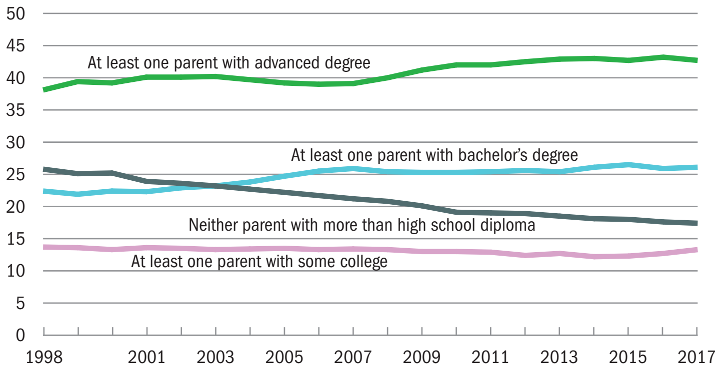
Within each broad field of study, 6% to 9% of doctorate recipients had incurred low levels ($10,000 or less) of education-related debt by the time they graduated. The shares of doctoral graduates with education-related debt burdens over $30,000 were greatest in education (37%), psychology and social sciences (30%), other non-S&E fields (30%), and humanities and arts (26%) (figure E).

Time to degree

Over the past 20 years, the time between entering graduate school and earning the doctorate has fallen in all fields of study, particularly in education. On average, it takes years longer to earn a doctorate in non-S&E fields than it does to complete doctoral training in S&E fields (figure F).

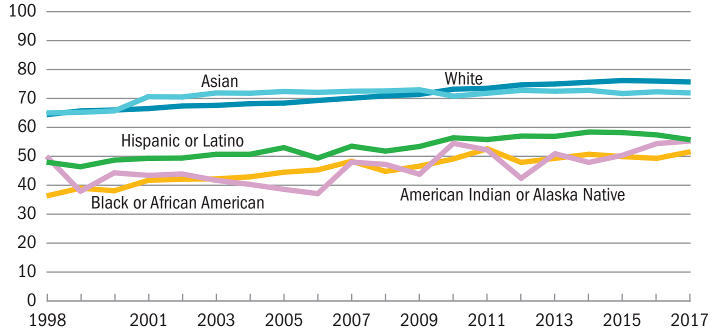
A Doctorates awarded, by highest parental educational attainment: 1998–2017

Percent



B Parental educational attainment of U.S. citizen and permanent resident doctorate recipients, by race and ethnicity: 1998–2017

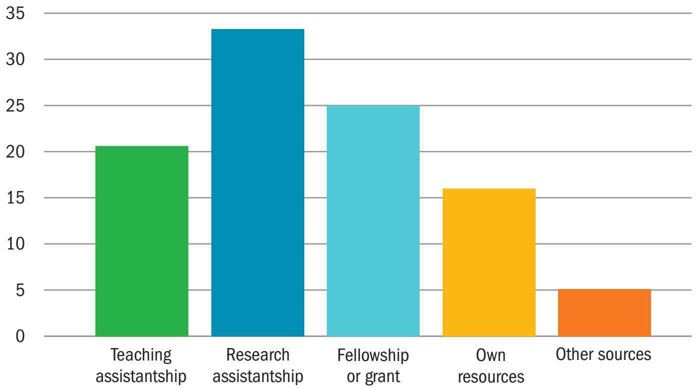
Percent having at least one parent with a bachelor's degree or higher



NOTE: Hispanic or Latino may be any race.

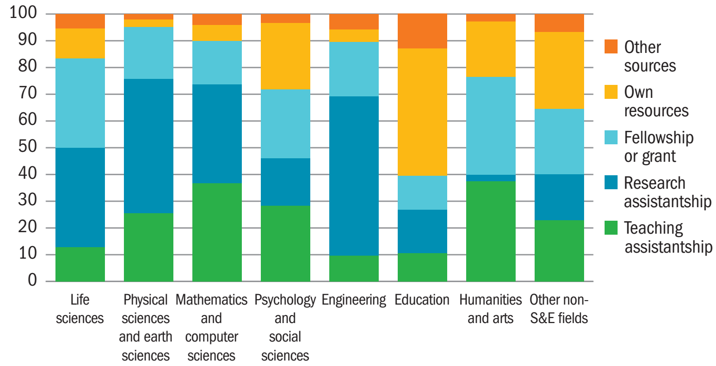
C Primary source of financial support for U.S. doctorate recipients: 2017

Percent



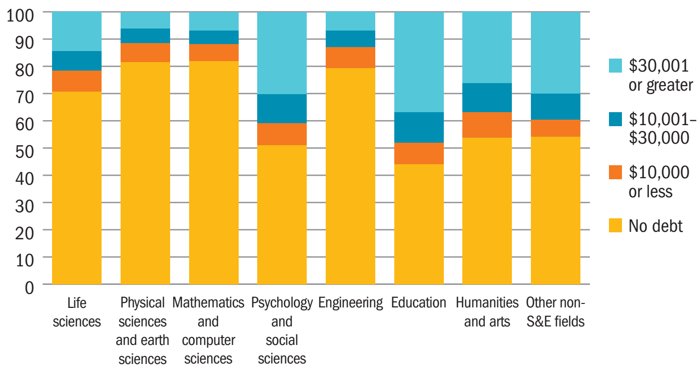
D Primary source of financial support for U.S. doctorate recipients, by broad field of study: 2017

Percent



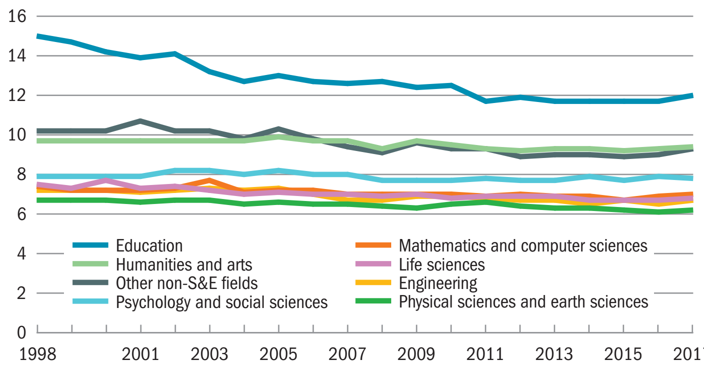
E Graduate education-related debt of U.S. doctorate recipients, by broad field of study: 2017

Percent



F Median time to degree of U.S. doctorate recipients, by broad field of study: 1998–2017

Years from graduate school entry to doctorate



WHAT ARE THE POSTGRADUATION TRENDS?

A graduate's first position after earning the doctoral degree may reflect broad economic conditions and can shape later career opportunities, earnings, and choices. Over the longer term, the early career patterns of doctorate recipients may influence the decisions of future generations of students considering careers as scientists, engineers, scholars, and researchers.

Job market

S&E

At any given time, the job market for new doctorate recipients will be better in some fields of study than in others. Though all fields tend to follow a similar cyclical pattern that generally reflects overall trends in economic conditions, definite commitments for employment are likely to be influenced by many factors.

The proportion of doctorate recipients in science and engineering (S&E) fields reporting definite commitments for employment, including postdoctoral (postdoc) study, has been in decline since 2001. Proportions hit low points from 2014 to 2016, depending on the field, but in 2017 increased in all S&E broad fields (figure A).

Non-S&E

In non-S&E fields, the proportion of doctorate recipients with definite commitments for employment, including postdoc study, has declined in the past 2 decades despite a slight improvement in the past year (figure B).

First postgraduate position

Academic employment

In 2017, 46% of all doctorate recipients with definite employment commitments (excluding postdoc positions) in the United States reported that their principal job would be in academe.

The highest rates of academic employment commitments were reported by doctorate recipients in humanities and arts (77%) and in other non-S&E fields (80%); the lowest rates were in engineering (14%) and in physical sciences and earth sciences (24%). In the past 10 years, the overall rate of academic employment commitments by doctorate recipients in S&E fields has declined, while that of doctorates in non-S&E fields has risen due to the increase in academic commitments in education (figure C).

Postdoc positions

Historically, postdoc study positions have been a customary part of the early career paths of doctorate recipients in life sciences and in physical sciences and earth sciences, making up over half of definite commitments. They also have become increasingly prevalent in mathematics and computer sciences, psychology and social sciences, engineering, and non-S&E fields, though at lower rates.

The overall proportion of S&E doctorate recipients taking postdoc positions in the United States immediately after graduation was similar in 2008 and 2017 (47%). However, the proportions of doctorate recipients taking postdoc positions in life sciences, physical and earth sciences, and mathematics and computer sciences declined, while the proportions in engineering and in psychology and social sciences increased (figure D).

Median salaries

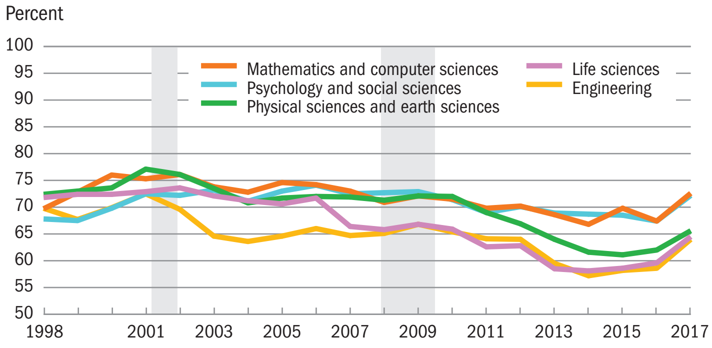
In 2017, doctorate recipients who had definite commitments for a postdoc or other employed position in the United States in the coming year reported basic annual salaries that varied by their field of study and the type of position to which they committed.

In every field, median salaries for doctorate recipients committing to jobs in industry were higher than those in postdocs and academe. The median salaries for postdocs in all broad fields were relatively similar, ranging from $46,000 to $50,000, except for postdocs in mathematics and computer sciences, who had a median salary of $60,000. In every broad field, reported postdoc salaries were lower than salaries reported by doctorate recipients entering non-postdoc employment in industry or academe. Doctorate recipients in engineering and those in other non-S&E fields, such as business, reported the highest median academic salaries. Those in mathematics and computer sciences and those in other non-S&E fields reported the highest median salaries in industry positions (figure E).

Temporary visa holders and postgraduation

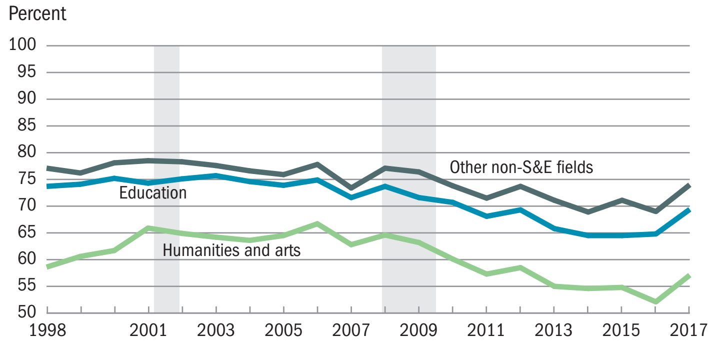
In 2017, 80% of temporary visa holder doctorate recipients in S&E fields with definite commitments reported that the location of their postdoc or other employment position was in the United States, up from 71% in 1998. Shares were highest in fields where temporary visa holders are more heavily represented: life sciences, physical sciences and earth sciences, mathematics and computer sciences, and engineering (figure F).

A Definite commitments for employment at doctorate award among U.S. doctorate recipients, by S&E broad field of study: 1998–2017



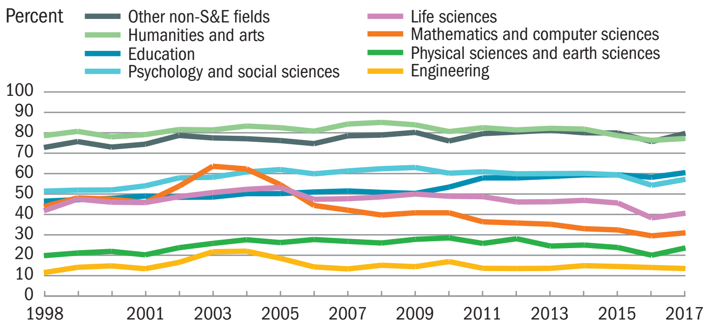
NOTES: Shaded areas reflect recessions that occurred between March 2001 and November 2001 and between December 2007 and June 2009. Employment includes postdoc study.

B Definite commitments for employment at doctorate award among U.S. doctorate recipients, by non-S&E broad field of study: 1998–2017



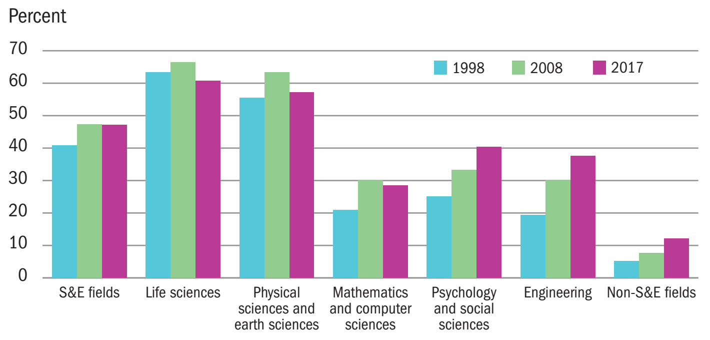
NOTES: Shaded areas reflect recessions that occurred between March 2001 and November 2001 and between December 2007 and June 2009. Employment includes postdoc study.

C Definite commitments for academic employment in the United States, by broad field of study: 1998–2017



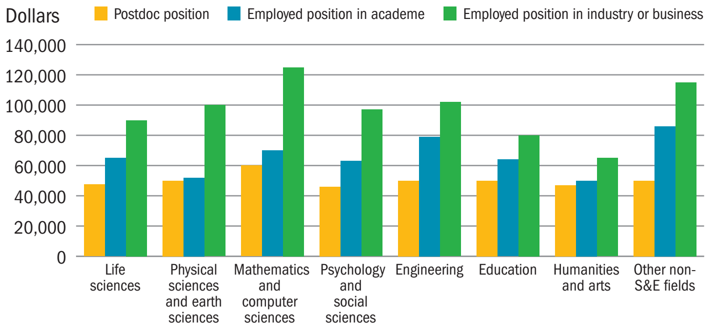
NOTE: Percentages are based on the number of doctorate recipients who reported definite commitments for employment, excluding postdoc study, in the coming year (including those missing employer type) and plans to stay in the United States.

D U.S. postdoctorate rate for U.S. doctorate recipients, by broad field of study: Selected years, 1998–2017



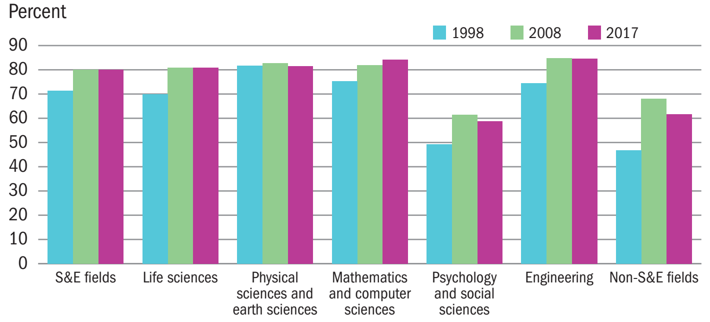
NOTE: Percentages are based on the number of doctorate recipients who reported definite commitments in the coming year, who reported whether their commitment was for postdoc study or other employment, and who plan to live in the United States.

E Median basic annual salary of U.S. doctorate recipients with definite commitments for employment in the United States, by position type and broad field of study: 2017



NOTES: Employment includes postdoc study. Other non-S&E fields includes business management and administration.

F Temporary visa holder U.S. doctorate recipients with definite commitments for employment in the United States, by broad field of study: Selected years, 1998–2017



NOTE: Percentages are based on the number of doctorate recipients who reported definite commitments for employment, including postdoc study, in the coming year and plans to stay in the United States.

PATTERNS OF INTERSTATE MOBILITY: WHAT ARE THE DEMOGRAPHIC AND FIELD OF STUDY TRENDS?

Interstate mobility is a key measure of the population and the workforce. The flows of newly minted doctorate recipients from one state to another for their first job after graduation are an indicator of economic growth and workforce development within the United States.

Overall trends

The trends presented here were estimated using data from doctorate recipients with definite employment commitments in the United States. Of the 517,336 doctorates who earned their degrees from 2008 to 2017, 59% reported postgraduation plans to work in the United States. They were considered mobile if their first definite employment commitment was in a state different from the state of their doctoral institution.

Among U.S. citizens and permanent residents, the number of mobile doctorate recipients has been on the rise for 12 years following an almost 40-year period of gradual decline. In the late 1960s, two-thirds of U.S. citizen and permanent resident doctorates had definite employment commitments outside the state of their awarding institution. This interstate mobility proportion declined to just over half (51%) by 2005 but increased to 56% in 2017 (figure A).

Doctorate recipients who were on temporary visas had greater interstate mobility than U.S. citizens and permanent residents. The rest of this section focuses on interstate mobility by demographic characteristics of U.S. citizens and permanent residents.

Sex and marital status

In 2017, women who had never married were slightly more mobile than men with the same marital status. Men who were or had been married or in marriage-like relationships were more mobile than their female counterparts.

From 2008 to 2017, interstate mobility increased the most for men and women who were widowed, separated, or divorced and for women who were married or in marriage-like relationships. Doctorate recipients who had never married were more mobile than those who reported any other marital status (figure B).

Age of dependents

Doctorate recipients with no dependents were more mobile than those with dependents. Overall, women with dependents had lower interstate mobility rates than men with dependents, with the largest differences among doctorate recipients who had dependents younger than age 18. Among these doctorate recipients, mobility declined for both men and women as the age of the children increased (figure C).

Age

Interstate mobility rates decline with age. In the youngest cohorts of doctorate recipients (age 30 and younger), nearly two-thirds accepted employment in a state different from where they earned their degree. Among doctorate recipients who were age 45 or older, only close to a third accepted employment in a different state (figure D).

Race and ethnicity

In the past 10 years, slightly more than half of new doctorates committed to employment in another state, and mobility was similar across most racial and ethnic groups. The interstate mobility rate of American Indians or Alaska Natives was the lowest (46%) among racial or ethnic groups, while that of doctorate recipients of more than one race (57%) was the highest (figure E).

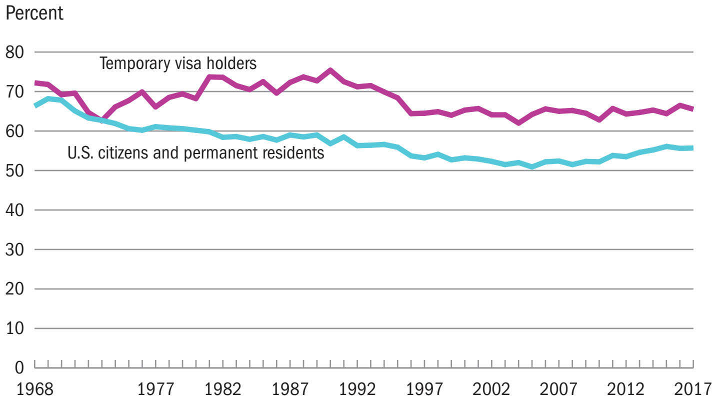
Field of study

In the past decade, doctorate recipients in business management and administration had the highest interstate mobility rates and education doctorates the lowest. More than three-quarters (76%) of men and over two-thirds (70%) of women earning a doctorate award in business management and administration accepted a job in a state different from the state of their doctoral institution. In contrast, interstate mobility of doctorate recipients in education during this period was 35% for men and 31% for women (figure F).

In science and engineering fields, interstate mobility was highest in psychology and social sciences, physical sciences and earth sciences, and mathematics and computer sciences. In mathematics and computer sciences, engineering, and physical sciences and earth sciences—which were broad fields with low participation of women—women were as mobile or slightly more mobile than men.

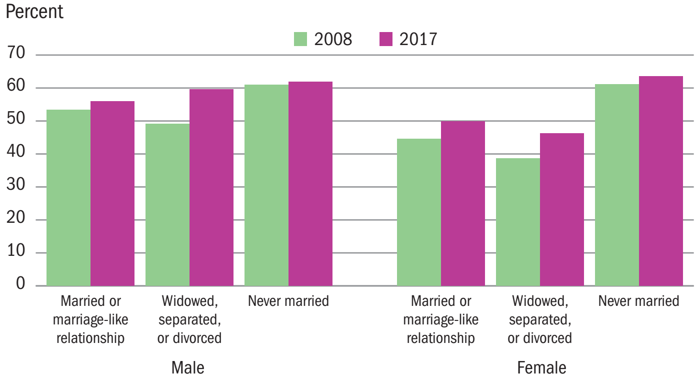
A

Doctorate recipients with definite employment commitments outside the state where the degree was awarded, by citizenship: 1968–2017



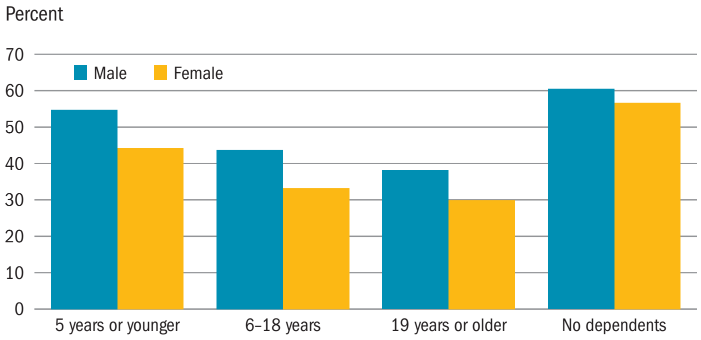
B

U.S. citizen and permanent resident doctorate recipients with definite employment commitments outside the state where the degree was awarded, by sex and marital status: 2008 and 2017



C

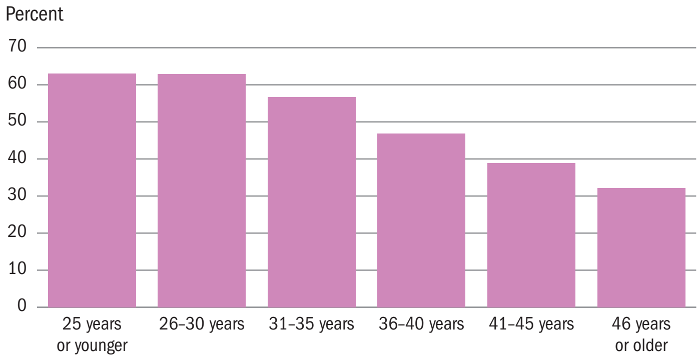
U.S. citizen and permanent resident doctorate recipients with definite employment commitments outside the state where the degree was awarded, by age of dependents and sex: 2008–17



NOTE: Individuals can report dependents in multiple categories.

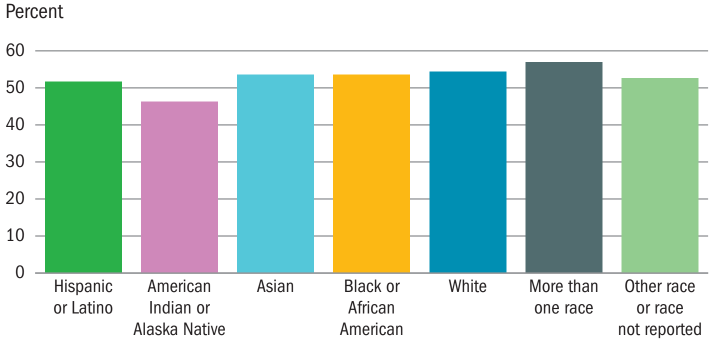
D

U.S. citizen and permanent resident doctorate recipients with definite employment commitments outside the state where the degree was awarded, by age: 2008–17



E

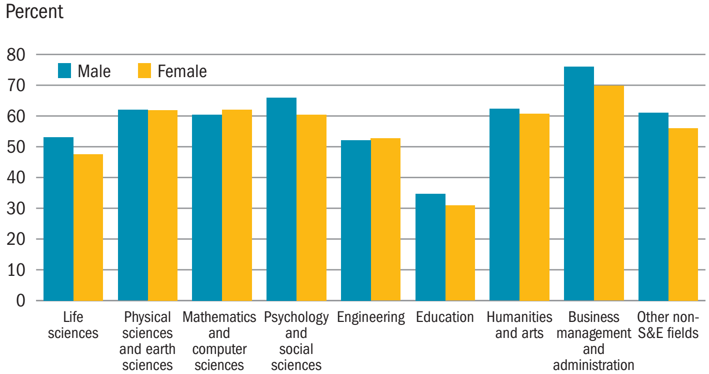
U.S. citizen and permanent resident doctorate recipients with definite employment commitments outside the state where the degree was awarded, by race and ethnicity: 2008–17



NOTE: Hispanic or Latino may be any race.

F

U.S. citizen and permanent resident doctorate recipients with definite employment commitments outside the state where the degree was awarded, by broad field of study and sex: 2008–17



PATTERNS OF INTERSTATE MOBILITY: WHAT ARE THE EMPLOYMENT AND GEOGRAPHIC TRENDS?

Employment opportunities available for highly skilled individuals vary considerably by state based on employment sector and primary work activity. Some doctorate recipients may take a job in a different state in search of opportunities to conduct research and development (R&D). Others may stay because they are more settled or have job opportunities in the area.

Employment sector

In 2017, doctorate recipients with definite employment commitments for a postdoc were more mobile than those committed to jobs in other sectors. About half or more of doctorate recipients committed to work in academe, government, business, and the nonprofit sectors moved out of state for a job after graduating. Doctorate recipients in the "other or unknown" category, which includes mostly those in K–12 teaching, had the lowest interstate mobility rate of all sectors (figure A).

In the past 10 years, interstate mobility increased in all sectors. Doctorate recipients with commitments in academe had the smallest increase in mobility and those with jobs in government, the largest.

Primary work activity

Doctorate recipients who would be primarily working in R&D were the most mobile, followed closely by those who would be mainly teaching. In comparison, interstate mobility was lower for those who would be primarily managers or administrators and those providing professional services to individuals—but their mobility rates have seen larger increases in the past 10 years, peaking in 2017. Doctorate recipients who would be primarily offering professional services to individuals were now nearly as mobile as those who would be teaching (figure B).

Doctorate recipients staying in state

S&E

Among doctorate recipients in science and engineering (S&E) fields, the rates of those staying to work in the state where they earned their degree (stay rates) were highest in Puerto Rico (69%), Alaska (66%), California (60%), and Hawaii (57%). Four Midwest states (Michigan, Indiana, Iowa, and Minnesota) had stay rates below 35% and Southeastern states had stay rates between 35% and 45% (figure C).

Non-S&E

In nearly every state, stay rates were higher among doctorate recipients in non-S&E than in S&E fields. The vast majority of non-S&E doctorate recipients from Puerto Rico and Alaska stayed there for their first job after graduation (94% and 87% respectively). Other states with high stay rates (between 65% and 80%) included Maine, Hawaii, Idaho, Montana, Alabama, and Texas (figure D).

Net inflows and outflows by state

Highest S&E flows

Over the past 10 years, several states registered a net inflow of new S&E doctorate recipients—an increase in the number of new doctorate recipients working in the state, relative to the number of doctorates awarded by universities in the state over the same period (see "Glossary"). Net inflows of S&E doctorate recipients were particularly strong in Northeastern and Mid-Atlantic states (Maine, Vermont, Maryland, and the District of Columbia) and in the Northwest (Oregon, Washington, and Idaho). New Mexico had the greatest net inflow of doctorate recipients—indicating a large number of research-intensive S&E jobs relative to S&E doctorates awarded (figure E).

Some states in the East North Central region (Indiana, Michigan, and Wisconsin) and the West North Central region (Iowa, North Dakota, Kansas, and Minnesota) together with Delaware, West Virginia, Florida, Alabama, and Wyoming registered the largest net outflows, training more S&E doctorate recipients than they employed.

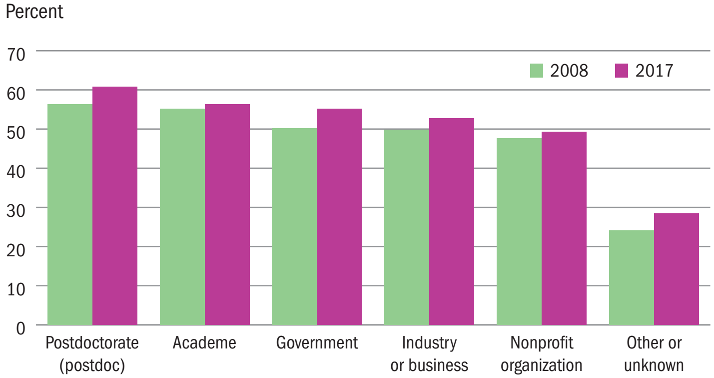
Highest non-S&E flows

From 2008 to 2017, Alaska, Vermont, Maine, and New Hampshire registered the highest net inflows of non-S&E doctorate recipients, while Delaware, the District of Columbia, Minnesota, and Arizona had the highest net outflows (figure F).

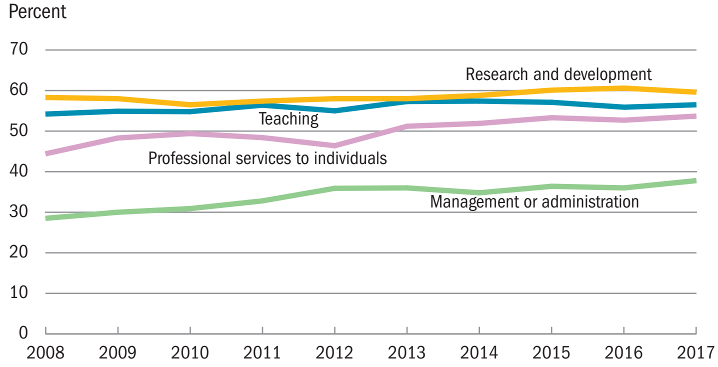
Other notable geographic trends

Over the past decade, some states in the East North Central region (Illinois, Indiana, Michigan, and Wisconsin) and West North Central region (Nebraska, Minnesota, North Dakota, Iowa, and Kansas) registered net outflows of both non-S&E and S&E doctorate recipients. The states of Wyoming, Utah, Georgia, North Carolina, Alabama, and Louisiana, registered net inflows in non-S&E but net outflows in S&E fields.

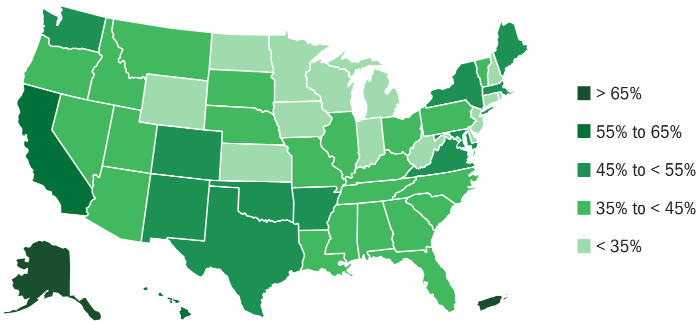
A **U.S. citizen and permanent resident doctorate recipients with definite employment commitments outside the state where the degree was awarded, by sector: 2008 and 2017**



B **U.S. citizen and permanent resident doctorate recipients with definite employment commitments outside the state where the degree was awarded, by primary work activity: 2008–17**

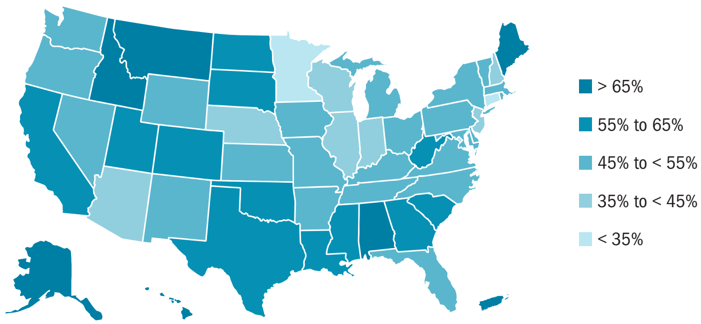


C **U.S. citizen and permanent resident S&E doctorate recipients with definite commitments in the state where the degree was awarded, by state: 2008–17**



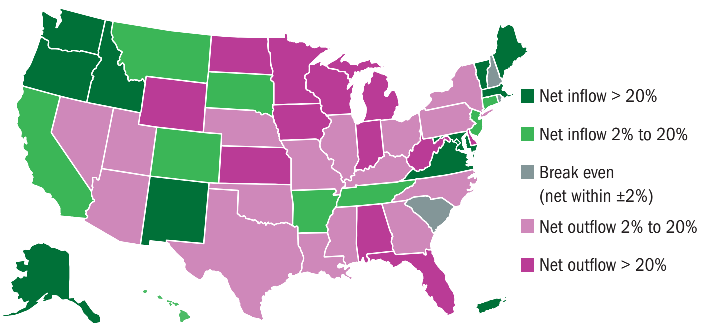
NOTE: Puerto Rico includes outlying territories.

D **U.S. citizen and permanent resident non-S&E doctorate recipients with definite commitments in the state where the degree was awarded, by state: 2008–17**



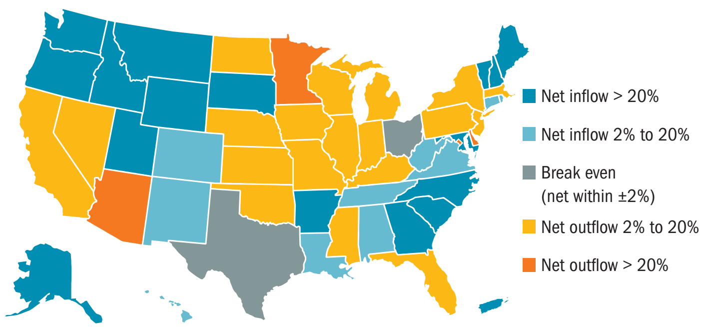
NOTE: Puerto Rico includes outlying territories.

E **Net inflows or outflows of U.S. citizen and permanent resident S&E doctorate recipients relative to S&E doctorates awarded, by state: 2008–17**



NOTE: Puerto Rico includes outlying territories.

F **Net inflows or outflows of U.S. citizen and permanent resident non-S&E doctorate recipients relative to non-S&E doctorates awarded, by state: 2008–17**



NOTE: Puerto Rico includes outlying territories.

GLOSSARY

Basic annual salary. Annual salary to be earned from the doctorate recipient's principal job in the next year, not including bonuses or additional compensation for summertime teaching or research.

Carnegie Classification. The Carnegie Classification of academic institutions is a commonly used classification of postsecondary institutions based on level of degree awarded, fields in which degrees are conferred, and, in some cases, enrollment, federal research support, and selectivity of admissions criteria. The categories used here are from the 2015 version of the classification and include highest research universities, higher research universities, moderate research universities, and other universities.

Definite commitment. A commitment, through a contract or other method, by doctorate recipients to accept employment, including a postdoc study, in the coming year or to return to predoctoral employment.

Definite employment commitment. A definite commitment by doctorate recipients for employment in a non-postdoc position in the coming year.

Field of study. The Survey of Earned Doctorates (SED) collects data on 331 fields of doctoral study. For reporting purposes, these fields are grouped into 35 major fields and are further aggregated into eight broad fields: life sciences; physical sciences and earth sciences; mathematics and computer sciences; psychology and social sciences; engineering; education; humanities and arts; and other non-science and engineering fields. See technical table A-6 in the online resources of this report for a listing of the major fields within each broad field category. See the survey questionnaire for a full listing of the fine fields of study in 2017 (https://www.nsf.gov/statistics/sed/).

Graduate education-related debt. The amount of debt owed by a doctorate recipient at the time the doctorate is awarded that is directly related to graduate education.

Interstate mobility. Characteristic of doctorate recipients who at graduation have a definite employment commitment in a different state from the state of the institution that awarded the doctoral degree. This report focuses on interstate mobility of U.S. citizens and permanent residents with definite employment commitments in the United States.

Net inflows or outflows of doctorate recipients. An index measuring the increase or decrease in the number of U.S. doctorate recipients working in a state over a period of time, relative to the size of the doctorate recipient cohort in that state during that time. The measure is calculated as follows: Over the past 10 years [(total number of doctorates awarded in that state minus recipients who accepted a job in a different state plus those whose job commitments brought them into the state) divided by total number of doctorates awarded in that state] multiplied by 100. In this measure, interstate mobility could include taking a job in a different state but continuing to live in the state of their doctoral institution.

Non-S&E. Non-science and engineering: A grouping of broad fields of study that includes education, humanities and arts, and other non-S&E fields, such as business.

Parental educational attainment. The highest level of education attained by either parent of a doctorate recipient.

Postdoc position. As defined on the questionnaire form, a temporary position primarily for gaining additional education and training in research, usually awarded in academe, industry, government, or a nonprofit organization.

Postdoc rate. The proportion of doctorate recipients who have definite commitments for a postdoc position among all doctorate recipients with definite commitments in the coming year, who reported whether their commitment was for postdoc study or other employment, and who plan to live in the United States.

Race and ethnicity. Doctorate recipients who report Hispanic or Latino heritage, regardless of racial designation, are counted as Hispanic or Latino, and as of 2013, those who do not answer the Hispanic or Latino ethnicity question are counted as "ethnicity not reported." Respondents who indicate that they are not Hispanic or Latino and indicate a single race are reported in their respective racial groups, except for those indicating Native Hawaiian or Other Pacific Islander, who are included in "other race or race not reported." Beginning in 2001, respondents who are not Hispanic or Latino and who indicate more than one race are reported in the category "more than one race." Data for this category were not collected before 2001. Before 2001, respondents who are not Hispanic or Latino and who indicate more than one race were categorized as "other or unknown." For 2001 and later data, the "other or unknown" category includes doctorate recipients who indicated that they were not Hispanic or Latino and either did not respond to the race item or reported their race as Native Hawaiian and Other Pacific Islander. For 2000 and earlier data, Native Hawaiians and Other Pacific Islanders are counted in the Asian group.

Research doctorate. A doctoral degree that is oriented toward preparing students to make original intellectual contributions in a field of study and that is not primarily intended for the practice of a profession. Research doctorates require the completion of a dissertation or equivalent project. In this report, the terms "doctorate" and "doctoral degree" are used to represent any of the research doctoral degrees covered by the survey. Professional doctorates, such as the MD, DDS, JD, and PsyD, are not covered by the Survey of Earned Doctorates.

S&E. Science and engineering: A grouping of broad fields of study that includes science (life sciences, physical sciences and earth sciences, mathematics and computer sciences, psychology and social sciences) and engineering fields.

Sources of financial support. Sources of financial support are grouped into the following five categories: fellowships (includes scholarships and grants); teaching assistantships; research assistantships (includes traineeships, internships, clinical residencies, and other assistantships); own resources (includes loans, personal savings, personal earnings, and earnings or savings of spouse, partner, or family); and other (includes employer reimbursements and support from non-U.S. sources).

State stay rates. The rate of doctorate recipients whose definite commitment for employment immediately after graduation is in the same state as the institution that awarded the degree.

Time to degree. The median time elapsed from the start of any graduate school program to completion of the doctoral degree. In addition to this measure, two other measures of time to degree are also reported in the data tables: median time elapsed from completion of the bachelor's degree to completion of the doctorate, and median time elapsed from the start of the doctoral program.

Underrepresented minority. The following groups are underrepresented in science and engineering, relative to their numbers in the U.S. population: American Indian or Alaska Native, black or African American, and Hispanic or Latino.

DATA SOURCE

The Survey of Earned Doctorates (SED) is the sole data source for *Doctorate Recipients from U.S. Universities: 2017*. The principal elements of the 2017 SED data collection are described in the sections that follow. More detailed information and related technical tables are available at https://www.nsf.gov/statistics/sed/.

Survey eligibility. The SED collects information on research doctorate recipients only. Research doctorates require the completion of a dissertation or equivalent project, are oriented toward preparing students to make original intellectual contributions in a field of study and are not primarily intended for the practice of a profession. The 2017 SED recognized 18 distinct types of research doctorates. In 2017, 98% of research doctorate recipients earned the PhD.

Survey universe. The population eligible for the 2017 survey consisted of all individuals who received a research doctorate from an accredited U.S. academic institution in the 12-month period from 1 July 2016 to 30 June 2017. The total universe consisted of 54,664 persons in 428 institutions that conferred research doctorates in academic year 2017.

Data collection. Institutional coordinators at each doctorate awarding institution distributed the SED Web survey link (or paper survey form) to individuals receiving a research doctorate. Nonresponding graduates were contacted by e-mail, mail, or phone to request response to the survey. RTI International served as the 2017 SED data collection contractor on behalf of the National Center for Science and Engineering Statistics within the National Science Foundation.

Survey response rates. In 2017, 91.4% of research doctorate recipients completed the survey. Limited records (field of study, doctoral institution, and sex) are constructed for nonrespondents from administrative records of the university—commencement programs, graduation lists, and other public records—and are included in the reported total of doctorate recipients. Response rates for 2008–17 are provided in the technical tables.

Time series data changes. After a multiyear review of Doctor of Education (EdD) degree programs participating in the SED, 143 programs were reclassified from research doctorate to professional doctorate over the 2010–11 period. No additional reclassifications of EdD degree programs are planned. SED data are no longer being collected from graduates earning degrees from the reclassified EdD programs, and this has affected the reporting of the number of doctorates awarded by sex, citizenship, race, and ethnicity. Several figures in this report show a decline in number of degrees awarded from 2009 to 2011 (in particular, see figures D and F in the "Who earns a U.S. doctorate?" section and figure B in the "Which fields attract students?" section). Readers should note that the declines from 2009 to 2010 and from 2010 to 2011 are at least partly attributable to the EdD reclassification.

Data license. Microdata from the SED may be obtained through a restricted-use data license (see https://nsf.gov/statistics/license/index.cfm).

FURTHER READING

For an overarching view of long-term trends in U.S. doctoral education, as reflected in the data from the Survey of Earned Doctorates (SED), please see *U.S. Doctorates in the 20th Century* (NSF 06-319, October 2006, https://www.nsf.gov/statistics/nsf06319/). Additional context is provided in summary reports for previous years (*Doctorate Recipients from U.S. Universities*), available at https://www.nsf.gov/statistics/doctorates/.

Other publications from the National Center for Science and Engineering Statistics use SED data to report on focused topics. Publications that relate to the topics covered in *Doctorate Recipients from U.S. Universities: 2017* are listed below, by relevant section.

"Who earns a U.S. doctorate?" and "Which fields attract students?"

Women, Minorities, and Persons with Disabilities in Science and Engineering: 2017 (NSF 17-310, January 2017, https://www.nsf.gov/statistics/2017/nsf17310/).

Numbers of Doctorates Awarded in the United States Declined in 2010 (NSF 12-303, November 2011, https://www.nsf.gov/statistics/infbrief/nsf12303/).

Numbers of Doctorates Awarded Continue to Grow in 2009; *Indicators of Employment Outcomes Mixed* (NSF 11-305, November 2010, https://www.nsf.gov/statistics/infbrief/nsf11305/).

Interdisciplinary Dissertation Research (NSF 10-316, March 2010, https://www.nsf.gov/statistics/infbrief/nsf10316/).

Numbers of U.S. Doctorates Awarded Rise for Sixth Year, but Growth Slower (NSF 10-308, November 2009, https://www.nsf.gov/statistics/infbrief/nsf10308/).

"What influences the path to the doctorate?"

Baccalaureate Origins of U.S.-trained S&E Doctorate Recipients (NSF 13-323, April 2013, https://www.nsf.gov/statistics/infbrief/nsf13323/).

Role of HBCUs as Baccalaureate-Origin Institutions of Black S&E Doctorate Recipients (NSF 08-319, August 2008, https://www.nsf.gov/statistics/infbrief/nsf08319/).

Baccalaureate Origins of S&E Doctorate Recipients (NSF 08-311, July 2008, https://www.nsf.gov/statistics/infbrief/nsf08311/).

Time to Degree of U.S. Research Doctorate Recipients (NSF 06-312, March 2006, https://www.nsf.gov/statistics/infbrief/nsf06312/).

"What are the postgraduation trends?"

Unemployment among Doctoral Scientists and Engineers Remained Below the National Average in 2013 (NSF 14-317, September 2014, https://www.nsf.gov/statistics/infbrief/nsf14317/).

Unemployment among Doctoral Scientists and Engineers Increased but Remained below the National Average (NSF 14-310, April 2014, https://www.nsf.gov/statistics/infbrief/nsf14310/).

International Mobility and Employment Characteristics among Recent Recipients of U.S. Doctorates (NSF 13-300, October 2012, https://www.nsf.gov/statistics/infbrief/nsf13300/).

Emigration of U.S.-Born S&E Doctorate Recipients (NSF 04-327, June 2004, https://www.nsf.gov/statistics/infbrief/nsf04327/).

Plans for Postdoctoral Research Appointments among Recent U.S. Doctorate Recipients (NSF 04-308, March 2004, https://www.nsf.gov/statistics/infbrief/nsf04308/).

Interstate Migration Patterns of Recent Science and Engineering Doctorate Recipients (NSF 02-311, February 2002, https://www.nsf.gov/statistics/nsf02311/).

ONLINE RESOURCES

An interactive version of the printed report and its related resources, described below, are available at https://www.nsf.gov/statistics/sed/. Data from the Survey of Earned Doctorates (SED) also can be further explored in the National Center for Science and Engineering Statistics interactive data tool at https://ncsesdata.nsf.gov/ids/sed.

Data tables. Data on the full range of survey items collected by the 2017 SED are presented in 72 detailed statistical tables. These tables present detailed data on the demographic characteristics, educational history, sources of financial support, and postgraduation plans of doctorate recipients. The full set of tables is available for download as PDF and Excel files.

Figures. The figures illustrating each theme are presented as interactive graphics and available for download as image files, accompanied by the supporting source data in Excel format.

Survey questionnaire. A link to the questionnaire for the 2017 SED appears in the "How Do I…" section of the online report.

Technical notes and tables. The technical notes provide more detail on how the SED collects data about recipients of research doctorates. The technical tables provide such information as the types of research doctoral degrees included in the SED, survey response rates over time, and details on field aggregations.

ACKNOWLEDGMENTS, CITATION, AND CONTACT

Acknowledgments

The conduct of the Survey of Earned Doctorates (SED), the maintenance of the SED, and resulting publications are supported by the National Center for Science and Engineering Statistics (NCSES) within the National Science Foundation (NSF) and by the National Institutes of Health (NIH), Department of Education (ED), National Endowment for the Humanities (NEH), Department of Agriculture (USDA), and National Aeronautics and Space Administration (NASA). These federal agencies gratefully acknowledge the support and assistance of graduate deans and their staff, registrars, dissertation officers, and other administrators who participate in the SED effort and contribute to its success. Appreciation is also extended to the new research doctorate recipients who completed the 2017 survey.

Jaquelina Falkenheim (NCSES) oversaw the preparation of this report. Emilda Rivers, John Finamore, Samson Adeshiyan, and Kelly Kang at NCSES reviewed and commented on multiple drafts of the report and data tables. Amy Burke, Karen Hamrick, Derek Hill, Francisco Moris, and Darius Singpurwalla at NCSES provided helpful comments and suggestions. Staff at RTI International who played a valuable role in the 2017 SED and report effort are Jamie Friedman, August Gering, Patricia Green, Jane Griffin, Miranda Guardiola, Kaleen Healey, Ruth Heuer, Herschel Sanders, Joe Simpson, and Robert Steele.

The published report was produced by Catherine Corlies, Tanya Gore, and Christine Hamel (NCSES). Drew Mitchell and staff at OmniStudio, Inc., designed the cover and layout. Development of the Web version was guided by Rajinder Raut (NCSES), with technical assistance from staff of Penobscot Bay Media.

Suggested citation

National Science Foundation, National Center for Science and Engineering Statistics. 2018. *Doctorate Recipients from U.S. Universities: 2017*. Special Report NSF 19-301. Alexandria, VA. Available at https://ncses.nsf.gov/pubs/nsf19301/.

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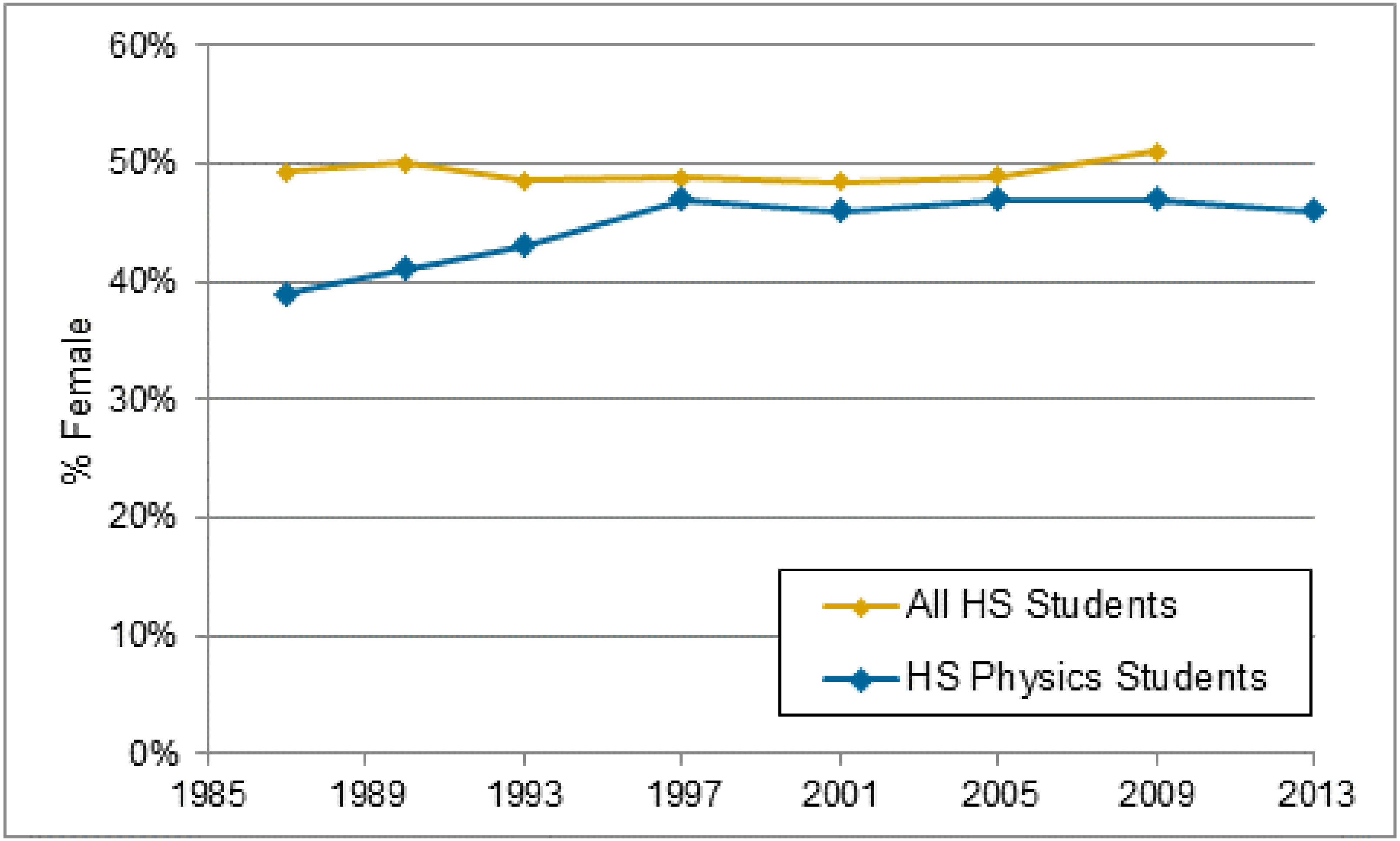
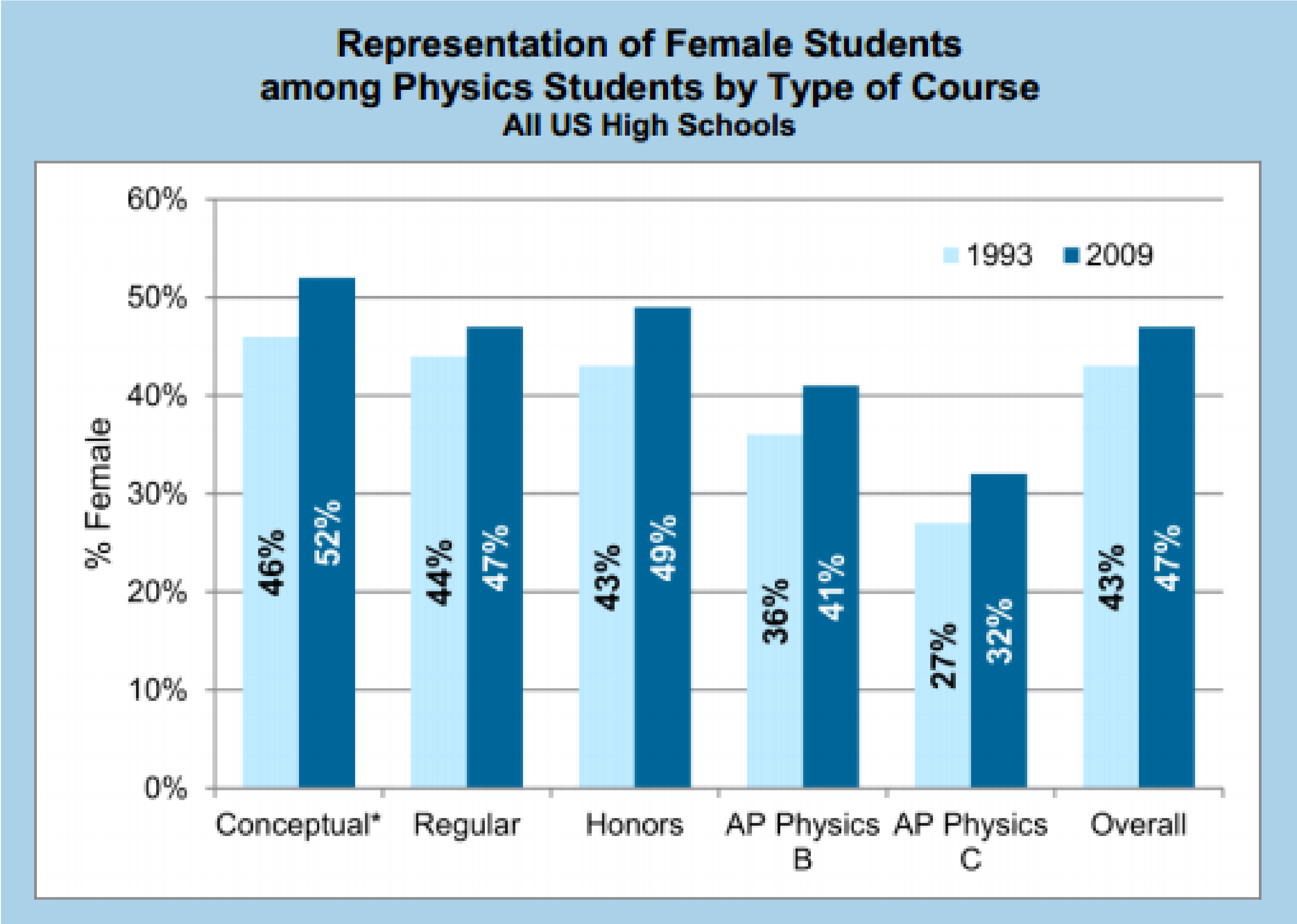
NSF 19-301

REPRESENTATION OF WOMEN

GIRLS AS A PERCENTAGE OF TOTAL ENROLLMENT IN HIGH SCHOOL PHYSICS

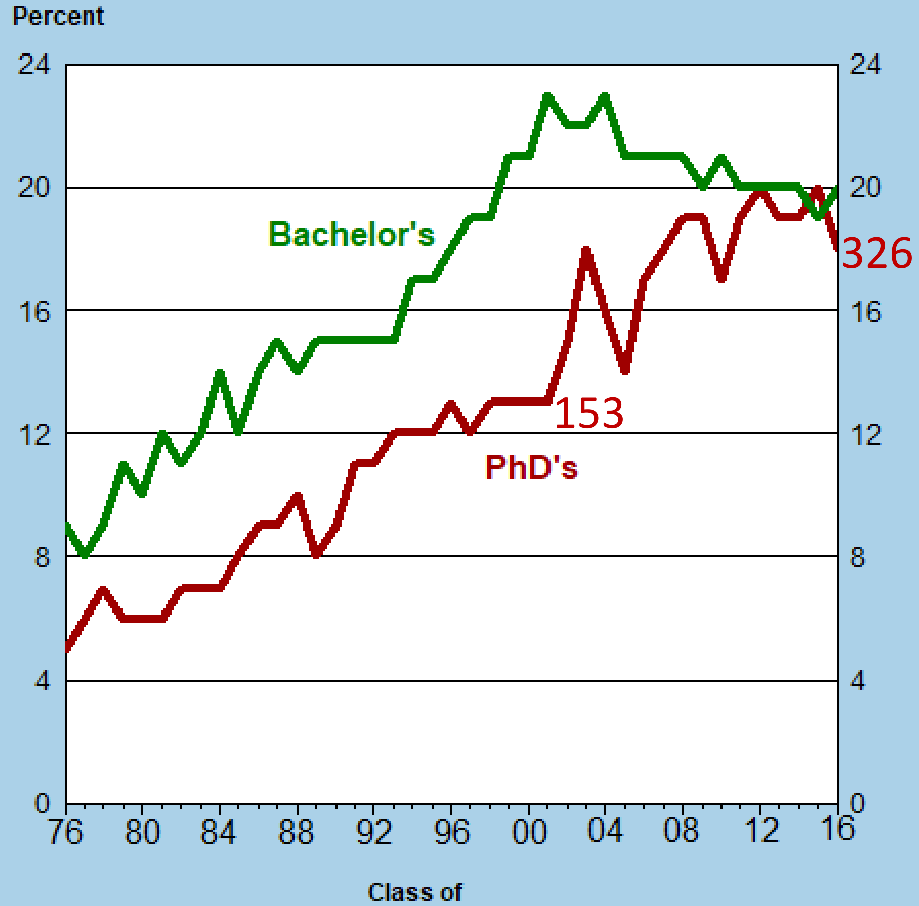




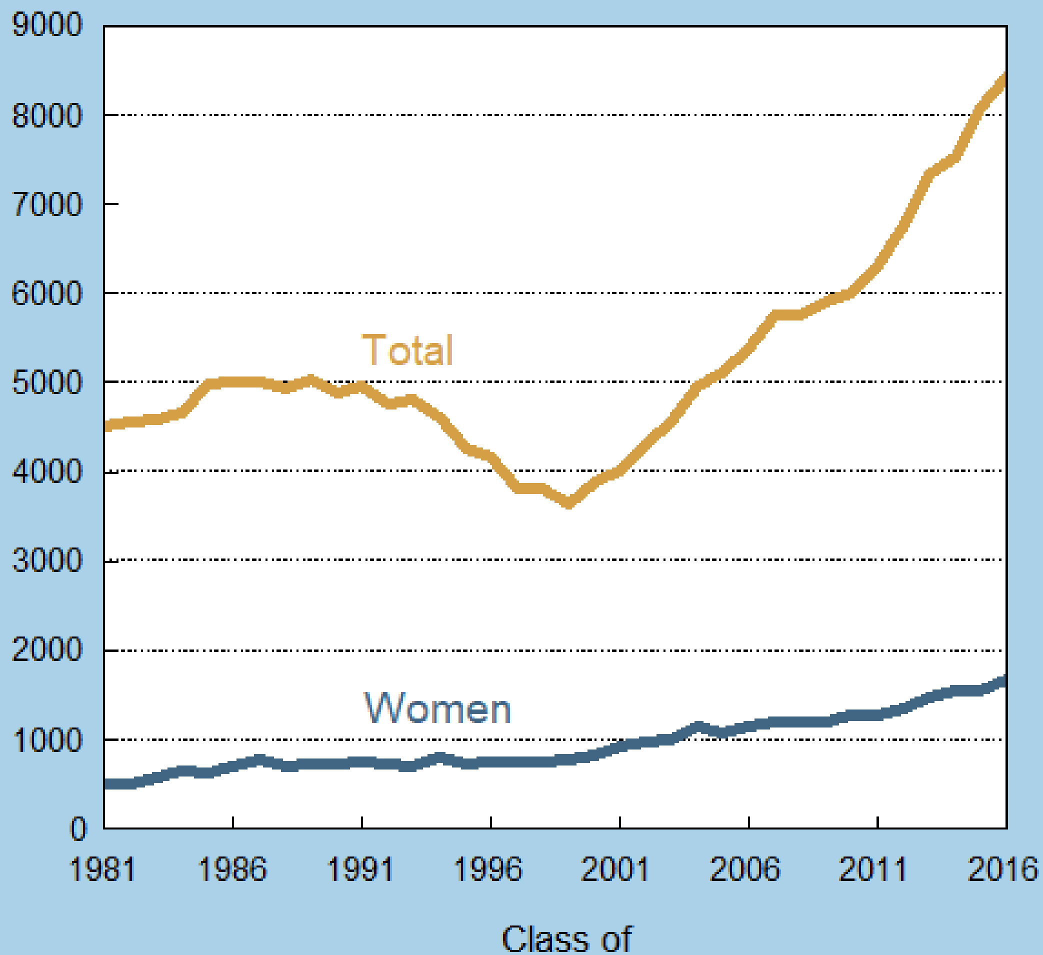
* Includes data for both Physics First and Conceptual Physics for 2009; Physics First data was not collected separately in 1993

http://www.aip.org/statistics

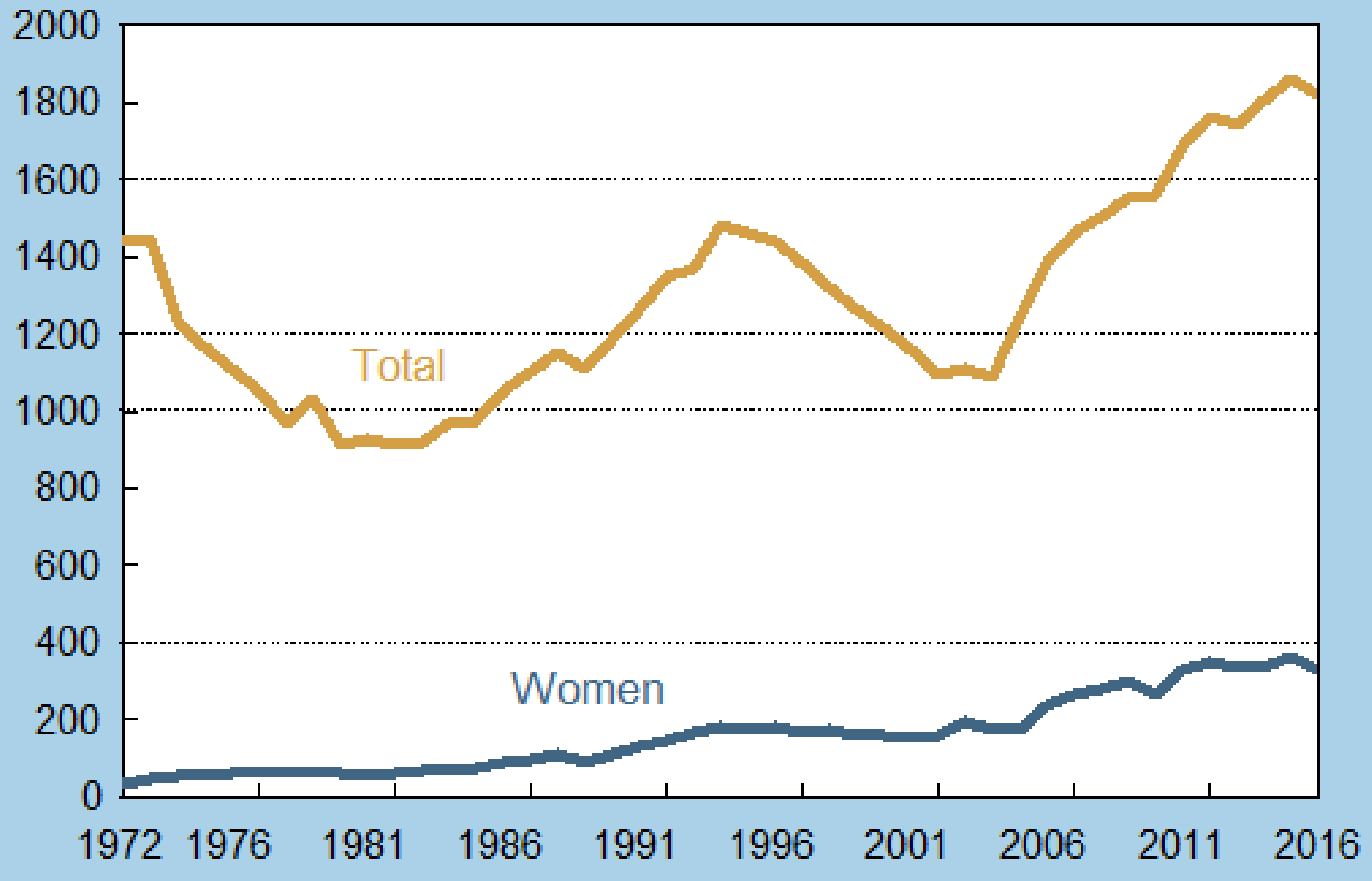
Percent of Physics Bachelors and PhDs earned by Women, Classes of 1976 through 2016.



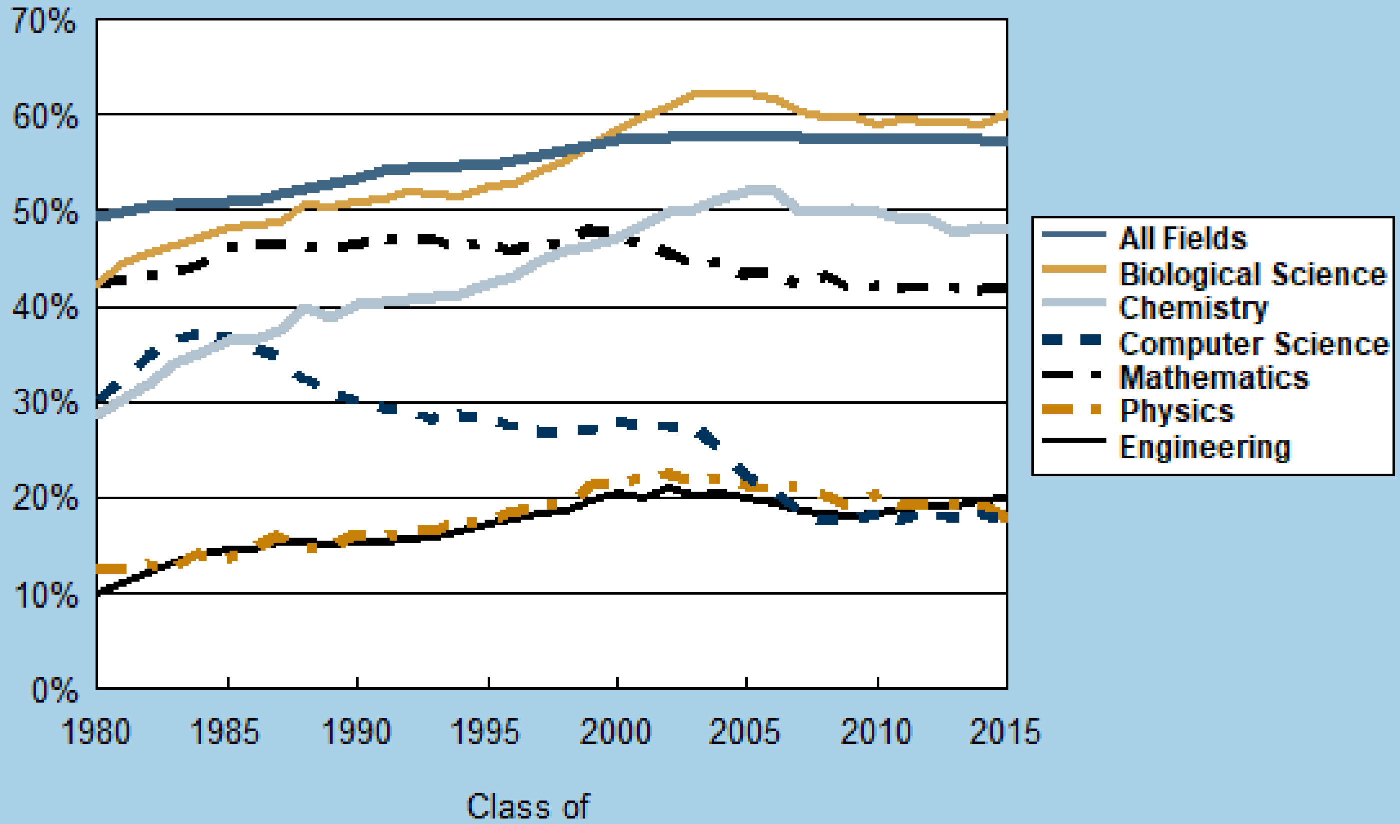
Number of Bachelor's Degrees Earned in Physics, Classes 1981 through 2016.



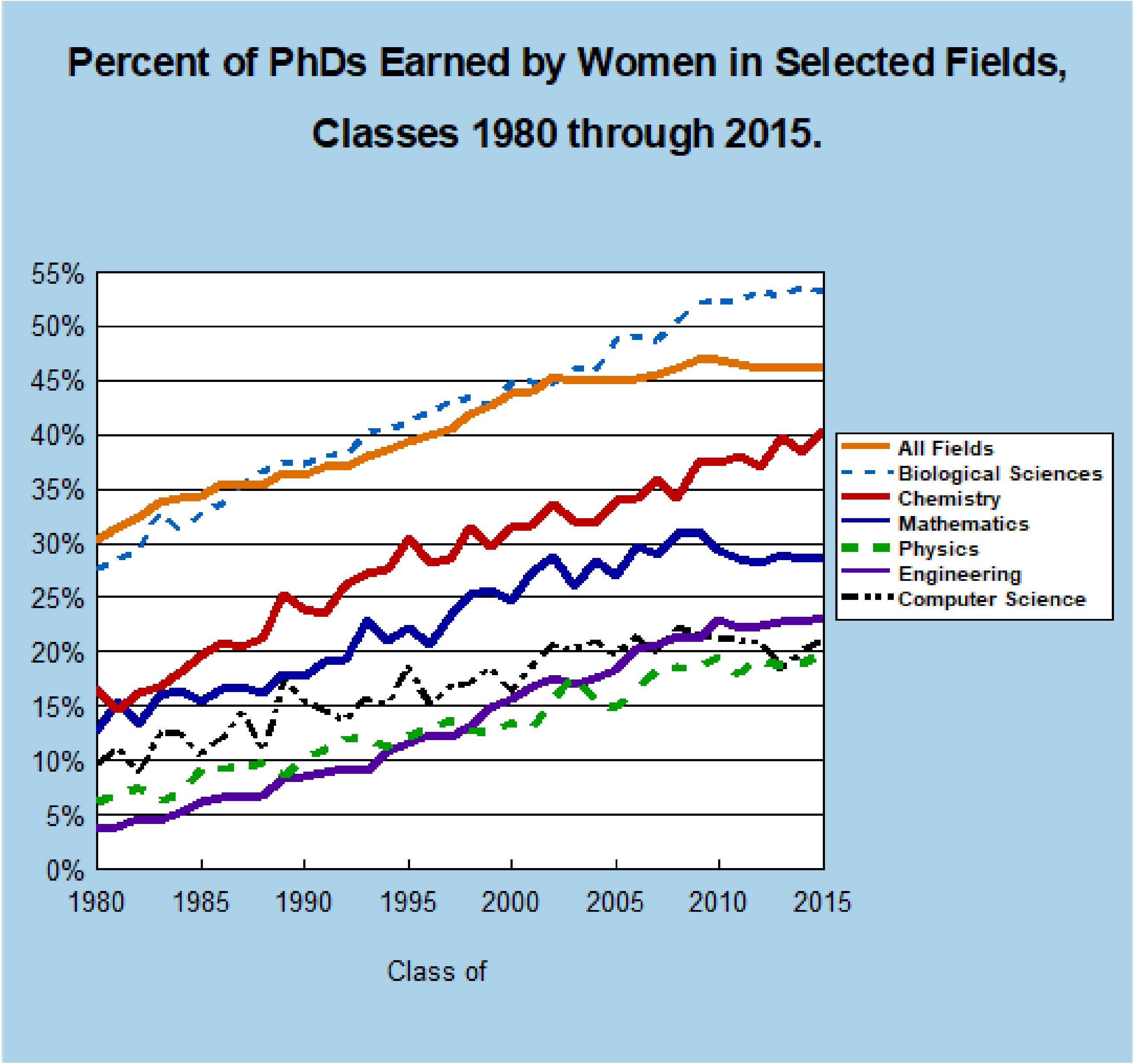
Number of PhDs Earned in Physics 1972 - 2016.



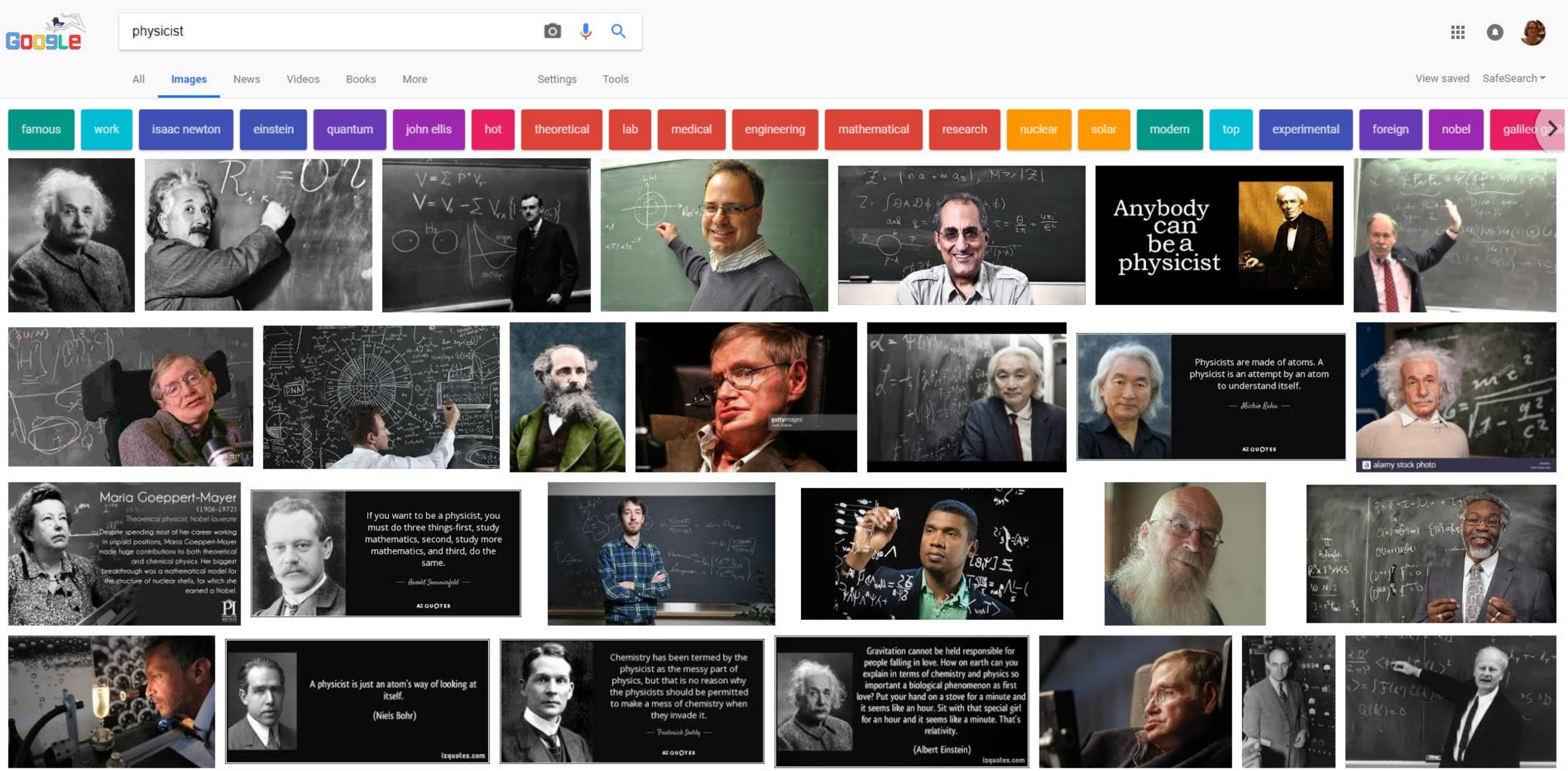
Percent of Bachelor's Degrees Earned by Women in Selected Fields, Classes 1980 through 2015.



National Center for Education Statistics. Compiled by AIP Statistical Research Center.



Percent of PhDs Earned by Women in Selected Fields,
Classes 1980 through 2015.
55%
50%
45%
40%
35%
30%
25%
20%
15%
10%
5%
0%
1980
1985
1990
1995
2000
2005
2010
2015
Class of
All Fields
Biological Sciences
Chemistry
Mathematics
Physics
Engineering
Computer Science


physicist
All
Images
News
Videos
Books
More
Settings
Tools
View saved
SafeSearch
famous
work
isaac newton
einstein
quantum
john ellis
hot
theoretical
lab
medical
engineering
mathematical
research
nuclear
solar
modern
top
experimental
foreign
nobel
Anybody can be a physicist
Physicists are made of atoms. A physicist is an attempt by an atom to understand itself.
— Michio Kaku —
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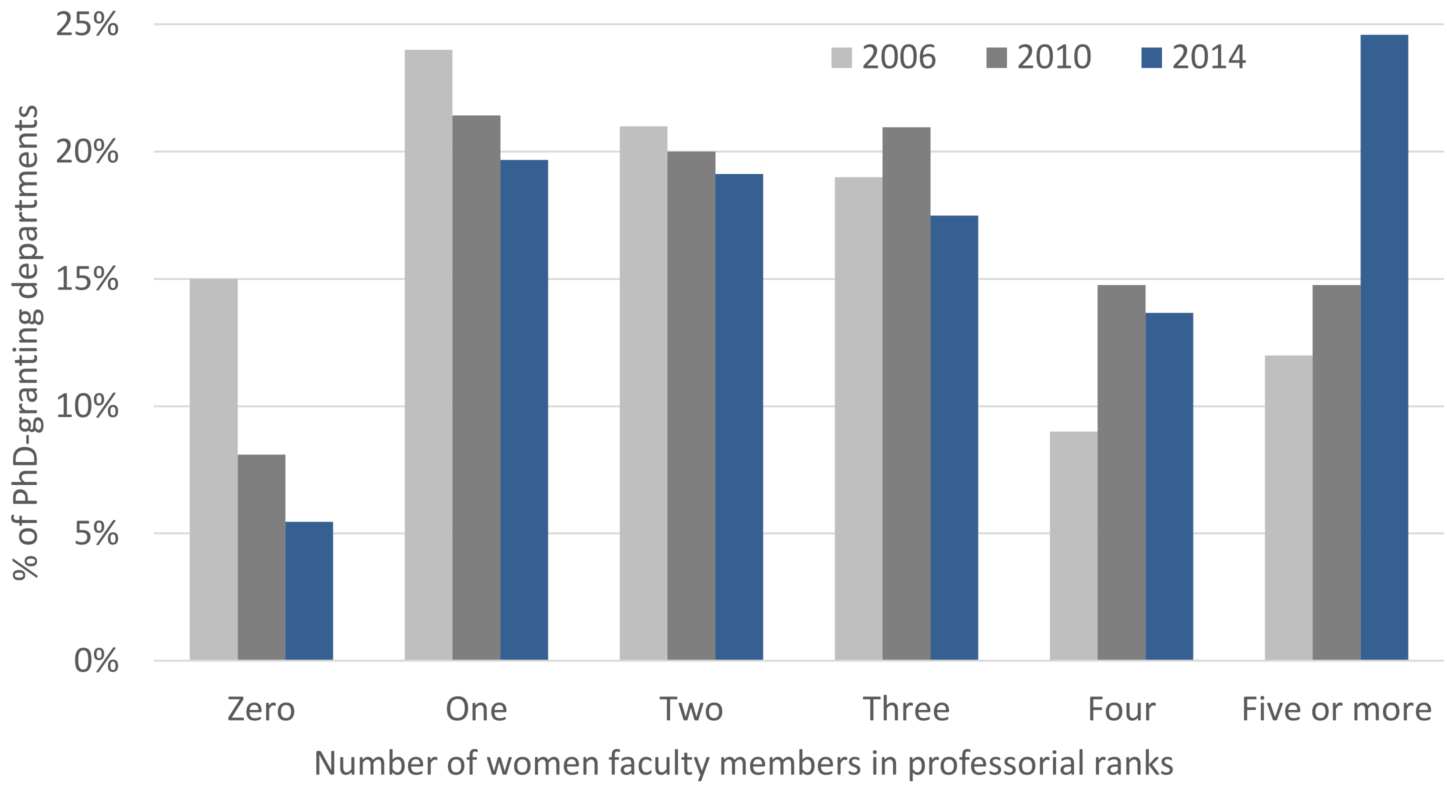
Maria Goeppert-Mayer
(1906-1972)
Theoretical physicist, Nobel laureate
Despite spending most of her career working in unpaid positions, Maria Goeppert-Mayer made huge contributions to both theoretical and chemical physics. Her biggest breakthrough was a mathematical model for the structure of nuclear shells, for which she earned a Nobel.
If you want to be a physicist, you must do three things-first, study mathematics, second, study more mathematics, and third, do the same.
— Arnold Sommerfeld —
AZ QUOTES
A physicist is just an atom's way of looking at itself.
(Niels Bohr)
izquotes.com
Chemistry has been termed by the physicist as the messy part of physics, but that is no reason why the physicists should be permitted to make a mess of chemistry when they invade it.
— Frederick Soddy —
AZ QUOTES
Gravitation cannot be held responsible for people falling in love. How on earth can you explain in terms of chemistry and physics so important a biological phenomenon as first love? Put your hand on a stove for a minute and it seems like an hour. Sit with that special girl for an hour and it seems like a minute. That's relativity.
(Albert Einstein)
izquotes.com

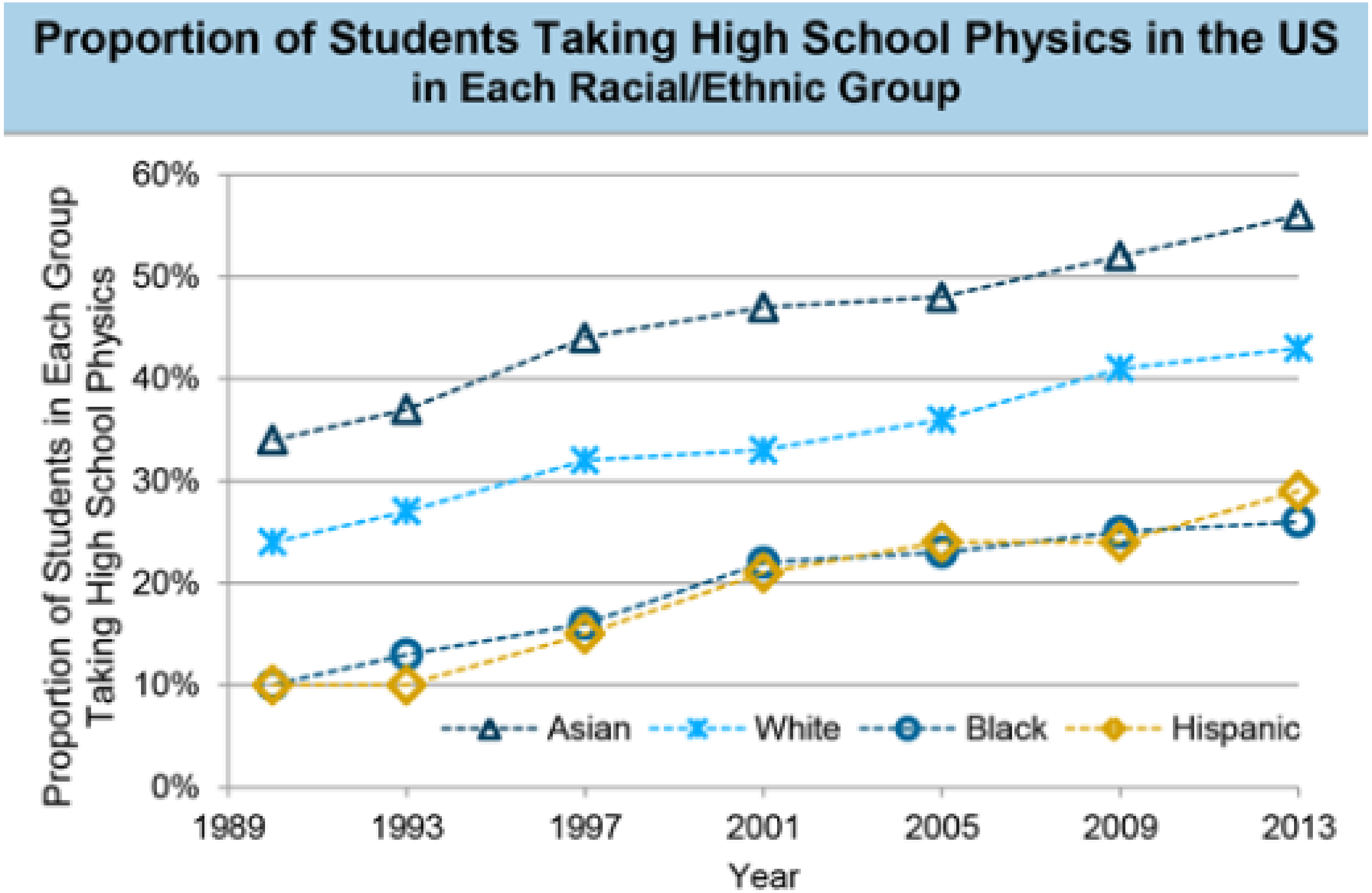
PERCENTAGE OF PHYSICS FACULTY MEMBERS WHO ARE WOMEN

	2002	2006	2010	2014
RANK				
FULL PROFESSOR	5	6	8	10
ASSOCIATE PROF	11	14	15	18
ASSISTANT PROF	16	17	22	23
INSTRUCTOR/ADJUNCT	16	19	21	23
OTHER RANKS	15	12	18	20
HIGHEST DEGREE OFFERED				
PHD	7	10	12	14
MASTER'S	13	15	15	18
BACHELOR'S	14	15	17	20
OVERALL	**10**	**12**	**14**	**16**

PHD-GRANTING PHYSICS DEPARTMENTS BY NUMBER OF WOMEN FACULTY MEMBERS IN PROFESSORIAL RANKS



UNDER-REPRESENTED MINORITIES

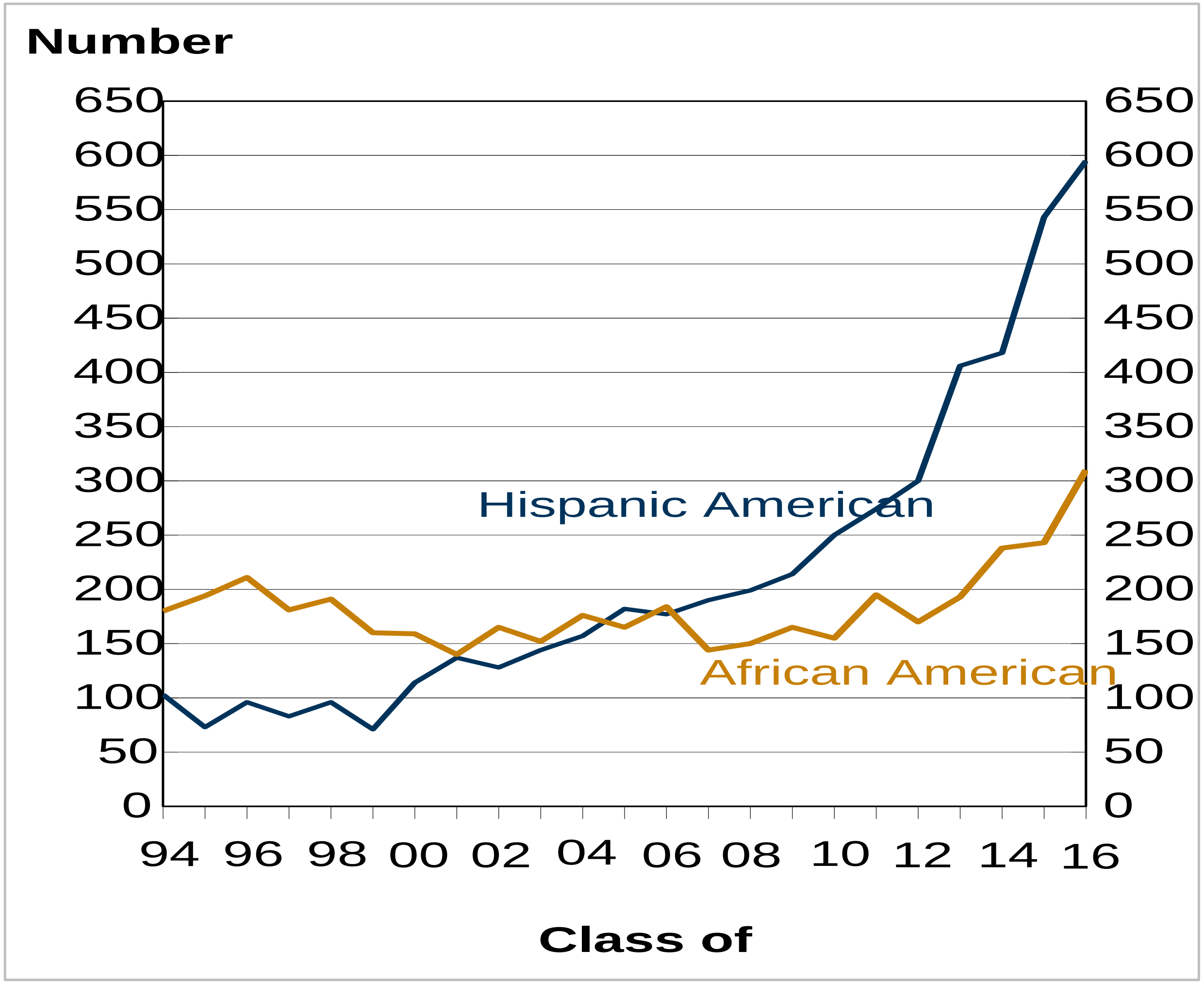


A closer examination of the data reveals that these differences are likely driven more by socioeconomic factors than by race.

RACE AND ETHNICITY OF PHYSICS BACHELORS CLASSES OF 2014 THROUGH 2016 (3-YEAR AVERAGE)

	Number	Percent of all Physics Bachelors
White	5,943	74
Asian American	551	7
Hispanic American	518	7
African American	253	3
Other US citizens	166	2
Non-US citizens	575	7
Total	8,006	100

Number of Physics Bachelor's Degrees Earned by African-Americans and Hispanic-Americans, Classes of 1994 through 2016.

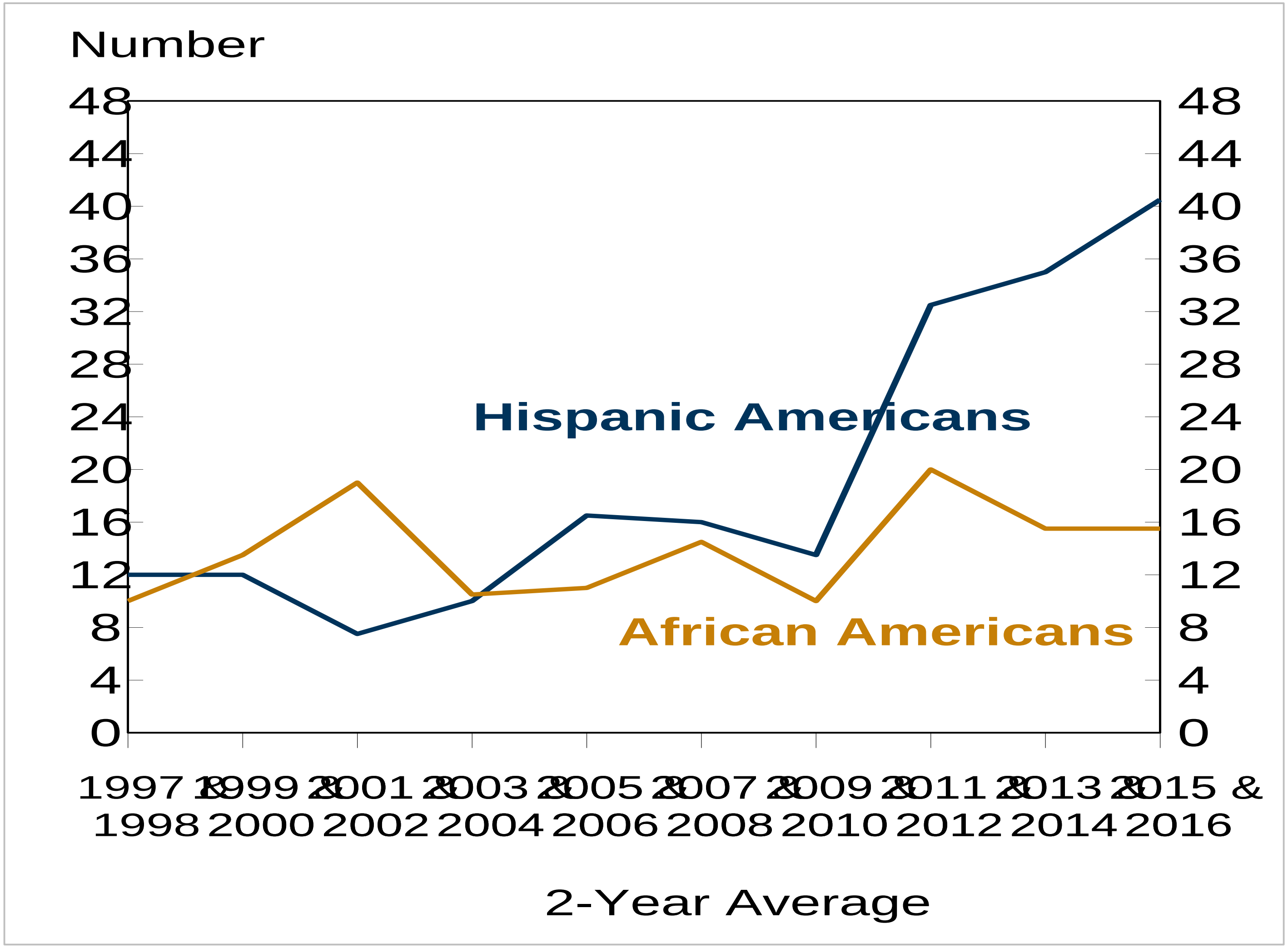


RACE AND ETHNICITY OF PHYSICS PHDS, CLASSES OF 2014 THROUGH 2016 (3-YEAR AVERAGE)

	Number	Percent of all Physics PhDs	Percent of U.S. Physics PhDs*
White	843	46	87
Asian American	57	3	6
Hispanic American	38	2	4
African American	16	1	2
Other US citizens	12	1	1
Non-US citizens	861	47	-
Total	1,827	100	100

*Based on a 3-year average of 966 US citizens.

Number of Physics Doctorates Earned by African-Americans And Hispanic-Americans, Classes of 1997 through 2016.

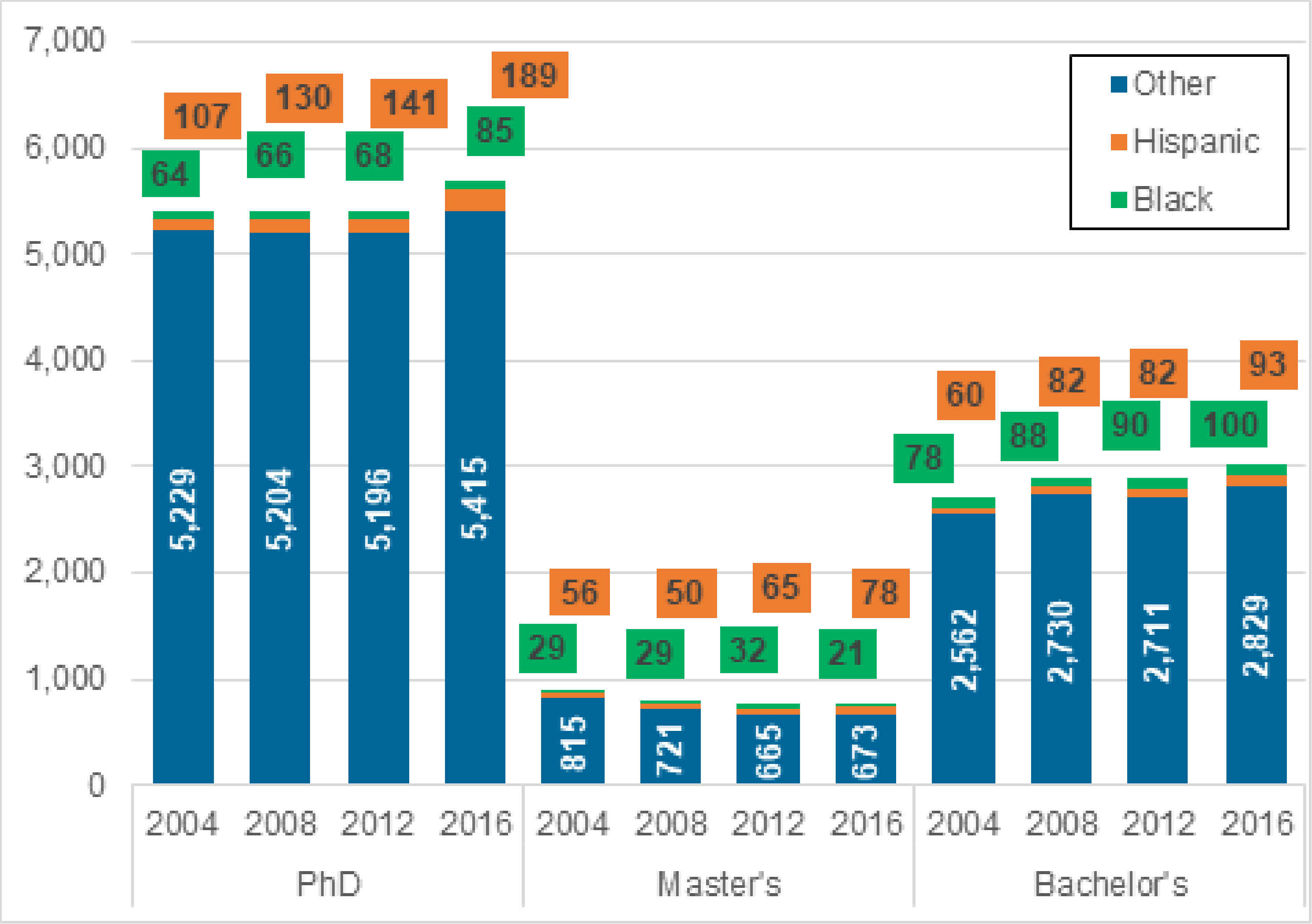


Race and Ethnicity of Physics Faculty Members, 2004-2016

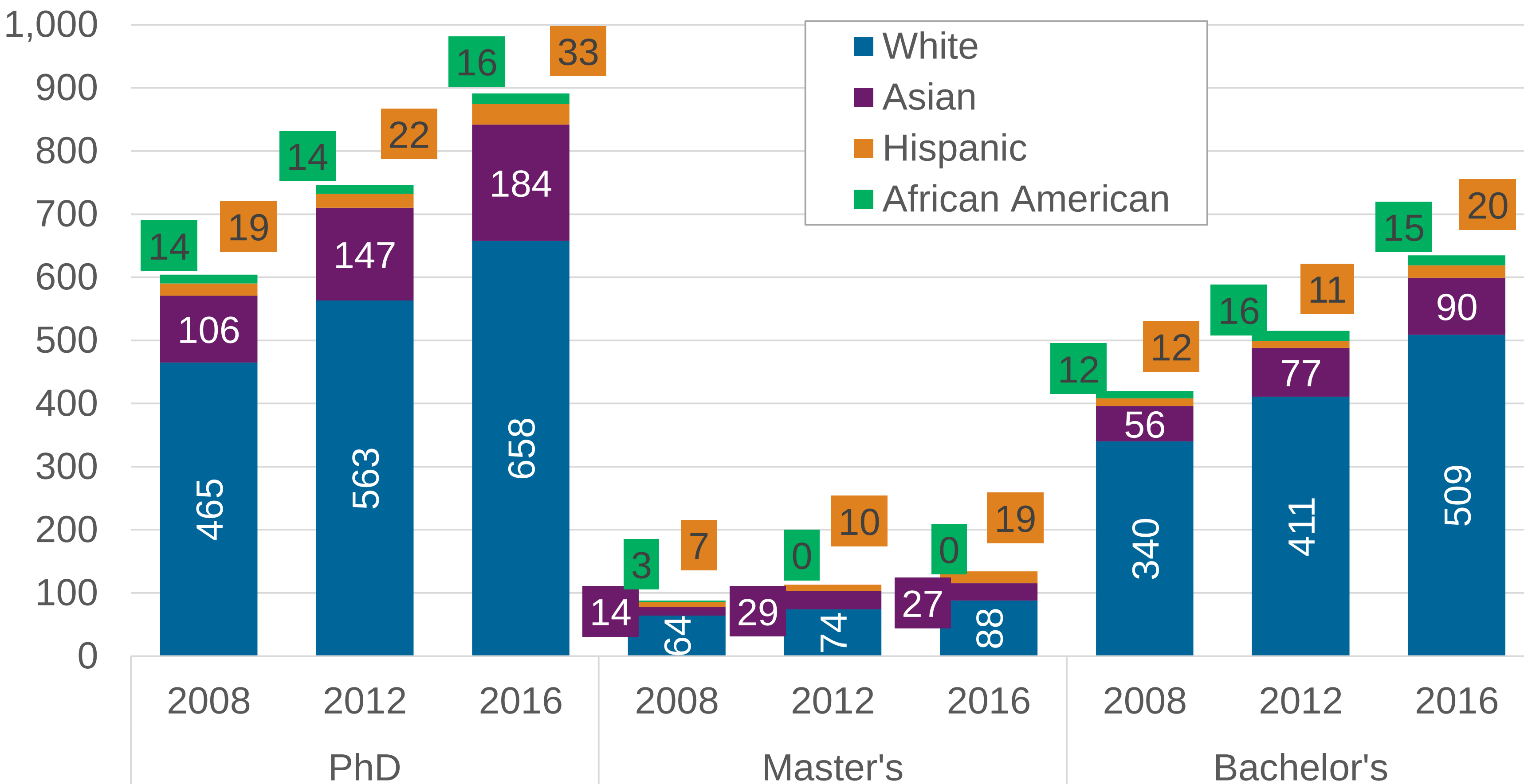
	Physics				All Disciplines*
	2004 (%)	2008 (%)	2012 (%)	2016 (%)	2015 (%)
African-American	2	2.2	2.1	2.5	6
Asian	10.6	13.2	14.3	15.2	10
Hispanic	2.7	3.1	3.2	3.8	4
White	82.2	80	79.2	76.3	77
Other	2.2	1.5	1.2	2.3	<2

*Data for all disciplines (including non-science disciplines) is located at:
https://nces.ed.gov/fastfacts/display.asp?id=61

Number of African-American and Hispanic Physics Faculty by Highest Degree Awarded by Department, 2004-2016



Number of Women in Physics and Astronomy Departments by Highest Degree Awarded, 2008-2016



Number of Physics Departments with African-American and Hispanic Faculty by Highest Degree Awarded, 2016

Number of Departments that have …	PhD	Master's	Bachelor's	Total
Both African-American and Hispanic Faculty	25	7	3	45
African-American Faculty and no Hispanic Faculty	25	8	53	86
Hispanic Faculty and no African-American Faculty	75	20	61	156
Neither African-American nor Hispanic Faculty	76	22	365	463
Total	202	56	492	750

WILL INCREASING REPRESENTATION FIX EVERYTHING?

- Data should be collected on other important areas
  - Workplace environment
  - Salary
- Even with equal representation, some groups could have limited access to resources and opportunities

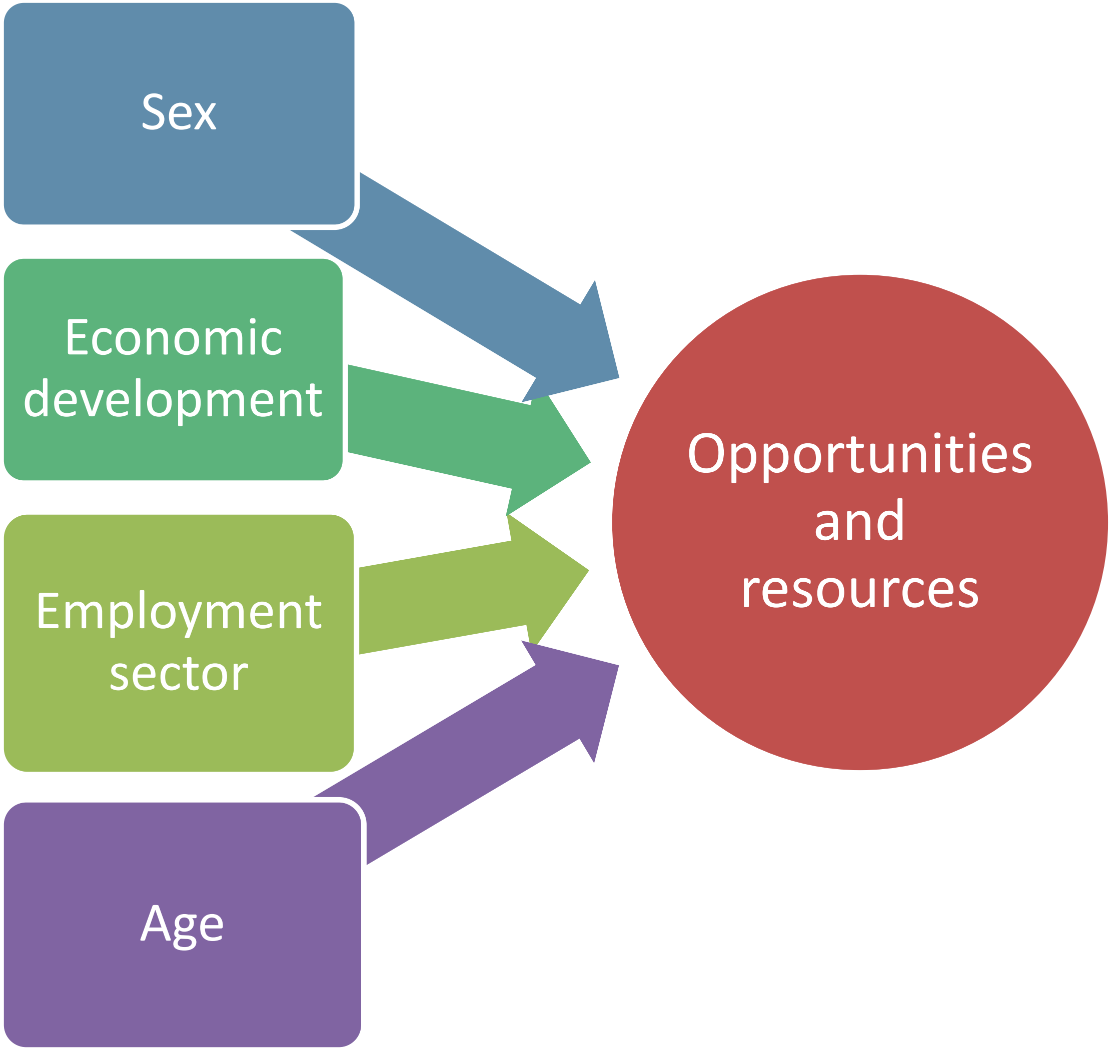
PHD+10 (TO 15) STUDY

- PhD classes of 1996, 1997, 2000, & 2001
  - Who lived in the US during 2011
  - 1,544 respondents
  - 45% response rate
- Salary regression showed that men make more than women
  - ~6% more (p = 0.025)
  - Controlling for employment sector, time since degree, whether respondent had stayed with same employer, whether or not respondent had take a postdoc, highest degree the department offers (academic only)

Global survey of Physicists, 2009-2010

- About 15,000 respondents from 130 countries
- Conducted in 8 languages
- Separate results for Canada

  https://www.aip.org/statistics/reports/there-land-equality-physicists


Sex
Economic development
Employment sector
Age
Opportunities and resources

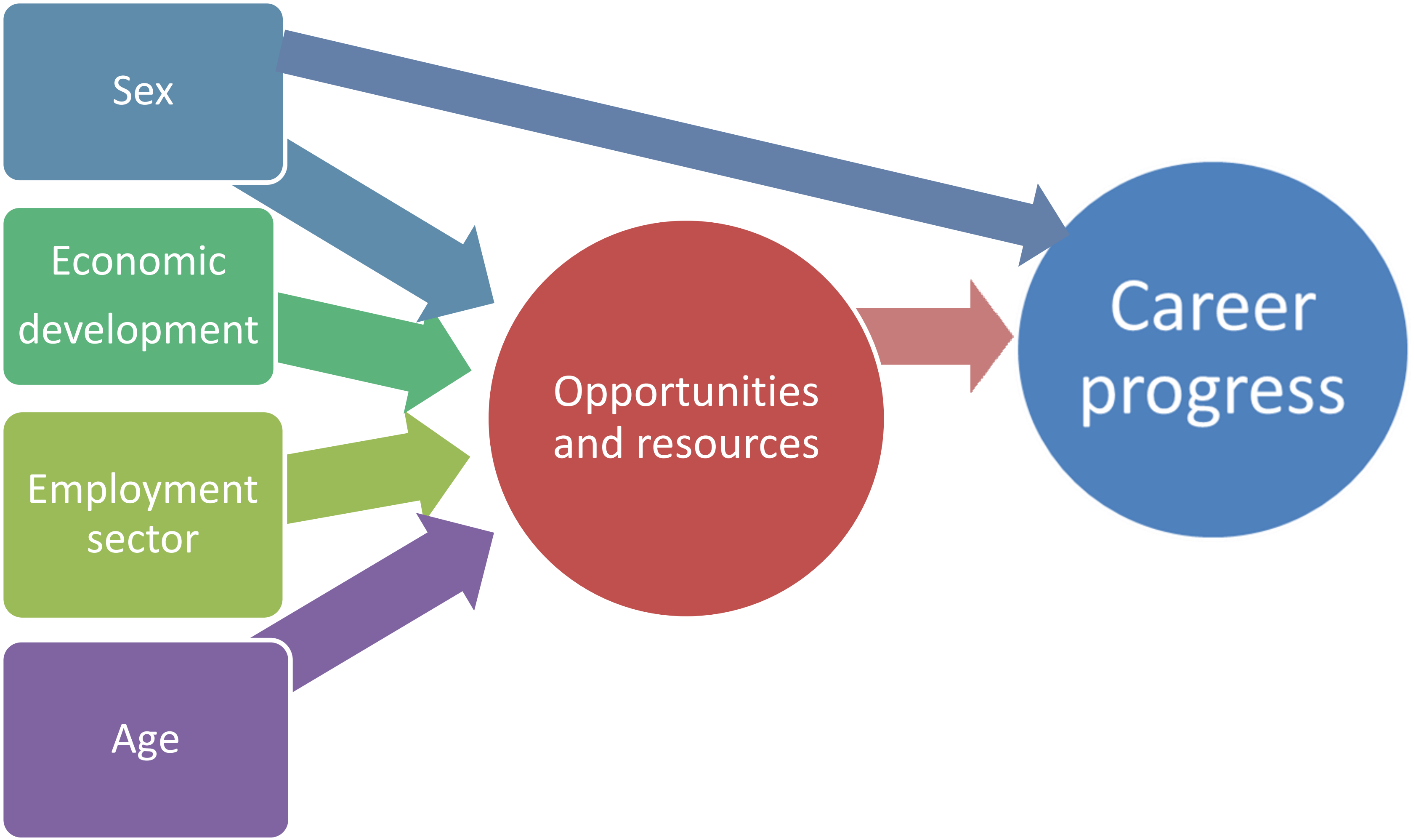
Percentage of respondents with access to key resources

	Less Developed		Very Highly Developed	
	Women	Men	Women	Men
Funding	34	51	52	60
Office space	64	74	72	77
Lab space	42	47	46	52
Equipment	42	49	58	64
Travel money	31	47	57	64
Clerical support	22	38	30	43
Employees or students	42	53	33	43

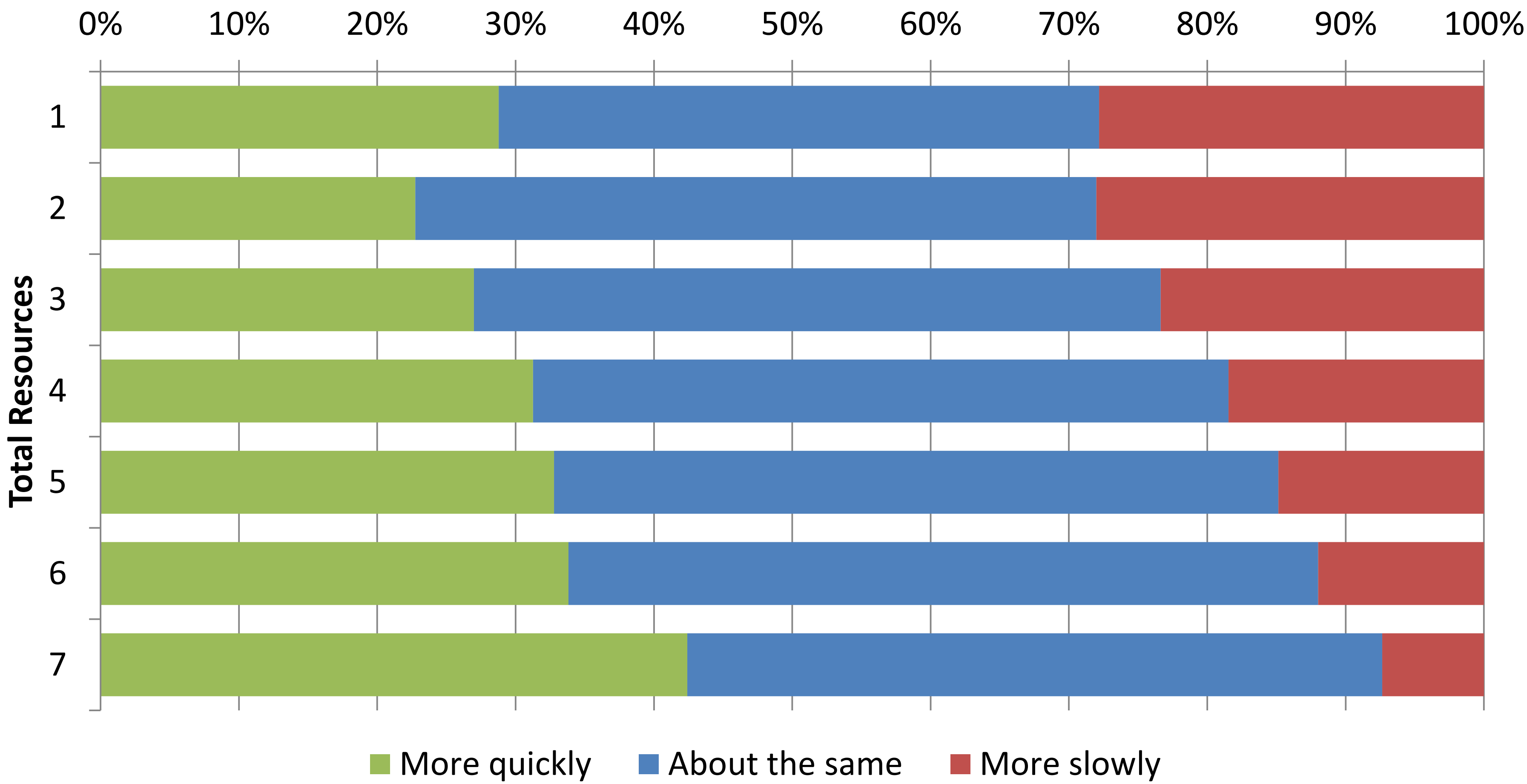
% of R's w/ career-advancing opportunities

% Yes	Less Developed		Very Highly Developed	
	Women	Men	Women	Men
Given a talk at a conference as an invited speaker	51	67	58	73
Attended a conference abroad	75	81	83	87
Conducted research abroad	54	71	61	69
Acted as a boss or manager	38	53	46	61
Served as editor of a journal	16	24	11	19
Served on committees for grant agencies	22	37	26	36
Served on important committees at your institute or company	50	62	48	60
Served on an organizing committee for a conference in your field	48	59	48	55
Advised undergraduate students	82	84	69	74
Advised graduate students	63	77	58	70
Served on thesis or dissertation committees (not as an advisor)	52	66	37	52

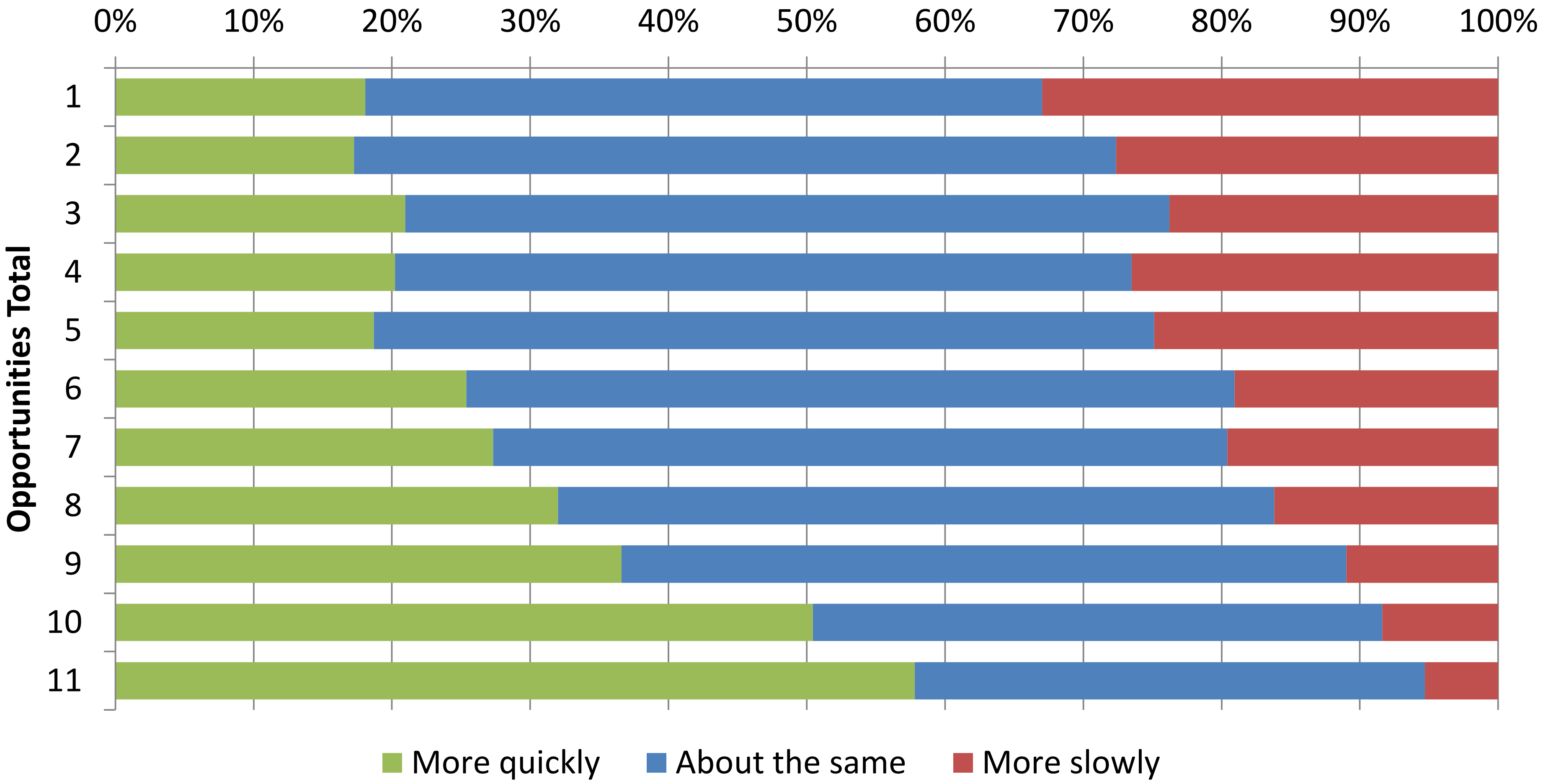
Global Survey of Physicists

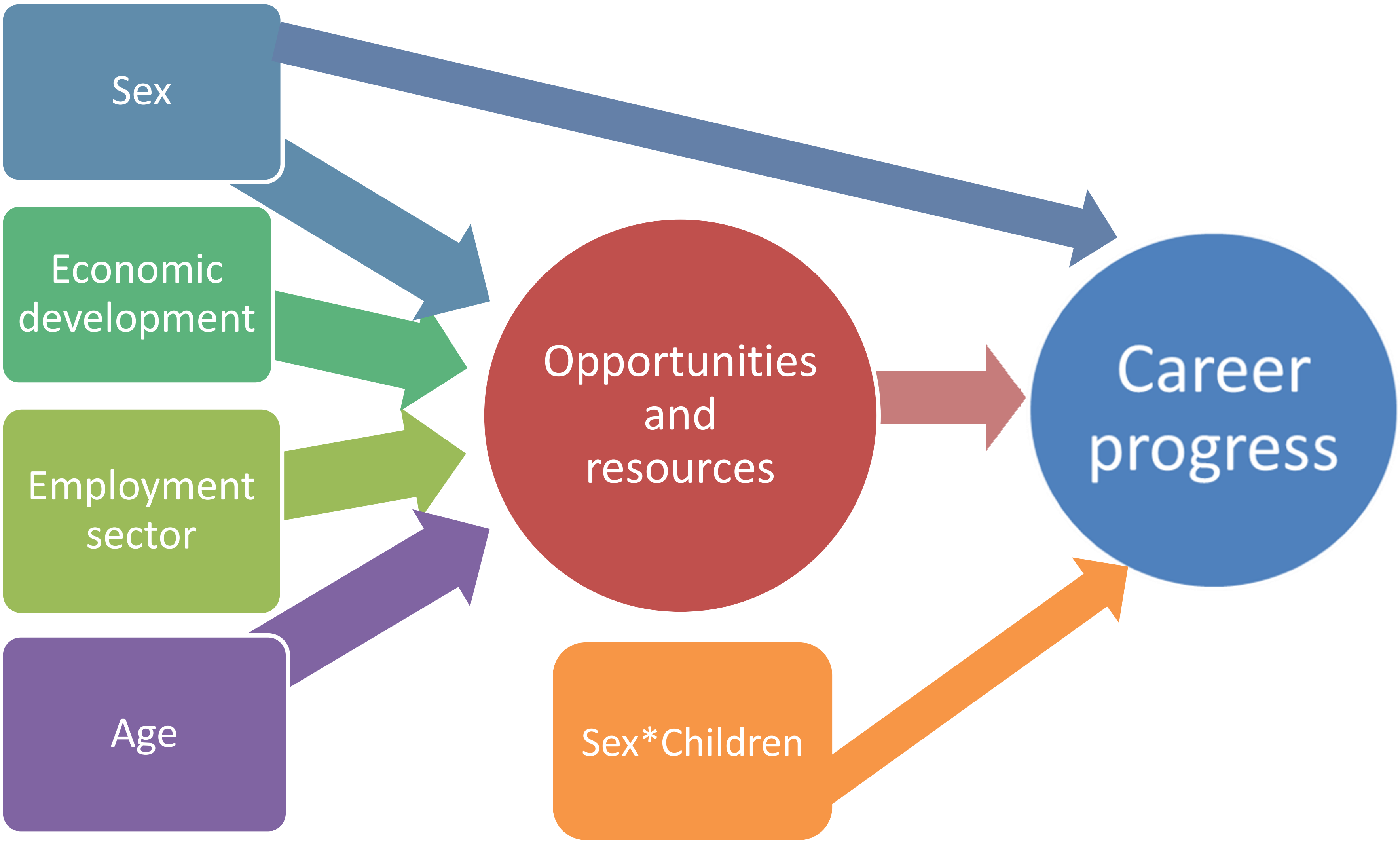


Relationship between career progress and resources

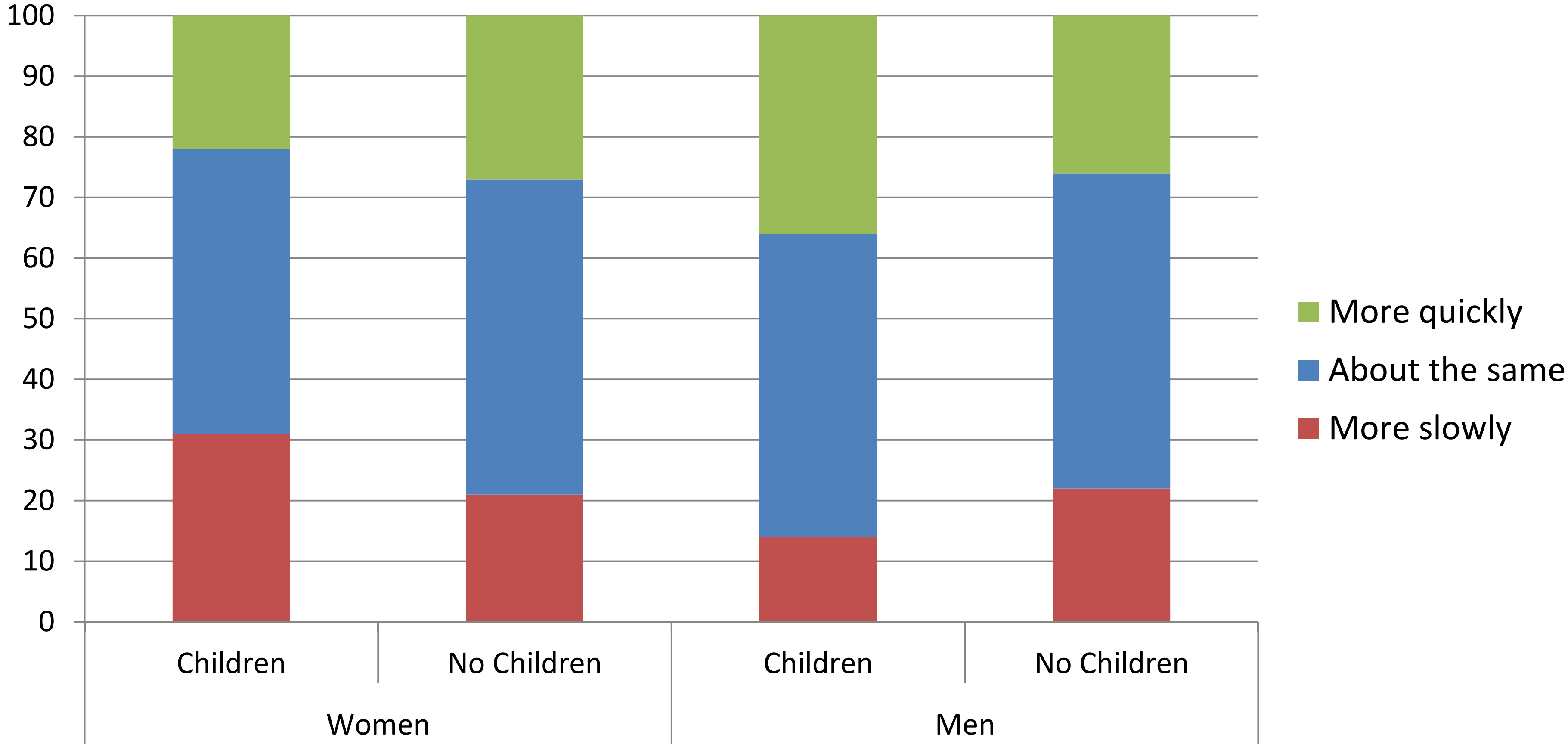


Relationship between career progress and opportunities




Sex
Economic development
Employment sector
Age
Opportunities and resources
Career progress
Sex*Children

Compared to colleagues, how quickly have you progressed in your career?



LONGITUDINAL STUDY OF ASTRONOMY GRADUATE STUDENTS

- Result of Women in Astronomy Conference, 2003 in California, USA
- At that time, about 60% of younger members were women, and AAS wanted to know outcomes for these members.
- Would women have a higher attrition rate? Are women more likely to leave the field? If so, why?

LONGITUDINAL STUDY OF ASTRONOMY GRADUATE STUDENTS

- Partnership between American Institute of Physics and American Astronomical Society (AAS)
- Includes everyone who was in graduate school in astronomy or astrophysics in the US, 2006-07
- Data have been collected from the same cohort of people in order to document individual career paths
- Three waves of data have been collected:
  - 2007-08
  - 2012-13 *five years later*
  - 2015-16 *eight years later*

THIS ANALYSIS

- Second survey
- limited to people who
  - completed PhDs at the time of the 2nd survey
  - were not postdocs at the time of the surveys

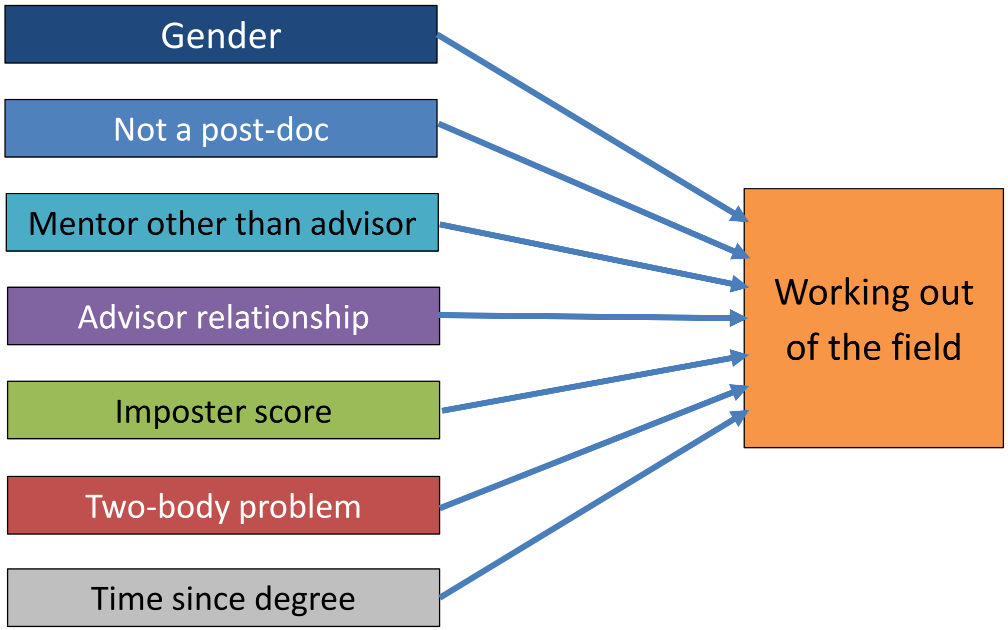
HYPOTHESIS

We hypothesized that women would be more likely to work outside of astronomy and physics. In other words, being female would have a *direct* effect on leaving the field, *independent* of other factors.

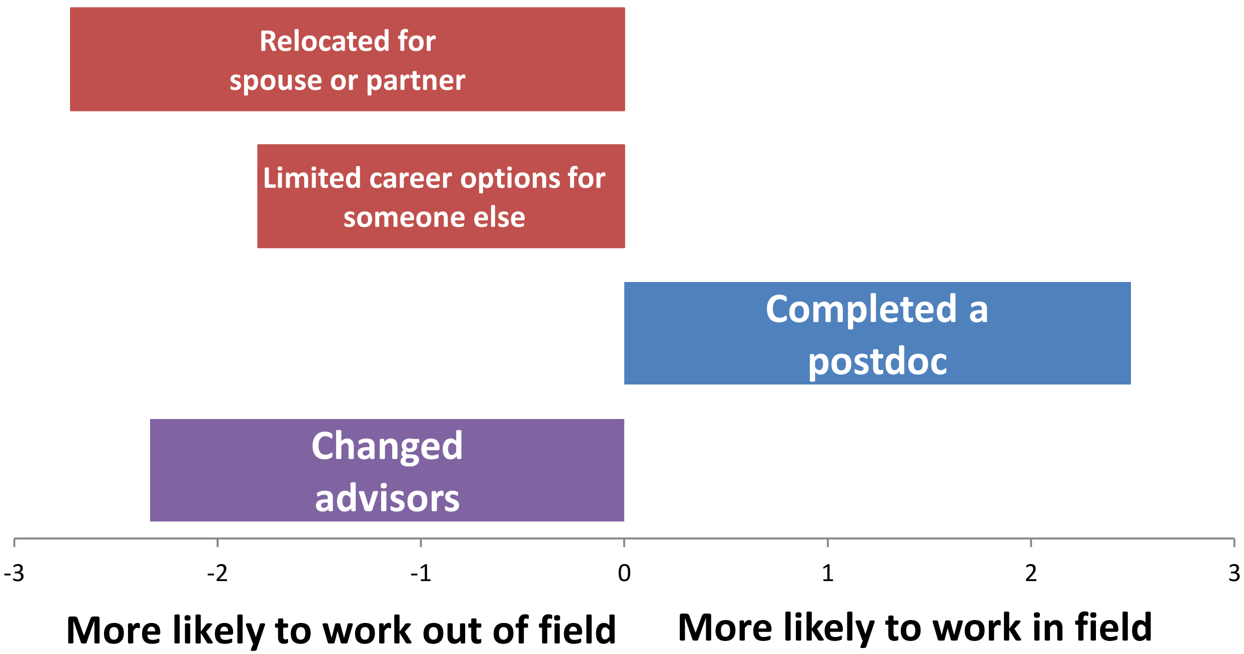
IS WORKING IN OR OUT OF FIELD AFFECTED BY

- Being male or female (40% female respondents)
- Taking a postdoc
- *Two-body problem (a work/family balance problem that refers to the difficulty of finding 2 jobs in same geographic area)*
- *Having a mentor other than advisor*
- *Relationship with advisor*
- *Imposter syndrome (at time of first survey)*
- Time since degree

SECOND SURVEY
DOES BEING MALE OR FEMALE INDEPENDENTLY AFFECT OTHER VARIABLES IN MODEL?



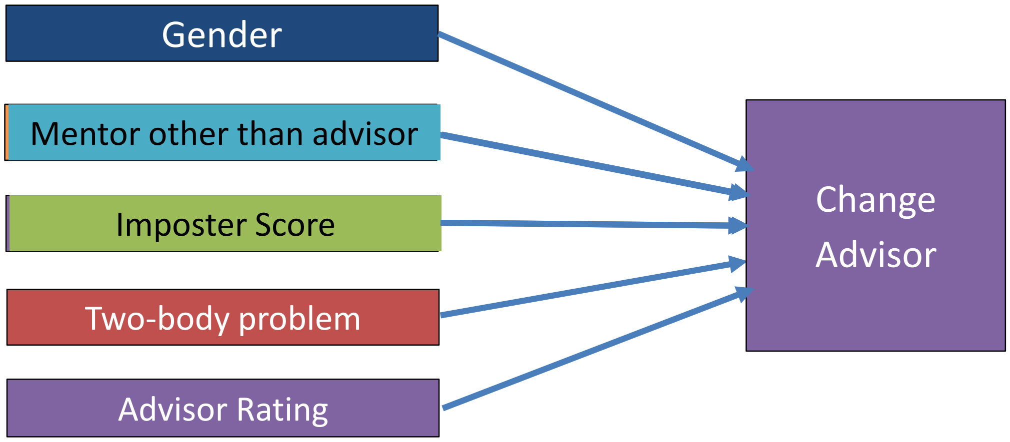
SECOND SURVEY FACTORS THAT INFLUENCE WORKING OUT OF FIELD



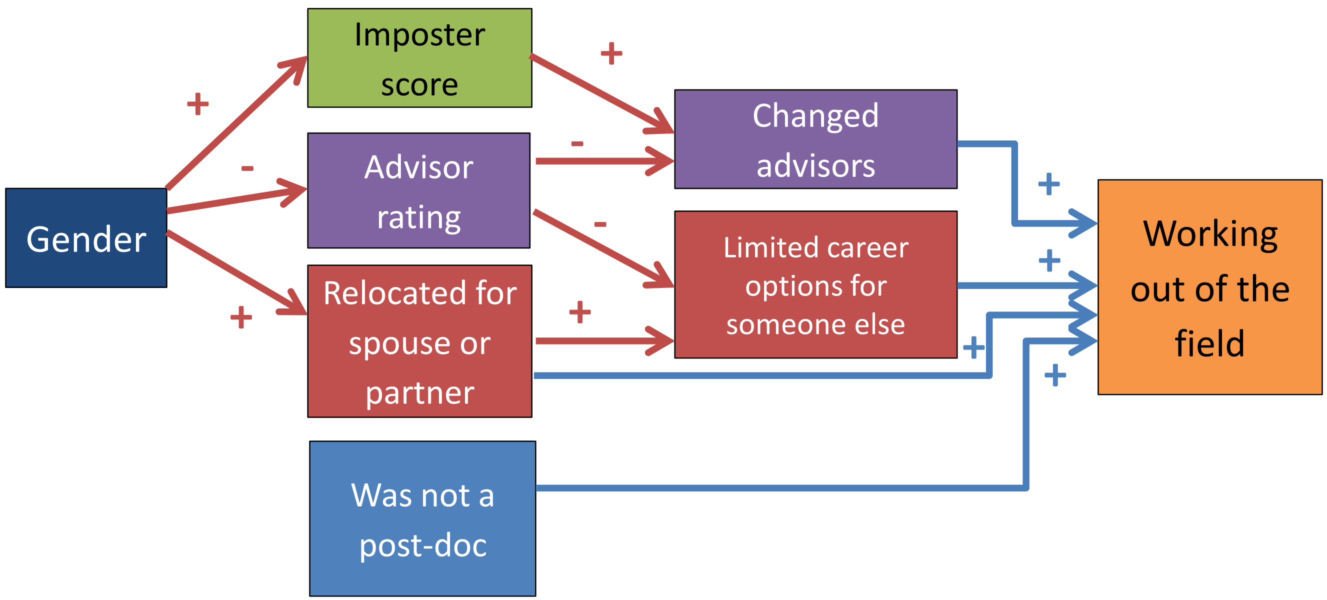
ANOTHER HYPOTHESIS

- There may be indirect effects of gender on working out of field.
- In other words, women may be more likely to have experiences that increase the likelihood of working out of field.

SECOND SURVEY
TESTING INDIRECT EFFECTS OF GENDER
EXAMPLE OF ONE MODEL



SECOND SURVEY
THE INDIRECT EFFECT OF GENDER ON WORKING OUT OF FIELD



CONCLUSIONS FROM SECOND SURVEY

- We hypothesized that women would be more likely to work outside of astronomy and physics. In other words, being female would have a direct effect on leaving the field, independent of other factors.
- However, there is no direct effect of being female on working outside the field. The effect of being female comes through other factors.
- Women may be more likely to leave astronomy because
  - Women are more likely to report less than satisfactory advising.
  - Women are more likely to report two-body problems related to the need to find two jobs in the same geographic area for a spouse or partner.

WHAT IS AIP DOING ABOUT THE REPRESENTATION OF OTHER UNDER-REPRESENTED GROUPS?

- AIP formed a task force on African Americans in undergraduate physics.
- We will be doing a survey of students, interviews, encouraging departments to collect data, site visits, and case studies.
- This will lead to recommendations for increasing the number of African Americans earning physics bachelor's degrees.

Thanks to my colleagues Susan White and Patrick Mulvey

For more information

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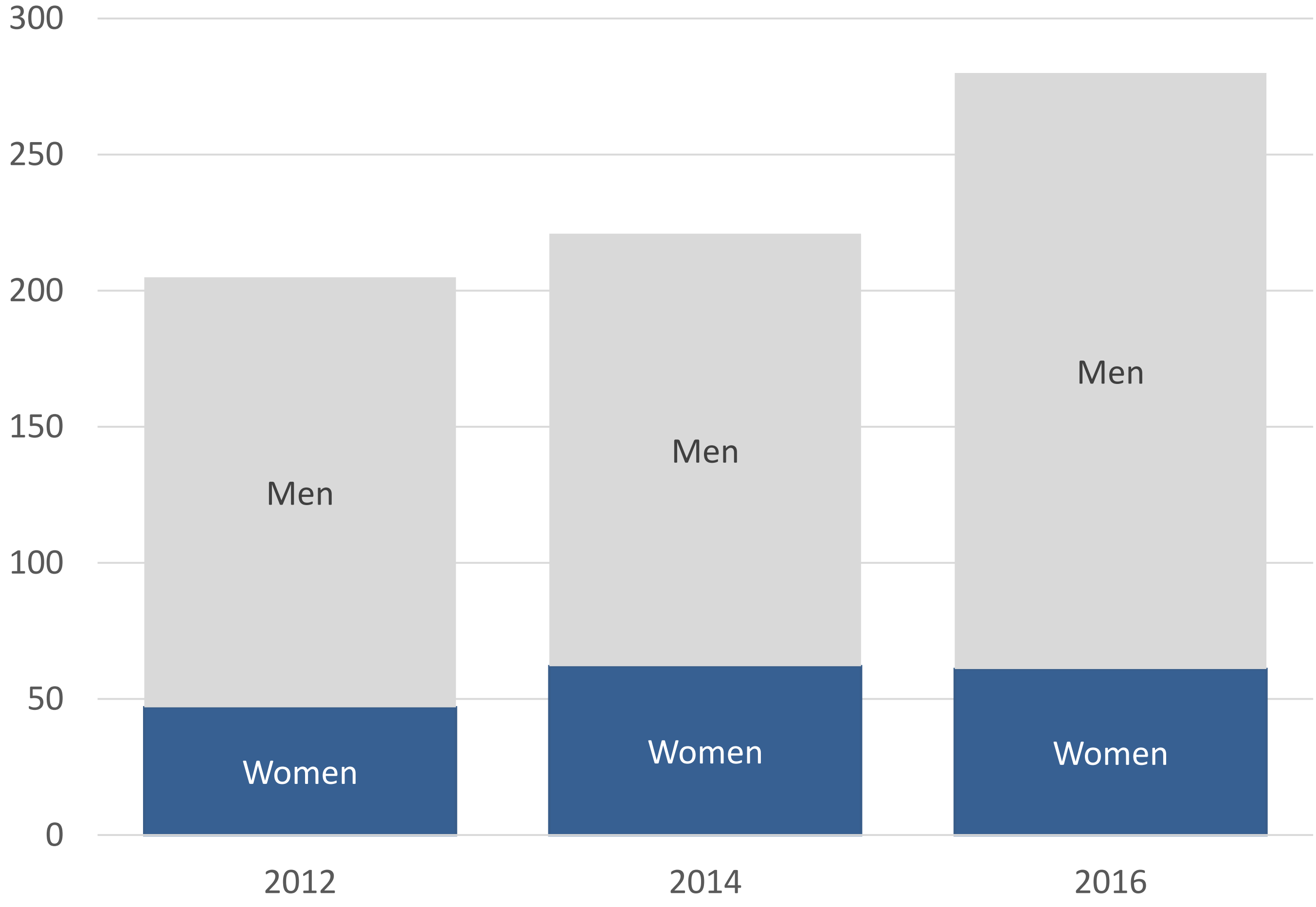
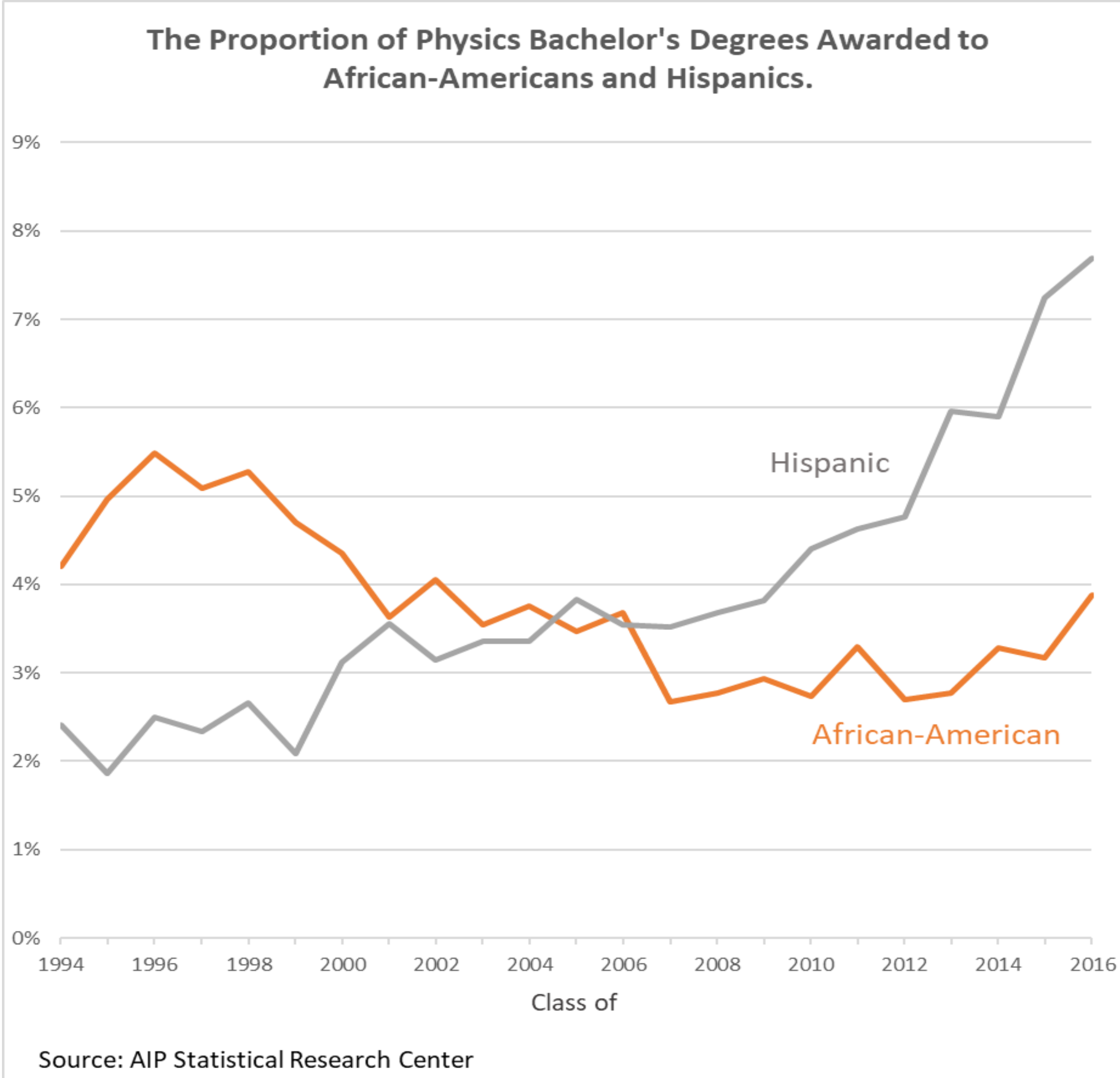
NEWLY-HIRED TENURE-TRACK FACULTY MEMBERS IN PHYSICS DEPARTMENTS



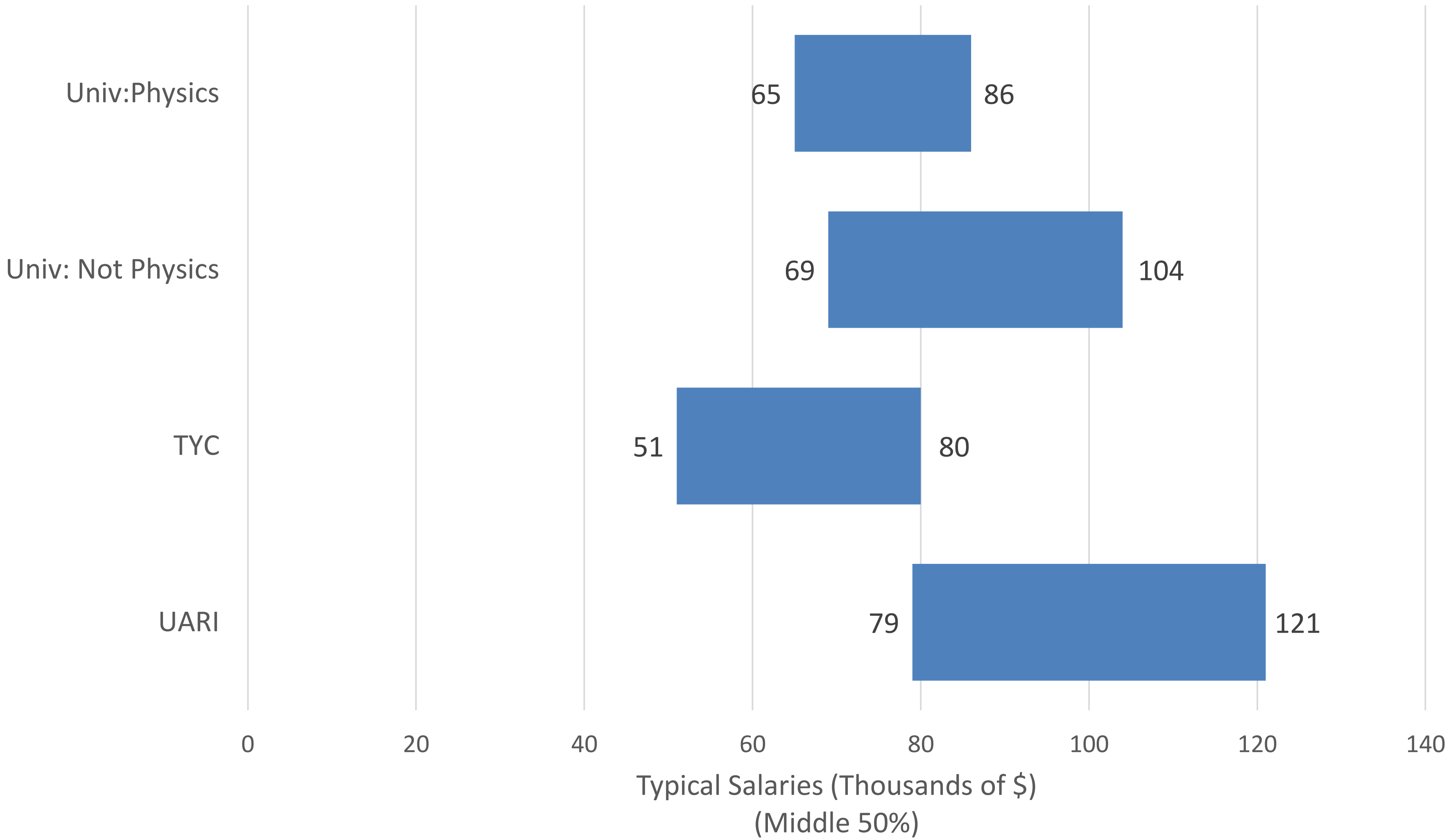
DEPARTMENTS AVERAGING 3 OR MORE AFRICAN-AMERICAN PHYSICS BACHELORS PER YEAR, CLASSES OF 2014 THROUGH 2016

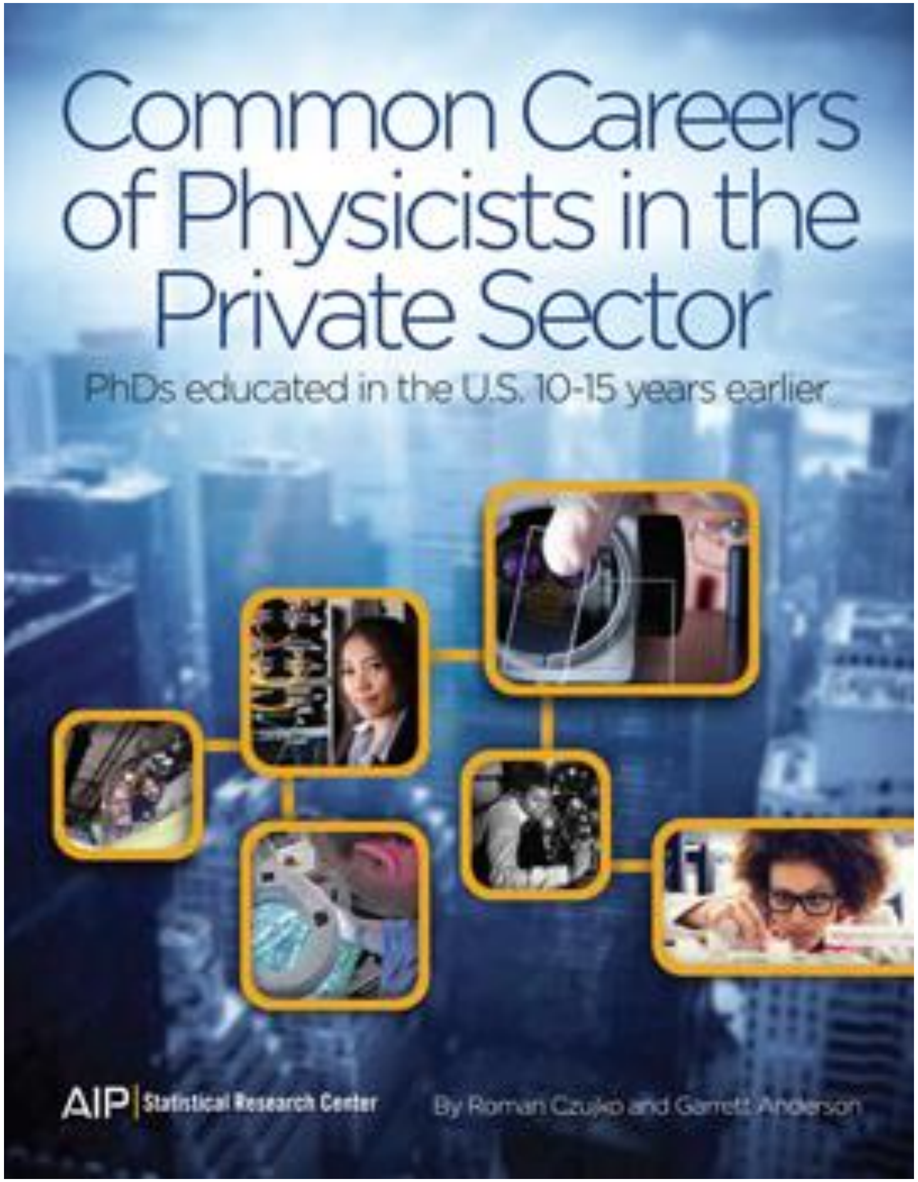
	Annual Average
Morehouse College (GA)*	8
U of Maryland, College Park	6
Delaware State U*	5
Dillard U (LA)*	5
Howard U (DC)*	4
Jackson State U (MS)*	4
North Carolina A&T State U*	4
Spelman College (GA)*	4
Tuskegee U (AL)*	4
Xavier U (LA)*	4
Florida A&M U*	3
Hampton U (VA)*	3
Norfolk State U (VA)*	3

*Historically Black College and University. List includes only those departments that contributed degree data for all 3 years.


The Proportion of Physics Bachelor's Degrees Awarded to African-Americans and Hispanics.
9%
8%
7%
6%
5%
4%
3%
2%
1%
0%
1994
1996
1998
2000
2002
2004
2006
2008
2010
2012
2014
2016
Class of
Hispanic
African-American
Source: AIP Statistical Research Center

Academic Salaries




Common Careers of Physicists in the Private Sector
PhDs educated in the U.S. 10-15 years earlier
AIP | Statistical Research Center
By Roman Czujko and Garrett Anderson

PRIMARY TYPES OF CAREERS IN PRIVATE SECTOR

Top eight primary types of careers that mid-career physicists chose to pursue in the private sector:

–self-employed

–finance

–government contractors,

–primarily engaged in engineering

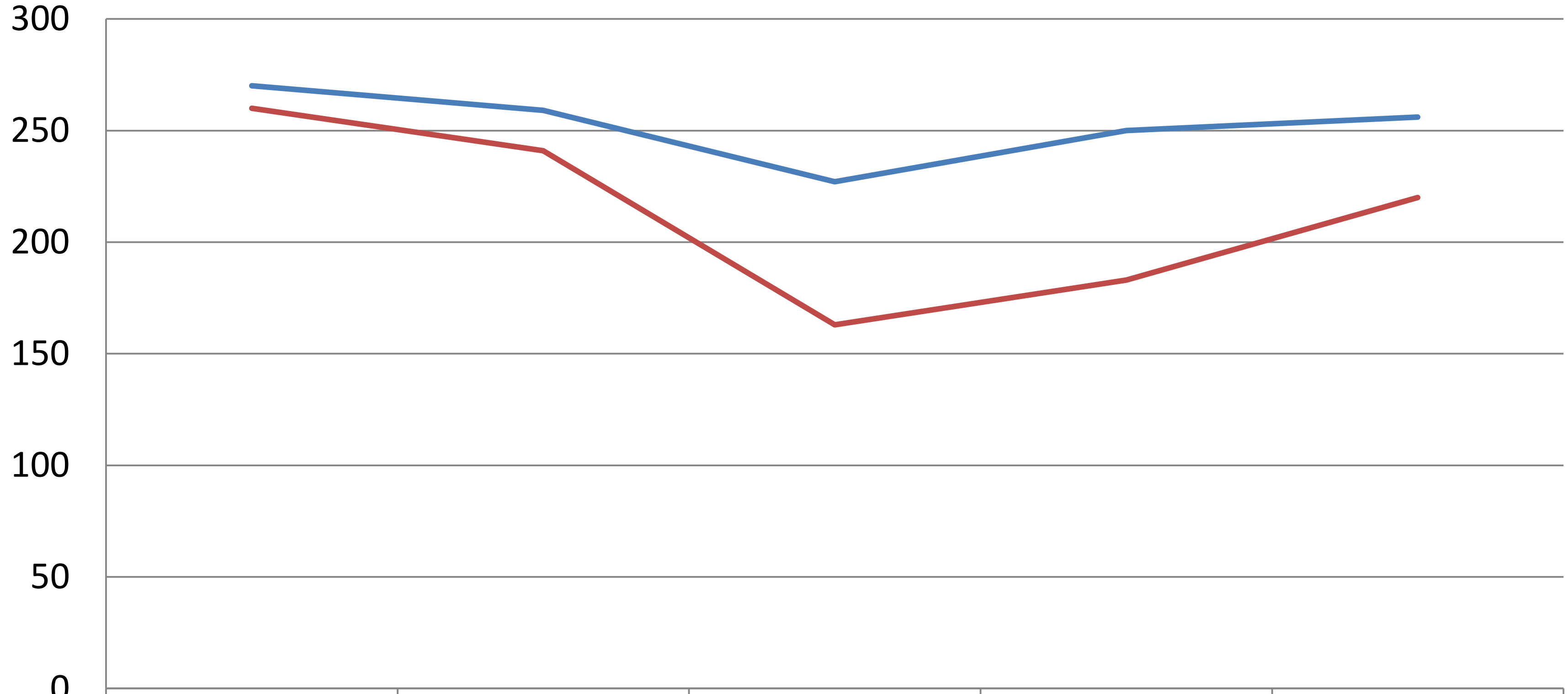
–primarily engaged in computer science

–primarily engaged in physics

–primarily engaged in other STEM fields

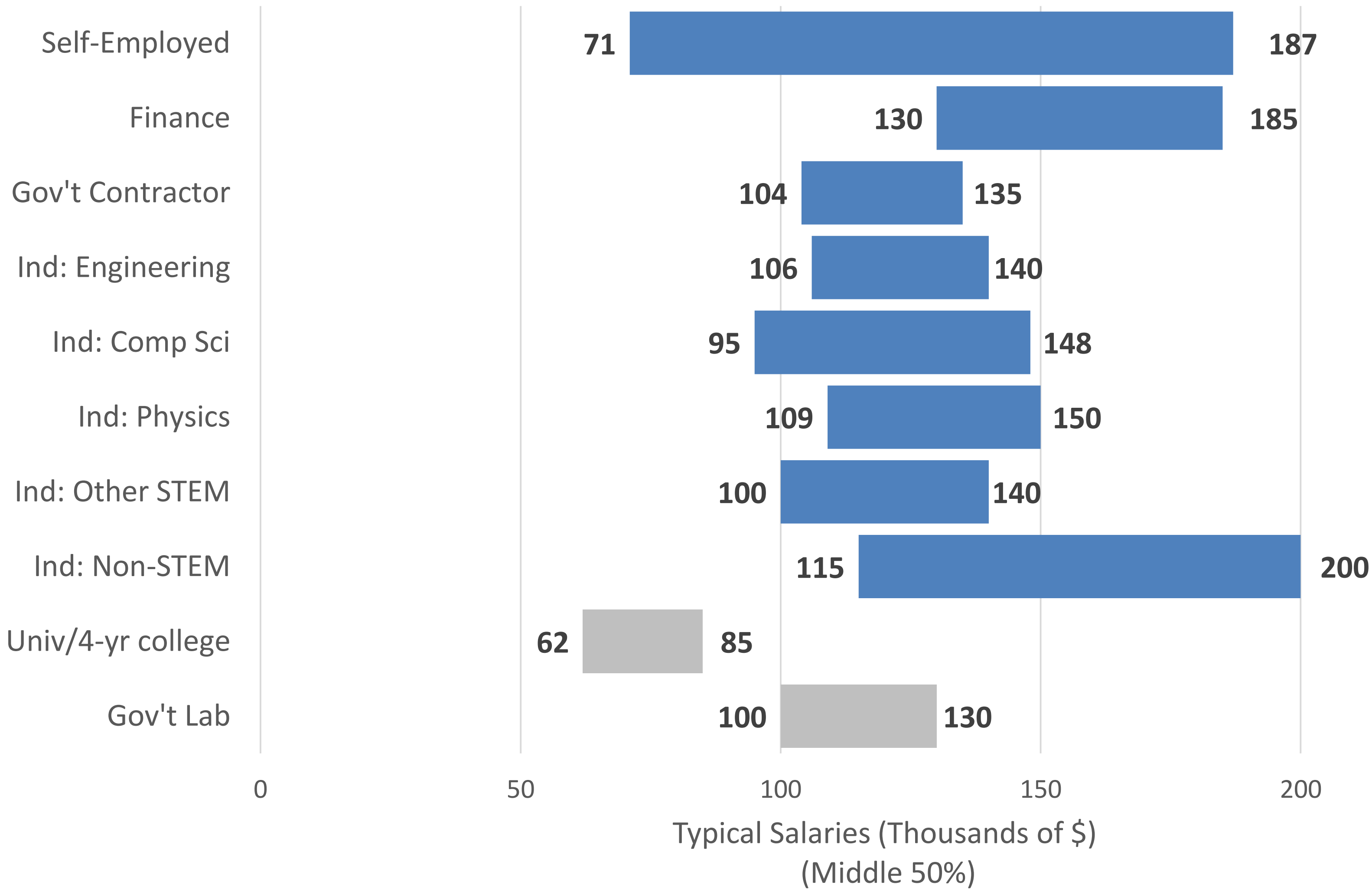
–not working in a STEM field.

Number of New Hires in Physics Departments



	2006	2008	2010	2012	2014
Bachelor's	270	259	227	250	256
PhD	260	241	163	183	220

Salaries


Self-Employed
71
187
Finance
130
185
Gov't Contractor
104
135
Ind: Engineering
106
140
Ind: Comp Sci
95
148
Ind: Physics
109
150
Ind: Other STEM
100
140
Ind: Non-STEM
115
200
Univ/4-yr college
62
85
Gov't Lab
100
130
0
50
100
150
200
Typical Salaries (Thousands of $)
(Middle 50%)

Highest Number of Physics Degrees Granted to Underrepresented Minorities (URM)

URM PhD Physics Degrees: PhD Degree Institutions 2011-2013

Institution	Average Degrees/Year
Stanford University	4
University of Michigan Ann Arbor	3
Massachusetts Institute of Technology	2
University of California Berkeley	2
California Institute of Technology	2
New Mexico State University Main Campus	2
Rice University	2
Texas A & M University College Station	2

Source: APS/IPEDS

roster

A publication of the AIP Statistical Research Center
September 2017

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Roster of Physics Departments with Enrollment and Degree Data, 2016

Results from the 2016 Survey of Enrollments and Degrees

Starr Nicholson and Patrick J. Mulvey

The physics bachelor's class of 2016 represents yet another all-time high. There were 8,432 bachelor's degrees conferred, an increase of 4% from the previous year and a 131% increase from the recent low in 1999. First-year graduate physics student enrollments have remained at about 3,200 students for the last 5 years. The number of physics PhDs conferred in the class of 2016 represented a 2% decline from the previous year, but degree production has been increasing in recent years, up 67% from 12 years earlier.

Total Physics Degrees Academic Year 2015-2016	
Bachelors	8,432
Exiting Masters	940
PhDs	1,819

Total Physics Enrollments Fall 2016	
Juniors	11,141
Seniors	14,277
1st Year Grad	3,264
Total Grad	15,849

Number of Departments by Highest Degree Offered Academic Year 2015-2016	
Bachelors	493
Masters	56
PhD	201
Total Departments	750

This roster contains detailed data from the annual Survey of Enrollments and Degrees. The survey was conducted in the fall of 2016 and covers all degree-granting physics departments in the United States.

Of the 750 degree-granting physics departments, 684 (91%) contributed to the data supplied in this year's roster. The totals above include data from responding departments as well as estimated data for the 66 non-responding departments.

roster

A publication of the AIP Statistical Research Center
September 2017

stats@aip.org
301.209.3070

Roster of Astronomy Departments with Enrollment and Degree Data, 2016

Results from the 2016 Survey of Enrollments and Degrees

Starr Nicholson and Patrick J. Mulvey

The number of both astronomy bachelor's degrees and PhDs awarded in the class of 2016 represent all-time highs. Astronomy bachelors have been increasing steadily for the last 15 years, with 469 degrees awarded in the class of 2016. With undergraduate astronomy enrollments continuing to grow, the trend is expected to continue for at least the next couple of years. The 41 PhD-granting astronomy departments conferred 170 astronomy PhDs in the class of 2016. There were 250 first-year students enrolling in US astronomy graduate programs in the fall of 2016.

Total Astronomy Degrees Academic Year 2015-2016	
Bachelors	469
Exiting Masters	22
PhDs	170

Total Astronomy Enrollments Fall 2016	
Juniors	721
Seniors	944
1st Year Grad	250
Total Grad	1,154

Number of Departments by Highest Degree Offered Academic Year 2015-2016	
Bachelors	37
Masters	3
PhD	41
Total Departments	81

This roster contains detailed data from the annual Survey of Enrollments and Degrees. The survey was conducted in the fall of 2016 and includes all degree-granting astronomy departments in the United States.

All but 2 of the 81 degree-granting astronomy departments contributed to the data supplied in this year's roster (98%). Thirty-nine are stand-alone astronomy departments and the remaining 42 are combined physics and astronomy departments. The totals above include data from the 79 responding departments as well as estimated data for the 2 non-responding departments.

Trend in astronomy enrollments and degrees, academic years 2005 to 2017.							
	Number of astronomy degrees			Undergraduate astronomy major enrollments		Graduate astronomy student enrollments	
Academic Year	Bachelors	Exiting Masters	PhDs	Juniors	Seniors	1st-year	Total
2005-06	351	30	119	511	565	188	1,026
2006-07	336	18	125	379	569	206	1,077
2007-08	327	36	161	364	536	193	1,081
2008-09	322	29	141	388	515	215	1,065
2009-10	382	23	156	382	605	193	1,083
2010-11	408	47	160	450	637	202	1,156
2011-12	385	35	152	487	666	224	1,122
2012-13	386	35	155	484	694	233	1,134
2013-14	428	28	147	530	711	183	1,118
2014-15	459	22	130	561	780	187	1,108
2015-16	469	22	170	604	782	198	1,137
2016-17				721	944	250	1,154

Notations used in this roster:

m	Masters is the department's highest astronomy degree (N=3).
p	PhD is the department's highest astronomy degree (N=41).
s	The astronomy department is administered separately from the physics department (N=39).
c	This is a combined department, offering degrees in both astronomy and physics (N=42). Data concerning the physics portion of their program can be found in the "Roster of Physics Departments, 2016".
GRADUATE ONLY	Department has no undergraduate program in astronomy (N=10).
FIRST YEAR	This column includes graduate students who were new to the department in the fall of 2016 as well as students who entered the department in the previous winter, spring and summer.
EXITING MASTER'S	This column reflects the number of students who left the department with a master's degree.
FIRST TERM INTRODUCTORY COURSE ENROLLMENTS	The introductory course enrollment totals listed for each department represent the number of students who took their first term of introductory level astronomy. Departments were instructed not to include enrollments for courses that were a continuation of a sequence.
——	Data for this field were not provided.

	INSTITUTION	DEPT TYPE	2015-16 FIRST-TERM INTRODUCTORY ASTRO COURSE ENROLLMENTS	FALL 2016 UNDERGRADUATE MAJORS JR	SR	FALL 2016 GRADUATE STUDENTS TOTAL	FOREIGN	FIRST YEAR	2015-16 ASTRONOMY DEGREES BACHELORS	EXITING MASTERS	PHDS
	ARIZONA										
p	Arizona State U (Astrophys)	s	2754	21	30	30	9	4	9	2	1
p	Arizona-U of	s	1375	41	27	40	13	6	4	0	6
p	Arizona-U of (Planetary)	s	GRADUATE ONLY			30	8	6		1	5
	Embry-Riddle Aeronautical U	c	24	3	2				0		
	Northern Arizona U	c	499	27	20				16		
	CALIFORNIA										
p	CA Inst of Tech	s	0	6	3	33	—	8	5	0	4
p	CA-U of, Berkeley	s	1376	4	53	31	5	6	34	0	2
p	CA-U of, Los Angeles	c	1599	25	37	34	7	7	14	0	4
p	CA-U of, Santa Cruz	s	1276	GRADUATE ONLY		33	8	14		1	9
m	San Diego State U	s	824	7	11	12	1	7	3	2	
	Southern CA-U of (USC)	c	535	3	1				1		
	COLORADO										
p	CO-U of, Boulder	s	1000	77	111	57	—	14	43	0	6
	CONNECTICUT										
m	Wesleyan U	s	172	5	6	4	2	2	2	0	
p	Yale U	s	487	10	4	24	6	6	5	1	4
	FLORIDA										
	Embry-Riddle Aeronautical U	c	37	2	3				1		
p	Florida Inst of Tech	c	61	14	18	22	4	8	13	3	2
p	Florida-U of	s	0	9	19	34	18	3	8	1	1
	GEORGIA										
	Agnes Scott Coll	c	53	3	1				2		
p	Georgia State U	c	997	GRADUATE ONLY		28	7	7		0	5
	Valdosta State U	c	346	3	3				4		
	HAWAII										
	Hawaii-U of, Hilo	c	163	9	9				9		
p	Hawaii-U of, at Manoa	s	379	5	2	39	9	5	0	0	3
	ILLINOIS										
p	Chicago-U of	s	GRADUATE ONLY			31	12	7		0	4
p	Illinois-U of, Urbana	s	2980	25	21	25	13	3	12	0	3
	INDIANA										
p	Indiana U-Bloomington	s	1979	7	5	20	2	4	2	0	2
	IOWA										
	Drake U	c	485	2	0				1		
p	Iowa State U	c	431	GRADUATE ONLY		9	0	9		0	2
m	Iowa-U of	c	664	4	3	1	0	1	5	0	
	KANSAS										
	Benedictine Coll	c		DATA NOT PROVIDED							
	Kansas-U of	c	203	5	4				2		
	MARYLAND										
p	Johns Hopkins U	c	6	GRADUATE ONLY		45	14	9		0	11
p	MD-U of, College Park	s	49	21	38	35	11	6	11	0	5
	MASSACHUSETTS										
p	Boston U	s	703	11	12	31	6	6	9	2	4
p	Harvard U	s	76	10	10	61	13	11	8	0	12
p	MA-U of, Amherst	s	1123	26	24	24	11	2	15	1	2
	Mount Holyoke Coll	s	158	6	3				1		
	Smith Coll	s	70	5	6				2		
	Tufts U	c	409	1	3				2		
	Wellesley Coll	s	140	4	4				7		
	Williams Coll	s	41	3	0				2		
	MICHIGAN										
p	Michigan State U	c	1078	22	31	16	0	4	10	0	4
p	Michigan-U of	s	2233	13	29	30	5	8	12	0	4
	Wayne St U	c	875	5	5				2		

	INSTITUTION	DEPT TYPE	2015-16 FIRST-TERM INTRODUCTORY ASTRO COURSE ENROLLMENTS	FALL 2016 UNDERGRADUATE MAJORS: JR	FALL 2016 UNDERGRADUATE MAJORS: SR	FALL 2016 GRADUATE STUDENTS: TOTAL	FALL 2016 GRADUATE STUDENTS: FOREIGN	FALL 2016 GRADUATE STUDENTS: FIRST YEAR	2015-16 ASTRONOMY DEGREES: BACHELORS	2015-16 ASTRONOMY DEGREES: EXITING MASTERS	2015-16 ASTRONOMY DEGREES: PHDS
	MINNESOTA										
p	Minnesota-U of	s	1151	7	32	21	3	2	12	2	1
	NEW HAMPSHIRE										
	Dartmouth Coll	c	406	1	1				2		
	NEW JERSEY										
p	Princeton U	s	196	9	9	25	10	8	9	0	8
p	Princeton U-Forrestal Campus	s	17	GRADUATE ONLY		42	15	9		0	4
	NEW MEXICO										
p	New Mexico State U	s	1046	GRADUATE ONLY		28	0	5		0	3
	NEW YORK										
	Barnard Coll	c	124	—	1				0		
	Colgate U	c	128	8	6				7		
p	Columbia U	s	420	18	15	28	8	3	13	1	7
p	Cornell U	s	314	3	2	25	9	—	5	—	2
	Rochester-U of	c	217	9	11				1		
	SUNY Coll at New Paltz	c		DATA NOT PROVIDED							
	SUNY-Stony Brook	c	339	11	17				7		
	Union Coll	c	93	0	0				0		
	Vassar Coll	c	201	4	4				3		
	OHIO										
p	Case Western Reserve U	s	144	3	2	3	1	1	6	1	1
p	Ohio State U	s	1781	27	35	25	4	4	7	0	3
	Ohio Wesleyan U	c	96	1	2				2		
	Toledo-U of	c	0	4	8				1		
	Youngstown State U	c	520	2	3				1		
	OKLAHOMA										
	Oklahoma-U of	c	331	7	15				7		
	PENNSYLVANIA										
	Haverford Coll	c	90	4	8				3		
	Lycoming Coll	c	20	2	3				2		
p	Pennsylvania St U	s	5023	12	22	45	12	13	16	0	7
p	Pittsburgh-U of	c	1097	11	10	*	*	*	3	0	0
	Swarthmore Coll	c	110	7	5				1		
	Villanova U	s	215	6	6				3		
	SOUTH CAROLINA										
	Charleston-Coll of	c	548	11	14				5		
	TEXAS										
p	Rice U	c	203	3	2	2	0	0	1	0	0
p	Texas A&M-College Station	c	1428	GRADUATE ONLY		5	1	5		0	0
p	Texas Christian U	c	963	GRADUATE ONLY		6	1	2		0	0
p	Texas-U of, at Austin	s	2298	22	63	35	8	7	18	0	8
	VERMONT										
	Marlboro Coll	c	1	0	0				1		
	VIRGINIA										
	George Mason U	c	1496	5	10				1		
p	Virginia-U of	s	1740	15	9	29	7	6	12	2	7
	WASHINGTON										
p	Washington-U of	s	2415	25	38	28	3	5	18	0	8
	Whitman Coll	s	80	8	6				4		
	WISCONSIN										
p	Wisconsin-U of, Madison	s	1041	19	15	28	2	4	16	2	6
	WYOMING										
	Wyoming-U of	c	104	7	4				3		

** U of Pittsburgh - Astronomy graduate enrollment data are incorporated into their physics graduate enrollments listed in the physics roster.*

Trend in physics enrollments and degrees, academic years 2005 to 2017.							
	Number of physics degrees			Undergraduate physics major enrollments		Graduate physics student enrollments	
Academic Year	Bachelors	Exiting Masters	PhDs	Juniors	Seniors	1st-year	Total
2005-06	5,373	799	1,380	7,141	8,272	2,984	13,889
2006-07	5,755	824	1,460	7,072	8,651	2,967	14,114
2007-08	5,767	790	1,499	7,444	9,037	3,069	14,326
2008-09	5,908	838	1,554	7,329	9,312	2,908	14,538
2009-10	6,017	794	1,558	7,804	9,669	3,089	14,808
2010-11	6,296	735	1,688	8,851	10,567	3,164	15,182
2011-12	6,778	801	1,762	9,236	11,399	3,108	15,152
2012-13	7,329	801	1,743	9,566	12,144	3,294	15,365
2013-14	7,526	870	1,803	10,229	12,855	3,157	15,530
2014-15	8,081	891	1,860	10,611	13,542	3,232	15,812
2015-16	8,432	940	1,819	11,076	13,915	3,210	15,595
2016-17				11,141	14,277	3,264	15,849

Notations used in this roster:

m	Masters is the department's highest physics degree (N=56).
p	PhD is the department's highest physics degree (N=201).
s	This institution also has a separate astronomy department (N=37).
c	This is a combined department, offering degrees in both physics and astronomy (N=42). Data concerning the astronomy portion of their program can be found in the "Roster of Astronomy Departments, 2016".
GRADUATE ONLY	Department has no undergraduate program in physics (N=8).
FIRST YEAR	This column includes graduate students who were new to the department in the fall of 2016 as well as students who entered the department in the previous winter, spring and summer.
EXITING MASTER'S	This column reflects the number of students who left the department with a master's degree.
FIRST TERM INTRODUCTORY COURSE ENROLLMENTS	This column represents the number of students who took their first term of introductory level physics, astronomy or physical science. Departments were instructed not to include enrollments for courses that were a continuation of a sequence.
——	Data for this field were not provided.

	INSTITUTION		2015-16 FIRST-TERM INTRODUCTORY COURSE ENROLLMENTS: PHYSICS	PHYSICAL SCI & ASTRONOMY	FALL 2016 UNDERGRADUATE MAJORS: JR	SR	FALL 2016 GRADUATE STUDENTS: TOTAL	FOREIGN	FIRST YEAR	2015-16 PHYSICS DEGREES: BACHELORS	EXITING MASTERS	PHDS
	ALABAMA											
p	Alabama A&M U		DATA NOT PROVIDED									
p	AL-U of, Birmingham		705	844	12	15	33	11	4	5	1	2
p	AL-U of, Huntsville		531	78	14	26	31	8	7	9	6	2
p	AL-U of, Tuscaloosa		844	596	27	35	48	33	10	19	1	8
p	Auburn U		1059	65	5	17	50	17	12	10	0	5
	Birmingham-Southern Coll		69	19	6	6				3		
	North Alabama-U of		85	20	0	1				6		
	Samford U		129	45	6	12				8		
	South Alabama-U of		817	64	6	10				1		
	Troy U		228	472	2	3				1		
	Tuskegee U		22	2	18	14				4		
	ALASKA											
p	Alaska-U of, Fairbanks		342	60	10	10	26	5	9	2	2	2
	ARIZONA											
p	Arizona State U	s	3548	137	68	131	80	39	11	52	17	16
p	Arizona-U of	s	2498	92	43	53	90	43	23	22	4	6
	Embry-Riddle Aeronautical U	c	591	0	11	13				5		
m	Northern Arizona U	c	1420	44	38	41	11	1	5	27	10	
	ARKANSAS											
	Arkansas State U		423	275	5	1				4		
	Arkansas Tech U		256	475	2	7				4		
p	AR-U of, Fayetteville		DATA NOT PROVIDED									
	AR-U of, Little Rock		260	207	4	7				4		
	AR-U of, Pine Bluff		287	358	4	2				12		
	Central Arkansas-U of		460	1028	17	23				13		
	Harding U		164	0	2	5				0		
	Henderson State U		105	440	10	6				4		
	Hendrix Coll		86	102	12	12				5		
	Ouachita Baptist U		42	41	3	5				2		
	Southern Arkansas U		219	270	3	6				3		
	CALIFORNIA											
	Azusa Pacific U		190	371	3	5				6		
p	Cal Inst of Tech	s	223	0	27	22	151	79	24	22	0	12
	Cal Lutheran U		136	98	5	7				11		
	Cal Poly St U-San Luis Obispo		2945	686	43	64				30		
	Cal St Poly U-Pomona		5357	106	—	—				25		
	Cal St U-Bakersfield		375	275	4	5				0		
	Cal St U-Channel Islands		DATA NOT PROVIDED									
	Cal St U-Chico		1628	249	5	21				6		
	Cal St U-Dominguez Hills		600	123	13	18				8		
m	Cal St U-Fullerton		784	370	29	49	15	1	7	13	7	
	Cal St U-East Bay		770	200	7	20				4		
m	Cal St U-Long Beach		3144	1086	29	84	62	4	17	41	19	
m	Cal St U-Los Angeles		—	—	—	—	—	—	—	8	—	
m	Cal St U-Northridge		1408	2168	24	12	30	3	6	11	8	
	Cal St U-San Bernardino		801	95	21	43				17		
	Cal St U-San Marcos		—	—	21	42				15		
	Cal St U-Stanislaus		531	220	10	12				5		
p	CA-U of, Berkeley	s	2368	0	124	157	278	78	51	116	0	31
p	CA-U of, Davis		3506	832	79	82	152	45	30	47	2	7
p	CA-U of, Irvine		4479	1081	43	53	142	24	29	19	4	22
p	CA-U of, Los Angeles	c	3325	0	86	147	164	41	29	80	1	20
p	CA-U of, Merced		1610	0	21	12	47	16	14	8	1	2
p	CA-U of, Riverside		2188	1292	27	17	132	68	28	23	2	16
p	CA-U of, San Diego		3405	154	210	156	152	62	22	34	3	16
p	CA-U of, Santa Barbara		2240	627	171	156	135	25	19	104	2	20
p	CA-U of, Santa Cruz	s	1933	0	25	115	74	7	20	51	2	7
	Claremont Colleges		205	52	10	15				13		

	INSTITUTION		2015-16 FIRST-TERM INTRODUCTORY COURSE ENROLLMENTS: PHYSICS	PHYSICAL SCI & ASTRONOMY	FALL 2016 UNDERGRADUATE MAJORS: JR	SR	FALL 2016 GRADUATE STUDENTS: TOTAL	FOREIGN	FIRST YEAR	2015-16 PHYSICS DEGREES: BACHELORS	EXITING MASTERS	PHDS
	CALIFORNIA CONTINUED											
m	Fresno State U		969	756	8	27	21	—	7	11	6	
	Harvey Mudd Coll		200	0	24	27				25		
	Humboldt State U		394	306	21	25				12		
	La Sierra U		341	21	3	5				5		
	La Verne-U of		274	184	3	6				2		
	Loyola Marymount U		525	128	5	7				8		
p	Naval Postgrad School		GRADUATE ONLY				47	12	23		29	1
	Occidental Coll		69	0	14	21				15		
	Pacific Union Coll		106	78	3	4				6		
	Pacific-U of the		774	32	6	3				4		
	Point Loma Nazarene U		129	236	19	21				10		
	Pomona Coll		—	—	25	8				8		
	Redlands-U of		95	21	15	12				11		
	Sacramento State U		1256	612	18	59				10		
	St. Marys Coll of CA		124	101	2	10				2		
m	San Diego St U	s	3716	0	31	28	33	—	19	12	14	
	San Diego-U of		359	0	17	7				11		
m	San Francisco St U		1377	1604	29	30	70	18	26	22	3	
	San Francisco-U of		351	537	8	11				5		
m	San Jose State U		1547	181	21	37	33	—	9	7	4	
	Santa Clara U		581	118	15	10				8		
	Sonoma State U		381	912	14	23				8		
p	Southern Cal-U of (USC)	c	1072	0	23	13	74	56	11	17	6	8
p	Stanford U		775	251	29	31	195	79	36	22	1	24
p	Stanford U (Appl Phy)		GRADUATE ONLY				142	58	26		3	16
	Westmont Coll		62	110	4	6				8		
	Whittier Coll		80	27	3	8				7		
	COLORADO											
	Colorado Coll		224	123	14	11				7		
	Colorado Mesa U		618	121	5	4				4		
p	Colorado School of Mines		1084	47	46	101	54	11	9	52	13	10
p	Colorado St U-Fort Collins		1841	519	13	16	60	8	11	16	0	7
	Colorado St U-Pueblo		205	158	2	0				1		
p	Colorado-U of, Boulder	s	3000	0	135	167	254	72	55	75	3	25
p	Colorado-U of, Colo Spgs		863	341	30	47	34	2	5	13	1	1
	Colorado-U of, Denver		824	112	23	35				5		
p	Denver-U of		311	97	5	18	19	4	5	9	1	3
	Fort Lewis Coll		203	0	5	6				11		
	Metropolitan St U of Denver		2291	570	24	31				7		
	Northern Colorado-U of		207	756	14	38				14		
	US Air Force Academy		924	4	17	16				13		
	CONNECTICUT											
	Central Conn St U		266	0	16	24				5		
	Connecticut Coll		94	45	4	5				4		
p	Connecticut-U of		2089	145	45	59	80	33	12	19	7	12
	Fairfield U		454	228	3	2				1		
	Hartford-U of		1512	48	2	3				1		
m	Southern Conn St U		1144	0	11	21	12	0	4	8	5	
	Trinity Coll		100	0	8	3				0		
p	Wesleyan U	s	175	0	26	23	14	12	2	14	2	1
p	Yale U	s	911	0	28	35	127	58	23	28	0	20
p	Yale U (Appl Phy)				1	3	31	12	3	3	1	4
	DELAWARE											
p	Delaware State U		161	48	11	20	12	7	2	4	0	2
p	Delaware-U of		1498	561	29	23	80	58	15	12	2	12
	DISTRICT OF COLUMBIA											
	American U		185	100	8	7				13		
p	Catholic U		60	80	5	3	—	—	—	2	—	—
p	George Washington U		372	177	13	11	27	—	5	11	4	3
p	Georgetown U		269	13	14	12	25	8	4	15	0	3
p	Howard U		810	35	3	3	16	10	4	7	3	2

	INSTITUTION		2015-16 FIRST-TERM INTRODUCTORY COURSE ENROLLMENTS: PHYSICS	PHYSICAL SCI & ASTRONOMY	FALL 2016 UNDERGRADUATE MAJORS: JR	SR	FALL 2016 GRADUATE STUDENTS: TOTAL	FOREIGN	FIRST YEAR	2015-16 PHYSICS DEGREES: BACHELORS	EXITING MASTERS	PHDS
	FLORIDA											
	Ave Maria U		45	0	2	4				3		
p	Central Florida-U of		2559	1731	37	59	101	49	27	21	2	17
	Eckerd Coll		114	0	2	8				3		
p	Embry-Riddle Aeronautical U	c	1128	497	50	46	17	2	6	21	6	0
p	Florida A&M U		630	330	2	2	18	6	8	2	0	1
p	Florida Atlantic U		505	492	13	29	27	21	4	14	5	5
p	Florida Inst of Tech	c	551	0	10	10	12	6	2	8	2	1
p	Florida International U		1664	0	30	25	45	8	9	16	—	6
p	Florida State U		1933	1119	28	54	147	70	22	22	2	27
p	Florida-U of	s	3238	0	37	48	124	64	15	47	0	21
	Jacksonville U		118	70	7	3				3		
p	Miami-U of		1731	81	—	—	25	21	6	—	0	3
	New Coll of Florida		65	59	4	4				2		
	North Florida-U of		964	888	85	19				18		
	Rollins Coll		106	23	5	7				6		
p	South Florida-U of		5340	1001	63	149	70	48	8	35	1	10
	Stetson U		126	79	5	6				7		
	West Florida-U of		539	0	12	28				12		
	GEORGIA											
	Agnes Scott Coll	c	116	0	2	5				0		
	Armstrong State U		283	266	5	8				0		
	Augusta U		392	295	17	12				10		
	Berry Coll		155	116	4	7				4		
m	Clark-Atlanta U		151	319	4	5	19	16	9	4	4	
	Covenant Coll		37	42	2	4				0		
p	Emory U		1025	183	15	20	48	33	13	16	1	1
	Georgia Coll		487	425	39	22				9		
p	Georgia Inst of Tech		1791	191	50	77	133	56	22	31	10	19
	Georgia Southern U		2207	836	8	15				5		
p	Georgia State U	c	1241	0	35	40	47	36	10	22	—	5
p	Georgia-U of		1644	1036	21	35	52	22	11	19	7	7
	Kennesaw State U		DATA NOT PROVIDED									
	Mercer U		378	21	0	0				0		
	Morehouse Coll		290	323	19	12				4		
	North Georgia-U of		338	239	46	21				16		
	Oglethorpe U		60	0	—	—				1		
	Piedmont Coll		46	17	0	0				0		
	Spelman Coll		271	20	4	0				4		
	Valdosta State U	c	302	157	8	8				4		
	West Georgia-U of		245	1366	6	6				6		
	HAWAII											
	Hawaii-U of, Hilo	c	193	0	3	4				5		
p	Hawaii-U of, at Manoa	s	441	190	12	15	39	8	9	11	1	4
	IDAHO											
	Coll of Idaho		64	40	10	7				8		
	Boise State U		1199	208	19	52				5		
	Brigham Young U-Idaho		1103	49	35	39				13		
p	Idaho State U		598	272	11	13	13	7	5	10	2	4
p	Idaho-U of		811	94	14	31	23	12	4	11	1	0
	Northwest Nazarene U		68	0	1	4				4		
	ILLINOIS											
	Augustana Coll		193	73	17	17				13		
	Benedictine U		262	333	2	5				2		
	Bradley U		276	121	4	2				4		
	Chicago State U		235	300	4	4				6		
p	Chicago-U of	s	519	24	74	61	165	83	26	74	0	14
m	DePaul U		740	122	20	29	9	2	6	17	2	
	Eastern Illinois U		180	63	—	—				5		
	Elmhurst Coll		90	115	4	4				6		
	Greenville Coll		DATA NOT PROVIDED									
	Illinois Coll		56	0	6	2				11		

	INSTITUTION		2015-16 FIRST-TERM INTRODUCTORY COURSE ENROLLMENTS: PHYSICS	2015-16 FIRST-TERM INTRODUCTORY COURSE ENROLLMENTS: PHYSICAL SCI & ASTRONOMY	FALL 2016 UNDERGRADUATE MAJORS: JR	FALL 2016 UNDERGRADUATE MAJORS: SR	FALL 2016 GRADUATE STUDENTS: TOTAL	FALL 2016 GRADUATE STUDENTS: FOREIGN	FALL 2016 GRADUATE STUDENTS: FIRST YEAR	2015-16 PHYSICS DEGREES: BACHELORS	2015-16 PHYSICS DEGREES: EXITING MASTERS	2015-16 PHYSICS DEGREES: PHDS
	ILLINOIS CONTINUED											
p	Illinois Inst of Tech		584	31	10	18	84	31	28	12	14	5
	Illinois State U		1872	127	16	49				17		
p	IL-U of, Chicago		1150	151	10	31	83	52	9	10	1	9
p	IL-U of, Urbana/Champaign	s	8296	43	142	244	292	135	50	149	1	28
	Illinois Wesleyan U		133	79	22	15				13		
	Knox Coll		141	34	7	10				7		
	Lake Forest Coll		183	0	7	6				6		
	Lewis U		178	58	23	21				10		
	Loyola U Chicago		687	101	34	32				47		
	Millikin U		50	45	6	0				5		
	Monmouth Coll		45	40	5	5				7		
	North Central Coll		85	46	8	10				5		
	North Park U		128	28	8	6				5		
	Northeastern Illinois U		1194	355	4	8				5		
p	Northern Illinois U		1542	133	13	30	56	25	14	5	7	3
p	Northwestern U		454	162	18	19	90	—	13	13	4	13
	Principia Coll		DATA NOT PROVIDED									
p	Sthrn IL U-Carbondale		DATA NOT PROVIDED									
	Sthrn IL U-Edwardsville		740	159	7	11				8		
m	Western Illinois U		407	244	3	12	29	28	13	6	16	
	Wheaton Coll		214	143	6	16				9		
	INDIANA											
	Anderson U		DATA NOT PROVIDED									
m	Ball State U		275	427	4	14	21	6	5	7	6	
	Butler U		289	76	10	12				8		
	DePauw U		DATA NOT PROVIDED									
	Earlham Coll		DATA NOT PROVIDED									
	Evansville-U of		253	27	5	2				2		
	Goshen Coll		24	0	3	7				6		
	Hanover Coll		32	34	1	0				2		
	Indiana State U		466	286	2	3				7		
p	Indiana U-Bloomington	s	2338	197	24	59	106	35	24	26	5	15
	Indiana U-South Bend		133	219	7	11				2		
	Indiana U Purdue U-Ft Wayne		624	50	14	15				8		
p	Indiana U Purdue U-Indpls		1033	1175	10	18	27	14	8	15	1	1
	Indianapolis-U of		92	42	2	5				1		
	Manchester U		140	25	3	4				4		
p	Notre Dame-U of		1143	348	26	26	101	31	11	24	0	10
	Purdue U-Northwest		399	215	12	10				3		
p	Purdue U-West Lafayette		4363	163	29	60	148	96	32	38	0	24
	Rose-Hulman Inst of Tech		448	82	8	5				13		
	St. Marys Coll		78	33	3	0				0		
	Southern Indiana-U of		280	48	3	3				2		
	Taylor U		83	18	8	11				12		
	Valparaiso U		265	116	8	9				4		
	Wabash Coll		71	40	9	6				11		
	IOWA											
	Buena Vista U		68	30	0	1				0		
	Central Coll		55	0	10	4				11		
	Coe Coll		84	35	19	14				13		
	Cornell Coll		56	12	4	5				4		
	Dordt Coll		86	22	1	1				1		
	Drake U	c	238	20	4	3				8		
	Grinnell Coll		246	40	21	18				20		
p	Iowa State U	c	3195	181	16	47	91	62	12	6	0	6
p	Iowa-U of	c	1606	75	15	27	65	20	9	11	0	10
	Luther Coll		DATA NOT PROVIDED									
	Morningside Coll		95	70	2	0				2		
	Northern Iowa-U of		423	0	19	16				5		
	Simpson Coll		46	0	5	1				4		
	Wartburg Coll		112	22	1	1				0		

	INSTITUTION		2015-16 FIRST-TERM INTRODUCTORY COURSE ENROLLMENTS: PHYSICS	PHYSICAL SCI & ASTRONOMY	FALL 2016 UNDERGRADUATE MAJORS: JR	SR	FALL 2016 GRADUATE STUDENTS: TOTAL	FOREIGN	FIRST YEAR	2015-16 PHYSICS DEGREES: BACHELORS	EXITING MASTERS	PHDS
	KANSAS											
	Baker U		41	37	5	4				3		
	Benedictine Coll	c	DATA NOT PROVIDED									
m	Emporia State U		78	198	6	7	5	5	0	5	3	
	Fort Hays State U		170	602	9	9				5		
p	Kansas State U		2019	45	18	17	60	43	15	20	4	6
p	Kansas-U of	c	2232	0	0	5	58	22	8	15	1	5
	Kansas Wesleyan U		44	9	4	6				1		
m	Pittsburg State U		191	513	5	6	9	4	3	1	3	
	Washburn U of Topeka		127	405	7	3				2		
	Wichita State U		683	158	12	31				2		
	KENTUCKY											
	Bellarmine U		191	79	4	7				2		
	Berea Coll		—	—	3	9				2		
	Centre Coll of KY		108	0	8	3				5		
	Cumberlands-U of the		135	119	2	2				4		
	Eastern Kentucky U		532	170	15	20				8		
	Georgetown Coll		DATA NOT PROVIDED									
p	Kentucky-U of		1860	877	27	46	83	46	22	16	1	5
	Kentucky Wesleyan Coll		—	—	—	—				3		
p	Louisville-U of		1185	656	18	24	35	23	6	8	5	2
	Morehead State U		—	—	—	—				5		
	Murray State U		182	73	4	1				3		
	Northern Kentucky U		195	223	22	16				5		
	Thomas More Coll		35	35	2	2				3		
	Transylvania U		67	0	4	4				1		
m	Western Kentucky U		458	402	5	9	7	3	2	4	4	
	LOUISIANA											
	Dillard U		176	0	10	7				4		
	Grambling State U		231	360	5	7				3		
p	LA St U-Baton Rouge		5416	2138	20	34	101	48	23	22	5	18
	LA St U-Shreveport		DATA NOT PROVIDED									
m	Louisiana Tech U		DATA NOT PROVIDED									
m	Louisiana-U of, at Lafayette		1443	299	4	8	13	4	5	3	4	
	Loyola U-New Orleans		97	17	6	7				3		
p	New Orleans-U of		DATA NOT PROVIDED									
	Southeastern Louisiana U		339	208	6	10				9		
m	Southern U & A&M Coll		DATA NOT PROVIDED									
p	Tulane U		543	0	27	29	36	22	10	15	2	2
	Xavier U		199	21	5	5				4		
	MAINE											
	Bates Coll		278	134	15	20				13		
	Bowdoin Coll		46	44	16	25				16		
	Co by Coll		101	76	22	12				14		
p	Maine-U of		729	379	17	17	35	3	6	11	5	3
	Southern Maine-U of		206	99	2	2				2		

	INSTITUTION		2015-16 FIRST-TERM INTRODUCTORY COURSE ENROLLMENTS: PHYSICS	PHYSICAL SCI & ASTRONOMY	FALL 2016 UNDERGRADUATE MAJORS: JR	SR	FALL 2016 GRADUATE STUDENTS: TOTAL	FOREIGN	FIRST YEAR	2015-16 PHYSICS DEGREES: BACHELORS	EXITING MASTERS	PHDS
	MARYLAND											
	Frostburg State U		330	79	5	8				11		
	Goucher Coll		35	54	5	8				11		
p	Johns Hopkins U	c	638	0	27	27	58	31	11	15	5	7
	Loyola U of MD		151	375	2	4				3		
p	Maryland-U of, Balt Cnty		956	125	45	65	41	16	11	18	0	6
p	Maryland-U of, Coll Park	s	1801	0	81	152	219	111	47	69	1	34
	McDaniel Coll		30	144	7	2				5		
	Morgan State U				DATA NOT PROVIDED							
	Notre Dame of MD U		31	14	0	1				0		
	St. Marys College of MD		94	92	9	10				10		
	Salisbury U		247	124	29	25				22		
m	Towson U		815	356	25	42	14	—	7	15	1	
	US Naval Academy		1073	23	27	30				29		
	Washington Coll		158	16	2	3				2		
	MASSACHUSETTS											
	Amherst Coll		—	—	6	9				7		
	Bard Coll at Simon's Rock		28	0	2	2				0		
p	Boston Coll		192	0	17	18	44	23	2	16	1	2
p	Boston U	s	1096	0	32	36	81	48	11	23	4	15
p	Brandeis U		182	91	20	17	48	19	12	13	1	8
	Bridgewater State U		636	142	8	17				9		
p	Clark U		146	136	9	14	10	7	2	11	0	1
	Eastern Nazarene Coll				DATA NOT PROVIDED							
	Gordon Coll		56	0	7	14				11		
p	Harvard U	s	427	0	75	53	224	89	35	56	11	31
p	Harvard U (Appl Sci)		75	0	GRADUATE ONLY		119	54	13		0	19
	Holy Cross-Coll of the		154	24	12	14				15		
	MA Coll of Liberal Arts		42	25	1	0				5		
p	Mass Inst of Tech (MIT)		652	0	75	73	—	—	—	81	—	—
p	MA-U of, Amherst	s	3711	400	41	30	74	48	15	48	6	10
p	MA-U of, Boston		768	173	19	15	29	9	9	7	4	0
m	MA-U of, Dartmouth		477	601	11	8	20	5	9	7	3	
p	MA-U of, Lowell		1150	575	25	34	78	39	21	21	14	12
	Merrimack College		215	0	2	1				1		
	Mount Holyoke Coll	s	146	0	11	9				12		
p	Northeastern U		1502	181	36	31	81	50	18	30	1	8
	Simmons Coll		51	0	2	2				0		
	Smith Coll	s	113	0	15	9				3		
	Suffolk U		202	702	5	5				3		
p	Tufts U	c	465	0	14	17	32	12	9	14	3	5
	Wellesley Coll	s	180	0	15	16				17		
	Wheaton Coll		128	274	7	8				6		
	Williams Coll	s	171	0	10	17				14		
p	Worcester Polytech Inst		1090	0	17	17	22	13	7	11	6	1
	MICHIGAN											
	Adrian Coll		56	0	1	8				2		
	Albion Coll		118	41	15	5				5		
	Alma Coll		73	0	2	4				3		
	Andrews U		156	51	4	8				5		
	Calvin Coll		251	64	3	4				3		
m	Central Michigan U		1040	968	10	12	20	16	4	5	8	
m	Eastern Michigan U		673	990	10	19	11	0	3	11	2	
	Grand Valley St U		2254	197	9	17				8		
	Hillsdale Coll				DATA NOT PROVIDED							
	Hope Coll		161	28	3	3				8		
	Kalamazoo Coll		96	0	—	—				8		
	Kettering U (Appl Phys)		780	0	15	29				9		
	Lawrence Technological U		373	18	2	3				1		
p	Michigan State U	c	3515	525	98	74	152	39	34	30	6	12
p	Michigan Technological U		1156	101	9	22	41	29	10	7	2	6
p	Michigan-U of, Ann Arbor	s	2344	0	41	124	150	59	24	61	3	22
p	Michigan-U of, Ann Arbor (Appl Phys)		GRADUATE ONLY				85	13	15		0	7

	INSTITUTION		2015-16 FIRST-TERM INTRODUCTORY COURSE ENROLLMENTS: PHYSICS	PHYSICAL SCI & ASTRONOMY	FALL 2016 UNDERGRADUATE MAJORS: JR	SR	FALL 2016 GRADUATE STUDENTS: TOTAL	FOREIGN	FIRST YEAR	2015-16 PHYSICS DEGREES: BACHELORS	EXITING MASTERS	PHDS
	MICHIGAN CONTINUED											
	Michigan-U of, Dearborn		479	225	4	6				1		
	Michigan-U of, Flint		329	17	3	7				1		
	Northern Michigan U		416	103	4	10				5		
p	Oakland U		1295	266	13	12	18	11	8	12	0	3
	Saginaw Valley St U		416	406	3	3				1		
p	Wayne State U	c	911	0	27	41	67	32	14	12	1	9
p	Western Michigan U		1175	251	14	14	27	22	8	8	2	2
	MINNESOTA											
	Augsburg Coll		79	90	7	12				13		
	Bethel U		135	57	28	36				22		
	Carleton Coll		187	142	21	20				24		
	Coll. of St. Benedict / St. John's U		156	42	19	10				11		
	Concordia Coll		72	101	4	5				3		
	Gustavus Adolphus Coll		107	30	14	16				19		
	Hamline U		153	40	13	6				13		
	Macalester Coll		111	60	9	11				12		
m	Minnesota St U-Mankato		1035	689	12	8	8	2	3	4	0	
	Minnesota St U-Moorhead		250	388	6	8				8		
m	Minnesota-U of, Duluth		1177	476	12	21	20	10	7	3	5	
p	Minnesota-U of, Minnpls	s	3071	1321	32	110	189	80	34	57	3	21
	Minnesota-U of, Morris		126	34	6	5				5		
	St. Cloud State U		830	900	9	6				1		
	St. Mary's U of MN		82	71	5	1				2		
	St. Olaf Coll		175	0	25	23				35		
	St. Thomas-U of		326	195	9	22				8		
	Winona State U		969	78	1	7				2		
	MISSISSIPPI											
	Jackson State U		429	428	4	2				3		
	Millsaps Coll		30	17	0	1				1		
	Mississippi Coll		DATA NOT PROVIDED									
p	Mississippi State U		1355	502	7	12	48	42	9	7	2	1
p	Mississippi-U of		830	722	9	6	44	33	5	7	2	1
m	Sthrn Mississippi-U of		420	119	5	5	19	9	3	3	1	
	Tougaloo Coll		74	0	1	1				2		
	MISSOURI											
	Central Methodist U		44	56	0	2				1		
	Central Missouri-U of		499	20	0	0				0		
	Drury U		158	0	3	3				3		
	Lincoln U (MO)		34	130	—	2				2		
	Missouri Southern St U		122	366	7	4				5		
m	Missouri State U		DATA NOT PROVIDED									
p	Missouri U of Sci & Tech		498	0	12	35	26	17	5	15	2	6
p	MO-U of Columbia		1380	0	35	30	55	22	10	27	1	7
p	MO-U of, Kansas City		1000	14	12	24	25	11	4	13	0	2
p	MO-U of, St. Louis (1)		335	211	12	17	20	8	5	8	3	2
	Rockhurst U		DATA NOT PROVIDED									
	St. Louis U		425	0	2	4				5		
	Southeast Missouri St U		547	441	8	10				5		
	Truman State U		513	89	23	15				7		
p	Washington U		728	0	10	15	83	45	11	24	3	13
	Westminster Coll		DATA NOT PROVIDED									
	William Jewell Coll		78	72	11	5				12		
	MONTANA											
p	Montana State U		1599	1019	24	25	66	6	18	10	3	5
	Montana-U of		364	439	16	23				10		

(1) Students earning a PhD at U of Missouri, St. Louis are in a co-op program with Missouri U of Sci & Tech.

	INSTITUTION		2015-16 FIRST-TERM INTRODUCTORY COURSE ENROLLMENTS: PHYSICS	2015-16 FIRST-TERM INTRODUCTORY COURSE ENROLLMENTS: PHYSICAL SCI & ASTRONOMY	FALL 2016 UNDERGRADUATE MAJORS: JR	FALL 2016 UNDERGRADUATE MAJORS: SR	FALL 2016 GRADUATE STUDENTS: TOTAL	FALL 2016 GRADUATE STUDENTS: FOREIGN	FALL 2016 GRADUATE STUDENTS: FIRST YEAR	2015-16 PHYSICS DEGREES: BACHELORS	2015-16 PHYSICS DEGREES: EXITING MASTERS	2015-16 PHYSICS DEGREES: PHDS
	NEBRASKA											
m	Creighton U		220	160	12	9	14	4	5	5	1	
	Doane U		76	47	5	5				5		
	Hastings Coll		46	23	6	7				7		
	Nebraska-U of, Kearney		93	80	4	0				1		
p	Nebraska-U of, Lincoln		1734	642	21	30	90	59	21	12	1	3
	Nebraska-U of, Omaha		—	—	8	12				4		
	Nebraska Wesleyan U		81	46	6	1				6		
	Union Coll		32	12	0	0				0		
	NEVADA											
p	Nevada-U of, Las Vegas		DATA NOT PROVIDED									
p	Nevada-U of, Reno		1732	351	27	8	27	4	6	21	3	6
	NEW HAMPSHIRE											
p	Dartmouth Coll	c	416	35	32	17	50	25	5	20	1	9
p	New Hampshire-U of		860	303	15	25	59	19	11	11	4	11
	St. Anselm Coll		51	63	5	6				1		
	NEW JERSEY											
	Drew U		DATA NOT PROVIDED									
	Montclair State U		403	20	10	9				5		
	New Jersey City U		DATA NOT PROVIDED									
	New Jersey-The Coll of		432	234	18	18				29		
p	New Jersey Inst of Tech		76	18	13	14	22	17	5	10	2	5
p	Princeton U	s	204	0	20	26	117	76	26	17	0	15
	Ramapo Coll of NJ		459	350	8	13				9		
	Rowan U		1013	457	53	47				23		
	Rutgers U-Camden		DATA NOT PROVIDED									
p	Rutgers U-New Brunswick		3543	924	67	107	118	58	23	62	0	13
p	Rutgers U-Newark*		DATA NOT PROVIDED									
	St. Peter's U		6	0	2	3				2		
	Seton Hall U		711	145	20	17				8		
p	Stevens Inst of Tech		515	0	8	6	27	22	8	10	0	4
	Stockton U		983	390	21	21				5		
	NEW MEXICO											
p	NM Inst of Mining & Tech		365	23	27	32	21	5	3	12	0	4
p	New Mexico St U	s	781	0	16	39	30	23	5	21	3	7
p	New Mexico-U of		1496	1677	29	54	119	54	20	10	4	13
	NEW YORK											
	Adelphi U		450	160	20	11				—		
	Alfred U		177	112	3	5				3		
	Bard Coll		157	0	6	5				8		
	Barnard Coll	c	54	0	10	10				4		
	Canisius Coll		83	35	1	1				3		
p	Clarkson U		1279	0	12	20	18	6	5	7	2	2
	Colgate U	c	171	0	25	13				18		
p	Columbia U	s	1988	8	17	26	99	52	17	39	0	21
p	Columbia U (Appl Sci)				10	13	71	32	18	8	14	3
p	Cornell U	s	2147	0	40	39	159	72	28	40	1	21
p	Cornell U (Appl Sci)		DATA NOT PROVIDED									
	(CUNY) Lehman Coll		1040	676	5	17				1		
	(CUNY) Staten Island-Coll of		DATA NOT PROVIDED									
	(CUNY) York Coll		387	512	4	6				3		
p	(CUNY) Grad Center		GRADUATE ONLY				106	54	22			21
m	(CUNY) Brooklyn Coll**		990	0	8	10				3	2	
m	(CUNY) City Coll**		1335	731	20	44				12	8	
m	(CUNY) Hunter Coll**		398	325	8	7				8	5	
m	(CUNY) Queens Coll**		738	645	27	35				6	14	

**U of Rutgers, Newark s graduate program is administered in partnership with the New Jersey Institute of Technology (NJIT) but did not provide data this year.*

***All CUNY graduate enrollment data are incorporated into CUNY Grad Center enrollments.*

	INSTITUTION		2015-16 FIRST-TERM INTRODUCTORY COURSE ENROLLMENTS		FALL 2016 UNDERGRADUATE MAJORS		FALL 2016 GRADUATE STUDENTS			2015-16 PHYSICS DEGREES		
			PHYSICS	PHYSICAL SCI & ASTRONOMY	JR	SR	TOTAL	FOREIGN	FIRST YEAR	BACHELORS	EXITING MASTERS	PHDS
	NEW YORK CONTINUED											
	Long Island U-C.W. Post				DATA NOT PROVIDED							
	Fordham U		493	525	28	34				32		
	Hamilton Coll		117	0	13	12				14		
	Hartwick Coll		117	71	2	4				7		
	Hobart & Wm Smith Coll		175	57	10	12				5		
	Hofstra U		466	335	11	8				5		
	Houghton Coll		51	0	7	3				6		
	Iona Coll				DATA NOT PROVIDED							
	Ithaca Coll		334	342	12	15				18		
	Le Moyne Coll		172	0	8	15				5		
	Manhattan Coll		880	388	3	4				2		
	Manhattanville Coll		40	0	0	0				0		
p	New York U, School of Arts & Science		1443	210	35	32	94	64	17	26	2	9
m	New York U, Tandon Sch. of Engrg.		548	30	8	12	14	7	10	9	2	
	Pace U-Pleasantville				DATA NOT PROVIDED							
p	Rensselaer Polytech Inst		1124	131	32	32	45	10	11	29	6	6
	Roberts Wesleyan Coll		50	28	3	2				6		
p	Rochester Inst of Tech		1740	183	36	19	30	7	9	14	0	1
p	Rochester-U of	c	629	0	17	28	104	28	21	25	0	18
p	Rockefeller U			GRADUATE ONLY			8	3	0		0	0
	St. Bonaventure U		52	63	2	5				3		
	St. John Fisher Coll		140	0	4	3				1		
	St. John's U		582	97	31	11				11		
	St. Lawrence U		137	28	6	8				5		
	Siena Coll		252	259	26	16				13		
	Skidmore Coll		122	0	19	13				14		
	SUNY Coll at Brockport		207	47	2	3				2		
	SUNY Coll-Buffalo St Coll		515	0	7	6				8		
	SUNY Coll at Cortland				DATA NOT PROVIDED							
	SUNY Coll at Fredonia		180	90	18	11				7		
	SUNY Coll at Geneseo		331	354	46	59				44		
	SUNY Coll at New Paltz	c			DATA NOT PROVIDED							
	SUNY Coll at Oneonta		380	299	19	19				6		
	SUNY Coll at Oswego		684	497	11	13				7		
	SUNY Coll at Potsdam		225	55	7	9				10		
p	SUNY-U at Albany		964	615	54	34	47	20	7	32	3	7
p	SUNY-Binghamton U				DATA NOT PROVIDED							
p	SUNY-U at Buffalo		4438	0	19	54	85	52	16	21	4	13
	SUNY-Plattsburgh St U		210	175	11	11				21		
p	SUNY-Stony Brook U	c	2210	0	77	131	178	118	35	46	7	27
	Stern Coll for Women		159	0	0	0				0		
p	Syracuse U		984	799	18	16	80	40	17	17	1	10
	Union Coll	c	179	0	10	8				13		
	US Military Academy		1375	0	21	13				19		
	Utica Coll		119	16	1	3				3		
	Vassar Coll	c	284	0	16	20				17		
	Wagner Coll		114	229	2	4				1		
	Wells Coll		35	20	2	1				5		
	Yeshiva U		52	0	7	7				6		
	NORTH CAROLINA											
m	Appalachian State U		926	410	42	73	36	3	23	37	16	
	Davidson Coll		108	28	16	15				16		
p	Duke U		608	58	23	29	83	44	18	29	1	9
p	East Carolina U		2746	0	12	40	38	5	9	8	3	0
	Elon U		244	143	4	9				9		
	Guilford Coll		61	24	6	2				0		
	High Point U		150	170	6	5				6		
	Lenoir-Rhyne Coll				DATA NOT PROVIDED							
m	North Carolina A&T St U		871	366	10	8	7	4	3	5	6	
m	North Carolina Central U				DATA NOT PROVIDED							

	INSTITUTION		2015-16 FIRST-TERM INTRODUCTORY COURSE ENROLLMENTS		FALL 2016 UNDERGRADUATE MAJORS		FALL 2016 GRADUATE STUDENTS			2015-16 PHYSICS DEGREES		
			PHYSICS	PHYSICAL SCI & ASTRONOMY	JR	SR	TOTAL	FOREIGN	FIRST YEAR	BACHELORS	EXITING MASTERS	PHDS
	NORTH CAROLINA CONT'D											
p	North Carolina St U		2481	86	50	63	113	58	19	28	2	16
	NC-U of, Asheville		415	219	8	9				7		
p	NC-U of, Chapel Hill		1175	854	52	48	80	7	14	42	3	12
m	NC-U of, Charlotte		1567	375	38	56	9	1	1	17	7	
	NC-U of, Greensboro		362	357	9	18				5		
	NC-U of, Wilmington		—	—	10	33				18		
p	Wake Forest U		661	160	25	32	34	12	5	20	2	6
	NORTH DAKOTA											
p	North Dakota St U		1135	167	7	17	17	4	4	6	1	1
p	North Dakota-U of				DATA NOT PROVIDED							
	OHIO											
p	Air Force Inst of Tech			GRADUATE ONLY			18	—	7		18	4
m	Akron-U of		941	164	4	7	19	14	5	4	6	
	Ashland U		22	59	1	1				0		
	Baldwin-Wallace U		229	255	10	14				5		
	Bluffton U		52	58	1	6				6		
m	Bowling Green St U		611	1127	3	11	13	10	6	2	6	
p	Case Western Reserve U	s	805	0	36	45	65	25	7	27	5	8
	Cedarville U		178	20	2	6				3		
p	Cincinnati-U of		1604	457	12	15	51	35	11	10	4	10
m	Cleveland State U		1169	127	9	18	22	3	3	8	10	
	Dayton-U of		2208	3	6	8				8		
	Denison U		55	37	12	10				10		
	Hiram Coll		46	0	3	1				2		
	John Carroll U		99	57	5	14				10		
p	Kent State U		2376	494	10	27	73	60	11	6	11	9
	Kenyon Coll		51	88	12	9				11		
	Marietta Coll		122	0	2	10				3		
m	Miami U		2657	446	30	24	20	9	10	13	13	
	Mount Union-U of		108	73	4	3				3		
	Muskingum U		53	42	1	0				1		
	Oberlin Coll		426	119	20	14				14		
	Ohio Northern U				DATA NOT PROVIDED							
p	Ohio State U	s	3034	0	77	70	200	45	24	51	3	24
p	Ohio U		1217	669	16	25	70	52	16	16	5	13
	Ohio Wesleyan U	c	61	0	4	2				3		
	Otterbein Coll		98	0	18	5				2		
p	Toledo-U of	c	—	—	13	18	57	33	6	3	2	10
	Wittenberg U		96	0	5	6				7		
	Wooster-Coll of		141	49	10	11				17		
m	Wright State U				DATA NOT PROVIDED							
	Xavier U		581	124	15	9				12		
	Youngstown State U	c	969	0	5	2				3		
	OKLAHOMA											
	Cameron U		100	309	4	5				1		
	East Central U		100	189	6	14				3		
	Oklahoma Baptist U		134	60	1	4				1		
	Oklahoma City U				DATA NOT PROVIDED							
p	Oklahoma State U		1741	402	9	17	41	23	7	8	1	8
p	Oklahoma-U of	c	3528	0	27	43	82	39	19	19	6	6
	Sci and Arts of OK-U of		23	172	0	5				2		
	Southern Nazarene U		25	18	4	2				1		
	Southwestern OK St U		243	302	5	9				2		
p	Tulsa-U of		406	62	11	4	14	11	4	5	0	1

			2015-16 FIRST-TERM INTRODUCTORY COURSE ENROLLMENTS		FALL 2016 UNDERGRADUATE MAJORS		FALL 2016 GRADUATE STUDENTS			2015-16 PHYSICS DEGREES		
	INSTITUTION		PHYSICS	PHYSICAL SCI & ASTRONOMY	JR	SR	TOTAL	FOREIGN	FIRST YEAR	BACHELORS	EXITING MASTERS	PHDS
	OREGON											
	Lewis & Clark Coll		188	58	19	9				12		
	Linfield Coll		DATA NOT PROVIDED									
p	Oregon State U		2182	990	35	55	43	11	9	16	0	5
p	Oregon-U of		1264	279	49	76	87	14	10	30	21	13
	Pacific U		125	0	6	12				10		
p	Portland State U		832	93	40	65	46	6	11	36	3	1
	Portland-U of		376	84	5	5				4		
	Reed Coll		98	0	26	20				18		
	Willamette U		144	36	16	13				10		
	PENNSYLVANIA											
	Albright Coll		40	73	3	2				3		
	Allegheny Coll		133	65	8	12				14		
	Bloomsburg U of PA		270	617	8	13				1		
p	Bryn Mawr Coll		151	0	18	12	6	1	1	6	0	0
	Bucknell U		336	42	11	12				11		
	California U of PA		DATA NOT PROVIDED									
p	Carnegie Mellon U		253	36	26	24	79	47	15	20	0	15
	Clarion U of PA		164	390	8	13				6		
	Dickinson Coll		81	29	11	15				10		
p	Drexel U		2318	328	12	26	46	5	5	5	0	4
	Duquesne U		553	419	9	20				11		
	East Stroudsburg U		301	215	4	7				2		
	Edinboro U of PA		360	27	5	4				3		
	Elizabethtown Coll		193	86	3	2				0		
	Franklin & Marshall Coll		144	124	14	15				8		
	Geneva Coll		81	122	0	3				0		
	Gettysburg Coll		266	138	15	16				12		
	Grove City Coll		330	50	10	6				6		
	Haverford Coll	c	74	0	14	17				15		
m	Indiana U of PA		334	281	25	26	4	3	1	13	3	
	Juniata Coll		173	47	11	13				10		
	Kutztown U		151	547	12	16				15		
	Lafayette Coll		278	36	3	9				7		
	Lebanon Valley Coll		118	22	6	5				5		
p	Lehigh U		586	249	10	19	44	15	8	9	0	5
	Lincoln U (PA)		89	356	2	2				2		
	Lock Haven U		126	70	10	22				8		
	Lycoming Coll	c	50	0	15	5				7		
	Mercyhurst U		60	0	1	2				4		
	Messiah Coll		280	0	5	2				6		
	Millersville U		273	200	11	14				8		
	Moravian Coll		60	80	7	4				7		
	Muhlenberg Coll		161	86	12	5				4		
p	Pennsylvania St U	s	7676	0	31	70	130	79	21	51	3	25
	Pennsylvania St U-Erie		698	166	8	3				3		
p	Pennsylvania-U of		414	23	16	69	—	—	18	28	6	—
p	Pittsburgh-U of	c	2310	0	33	42	110*	72*	30*	18	3	14
	St. Josephs U		104	100	2	2				3		
	St. Vincent Coll		231	56	2	6				3		
	Scranton-U of		307	0	2	1				7		
	Shippensburg U		525	341	22	12				7		
	Slippery Rock U		764	73	14	19				10		
	Susquehanna U		140	56	8	6				3		
	Swarthmore Coll	c	138	33	11	6				8		
p	Temple U		2347	440	20	36	61	41	10	12	1	7
	The Sciences-U of		143	0	2	6				1		
	Thiel Coll		18	13	1	1				3		
	Ursinus Coll		171	28	14	5				8		
	Villanova U	s	380	0	6	4				12		
	Wash. & Jefferson Coll		45	0	7	4				7		
	West Chester U		1490	149	27	39				6		
	Westminster Coll		46	20	4	2				5		
	Widener U		236	58	4	9				1		

**U of Pittsburgh - includes graduate-level astronomy enrollments*

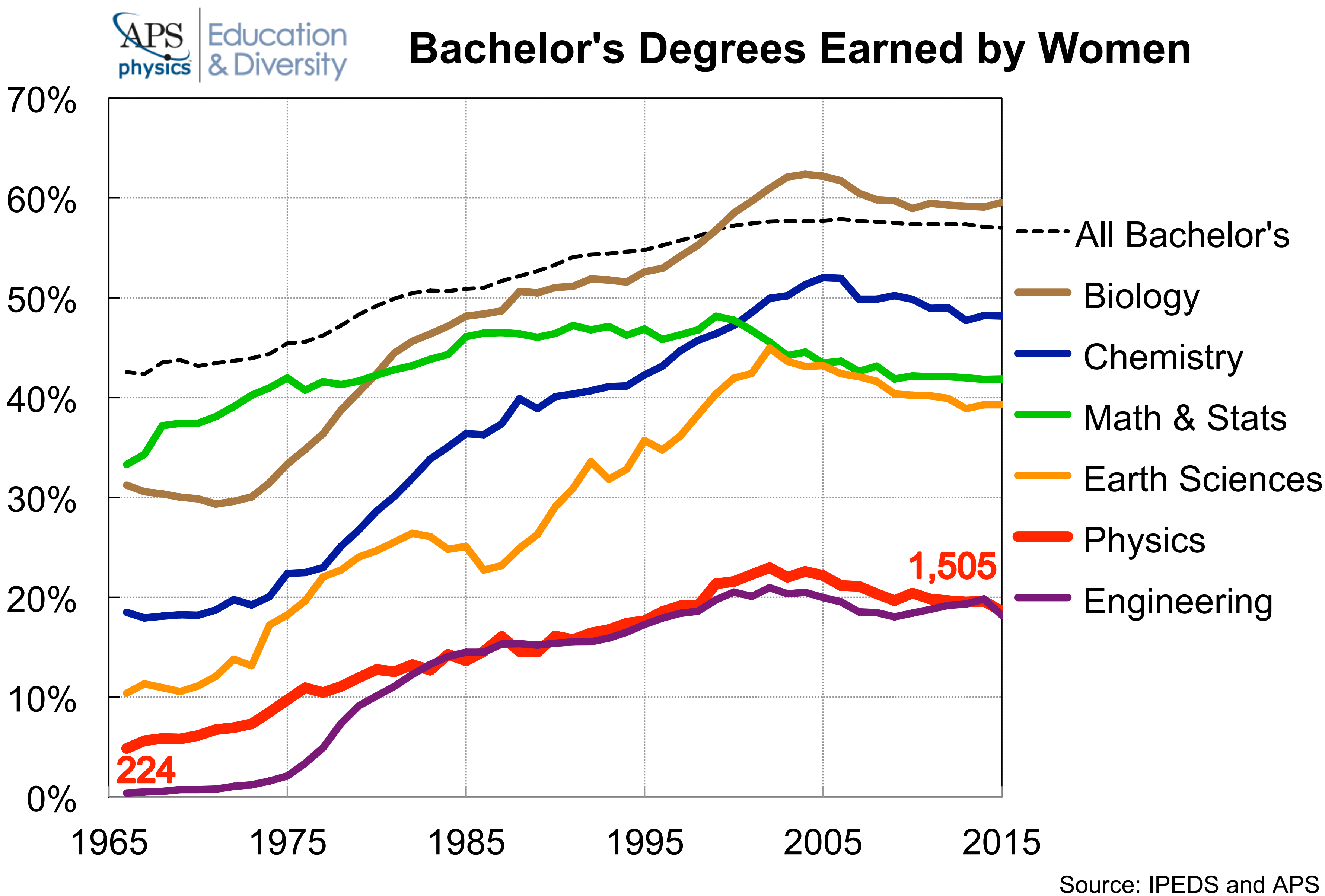
	INSTITUTION		2015-16 FIRST-TERM INTRODUCTORY COURSE ENROLLMENTS: PHYSICS	2015-16 FIRST-TERM INTRODUCTORY COURSE ENROLLMENTS: PHYSICAL SCI & ASTRONOMY	FALL 2016 UNDERGRADUATE MAJORS: JR	FALL 2016 UNDERGRADUATE MAJORS: SR	FALL 2016 GRADUATE STUDENTS: TOTAL	FALL 2016 GRADUATE STUDENTS: FOREIGN	FALL 2016 GRADUATE STUDENTS: FIRST YEAR	2015-16 PHYSICS DEGREES: BACHELORS	2015-16 PHYSICS DEGREES: EXITING MASTERS	2015-16 PHYSICS DEGREES: PHDS
	PUERTO RICO											
	Puerto Rico-U of, Humacao		228	116	7	19				6		
m	Puerto Rico-U of, Mayaguez		3000	257	25	5	24	17	9	11	7	
p	Puerto Rico-U of, Rio Piedras		516	16	18	12	42	21	3	6	1	10
	RHODE ISLAND											
p	Brown U		707	62	25	19	123	79	39	24	12	19
	Providence Coll		245	165	2	4				3		
	Rhode Island Coll				DATA NOT PROVIDED							
p	Rhode Island-U of		1170	211	7	10	17	9	2	8	2	5
	SOUTH CAROLINA											
	Benedict Coll		162	0	2	1				1		
	Bob Jones U		44	15	3	1				1		
	Charleston-Coll of	c	790	0	19	20				16		
	Citadel-The		476	22	9	8				10		
p	Clemson U		2255	465	17	20	53	30	13	12	5	7
	Coastal Carolina U		300	378	18	9				6		
	Francis Marion U		—	—	4	9				13		
	Furman U		247	82	13	23				7		
	Presbyterian Coll		148	48	14	14				7		
	South Carolina St U		98	300	1	1				1		
p	South Carolina-U of		1826	576	27	37	52	22	7	7	2	3
	Wofford Coll		243	0	6	3				11		
	SOUTH DAKOTA											
	Augustana U		130	22	6	5				6		
p	SD Sch of Mines & Tech				DATA NOT PROVIDED							
	South Dakota St U		836	44	3	4				6		
p	South Dakota-U of				DATA NOT PROVIDED							
	TENNESSEE											
	Austin Peay St U		367	536	8	22				8		
	Belmont U				DATA NOT PROVIDED							
	Christian Brothers U		152	51	3	2				0		
	East Tennessee St U		772	267	13	8				9		
m	Fisk U		63	0	6	5	15	0	6	3	7	
	King U				DATA NOT PROVIDED							
	Lane Coll		63	303	0	0				0		
	Lipscomb U		208	71	1	2				3		
m	Memphis-U of		—	—	4	26	13	8	6	7	3	
	Middle Tennessee St U		722	955	26	20				13		
	Rhodes Coll		96	71	13	7				5		
	Southern Adventist U		85	217	3	4				1		
	South-U of the		76	101	6	2				3		
	Tennessee Tech U		661	70	5	4				1		
	TN-U of, Chattanooga		636	690	8	10				4		
p	TN-U of, Knoxville		1720	550	61	57	124	51	26	10	4	11
p	TN-U of, Space Inst (2)			GRADUATE ONLY								
	Trevecca Nazarene U		54	16	4	2				2		
	Union U		64	152	3	3				3		
p	Vanderbilt U		388	145	13	16	60	17	12	18	0	16
	TEXAS											
	Abilene Christian U		132	255	4	6				3		
	Angelo State U		292	430	21	26				6		
	Austin Coll		89	42	12	5				7		
p	Baylor U				DATA NOT PROVIDED							
	Dallas-U of		114	109	10	7				8		
	Houston Baptist U		140	30	1	0				5		
p	Houston-U of		4837	361	34	41	116	83	25	10	0	12
m	Houston-U of, Clear Lake				DATA NOT PROVIDED							
	Lamar U		1019	53	7	20				7		
	McMurry U		49	34	1	3				4		

(2) Data for the degree program at University of Tennessee, Space Institute are included with U. of TN, Knoxville

			2015-16 FIRST-TERM INTRODUCTORY COURSE ENROLLMENTS		FALL 2016 UNDERGRADUATE MAJORS		FALL 2016 GRADUATE STUDENTS			2015-16 PHYSICS DEGREES		
	INSTITUTION		PHYSICS	PHYSICAL SCI & ASTRONOMY	JR	SR	TOTAL	FOREIGN	FIRST YEAR	BACHELORS	EXITING MASTERS	PHDS
	TEXAS CONTINUED											
	Midwestern State U*				DATA NOT PROVIDED							
p	North Texas-U of		1613	3825	29	38	66	29	14	15	4	6
	Prairie View A&M U*				DATA NOT PROVIDED							
p	Rice U	c	512	0	18	6	104	59	19	7	5	12
	St. Mary's U		365	32	10	9				8		
	Sam Houston St U		449	488	17	20				6		
p	Southern Methodist U		411	27	5	7	19	10	3	6	1	2
	Southwestern U				DATA NOT PROVIDED							
m	Stephen F Austin St U		245	1098	19	14	0	0	0	3	0	
	Tarleton State U*		480	174	7	4				6		
p	Texas A&M-College Station	c	3745	0	25	40	174	99	33	26	2	29
m	Texas A&M-Commerce*		257	155	13	15	50	2	42	9	3	
	Texas A&M-Corpus Christi*		517	114	0	1				0		
	Texas A&M-Kingsville*				DATA NOT PROVIDED							
p	Texas Christian U	c	413	0	7	10	15	7	5	3	0	6
	Texas Lutheran U		44	0	3	11				3		
	Texas Southern U*				DATA NOT PROVIDED							
m	Texas State U-San Marcos		3084	352	43	23	22	4	7	21	4	
p	Texas Tech U		1546	656	48	38	78	62	9	6	2	4
p	Texas-U of, at Arlington		—	—	—	—	53	27	16	32	2	10
p	Texas-U of, at Austin	s	4734	1131	93	205	206	98	37	96	5	23
m	Texas-U of, Rio Grande Valley		1460	1636	43	79	19	9	—	45	4	
p	Texas-U of, at Dallas				DATA NOT PROVIDED							
m	Texas-U of, at El Paso		1558	854	27	35	23	14	16	20	10	
p	Texas-U of, at San Antonio		2029	829	31	44	75	25	18	25	2	12
	Trinity U		143	146	8	9				8		
	West Texas A&M U*		295	124	3	4				1		
	UTAH											
p	Brigham Young U		2292	3931	48	129	34	4	7	65	7	1
p	Utah State U		1232	792	24	54	34	6	4	13	2	2
p	Utah-U of		1472	593	59	139	106	64	19	45	2	16
	Utah Valley U				DATA NOT PROVIDED							
	Weber State U		1096	501	12	30				9		
	Westminster Coll		88	17	3	7				6		
	VERMONT											
	Marlboro Coll	c	5	0	1	0				0		
	Middlebury Coll		164	43	18	21				20		
	Norwich U		155	112	6	3				2		
	St. Michael's Coll		59	37	3	2				2		
m	Vermont-U of		1030	480	10	9	2	0	0	4	1	
	VIRGINIA											
	Bridgewater Coll		128	34	10	8				16		
m	Christopher Newport U		691	167	10	12	18	3	—	3	4	
	Emory & Henry Coll				DATA NOT PROVIDED							
P	George Mason U	c	1209	0	24	40	51	11	18	13	9	10
	Hampden-Sydney Coll		239	116	7	6				17		
p	Hampton U		211	135	1	2	18	11	1	3	0	1
	James Madison U		912	466	17	39				23		
	Longwood U		574	0	9	6				6		
	Lynchburg Coll		54	22	0	5				0		
	Mary Baldwin Coll				DATA NOT PROVIDED							
	Mary Washington-U of		111	75	6	12				1		
	Norfo k State U		198	234	2	4				1		
p	Old Dominion U		1214	390	18	26	49	26	11	12	3	4
	Radford U		208	154	3	13				11		
	Randolph-Macon Coll		73	0	4	2				3		
	Randolph Coll		62	50	10	12				8		

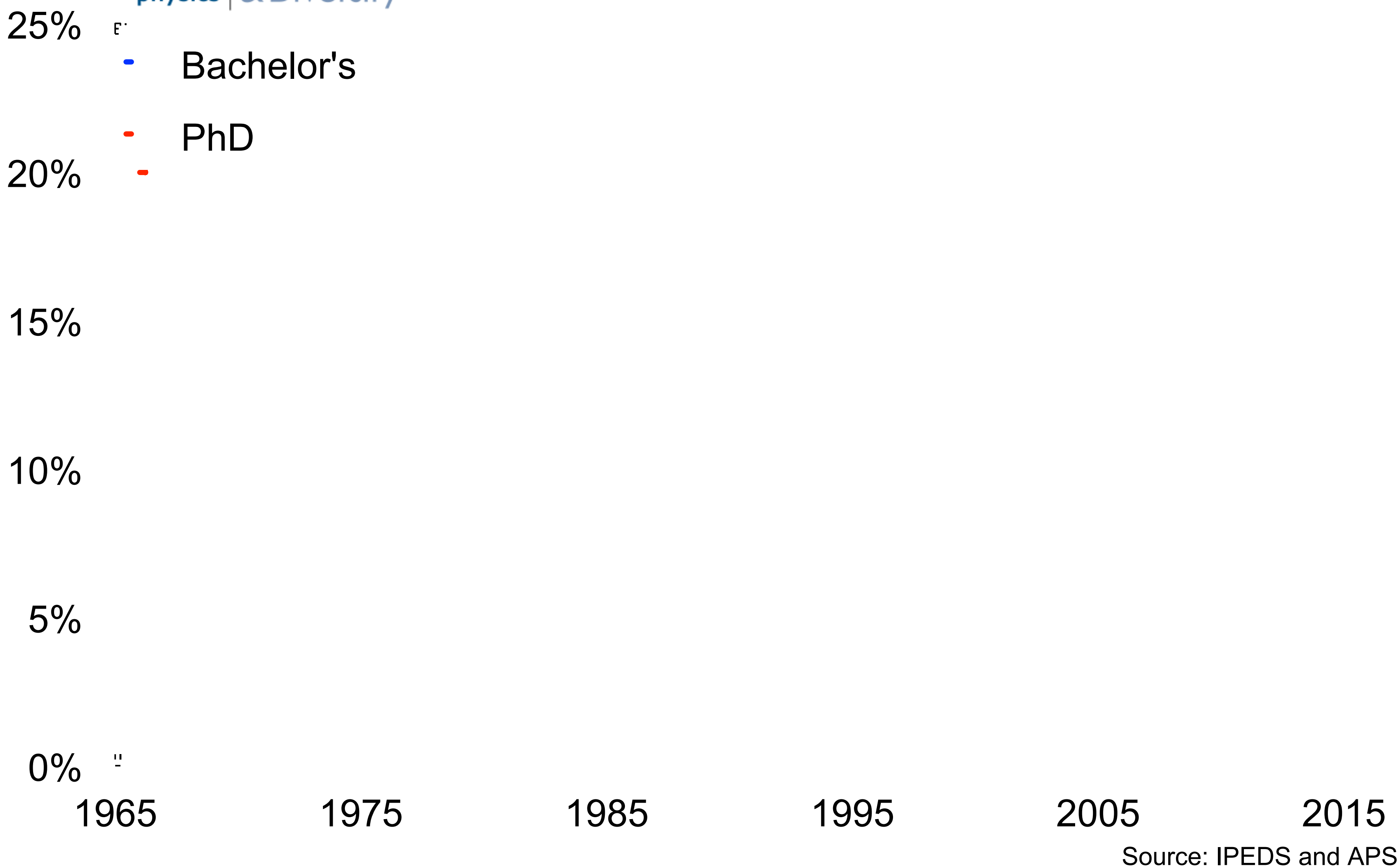
**Part of the Texas Physics Corsortium*

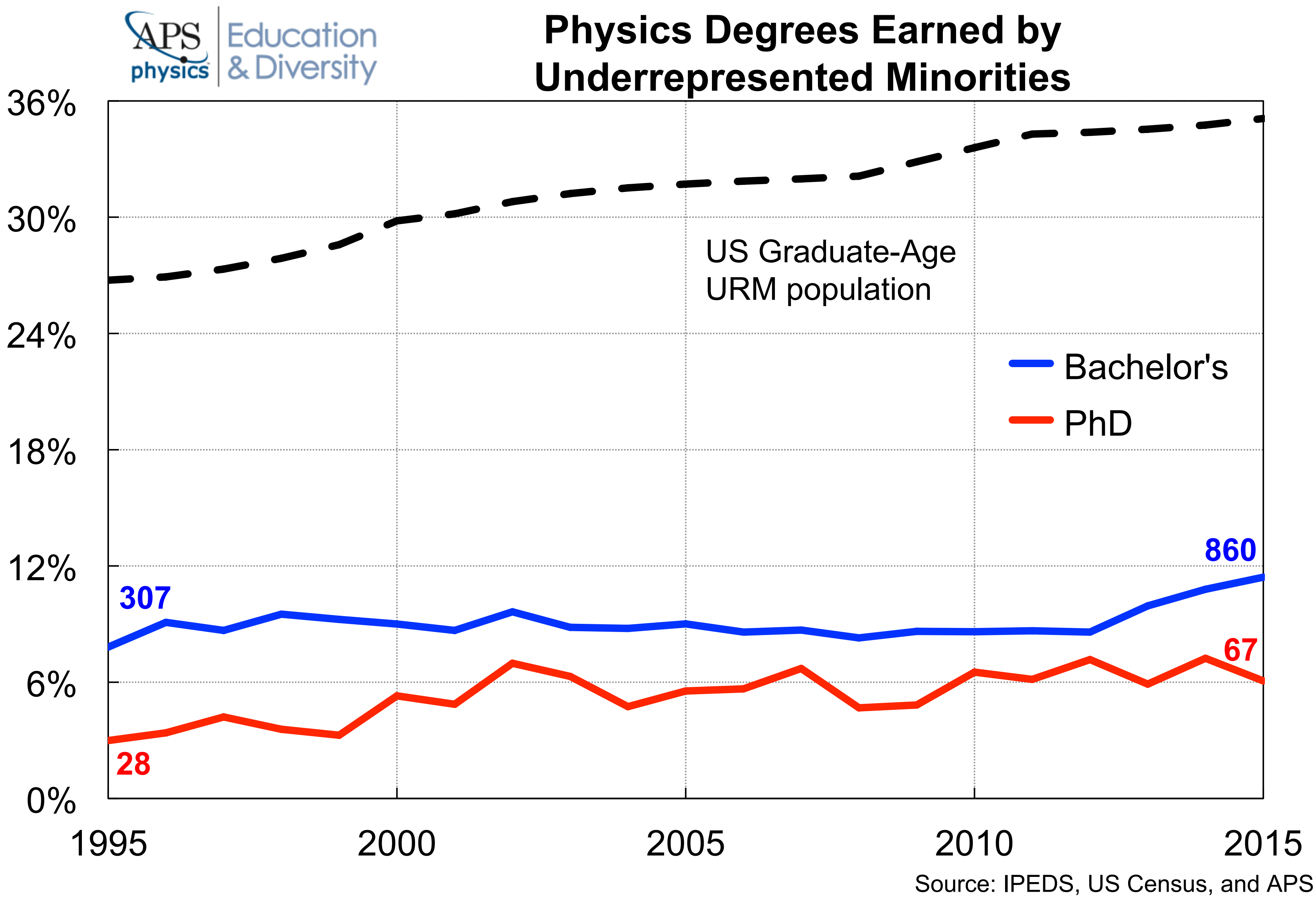
	INSTITUTION		2015-16 FIRST-TERM INTRODUCTORY COURSE ENROLLMENTS: PHYSICS	PHYSICAL SCI & ASTRONOMY	FALL 2016 UNDERGRADUATE MAJORS: JR	SR	FALL 2016 GRADUATE STUDENTS: TOTAL	FOREIGN	FIRST YEAR	2015-16 PHYSICS DEGREES: BACHELORS	EXITING MASTERS	PHDS
	VIRGINIA CONTINUED											
	Richmond-U of		151	0	14	11				14		
	Roanoke Coll		81	23	4	14				8		
	Sweet Briar College		—	—	1	1				1		
m	Virginia Commonwealth U		3080	2638	31	64	13	2	3	19	5	
	Virginia Military Inst		219	39	10	8				7		
p	Virginia Polytech Inst & St U		3286	629	73	51	86	60	11	42	1	12
p	Virginia-U of	s	1772	0	32	32	101	67	20	42	9	15
	Washington & Lee U		102	0	7	5				5		
p	William & Mary-Coll of		486	316	35	35	78	28	6	30	2	14
	WASHINGTON											
	Central Washington U		426	194	17	36				15		
	Eastern Washington U		366	169	5	10				7		
	Gonzaga U		450	88	3	3				3		
	Pacific Lutheran U				DATA NOT PROVIDED							
	Puget Sound-U of		319	60	16	11				14		
	Seattle Pacific U				DATA NOT PROVIDED							
	Seattle U		282	180	8	10				9		
	Walla Walla U		130	0	4	3				1		
p	Washington State U				DATA NOT PROVIDED							
p	Washington-U of	s	3336	0	147	254	197	29	43	135	11	17
	Western Washington U		1067	455	20	27				11		
	Whitman Coll	s	131	0	21	16				13		
	Whitworth U		118	103	17	17				25		
	WEST VIRGINIA											
	Marshall U				DATA NOT PROVIDED							
p	West Virginia U		1895	672	18	30	69	36	14	14	3	11
	West Virginia Wesleyan Coll		198	59	21	32				17		
	Wheeling Jesuit U				DATA NOT PROVIDED							
	WISCONSIN											
	Beloit Coll		67	0	14	13				8		
	Carthage Coll		194	100	11	15				10		
	Lawrence U		124	0	10	11				10		
	Marquette U		569	154	11	7				2		
	Ripon Coll		59	55	2	6				4		
	St. Norbert Coll		62	0	6	3				2		
	WI-U of, Eau Claire		609	746	23	22				27		
	WI-U of, La Crosse		816	264	40	50				41		
p	WI-U of, Madison	s	3271	0	19	89	185	47	39	37	4	16
p	WI-U of, Milwaukee		1882	786	9	13	46	22	5	6	3	5
	WI-U of, Oshkosh		181	259	13	11				8		
	WI-U of, Parkside		150	36	16	—				0		
	WI-U of, River Falls		373	342	28	46				16		
	WI-U of, Stevens Point		533	486	12	18				4		
	WI-U of, Whitewater		395	105	9	17				11		
	WYOMING											
p	Wyoming-U of	c	424	0	10	11	34	14	7	3	1	1



APS physics
Education & Diversity
Bachelor's Degrees Earned by Women
70%
60%
50%
40%
30%
20%
10%
0%
1965
1975
1985
1995
2005
2015
224
1,505
All Bachelor's
Biology
Chemistry
Math & Stats
Earth Sciences
Physics
Engineering
Source: IPEDS and APS

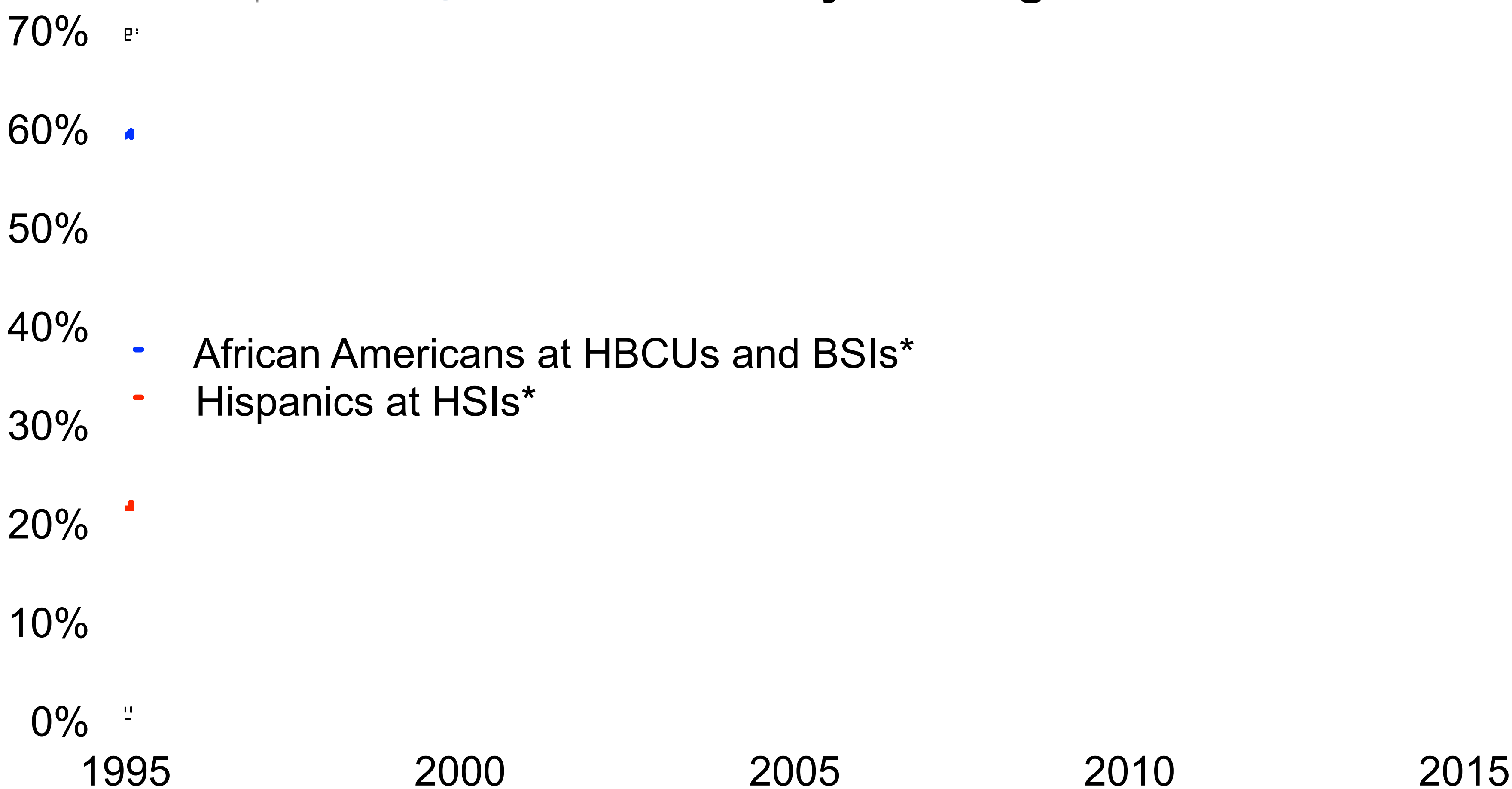
Physics Degrees Earned by Women





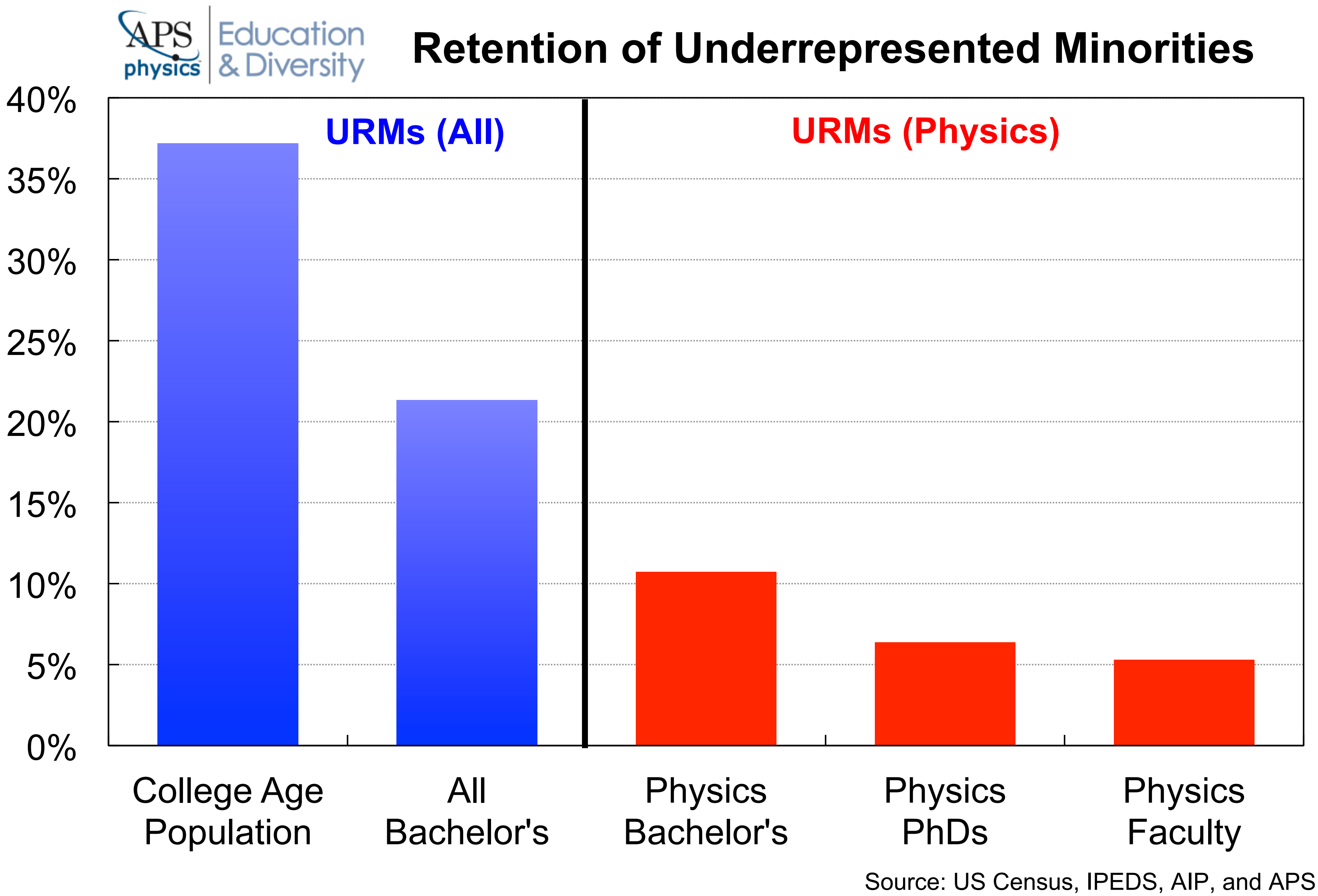
APS physics
Education & Diversity
Physics Degrees Earned by Underrepresented Minorities
36%
30%
24%
18%
12%
6%
0%
1995
2000
2005
2010
2015
US Graduate-Age URM population
Bachelor's
PhD
307
860
28
67
Source: IPEDS, US Census, and APS

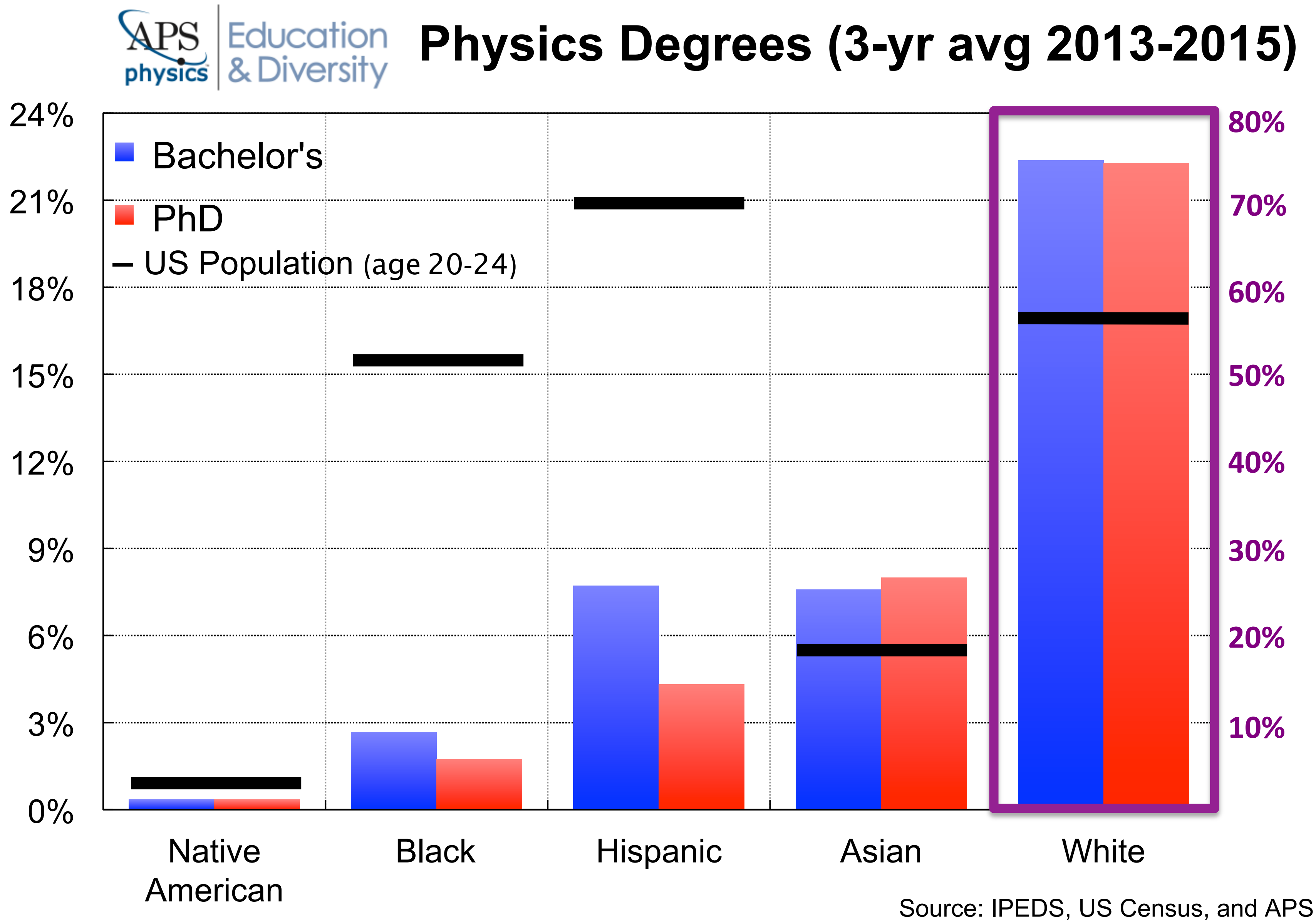
Physics Bachelor's Degrees Awarded at Minority-Serving Institutions

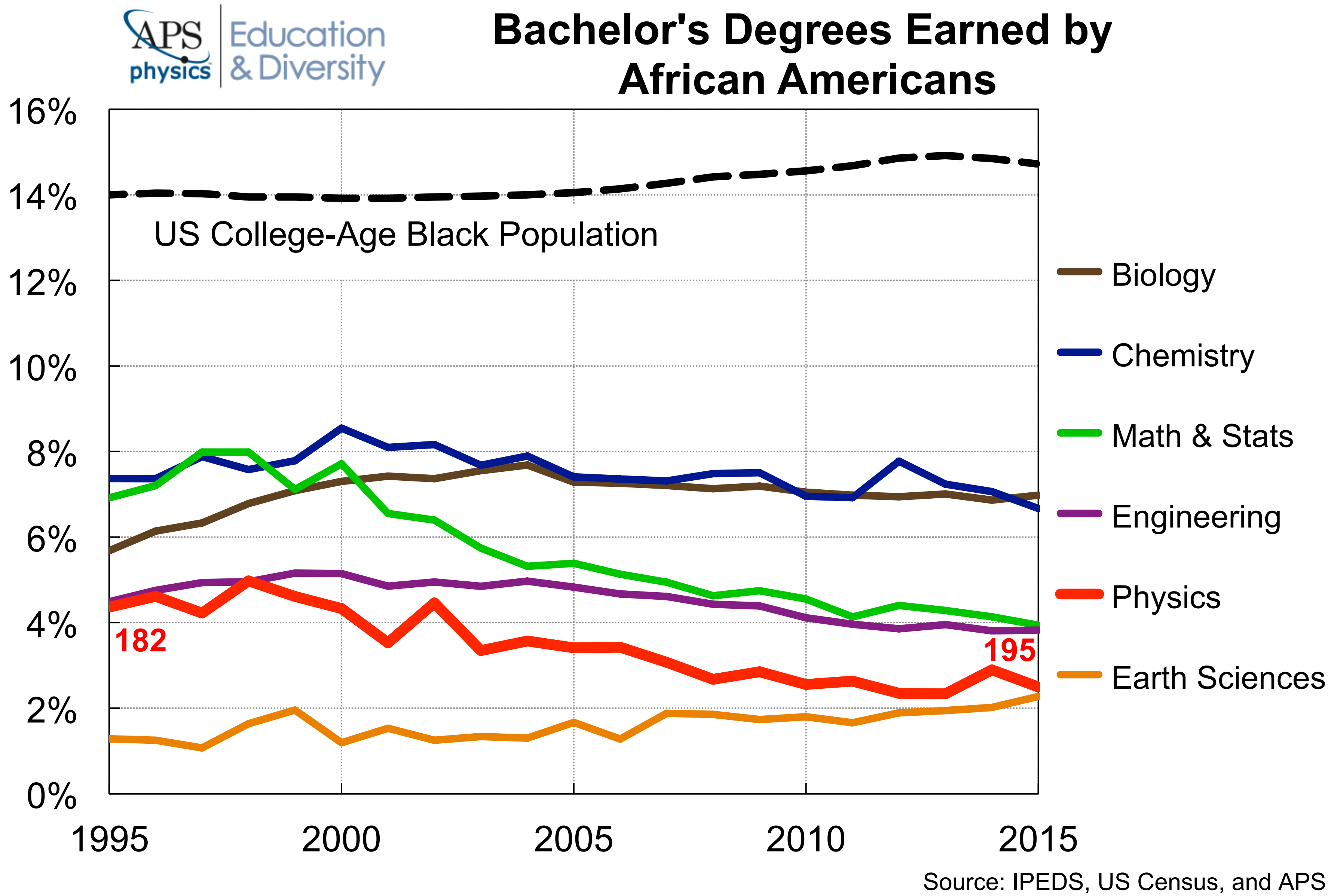


* HBCUs = Historically Black Colleges and Universities
BSIs = Black Serving Institutions
HSIs = Hispanic Serving Institutions

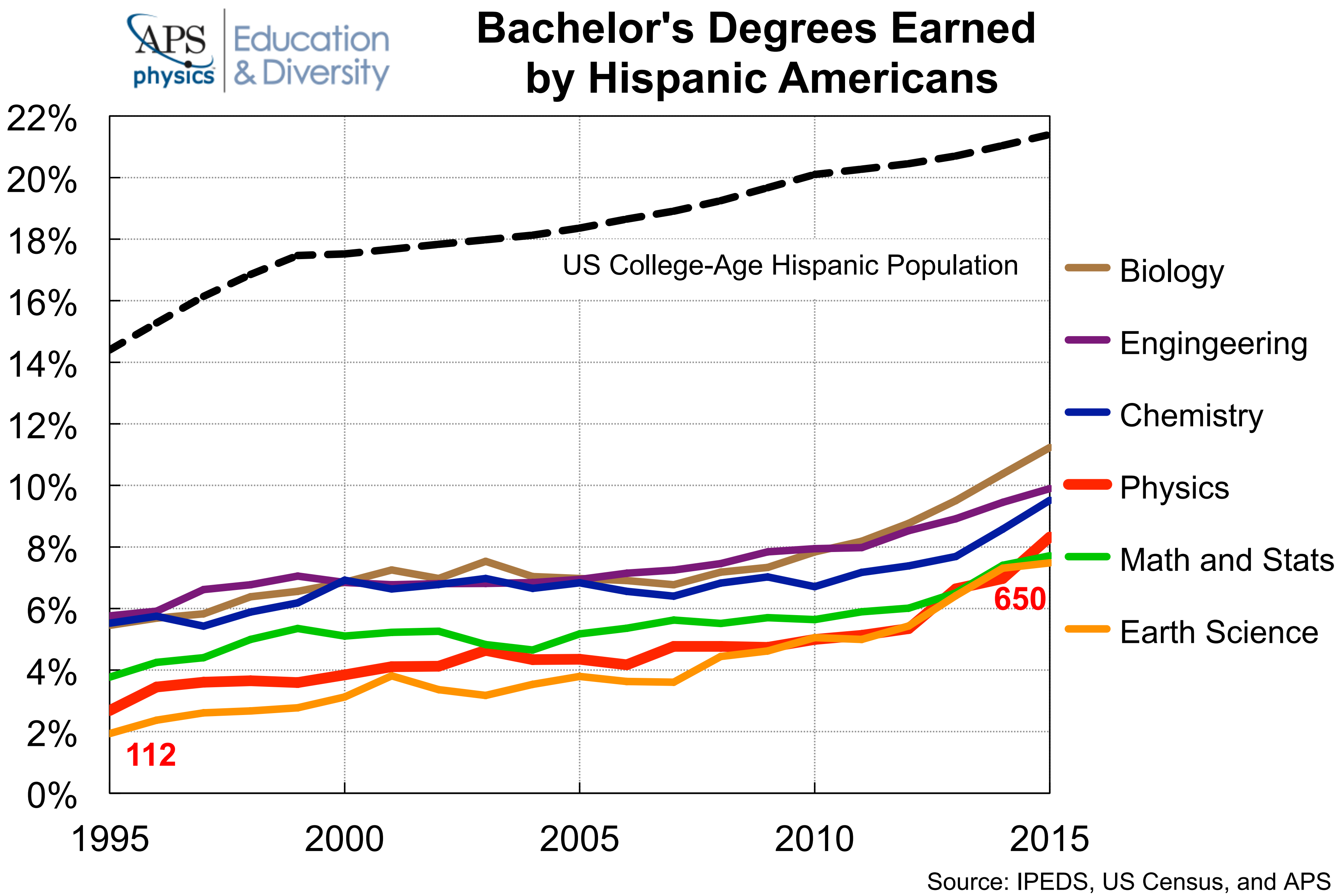
Source: IPEDS and APS

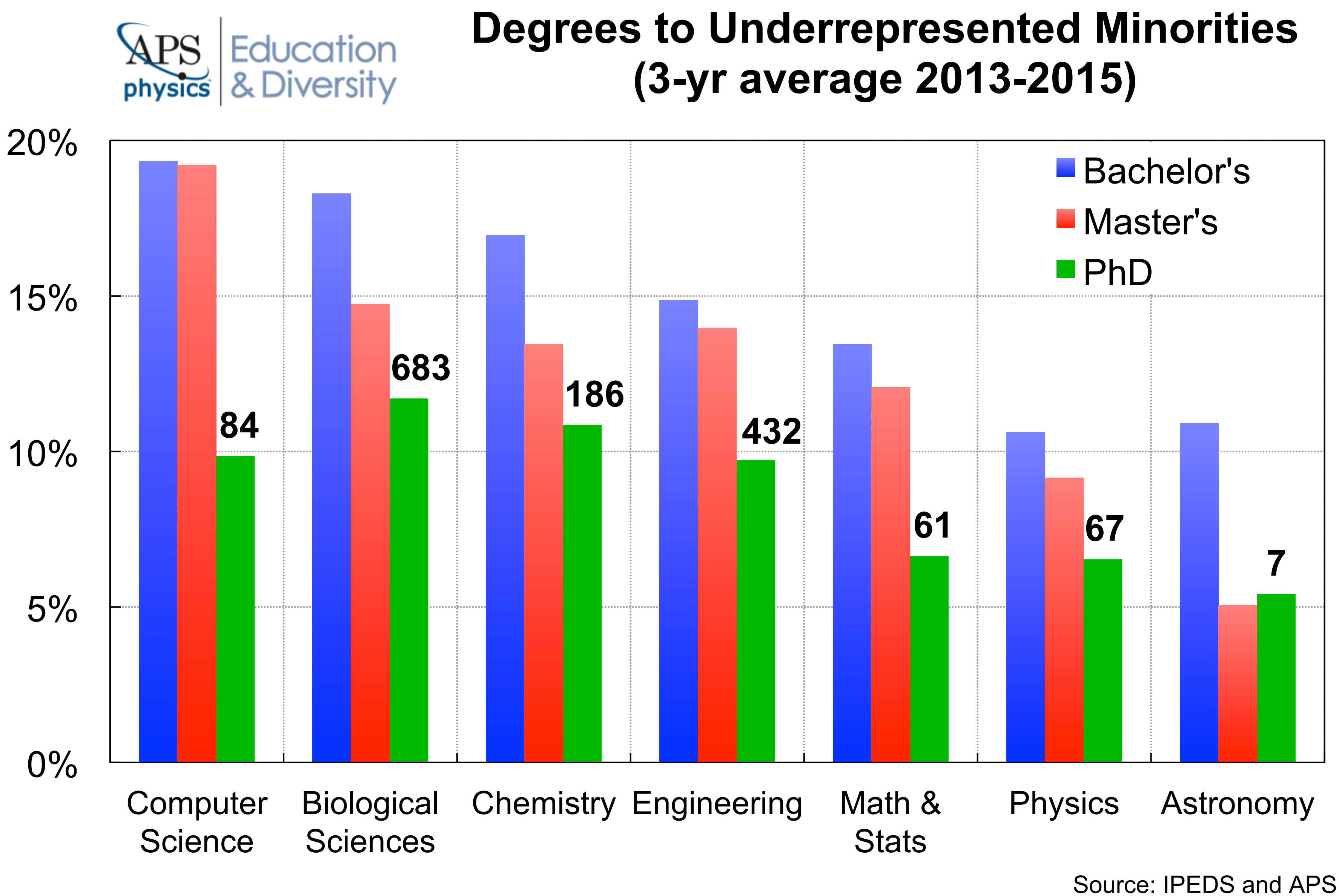

APS physics
Education & Diversity
Retention of Underrepresented Minorities
URMs (All)
URMs (Physics)
40%
35%
30%
25%
20%
15%
10%
5%
0%
College Age Population
All Bachelor's
Physics Bachelor's
Physics PhDs
Physics Faculty
Source: US Census, IPEDS, AIP, and APS


Education & Diversity
Physics Degrees (3-yr avg 2013-2015)
24%
21%
18%
15%
12%
9%
6%
3%
0%
Bachelor's
PhD
US Population (age 20-24)
80%
70%
60%
50%
40%
30%
20%
10%
Native American
Black
Hispanic
Asian
White
Source: IPEDS, US Census, and APS



APS physics
Education & Diversity
Bachelor's Degrees Earned by African Americans
16%
14%
12%
10%
8%
6%
4%
2%
0%
US College-Age Black Population
182
195
1995
2000
2005
2010
2015
Biology
Chemistry
Math & Stats
Engineering
Physics
Earth Sciences
Source: IPEDS, US Census, and APS


APS physics Education & Diversity
Bachelor's Degrees Earned
by Hispanic Americans
US College-Age Hispanic Population
Biology
Engingeering
Chemistry
Physics
Math and Stats
Earth Science
112
650
22%
20%
18%
16%
14%
12%
10%
8%
6%
4%
2%
0%
1995
2000
2005
2010
2015
Source: IPEDS, US Census, and APS


APS physics
Education & Diversity
Degrees to Underrepresented Minorities
(3-yr average 2013-2015)
20%
15%
10%
5%
0%
Bachelor's
Master's
PhD
84
683
186
432
61
67
7
Computer Science
Biological Sciences
Chemistry
Engineering
Math & Stats
Physics
Astronomy
Source: IPEDS and APS