

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

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[http://physicsresearch.net/STEMDiversityOutline\\_UOU\\_Plan\\_MDS\\_November\\_15\\_2015\\_Online.pdf](http://physicsresearch.net/STEMDiversityOutline_UOU_Plan_MDS_November_15_2015_Online.pdf)

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<sup>1</sup> in the professional ranks of mainstream America, finding effective and systemic strategies which improve the racial climate and promote understanding and sensitivity on the various campuses, and improving recruitment and retention of minorities. This topic of discussion—especially for science, technology, engineering, and mathematics (STEM) fields—is extant at the undergraduate as well as the graduate level.

## 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, and mathematics.*

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

1. 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 aforementioned topics.
2. Another seminal component (and a critical one) is the *creation and administration of an effective program* 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.

## Overview and Some Historical Background

Upon reviewing data from 1972-2006, the U.S. Department of Education, National Center for Education Statistics (NCES)<sup>2</sup> found that although the college enrollment participation rate<sup>3</sup> 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%

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<sup>1</sup>We define underrepresented minorities as African-American (Black), Hispanic (Latino), or Native Americans.

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

<sup>3</sup>The college enrollment rate is defined as the percentage of all high school completer ages 16–24 who enroll in college (2- or 4-year) in the fall immediately after high school

(White) versus 58% (Hispanics)]. *Income is a factor in the above-mentioned data:* 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<sup>4</sup>. *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’s degree or higher.

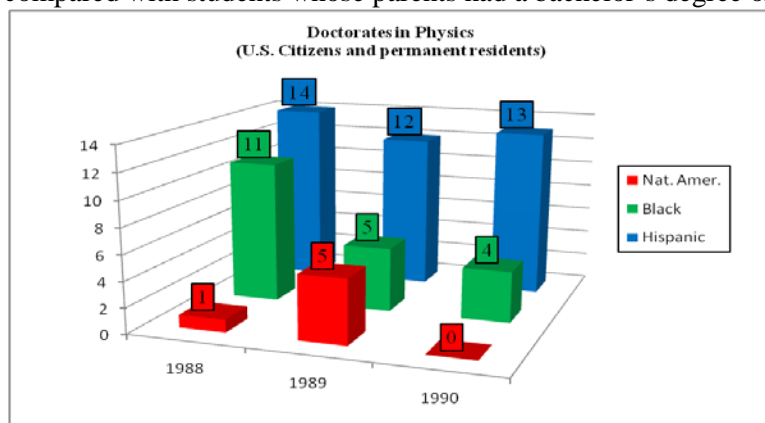


Figure 1. Black, Hispanic, and Native American doctoral recipients in Physics (Source: NSF detailed statistical tables and Department of Education/National Center for Education Statistics). (Prepared by M. D. Slaughter)

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 2, and Table 1).

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<sup>5</sup>, “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

**DOCTORATES IN PHYSICS (U. S. CITIZENS AND PERMANENT RESIDENTS)  
BY  
RACE/ETHNICITY AND DISCIPLINE (1988-2006)**

**Table 1.**

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	678
	2002	22	21	2	60	23	461	589
	2003	17	24	0	64	25	430	555
	2004	11	13	1	44	35	453	559
	2005	13	16	2	65	28	444	567
2006	11	12	1	49	18	511	604	

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

(Source: National Science Foundation (NSF) detailed statistical tables). (Prepared by M. D. Slaughter)

<sup>4</sup>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%

<sup>5</sup>Roman Czujko and David Bernstein. *Who Takes Science? A Report on Student coursework in High School Science and Mathematics*. American Institute of Physics (AIP), New York, New York (1989).

It is interesting to compare the data above with older data from the period from the late 1980s (See Figure 2 and Table

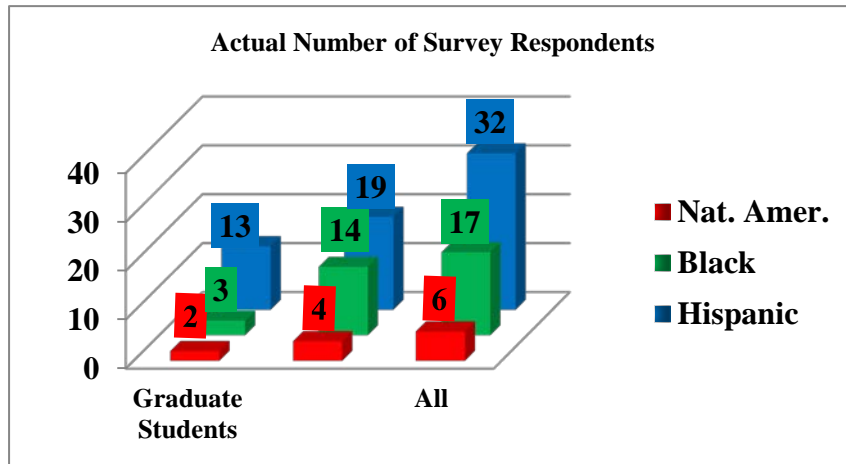


Figure 2. Underrepresented minority graduate student and non-graduate student respondents to an American Physical Society membership survey. (Source: APS 1990 Membership Survey). (Prepared by M. D. Slaughter).

college participation occurred during the late 1970's and early 1980's. Indeed, 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.

An American Physical Society (APS) membership survey<sup>7</sup> 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<sup>8</sup> 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*<sup>9</sup>.

According to the *Journal of Blacks in Higher Education*<sup>10</sup> and *CBS News*<sup>11</sup>, the graduation rate (2009)<sup>12</sup> for African-Americans is 43% versus 63% for whites. For black men, the rate is only 36%. Examples given are: A 55% graduation rate for Hampton University; Harvard University at 95%; and Yale University at 94%. At Historically Black Colleges and Universities (HBCUs), 70% of students who drop out cite financial problems and 20% of freshmen students take remedial classes. HBCUs account for about 25% of US black college graduates.

<sup>6</sup>American Council on Education. *Minorities in Higher Education: Eight annual Status Report, 1989* (Washington, D. C.).

<sup>7</sup>M. A. Foreman, *The 1990 APS Membership Survey: Preliminary Report*. American Physical Society, New York, New York (1991).

<sup>8</sup>National Science Foundation, *Science and Engineering Doctorates: 1960-90*, NSF 91-310 final, Detailed Statistical Tables (Washington, D. C., 1991).

<sup>9</sup>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.

<sup>10</sup><http://www.jbhe.com>

<sup>11</sup><http://www.cbsnews.com>, May 9, 2010

<sup>12</sup>A six-year standard is used to measure graduation rates.

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

**Table 2**

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

Data is available for 2001–2009 and unfortunately, the production rate for minority physicists has not qualitatively changed 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 .

It is crystal-clear from the data in Tables 3A and 3B that the situation for minorities in chemistry, computer science, engineering, and mathematics is not substantially different from that in physics<sup>13</sup>. *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* (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 programs which 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 which 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.*

<sup>13</sup> We give a number of similar graphs for various disciplines later in this document.

**DOCTORATES IN SELECTED STEM FIELDS (U. S. CITIZENS AND PERMANENT RESIDENTS)  
BY  
RACE/ETHNICITY AND DISCIPLINE (2001-2004)**

**Table 3A.**

<b>Discipline</b>	<b>Year</b>	<b>Black</b>	<b>Hispanic</b>	<b>Nat. Amer.</b>	<b>Asian</b>	<b>Other</b>	<b>White</b>	<b>Total</b>
<b>Chemistry</b>	2001	56	59	5	138	97	1,028	1,383
	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
<b>Computer Science</b>	2001	9	12	1	53	33	287	395
	2002	21	19	1	72	33	264	410
	2003	17	11	1	55	47	282	413
	2004	18	18	1	62	47	309	455
<b>Engineering</b>	2001	98	88	10	398	124	1844	2562
	2002	80	88	6	357	138	1592	2261
	2003	94	106	12	292	162	1571	2237
	2004	99	101	8	346	160	1633	2347
<b>Mathematics</b>	2001	17	17	2	55	34	400	525
	2002	14	9	1	26	28	360	438
	2003	19	17	1	43	44	389	513
	2004	8	23	0	48	41	388	508
<b>Physics</b>	2001	16	18	0	73	54	516	677
	2002	22	19	2	45	43	473	604
	2003	17	19	0	53	65	437	591
	2004	11	13	3	37	56	442	562

U. S. Citizen and permanent resident doctoral recipients in chemistry, computer science, engineering, mathematics, and physics in 2001–2004. (Source: Department of Education, National Center for Education Statistics). (Prepared by M. D. Slaughter)

**DOCTORATES IN SELECTED STEM FIELDS (U. S. CITIZENS AND PERMANENT RESIDENTS)  
BY  
RACE/ETHNICITY AND DISCIPLINE (2005-2009)**

**Table 3B.**

<b>Discipline</b>	<b>Year</b>	<b>Black</b>	<b>Hispanic</b>	<b>Nat. Amer.</b>	<b>Asian</b>	<b>Other</b>	<b>White</b>	<b>Total</b>
<b>Chemistry</b>	2005	37	57	6	139	106	1,021	1,366
	2006	43	70	6	160	102	1,080	1,461
	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
<b>Computer Science</b>	2005	19	17	0	88	68	308	500
	2006	21	6	6	92	70	356	551
	2007	30	17	3	111	82	437	680
	2008	24	16	0	87	94	446	667
	2009	30	23	2	116	76	483	730
<b>Engineering</b>	2005	101	98	6	372	179	1696	2452
	2006	110	105	7	470	204	1818	2714
	2007	117	138	8	508	250	1973	2994
	2008	128	130	15	501	294	2112	3180
	2009	139	153	19	504	324	2235	3374
<b>Mathematics</b>	2005	18	21	0	54	49	398	540
	2006	20	27	0	63	45	428	583
	2007	21	21	1	79	65	458	645
	2008	22	29	2	53	75	490	671
	2009	27	35	3	78	86	559	788
<b>Physics</b>	2005	15	16	1	62	56	435	585
	2006	11	21	3	54	50	496	635
	2007	20	22	4	60	71	519	696
	2008	15	20	1	57	79	582	754
	2009	11	25	3	53	86	603	781

U. S. Citizen and permanent resident doctoral recipients in chemistry, computer science, engineering, mathematics, and physics in 2005—2009. (Source: Department of Education, National Center for Education Statistics). (Prepared by M. D. Slaughter)

## **An excerpt from *Symmetry Magazine*<sup>14</sup> 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.”

A informative American Institute of Physics (AIP) report is “Untapped Talent: The African American Presence in Physics and the Geosciences”<sup>15</sup>, where the University of New Orleans was among the top nine Universities that awarded the largest number of physics masters and geosciences bachelors to African Americans during the period 2000-2004. Another AIP report—“Minority Issues”<sup>16</sup> where one finds that Florida International University ranked among the top universities that awarded physics bachelor’s degrees to Hispanics during the period 2004–2008. A number of interesting statistical data can be found at the AIP site <http://www.aip.org/statistics/>.

Another recent (July 2014) AIP report<sup>17</sup> contains information **vital** to understanding and solving some of the long-standing problems currently extant in STEM education and job placement for underrepresented minorities 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 diverse. Though the report focuses on the current situation in 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 and are **prerequisite unique** disciplines for colleges and universities, which provide the underpinning training for just about all other disciplines. The report is entitled ***African Americans & Hispanics among Physics & Astronomy Faculty***<sup>17</sup>. We take the opportunity in this document to provide a few quotes (words in red are attributable to the author of this document) from that report:

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<sup>14</sup> Symmetry Magazine (DOE Fermilab/SLAC Publication), Vol. 6, Issue 6, July 9, 2009.

<sup>15</sup> AIP Pub. Number R-444, Roman Czujko, Rachel Ivie, and James H. Stith, September, 2008.

<https://photos.aip.org/statistics/reports/untapped-talent-african-american-presence-physics-and-geosciences>.

<sup>16</sup> <http://www.aip.org/sites/default/files/statistics/minorities/hispamer-pg-08.pdf>

<sup>17</sup> <http://aip.org/sites/default/files/statistics/faculty/africanhisp-fac-pa-122.pdf>



“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.**”

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

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

Many informative websites exist at government and society sites from which one can draw the following conclusion: Universities which have the most success in recruiting, retention, and graduation of minorities generally have programs and resources of a systemic nature and which have an a critical mass of motivated 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. *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.*



## Program Solution Outline

### Sample Program at an 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.*

#### 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

#### 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 provide additional services conducive to UOUP mission success

### UOUP (Phase Three–Graduate Students)

- Create an *Undergraduate to Graduate Bridge Phase* of the UOUP. Supply a program of support which 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

### **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 (current) are:

- Average Student Debt for the College Class of 2010: \$25, 250<sup>19</sup>;
- Enrollment Decrease Among Families Experiencing Home Equity Decline: 30%<sup>20</sup>;
- Student Loans in Default is 8.8% and Number of Recent College Graduates Who Can't Pay Their Loans is 317,000<sup>21</sup>.
- Median Before-Tax Earnings: High School Graduate \$33,800, Some College but no Degree \$39,700, Bachelor's Degree \$55,700, Master's Degree \$67,300, Doctoral Degree \$91,900, Professional Degree \$100,000<sup>22</sup>.

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

There are numerous foundations and agencies which have 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 development of a fully functional interdisciplinary UOU “Tech Park”.

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<sup>19</sup> Source: The Project on Student Debt

<sup>20</sup> Source: Pew Charitable Trust

<sup>21</sup> Source: U. S. Department of Education

<sup>22</sup> Source: CollegeBoard.org, Education Pays 2010

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 and Data

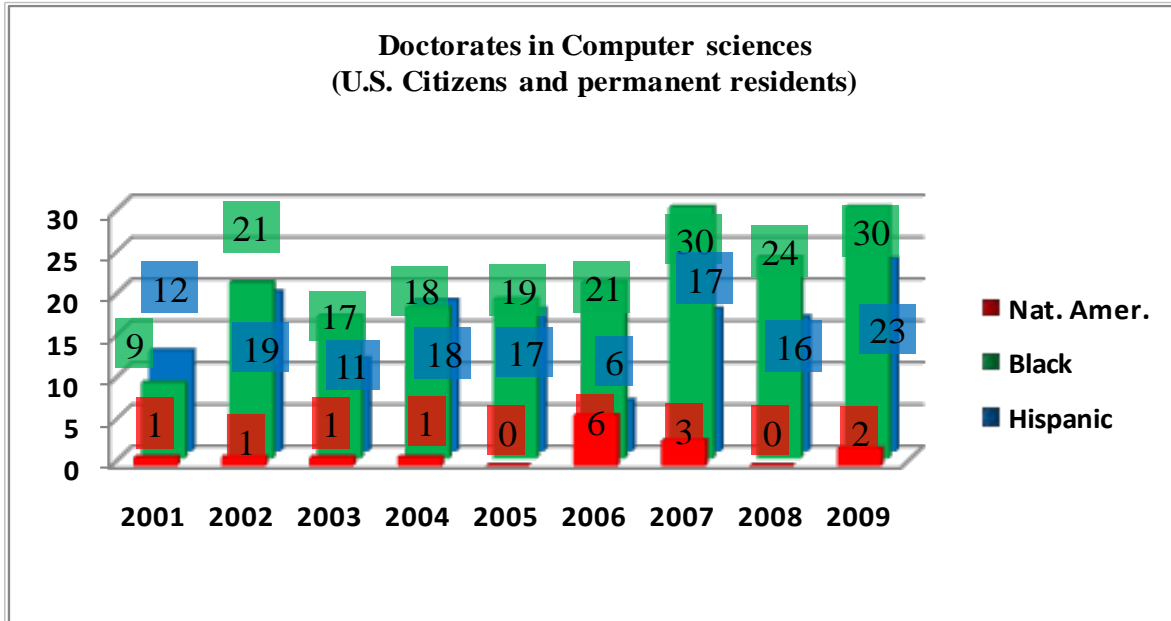
We present a variety of STEM charts and corresponding data (unless otherwise noted, most source data is derived from the Department of Education with corresponding charts prepared by Prof. M. D. Slaughter) below. *As easily ascertained, significant progress over more than two decades for underrepresented minorities has not been achieved in STEM education.*

We also present links (hopefully still active) to interesting and informative websites that contain STEM data on underrepresented minorities (student and faculty, dating from 2002 to 2011). The web sites at <http://www.collegeresults.org> (interactive search engine) and <http://www.edtrust.org> and <http://www.jbhe.com> 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 the [National Center for Education Statistics](#) of the Department of Education:

- [Black Student College Graduation Rates](#);
- [Hispanic College Graduation Rates](#) ;
- [Colleges With the Highest Black Student Graduation Rates](#);
- [High-Ranking Institutions With Low Black Student Graduation Rates](#);
- [Trends in Black Student Graduation Rates at Highly Ranked Universities](#),
- [Trends in Black Student Graduation Rates at Liberal Arts Colleges](#);
- [Graduation Rates at Flagship State Universities](#);
- [Graduation Rates at Historically Black Colleges and Universities](#);
- [Trends in Graduation Rates at HBCUs](#);
- [Hispanic-Serving Institutions \(HSIs\) Graduation Rates](#);
- [The Lack of Black Faculty in Higher Education](#).

**DOCTORATES IN SELECTED FIELDS**

**Table 5**

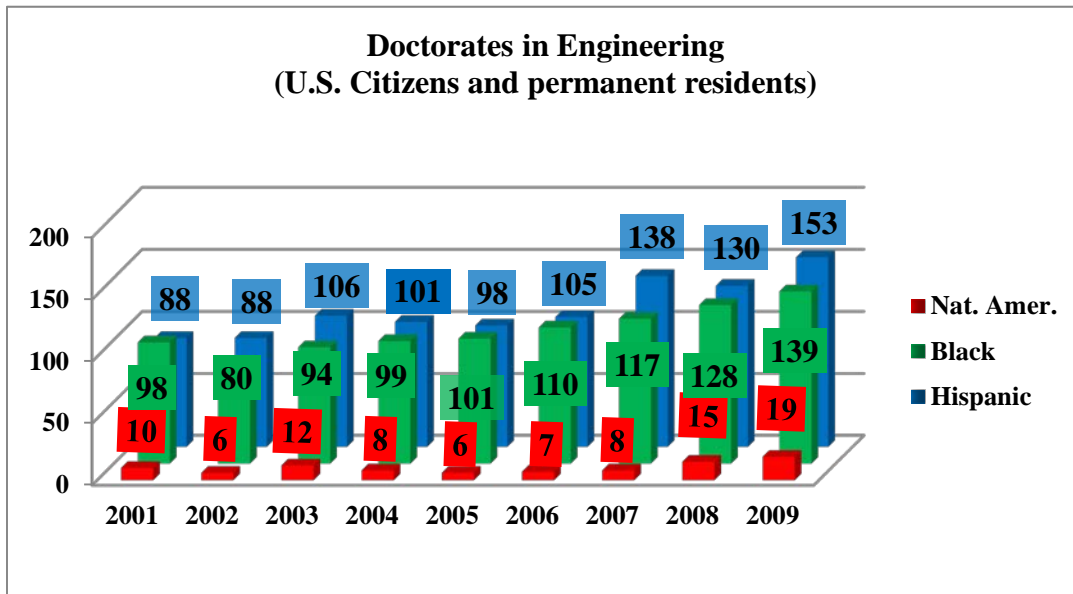


Computer sciences	U.S. citizens and permanent residents	White	Asian	Black	Hispanic	Nat. Amer.	Other
2001	395	287	53	9	12	1	33
2002	410	264	72	21	19	1	33
2003	413	282	55	17	11	1	47
2004	455	309	62	18	18	1	47
2005	500	308	88	19	17	0	68
2006	551	356	92	21	6	6	70
2007	680	437	111	30	17	3	82
2008	667	446	87	24	16	0	94
2009	730	483	116	30	23	2	76

**U. S. Citizen and permanent resident doctoral recipients in Computer Sciences.  
(Source: NCES. Prepared by M. D. Slaughter)**

**Table 6**

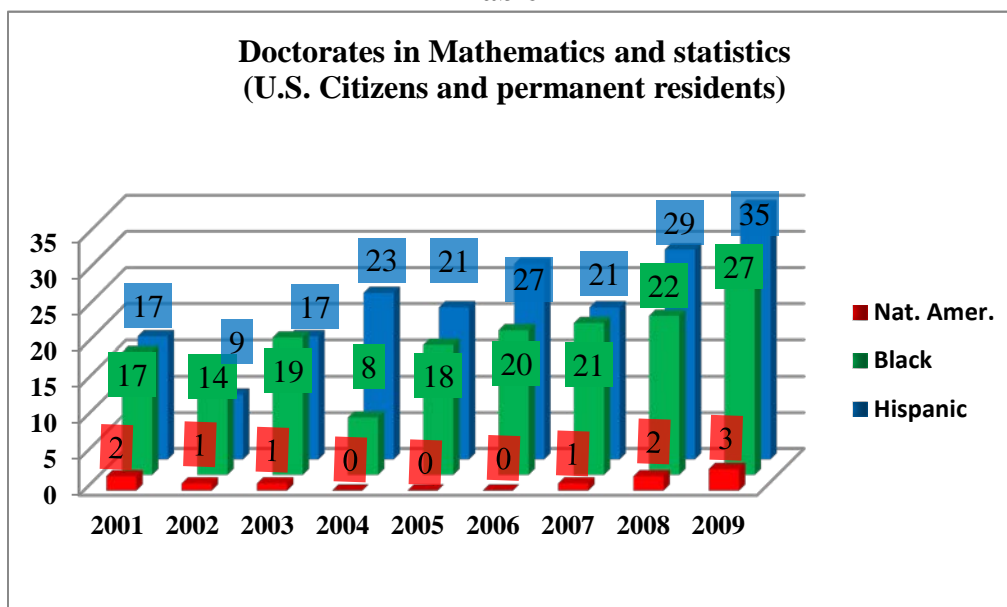
**Doctorates in Engineering  
(U.S. Citizens and permanent residents)**



Engineering	U.S. citizens and permanent residents	White	Asian	Black	Hispanic	Nat. Amer.	Other
2001	2562	1844	398	98	88	10	124
2002	2261	1592	357	80	88	6	138
2003	2237	1571	292	94	106	12	162
2004	2347	1633	346	99	101	8	160
2005	2452	1696	372	101	98	6	179
2006	2714	1818	470	110	105	7	204
2007	2994	1973	508	117	138	8	250
2008	3180	2112	501	128	130	15	294
2009	3374	2235	504	139	153	19	324

U. S. Citizen and permanent resident doctoral recipients in Engineering.  
(Source: NCES. Prepared by M. D. Slaughter)

**Table 7**

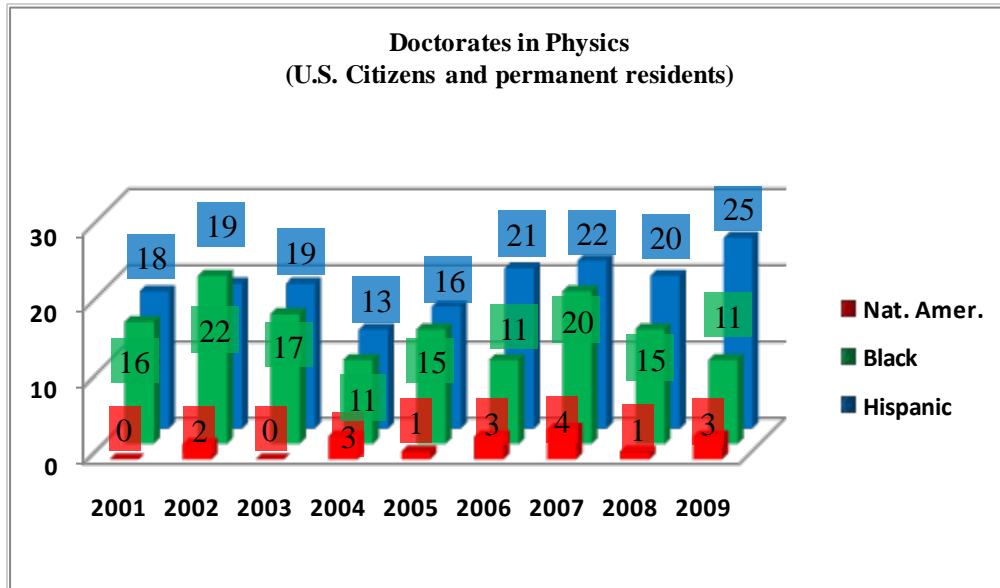


<b>Mathematics and statistics</b>	<b>U.S. citizens and permanent residents</b>	<b>White</b>	<b>Asian</b>	<b>Black</b>	<b>Hispanic</b>	<b>Nat. Amer.</b>	<b>Other</b>
<b>2001</b>	525	400	55	17	17	2	34
<b>2002</b>	438	360	26	14	9	1	28
<b>2003</b>	513	389	43	19	17	1	44
<b>2004</b>	508	388	48	8	23	0	41
<b>2005</b>	540	398	54	18	21	0	49
<b>2006</b>	583	428	63	20	27	0	45
<b>2007</b>	645	458	79	21	21	1	65
<b>2008</b>	671	490	53	22	29	2	75
<b>2009</b>	788	559	78	27	35	3	86

**U. S. Citizen and permanent resident doctoral recipients in Mathematics and statistics.  
(Source: NCES. Prepared by M. D. Slaughter)**



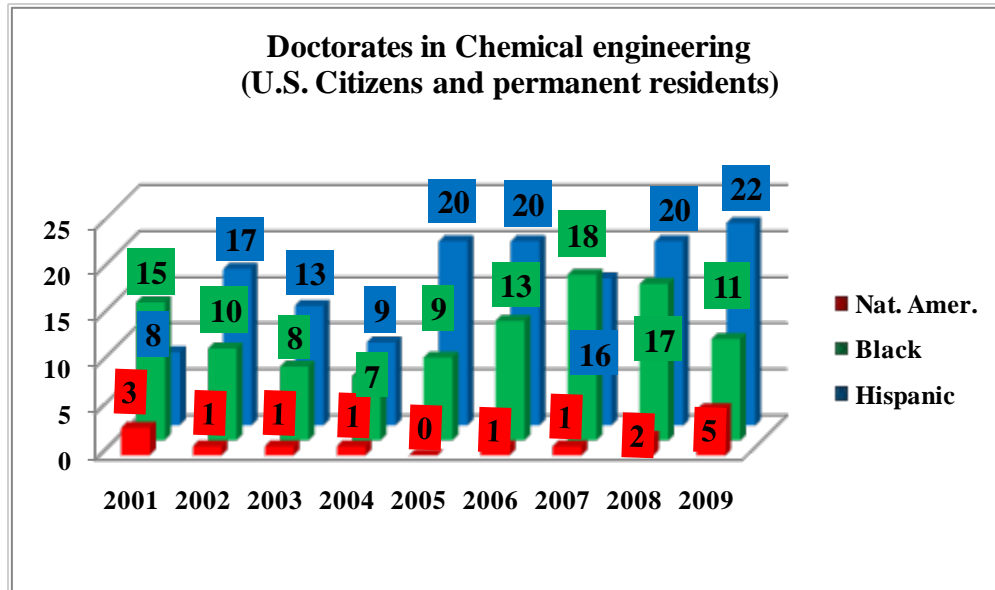
**Table 8**



Physics	U.S. citizens and permanent residents	White	Asian	Black	Hispanic	Nat. Amer.	Other
2001	677	516	73	16	18	0	54
2002	604	473	45	22	19	2	43
2003	591	437	53	17	19	0	65
2004	562	442	37	11	13	3	56
2005	585	435	62	15	16	1	56
2006	635	496	54	11	21	3	50
2007	696	519	60	20	22	4	71
2008	754	582	57	15	20	1	79
2009	781	603	53	11	25	3	86

**U. S. Citizen and permanent resident doctoral recipients in Physics.**  
(Source: NCES. Prepared by M. D. Slaughter)

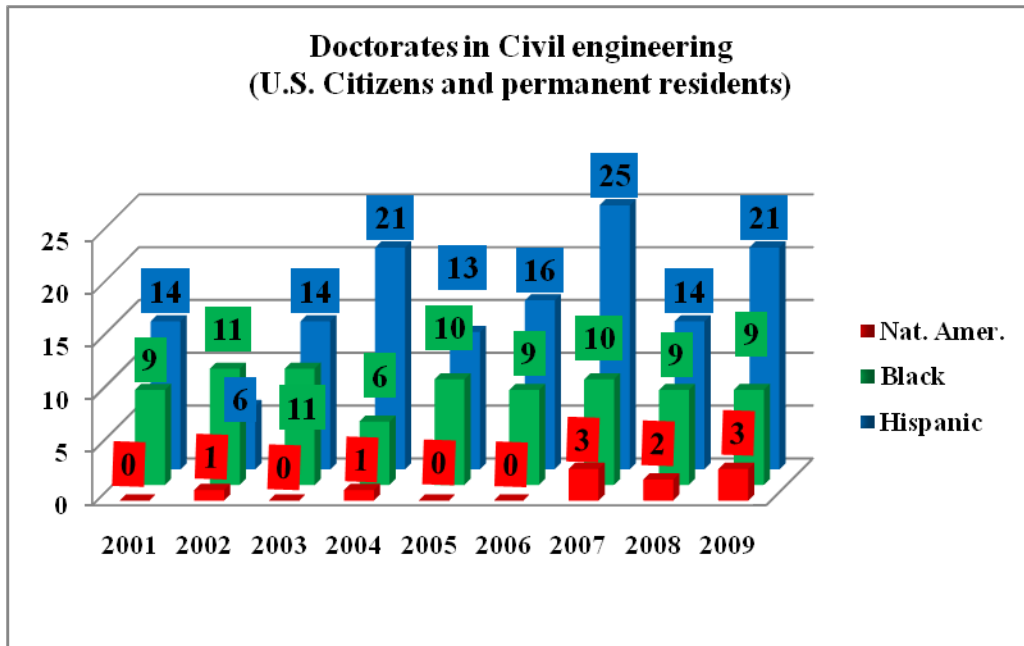
Table 9



Chemical engineering	U.S. citizens and permanent residents	White	Asian	Black	Hispanic	Nat. Amer.	Other
2001	357	271	49	15	8	3	11
2002	354	240	65	10	17	1	21
2003	295	209	44	8	13	1	20
2004	340	242	64	7	9	1	17
2005	360	275	43	9	20	0	13
2006	423	297	70	13	20	1	22
2007	373	250	63	18	16	1	25
2008	417	296	55	17	20	2	27
2009	437	312	56	11	22	5	31

**U. S. Citizen and permanent resident doctoral recipients in Chemical engineering.  
(Source: NCES. Prepared by M. D. Slaughter)**

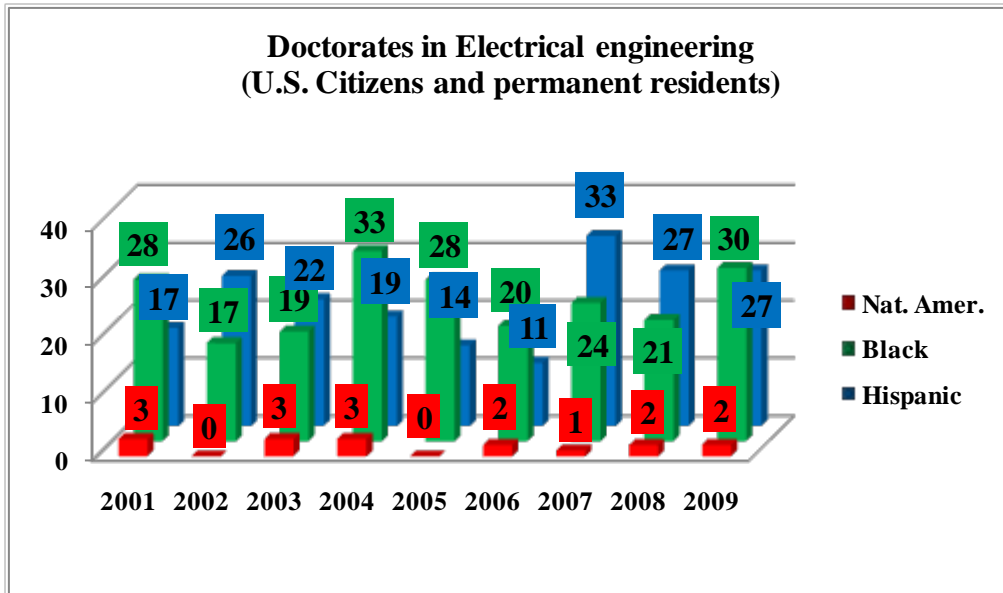
**Table 10**



Civil engineering	U.S. citizens and permanent residents	White	Asian	Black	Hispanic	Nat. Amer.	Other
2001	300	225	33	9	14	0	19
2002	273	205	30	11	6	1	20
2003	283	216	19	11	14	0	23
2004	257	188	25	6	21	1	16
2005	296	209	40	10	13	0	24
2006	296	208	44	9	16	0	19
2007	359	245	50	10	25	3	26
2008	330	231	38	9	14	2	36
2009	348	241	35	9	21	3	39

**U. S. Citizen and permanent resident doctoral recipients in Civil engineering.  
(Source: NCES. Prepared by M. D. Slaughter)**

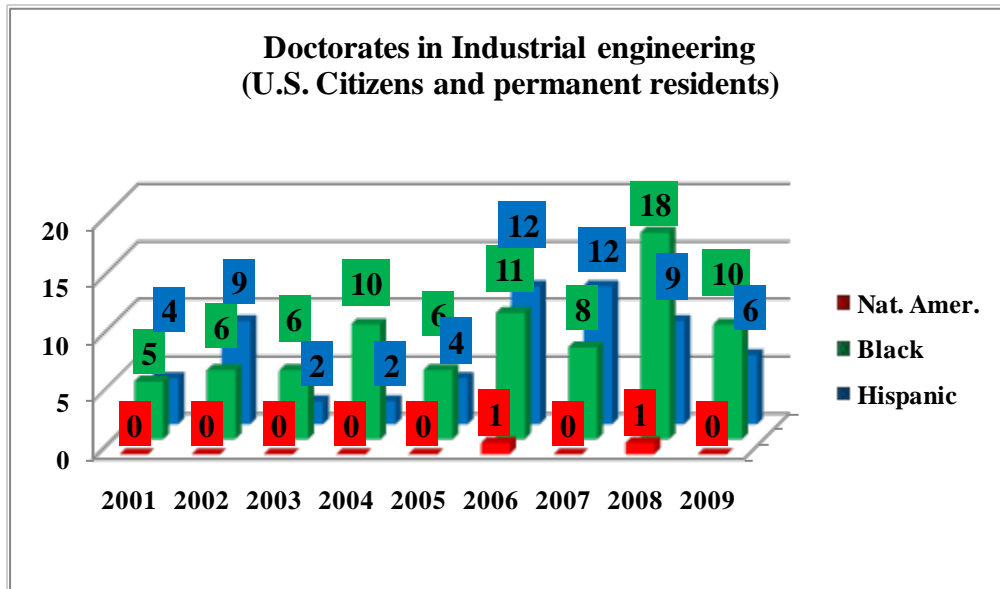
Table 11



Electrical engineering	U.S. citizens and permanent residents	White	Asian	Black	Hispanic	Nat. Amer.	Other
2001	587	374	127	28	17	3	38
2002	506	325	111	17	26	0	27
2003	478	282	112	19	22	3	40
2004	531	331	97	33	19	3	48
2005	567	346	128	28	14	0	51
2006	560	346	121	20	11	2	60
2007	645	367	156	24	33	1	64
2008	704	397	174	21	27	2	83
2009	711	415	156	30	27	2	81

U. S. Citizen and permanent resident doctoral recipients in Electrical engineering.  
(Source: NCES. Prepared by M. D. Slaughter)

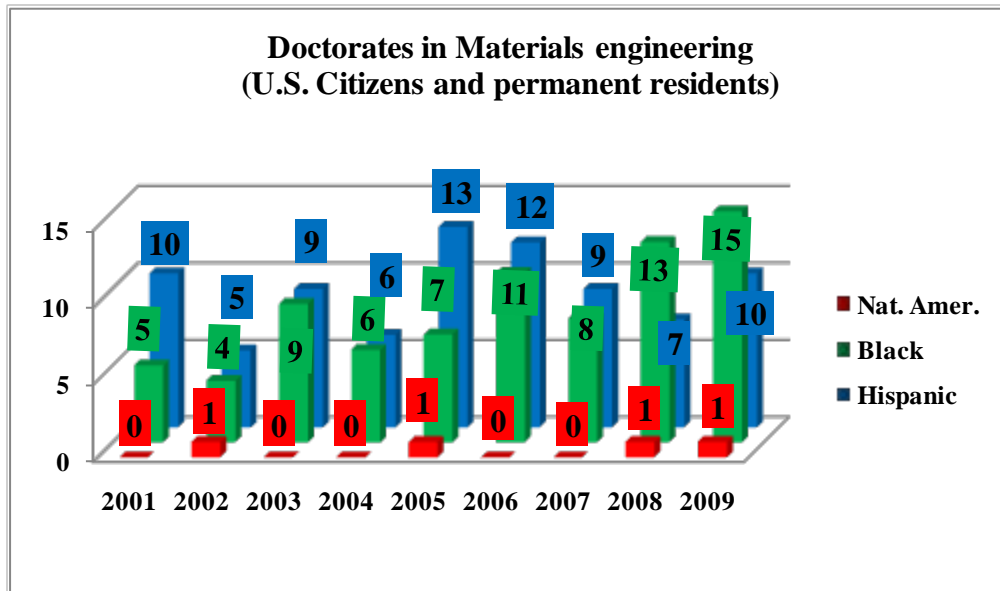
Table 12



Industrial engineering	U.S. citizens and permanent residents	White	Asian	Black	Hispanic	Nat. Amer.	Other
2001	109	79	14	5	4	0	7
2002	115	83	10	6	9	0	7
2003	93	67	12	6	2	0	6
2004	119	88	14	10	2	0	5
2005	107	73	17	6	4	0	7
2006	117	77	10	11	12	1	6
2007	129	82	15	8	12	0	12
2008	125	71	17	18	9	1	9
2009	112	71	15	10	6	0	10

U. S. Citizen and permanent resident doctoral recipients in Industrial engineering.  
(Source: NCES. Prepared by M. D. Slaughter)

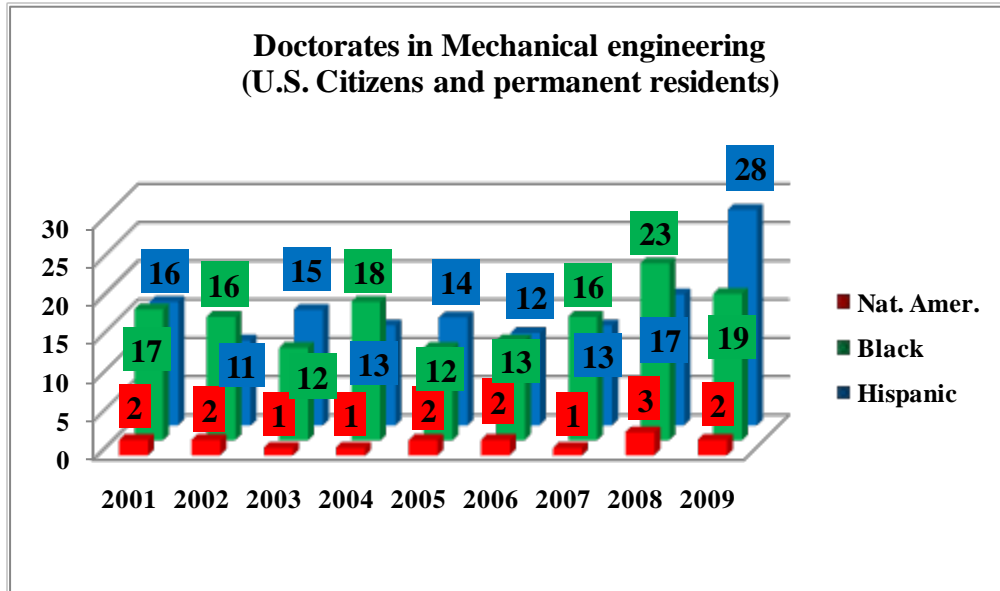
Table 13



Materials engineering	U.S. citizens and permanent residents	White	Asian	Black	Hispanic	Nat. Amer.	Other
2001	217	170	26	5	10	0	6
2002	172	135	22	4	5	1	5
2003	198	150	14	9	9	0	16
2004	205	159	27	6	6	0	7
2005	191	136	17	7	13	1	17
2006	242	163	38	11	12	0	18
2007	286	191	55	8	9	0	23
2008	284	209	27	13	7	1	27
2009	281	194	32	15	10	1	29

**U. S. Citizen and permanent resident doctoral recipients in Materials engineering.  
(Source: NCES. Prepared by M. D. Slaughter)**

Table 14

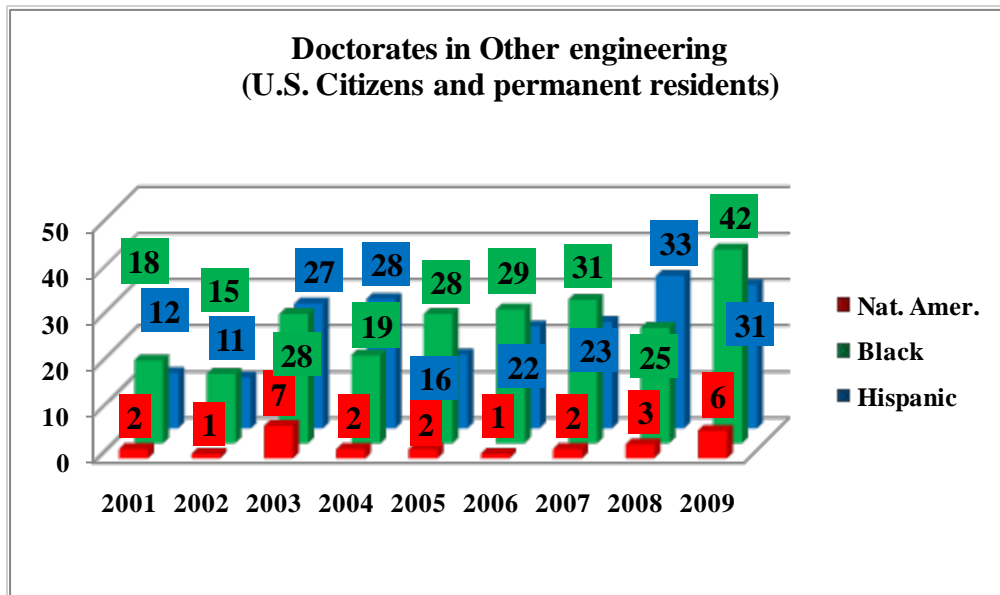


Mechanical engineering	U.S. citizens and permanent residents	White	Asian	Black	Hispanic	Nat. Amer.	Other
2001	414	285	76	17	16	2	18
2002	335	236	49	16	11	2	21
2003	336	254	40	12	15	1	14
2004	307	200	52	18	13	1	23
2005	338	242	42	12	14	2	26
2006	388	274	66	13	12	2	21
2007	376	265	52	16	13	1	29
2008	406	282	45	23	17	3	36
2009	472	320	50	19	28	2	53

U. S. Citizen and permanent resident doctoral recipients in Mechanical engineering.  
(Source: NCES. Prepared by M. D. Slaughter)



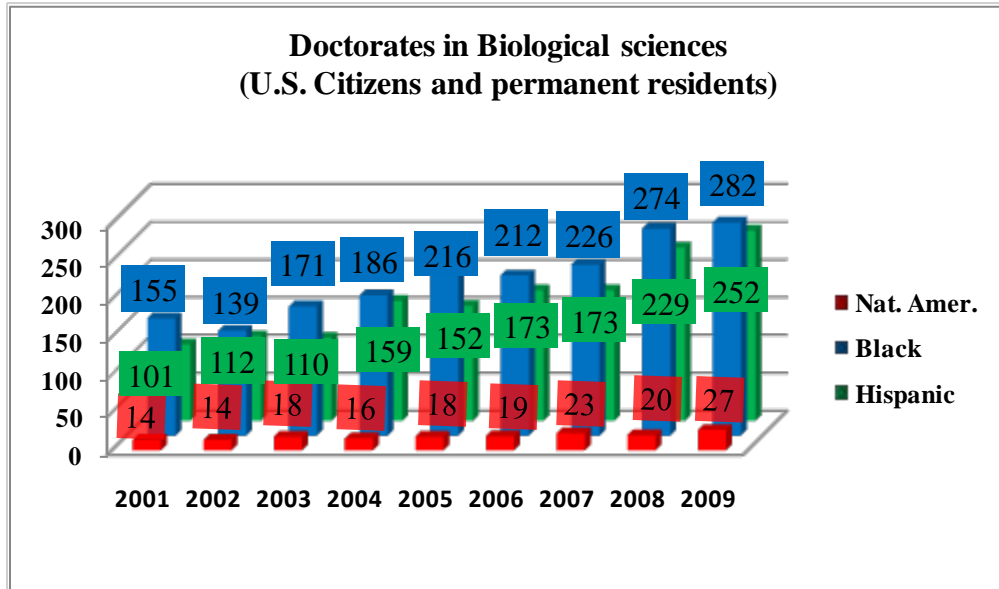
Table 15



Other engineering	U.S. citizens and permanent residents	White	Asian	Black	Hispanic	Nat. Amer.	Other
2001	477	361	62	18	12	2	22
2002	429	303	67	15	11	1	32
2003	482	345	43	28	27	7	32
2004	515	364	59	19	28	2	43
2005	502	342	77	28	16	2	37
2006	608	393	110	29	22	1	53
2007	718	492	109	31	23	2	61
2008	811	545	136	25	33	3	69
2009	876	583	144	42	31	6	70

U. S. Citizen and permanent resident doctoral recipients in Other engineering.  
(Source: NCES. Prepared by M. D. Slaughter)

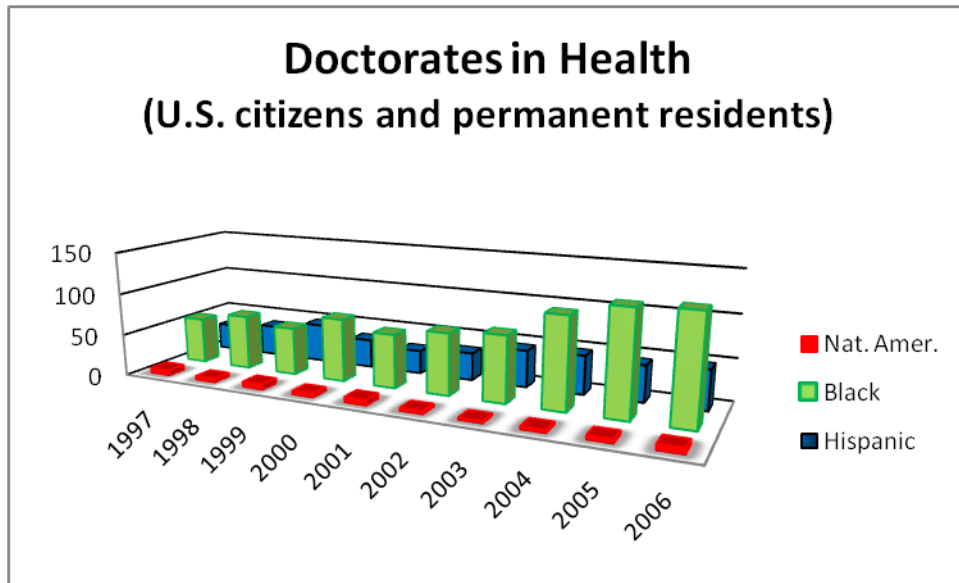
**Table 16**



Biological sciences	U.S. citizens and permanent residents	White	Asian	Black	Hispanic	Nat. Amer.	Other
2001	3,579	2,689	399	101	155	14	221
2002	3,443	2,613	388	112	139	14	177
2003	3,901	2,912	475	110	171	18	215
2004	4,118	3,047	489	159	186	16	221
2005	4,330	3,172	508	152	216	18	264
2006	4,377	3,206	477	173	212	19	290
2007	4,713	3,426	563	173	226	23	302
2008	5,091	3,608	575	229	274	20	385
2009	5,310	3,782	567	252	282	27	400

**U. S. Citizen and permanent resident doctoral recipients in Biological sciences.  
(Source: NCES. Prepared by M. D. Slaughter)**

**Table 17**

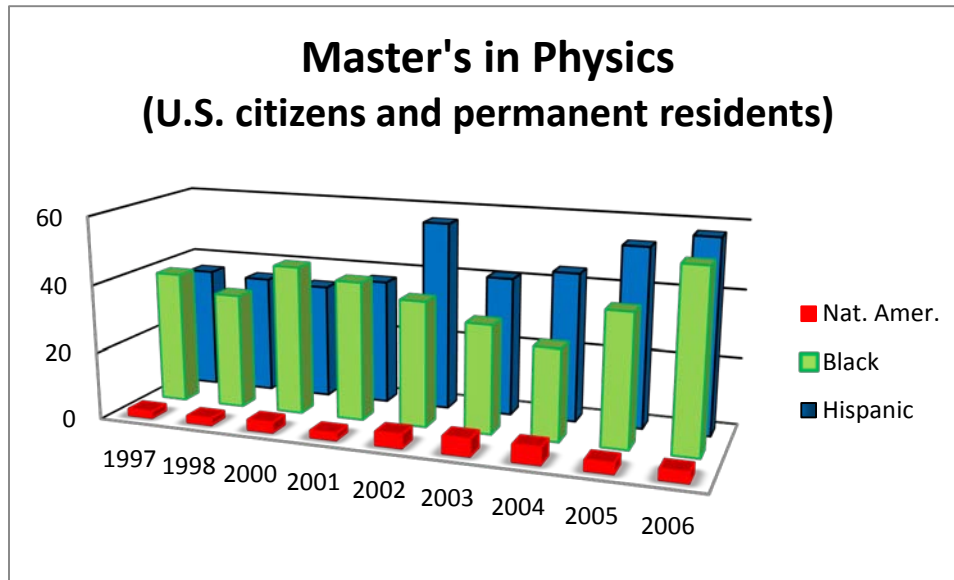


<b>Discipline</b>	<b>Year</b>	<b>Black</b>	<b>Hispanic</b>	<b>Nat. Amer.</b>
<b>Health</b>	1997	55	32	6
	1998	65	37	4
	1999	57	46	6
	2000	75	34	4
	2001	64	28	6
	2002	73	33	3
	2003	78	44	2
	2004	107	46	3
	2005	122	43	4
	2006	125	47	6

**SOURCE:** Tabulated by National Science Foundation/Division of Science Resources Statistics; data from Department of Education/National Center for Education Statistics: Integrated Postsecondary Education Data System Completions Survey. (Prepared by M. D. Slaughter)

**MASTER'S IN SELECTED FIELDS**

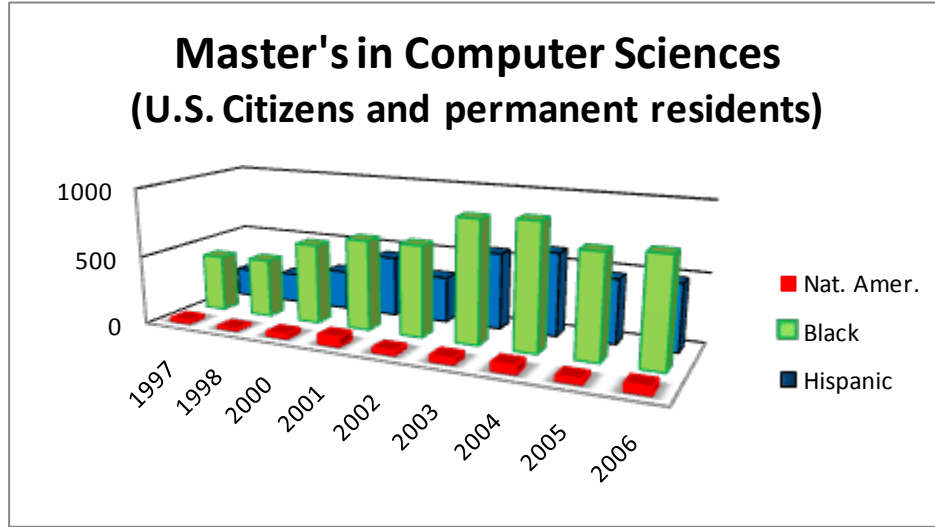
Table 18



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	12	15	0	68	25	558	678
	2002	22	21	2	60	23	461	589
	2003	12	24	0	64	25	430	555
	2004	13	13	1	44	35	453	559
2005	12	16	2	65	28	444	567	
2006	13	12	1	49	18	511	604	

**SOURCE:** Tabulated by National Science Foundation/Division of Science Resources Statistics; data from Department of Education/National Center for Education Statistics: Integrated Postsecondary Education Data System Completions Survey. (Prepared by M. D. Slaughter)

Table 19

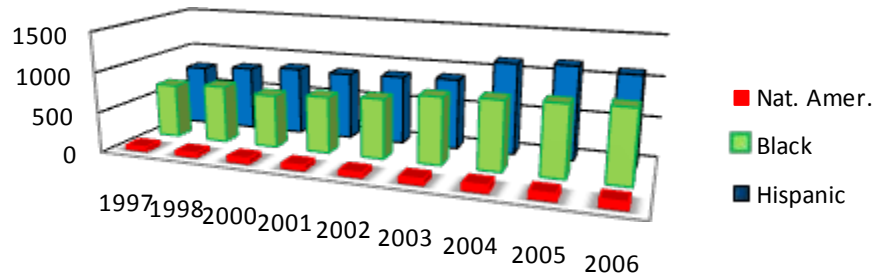


Discipline	Year	Black	Hispanic	Nat. Amer.
Computer Sciences	1997	411	211	25
	1998	424	219	15
	2000	580	288	32
	2001	654	440	68
	2002	659	333	32
	2003	881	555	42
	2004	902	602	57
	2005	740	462	35
	2006	766	480	54

**SOURCE:** Tabulated by National Science Foundation/Division of Science Resources Statistics; data from Department of Education/National Center for Education Statistics: Integrated Postsecondary Education Data System Completions Survey. (Prepared by M. D. Slaughter)

Table 20

**Master's in Engineering  
(U.S. Citizens and permanent residents)**



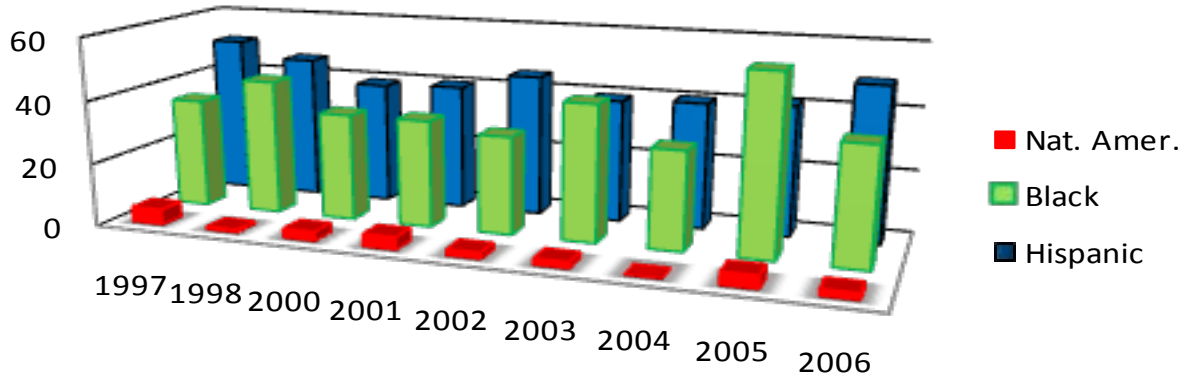
Discipline	Year	Black	Hispanic	Nat. Amer.
Engineering	1997	674	765	53
	1998	714	807	54
	2000	658	852	64
	2001	700	838	60
	2002	738	855	57
	2003	827	876	70
	2004	853	1,130	85
	2005	874	1,152	82
	2006	893	1,100	87

**SOURCE:** Tabulated by National Science Foundation/Division of Science Resources Statistics; data from Department of Education/National Center for Education Statistics: Integrated Postsecondary Education Data System Completions Survey. (Prepared by M. D. Slaughter)



Table 21

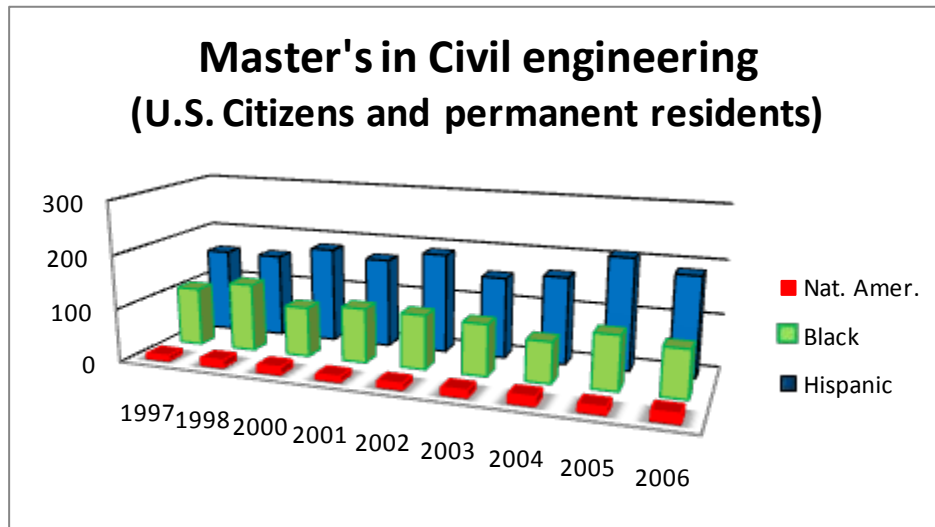
## Master's in Chemical engineering (U.S. Citizens and permanent residents)



Discipline	Year	Black	Hispanic	Nat. Amer.
Chemical engineering	1997	35	51	5
	1998	43	46	1
	2000	34	39	3
	2001	34	40	4
	2002	31	45	2
	2003	43	39	2
	2004	31	40	0
	2005	56	41	4
	2006	37	49	2

**SOURCE:** Tabulated by National Science Foundation/Division of Science Resources Statistics; data from Department of Education/National Center for Education Statistics: Integrated Postsecondary Education Data System Completions Survey. (Prepared by M. D. Slaughter)

Table 22

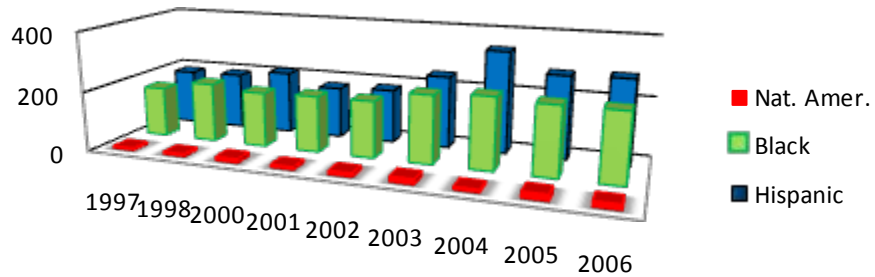


Discipline	Year	Black	Hispanic	Nat. Amer.
Civil engineering	1997	109	159	10
	1998	127	158	14
	2000	93	180	14
	2001	102	168	10
	2002	101	187	11
	2003	96	152	13
	2004	76	163	16
	2005	100	208	13
	2006	88	185	17

**SOURCE:** Tabulated by National Science Foundation/Division of Science Resources Statistics; data from Department of Education/National Center for Education Statistics: Integrated Postsecondary Education Data System Completions Survey. (Prepared by M. D. Slaughter)

Table 23

**Master's in Electrical engineering  
(U.S. Citizens and permanent residents)**

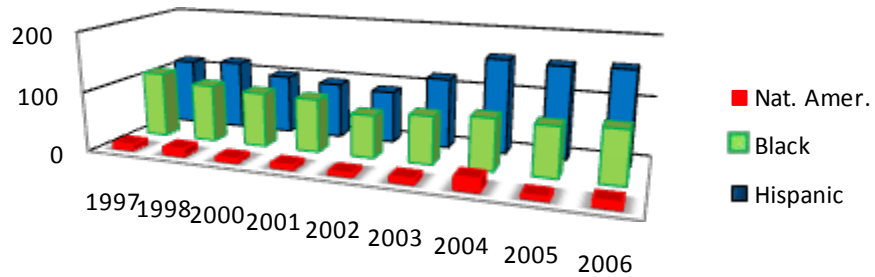


Discipline	Year	Black	Hispanic	Nat. Amer.
Electrical engineering	1997	168	187	8
	1998	198	190	9
	2000	183	211	14
	2001	188	172	10
	2002	189	180	13
	2003	226	242	18
	2004	238	340	10
	2005	229	276	20
	2006	229	281	17

**SOURCE:** Tabulated by National Science Foundation/Division of Science Resources Statistics; data from Department of Education/National Center for Education Statistics: Integrated Postsecondary Education Data System Completions Survey. (Prepared by M. D. Slaughter)

Table 24

**Master's in Mechanical engineering  
(U.S. Citizens and permanent residents)**

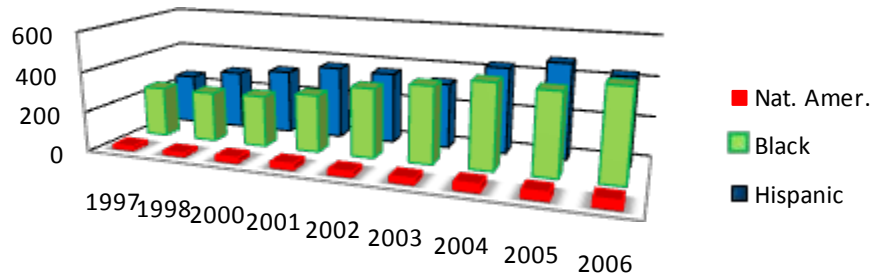


Discipline	Year	Black	Hispanic	Nat. Amer.
Mechanical engineering	1997	110	113	10
	1998	96	117	13
	2000	91	99	7
	2001	89	93	7
	2002	71	87	6
	2003	79	117	9
	2004	85	157	21
	2005	82	153	6
	2006	87	155	11

**SOURCE:** Tabulated by National Science Foundation/Division of Science Resources Statistics; data from Department of Education/National Center for Education Statistics: Integrated Postsecondary Education Data System Completions Survey. (Prepared by M. D. Slaughter)

Table 25

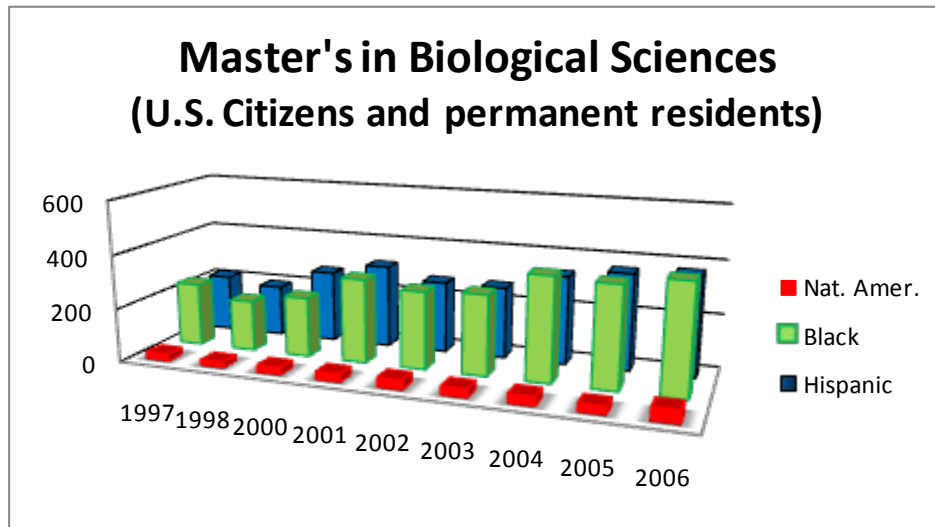
### Master's in Other engineering (U.S. Citizens and permanent residents)



Discipline	Year	Black	Hispanic	Nat. Amer.
Other engineering	1997	252	255	20
	1998	250	296	17
	2000	257	323	26
	2001	287	365	29
	2002	346	356	25
	2003	383	326	28
	2004	423	430	38
	2005	407	474	39
	2006	452	430	40

**SOURCE:** Tabulated by National Science Foundation/Division of Science Resources Statistics; data from Department of Education/National Center for Education Statistics: Integrated Postsecondary Education Data System Completions Survey. (Prepared by M. D. Slaughter)

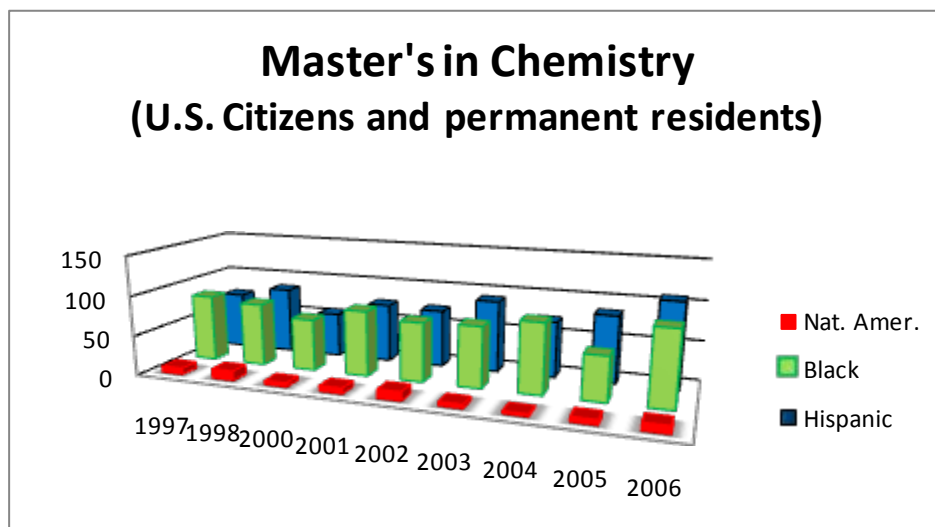
Table 26



Discipline	Year	Black	Hispanic	Nat. Amer.
Biological Sciences	1997	236	214	25
	1998	190	192	21
	2000	223	268	26
	2001	313	310	29
	2002	288	267	34
	2003	298	267	31
	2004	385	330	33
	2005	375	359	29
	2006	406	371	46

**SOURCE:** Tabulated by National Science Foundation/Division of Science Resources Statistics; data from Department of Education/National Center for Education Statistics: Integrated Postsecondary Education Data System Completions Survey. (Prepared by M. D. Slaughter)

Table 27



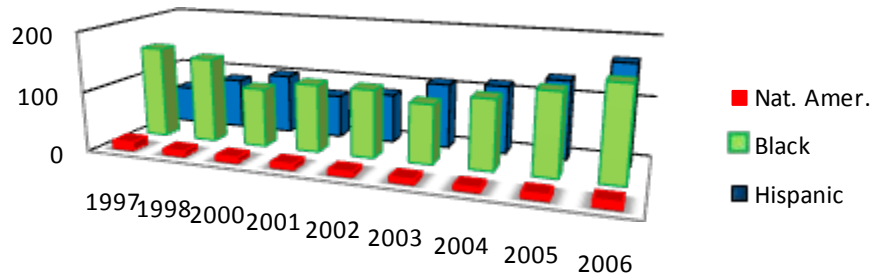
Discipline	Year	Black	Hispanic	Nat. Amer.
Chemistry	1997	84	72	8
	1998	79	84	12
	2000	65	56	5
	2001	82	74	7
	2002	74	72	11
	2003	76	90	5
	2004	87	70	3
	2005	55	84	6
	2006	93	107	9

**SOURCE:** Tabulated by National Science Foundation/Division of Science Resources Statistics; data from Department of Education/National Center for Education Statistics: Integrated Postsecondary Education Data System Completions Survey. (Prepared by M. D. Slaughter)



Table 28

**Master's in Mathematical Sciences  
(U.S. Citizens and permanent residents)**

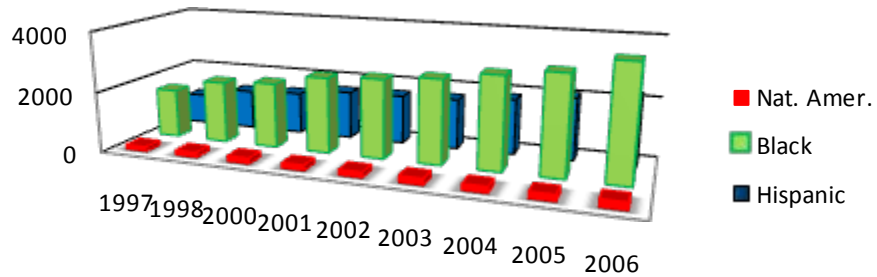


Discipline	Year	Black	Hispanic	Nat. Amer.
Mathematical Sciences	1997	154	63	14
	1998	142	85	9
	2000	98	100	9
	2001	113	72	9
	2002	113	82	8
	2003	98	108	8
	2004	115	113	7
	2005	135	130	9
	2006	155	165	11

**SOURCE:** Tabulated by National Science Foundation/Division of Science Resources Statistics; data from Department of Education/National Center for Education Statistics: Integrated Postsecondary Education Data System Completions Survey. (Prepared by M. D. Slaughter)

Table 29

### Master's in Health (U.S. Citizens and permanent residents)

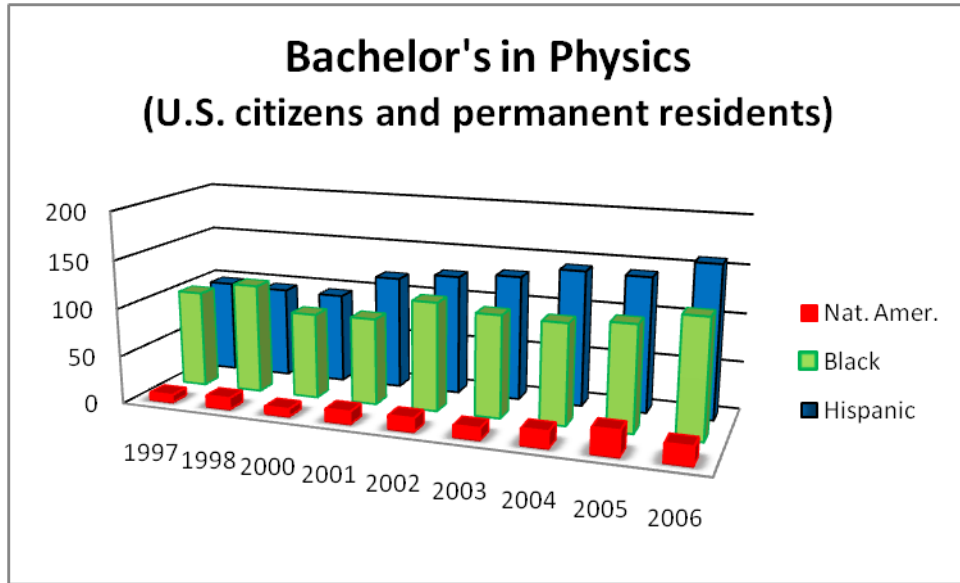


Discipline	Year	Black	Hispanic	Nat. Amer.
Health	1997	1,624	1,018	6
	1998	2,048	1,320	4
	2000	2,158	1,397	4
	2001	2,503	1,594	6
	2002	2,607	1,626	3
	2003	2,764	1,667	2
	2004	3,033	1,835	3
	2005	3,244	2,046	4
	2006	3,718	2,226	6

**SOURCE:** Tabulated by National Science Foundation/Division of Science Resources Statistics; data from Department of Education/National Center for Education Statistics: Integrated Postsecondary Education Data System Completions Survey. (Prepared by M. D. Slaughter)

**BACHELOR'S IN SELECTED FIELDS**

**Table 30**

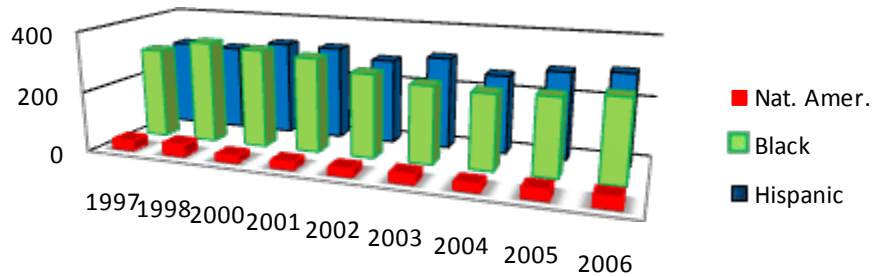


<b>Discipline</b>	<b>Year</b>	<b>Black</b>	<b>Hispanic</b>	<b>Nat. Amer.</b>
<b>Physics</b>	1997	101	97	8
	1998	114	95	12
	2000	89	94	8
	2001	90	118	13
	2002	113	125	14
	2003	106	130	12
	2004	104	141	17
	2005	109	140	26
	2006	122	158	19

**SOURCE:** Tabulated by National Science Foundation/Division of Science Resources Statistics; data from Department of Education/National Center for Education Statistics: Integrated Postsecondary Education Data System Completions Survey. (Prepared by M. D. Slaughter)

**Table 31**

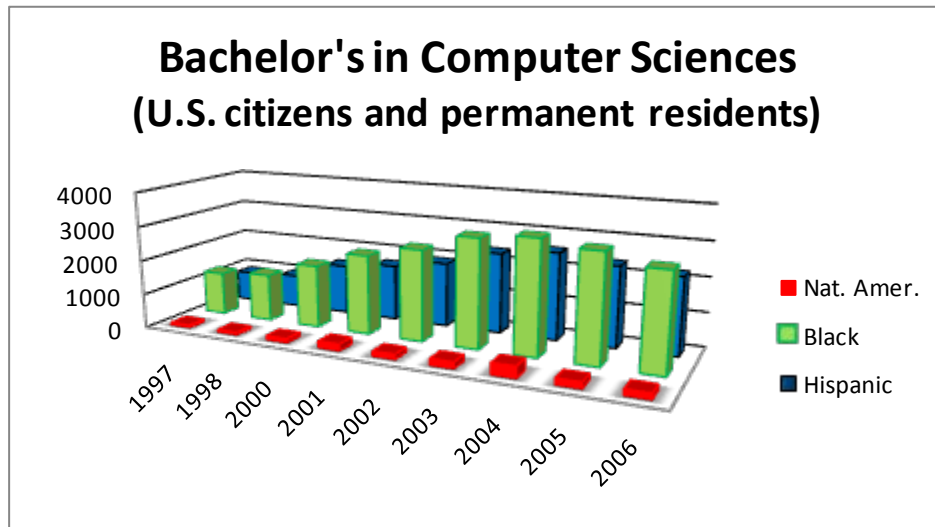
**Bachelor's in Chemistry  
(U.S. citizens and permanent residents)**



<b>Discipline</b>	<b>Year</b>	<b>Black</b>	<b>Hispanic</b>	<b>Nat. Amer.</b>
<b>Chemistry</b>	1997	302	293	33
	1998	340	288	40
	2000	327	315	23
	2001	314	312	24
	2002	277	283	25
	2003	255	304	31
	2004	246	260	25
	2005	253	287	33
	2006	269	298	35

**SOURCE:** Tabulated by National Science Foundation/Division of Science Resources Statistics; data from Department of Education/National Center for Education Statistics: Integrated Postsecondary Education Data System Completions Survey. (Prepared by M. D. Slaughter)

Table 32

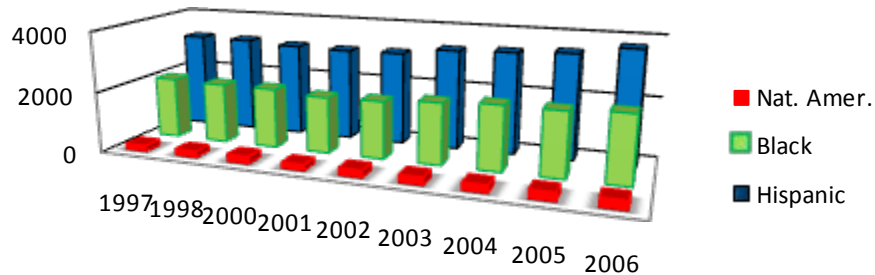


Discipline	Year	Black	Hispanic	Nat. Amer.
Computer Sciences	1997	1,253	890	71
	1998	1,372	961	76
	2000	1,827	1,460	113
	2001	2,302	1,628	193
	2002	2,630	1,878	144
	2003	3,117	2,342	181
	2004	3,267	2,526	323
	2005	3,083	2,328	171
	2006	2,775	2,212	162

**SOURCE:** Tabulated by National Science Foundation/Division of Science Resources Statistics; data from Department of Education/National Center for Education Statistics: Integrated Postsecondary Education Data System Completions Survey. (Prepared by M. D. Slaughter)

**Table 33**

**Bachelor's in Engineering  
(U.S. citizens and permanent residents)**

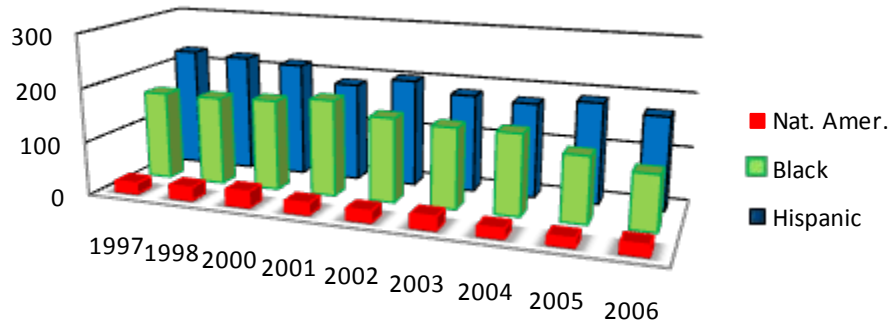


<b>Discipline</b>	<b>Year</b>	<b>Black</b>	<b>Hispanic</b>	<b>Nat. Amer.</b>
<b>Engineering</b>	1997	2,020	3,196	196
	1998	1,977	3,179	207
	2000	1,973	3,087	239
	2001	1,858	3,054	192
	2002	1,891	3,081	234
	2003	2,018	3,297	246
	2004	2,116	3,362	243
	2005	2,111	3,459	269
	2006	2,207	3,722	282

**SOURCE:** Tabulated by National Science Foundation/Division of Science Resources Statistics; data from Department of Education/National Center for Education Statistics: Integrated Postsecondary Education Data System Completions Survey. (Prepared by M. D. Slaughter)

Table 34

**Bachelor's in Chemical engineering  
(U.S. citizens and permanent residents)**

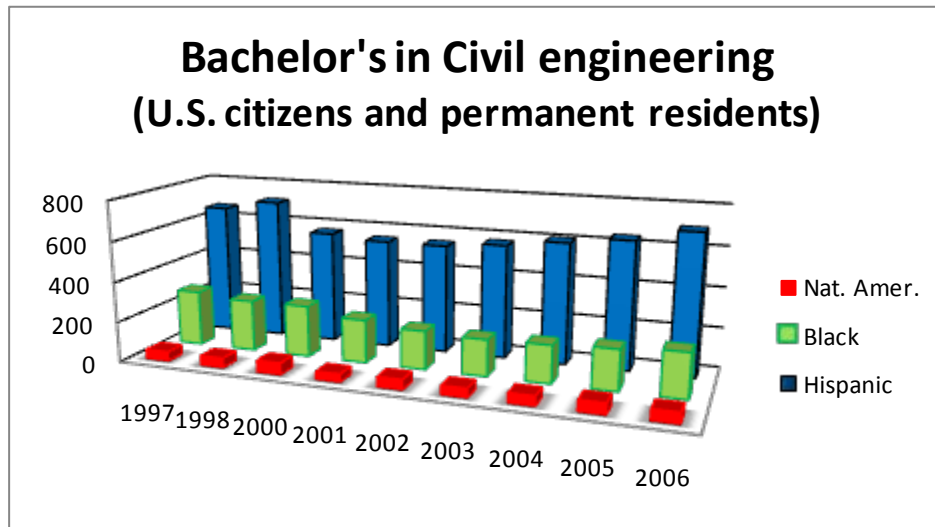


Discipline	Year	Black	Hispanic	Nat. Amer.
Chemical engineering	1997	165	226	21
	1998	165	221	25
	2000	169	214	30
	2001	179	184	22
	2002	156	200	21
	2003	149	181	25
	2004	149	175	18
	2005	121	186	16
	2006	101	171	20

**SOURCE:** Tabulated by National Science Foundation/Division of Science Resources Statistics; data from Department of Education/National Center for Education Statistics: Integrated Postsecondary Education Data System Completions Survey. (Prepared by M. D. Slaughter)



Table 35

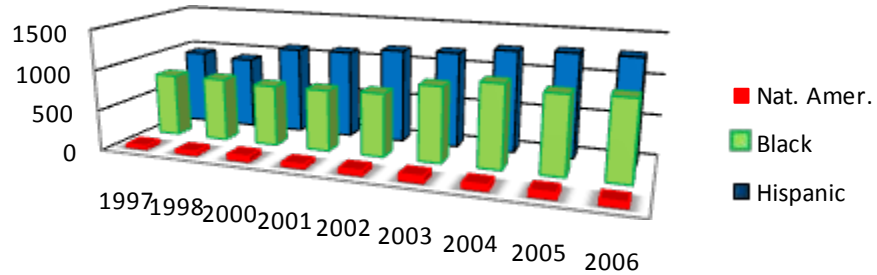


Discipline	Year	Black	Hispanic	Nat. Amer.
Civil engineering	1997	275	661	47
	1998	254	708	48
	2000	256	564	58
	2001	215	544	39
	2002	191	544	49
	2003	181	569	44
	2004	187	603	47
	2005	201	636	54
	2006	220	697	52

**SOURCE:** Tabulated by National Science Foundation/Division of Science Resources Statistics; data from Department of Education/National Center for Education Statistics: Integrated Postsecondary Education Data System Completions Survey. (Prepared by M. D. Slaughter)

Table 36

**Bachelor's in Electrical engineering  
(U.S. citizens and permanent residents)**

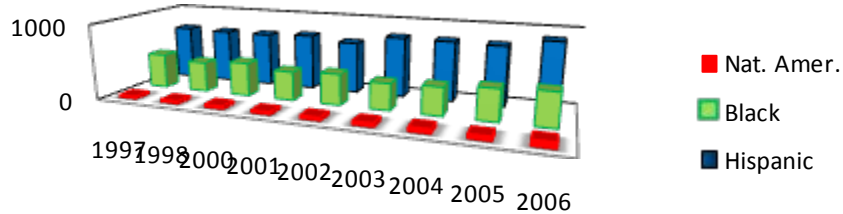


Discipline	Year	Black	Hispanic	Nat. Amer.
Electrical engineering	1997	777	944	43
	1998	782	904	48
	2000	753	1,085	68
	2001	759	1,096	48
	2002	781	1,164	60
	2003	929	1,184	78
	2004	1,019	1,258	68
	2005	959	1,281	73
	2006	977	1,282	64

**SOURCE:** Tabulated by National Science Foundation/Division of Science Resources Statistics; data from Department of Education/National Center for Education Statistics: Integrated Postsecondary Education Data System Completions Survey. (Prepared by M. D. Slaughter)

Table 37

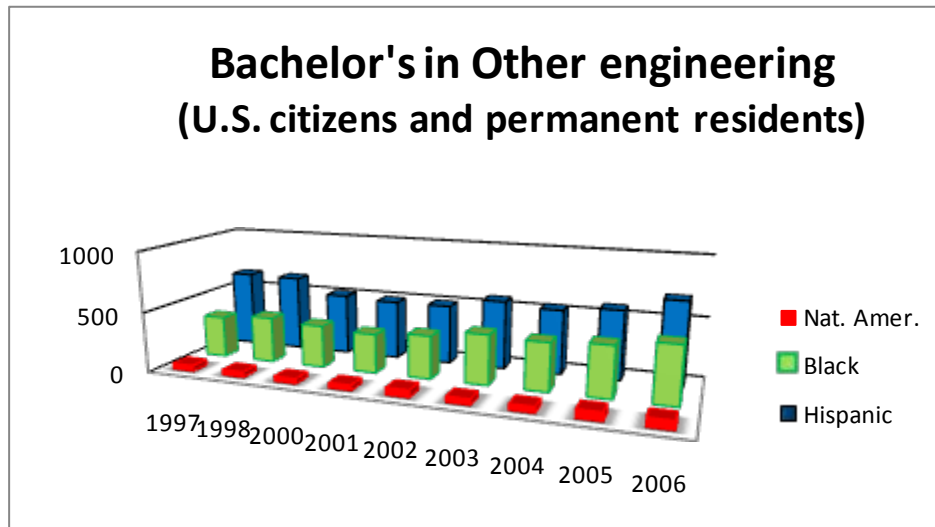
### Bachelor's in Mechanical engineering (U.S. citizens and permanent residents)



Discipline	Year	Black	Hispanic	Nat. Amer.
Mechanical engineering	1997	459	727	36
	1998	398	714	40
	2000	443	715	41
	2001	381	741	39
	2002	407	681	44
	2003	348	794	51
	2004	366	791	61
	2005	411	782	58
	2006	437	885	77

**SOURCE:** Tabulated by National Science Foundation/Division of Science Resources Statistics; data from Department of Education/National Center for Education Statistics: Integrated Postsecondary Education Data System Completions Survey. (Prepared by M. D. Slaughter)

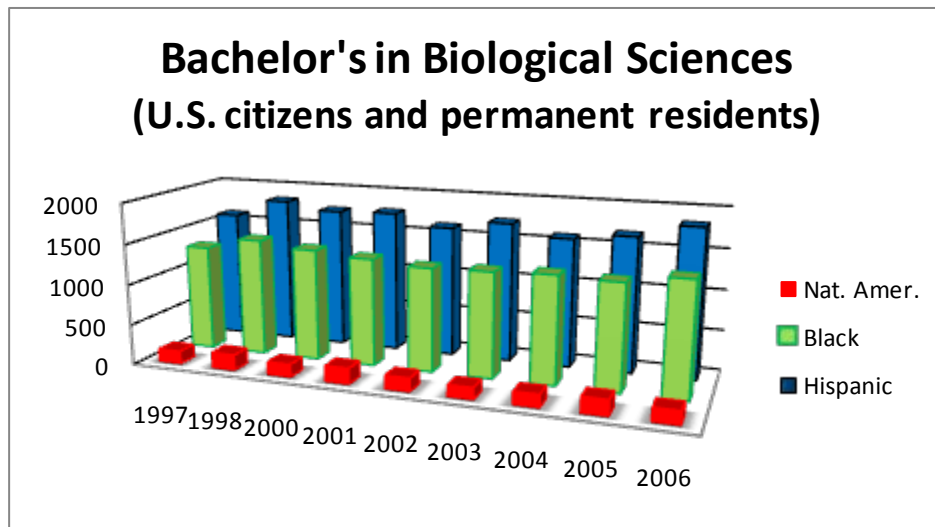
**Table 38**



Discipline	Year	Black	Hispanic	Nat. Amer.
Other engineering	1997	344	638	49
	1998	378	632	46
	2000	352	509	42
	2001	324	489	44
	2002	356	492	60
	2003	411	569	48
	2004	395	535	49
	2005	419	574	68
	2006	472	687	69

**SOURCE:** Tabulated by National Science Foundation/Division of Science Resources Statistics; data from Department of Education/National Center for Education Statistics: Integrated Postsecondary Education Data System Completions Survey. (Prepared by M. D. Slaughter)

Table 39

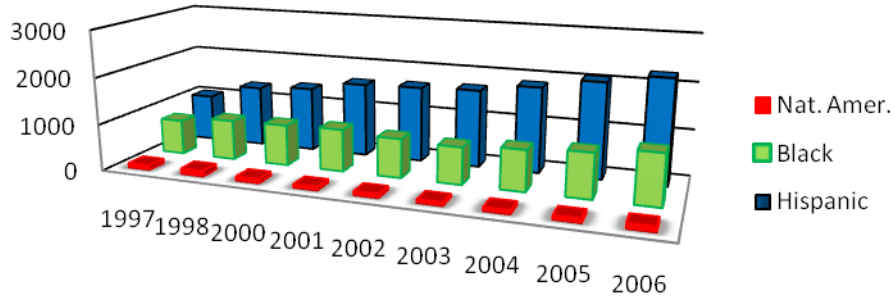


Discipline	Year	Black	Hispanic	Nat. Amer.
Biological Sciences	1997	1,304	1,599	157
	1998	1,448	1,823	191
	2000	1,380	1,736	156
	2001	1,326	1,756	194
	2002	1,276	1,619	163
	2003	1,292	1,723	140
	2004	1,317	1,586	154
	2005	1,295	1,664	188
	2006	1,393	1,827	161

**SOURCE:** Tabulated by National Science Foundation/Division of Science Resources Statistics; data from Department of Education/National Center for Education Statistics: Integrated Postsecondary Education Data System Completions Survey. (Prepared by M. D. Slaughter)

**Table 40**

**Bachelor's in Health  
(U.S. citizens and permanent residents)**

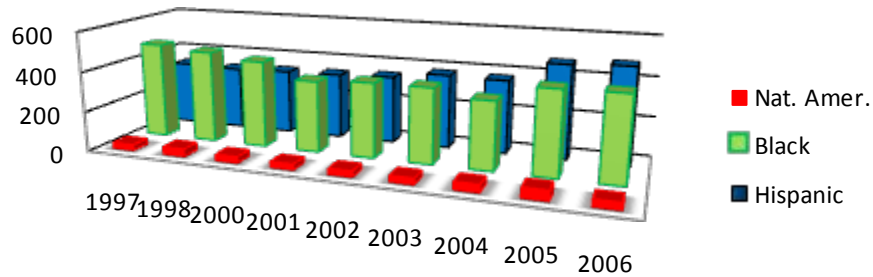


Discipline	Year	Black	Hispanic	Nat. Amer.
Health	1997	750	1,018	94
	1998	861	1,320	116
	2000	880	1,397	87
	2001	908	1,594	72
	2002	836	1,626	77
	2003	791	1,667	68
	2004	869	1,835	75
	2005	945	2,046	82
	2006	1,076	2,226	101

**SOURCE:** Tabulated by National Science Foundation/Division of Science Resources Statistics; data from Department of Education/National Center for Education Statistics: Integrated Postsecondary Education Data System Completions Survey. (Prepared by M. D. Slaughter)

Table 41

### Bachelor's in Mathematical Sciences (U.S. citizens and permanent residents)



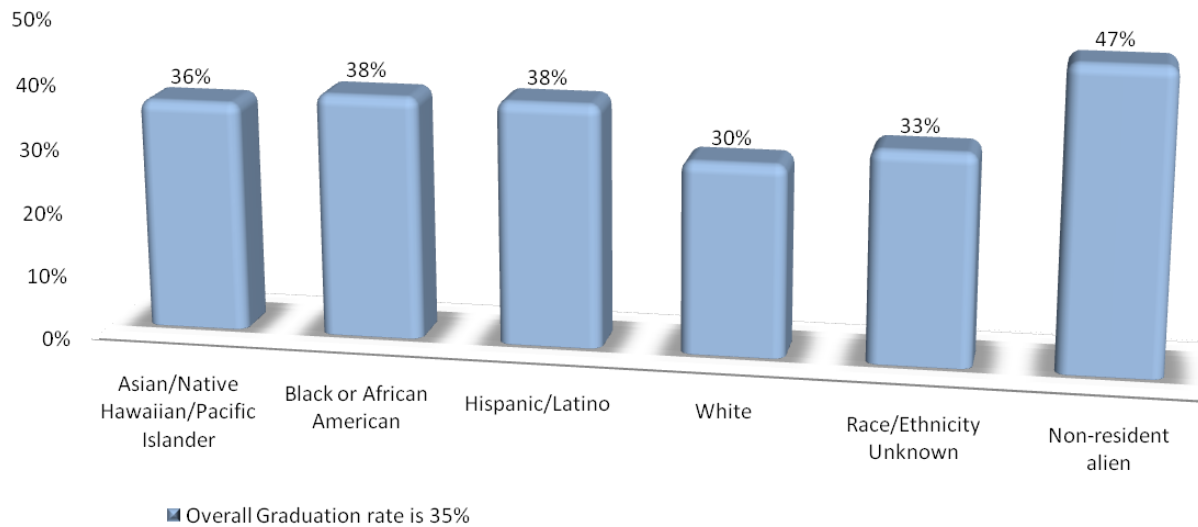
Discipline	Year	Black	Hispanic	Nat. Amer.
Mathematical Sciences	1997	483	326	29
	1998	462	318	38
	2000	434	326	31
	2001	357	330	28
	2002	373	340	29
	2003	374	372	30
	2004	337	368	37
	2005	416	468	48
	2006	420	480	33

**SOURCE:** Tabulated by National Science Foundation/Division of Science Resources Statistics; data from Department of Education/National Center for Education Statistics: Integrated Postsecondary Education Data System Completions Survey. (Prepared by M. D. Slaughter)

## **Selected 6-Year Graduation Rate Charts**



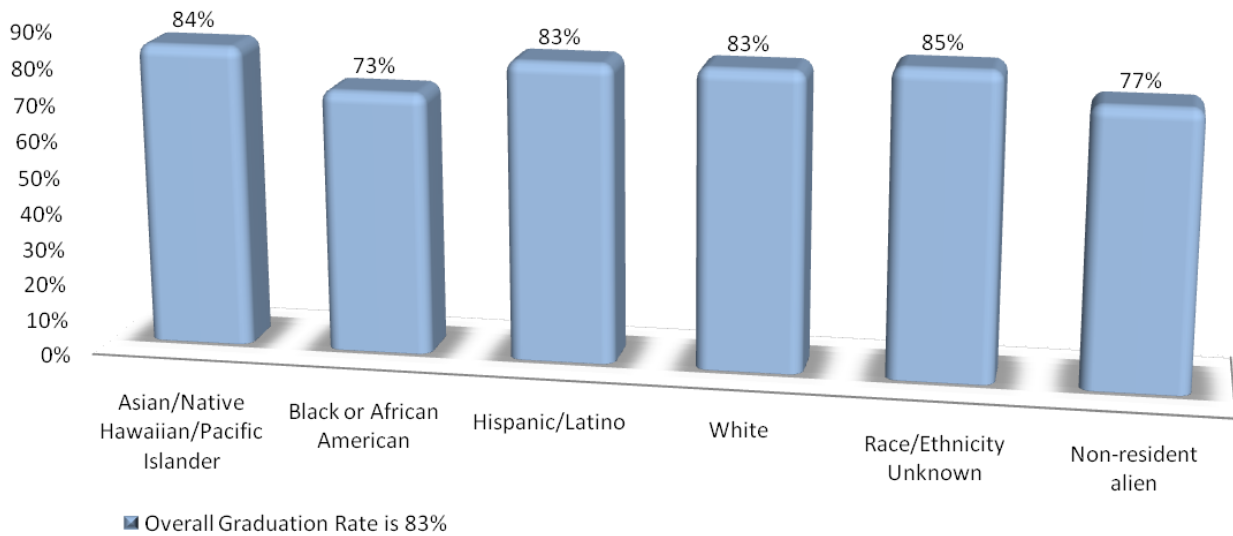
### Barry University 6-Year Graduation Rate by Race/Ethnicity for Students Pursuing Bachelor's Degrees



**Percentage of Full-Time, First-Time Students Who Began Their Studies in Fall 2004 and Received a Degree or Award Within 150% of "Normal Time" (Fall 2010) to Completion for Their Program**

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

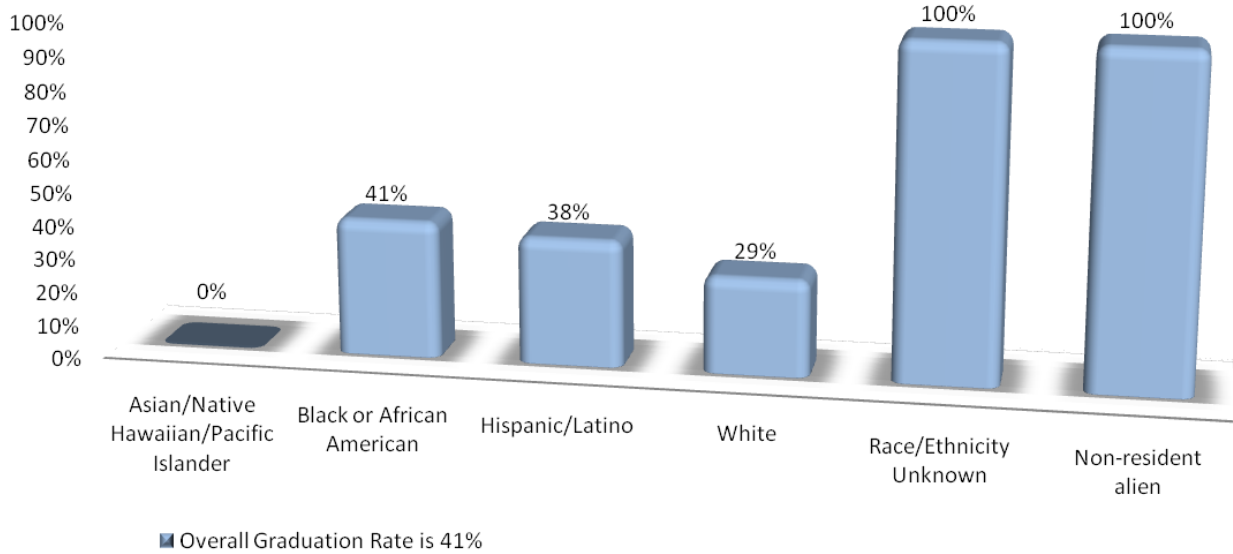
### Boston University 6-Year Graduation Rate by Race/Ethnicity for Students Pursuing Bachelor's Degrees



Percentage of Full-Time, First-Time Students Who Began Their Studies in Fall 2004 and Received a Degree or Award Within 150% of "Normal Time" (Fall 2010) to Completion for Their Program

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

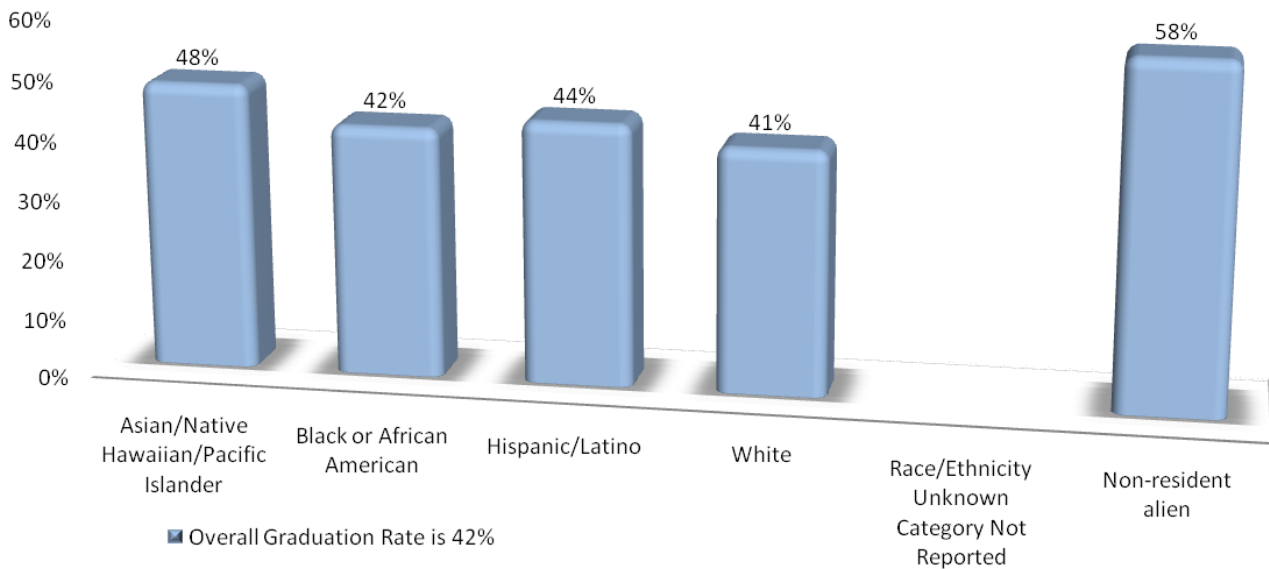
## Florida Agricultural and Mechanical University 6-Year Graduation Rate by Race/Ethnicity for Students Pursuing Bachelor's Degrees



**Percentage of Full-Time, First-Time Students Who Began Their Studies in Fall 2004 and Received a Degree or Award Within 150% of "Normal Time" (Fall 2010) to Completion for Their Program**

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

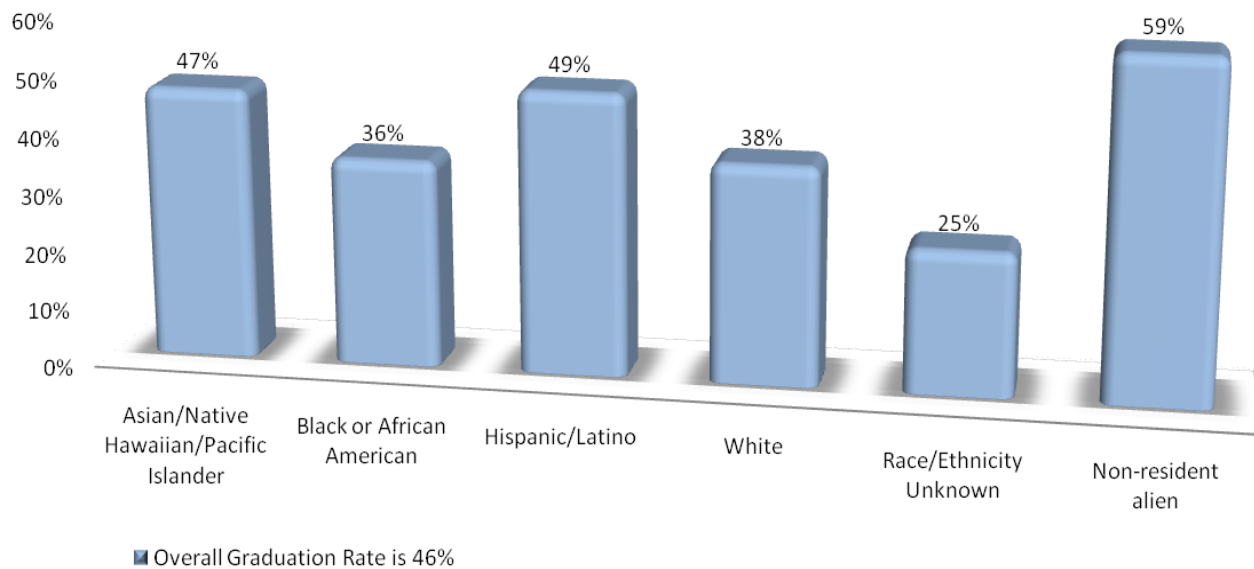
## Florida Atlantic University 6-Year Graduation Rate by Race/Ethnicity for Students Pursuing Bachelor's Degrees



**Percentage of Full-Time, First-Time Students Who Began Their Studies in Fall 2004 and Received a Degree or Award Within 150% of "Normal Time" (Fall 2010) to Completion for Their Program**

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

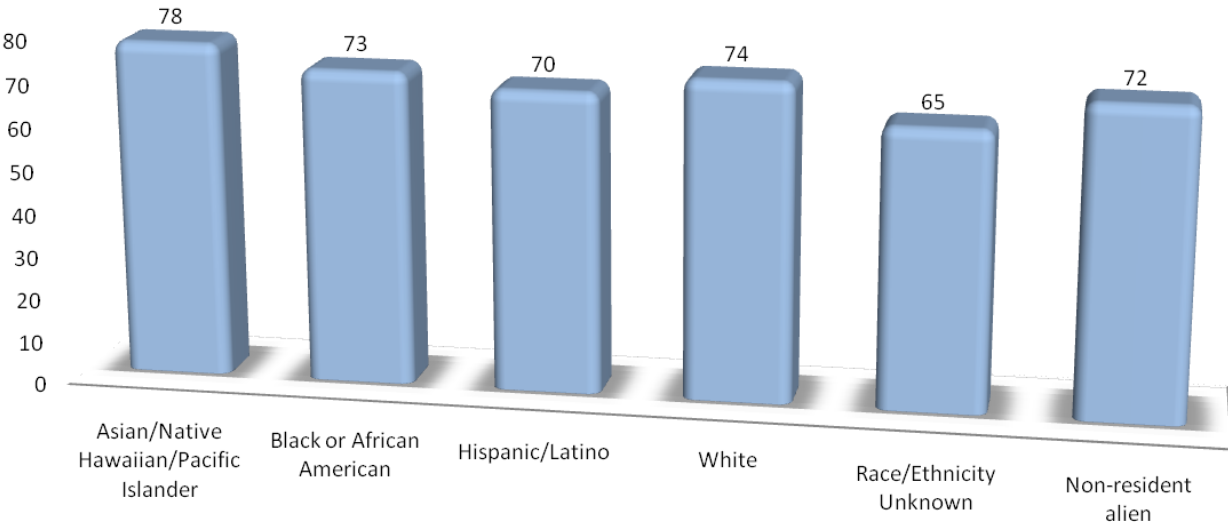
## Florida International University 6-Year Graduation Rate by Race/Ethnicity for Students Pursuing Bachelor's Degrees



Percentage of Full-Time, First-Time Students Who Began Their Studies in Fall 2004 and Received a Degree or Award Within 150% of "Normal Time" (Fall 2010) 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

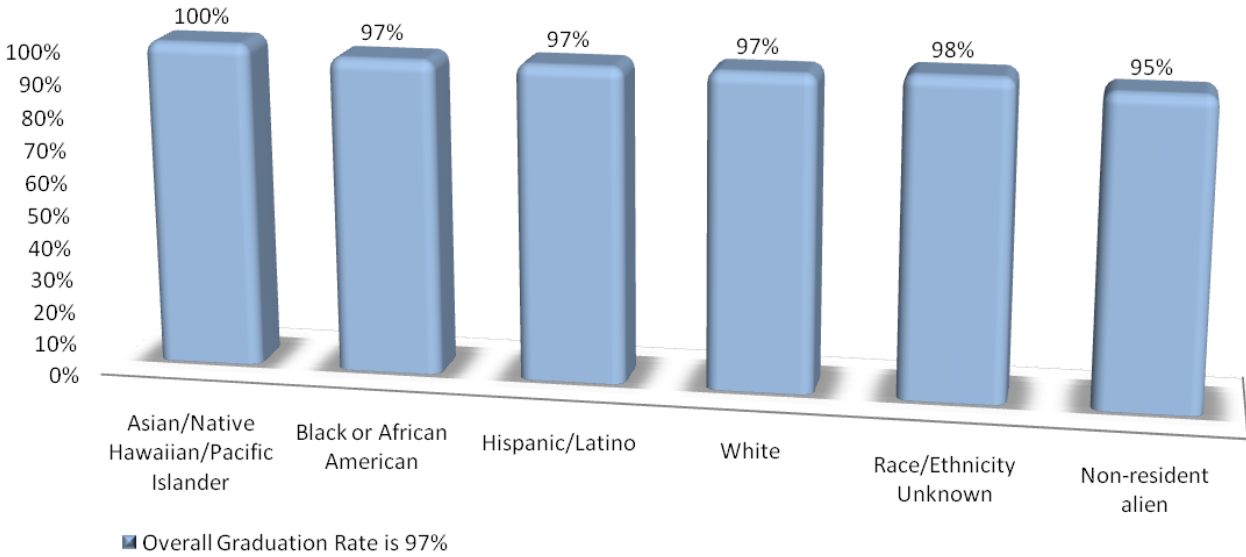


Overall Graduation Rate is 74%

Percentage of Full-Time, First-Time Students Who Began Their Studies in Fall 2004 and Received a Degree or Award Within 150% of "Normal Time" (Fall 2010) to Completion for Their Program

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

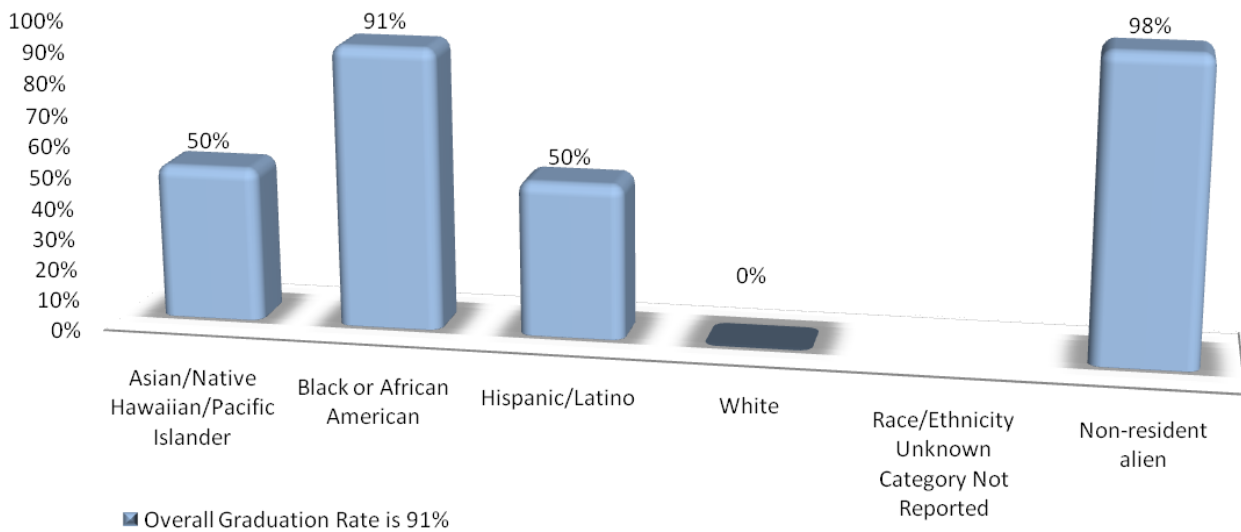
### Harvard University 6-Year Graduation Rate by Race/Ethnicity for Students Pursuing Bachelor's Degrees



Percentage of Full-Time, First-Time Students Who Began Their Studies in Fall 2004 and Received a Degree or Award Within 150% of "Normal Time" (Fall 2010) to Completion for Their Program

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

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

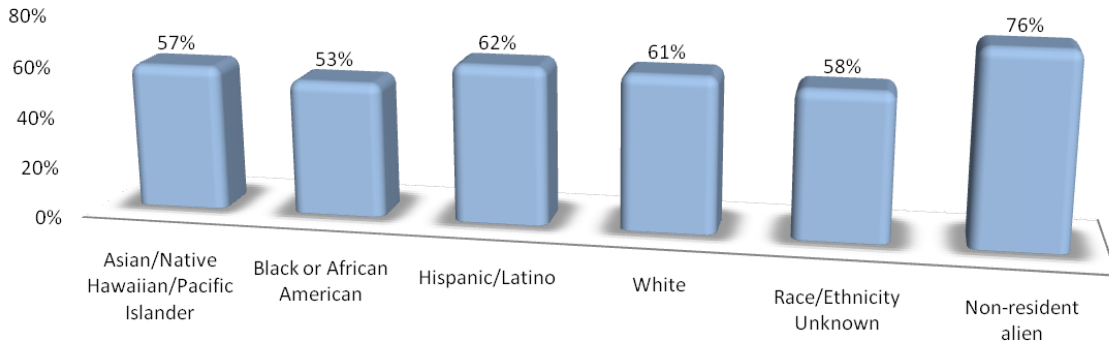


**Percentage of Full-Time, First-Time Students Who Began Their Studies in Fall 2004 and Received a Degree or Award Within 150% of "Normal Time" (Fall 2010) to Completion for Their Program**

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



### Louisiana State University and Agricultural & Mechanical College 6-Year Graduation Rate by Race/Ethnicity for Students Pursuing Bachelor's Degrees

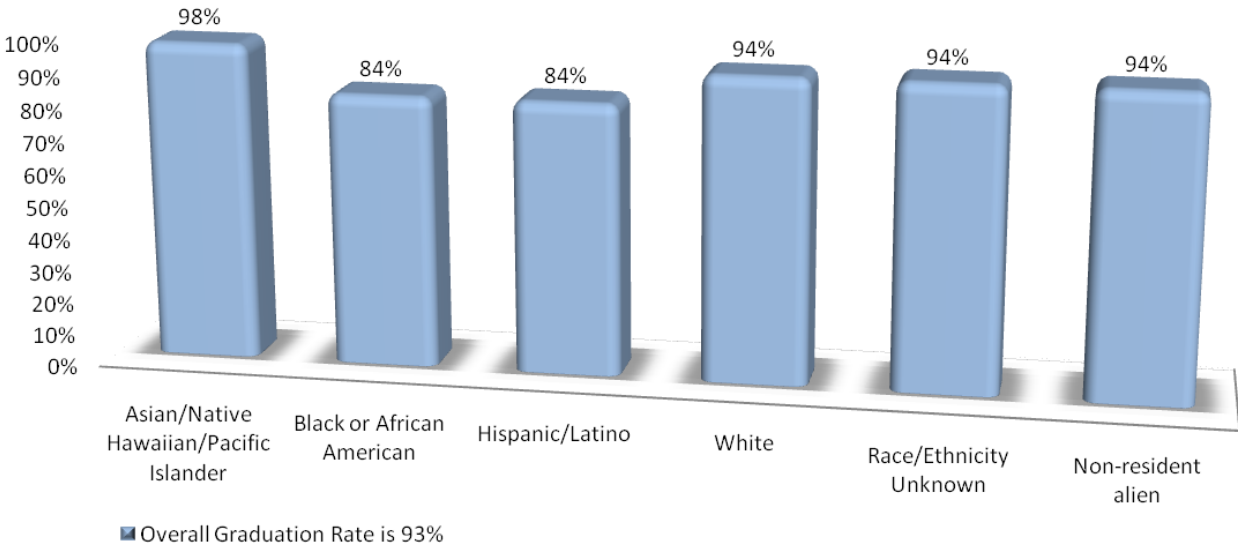


■ Overall Graduation Rate is 61%

Percentage of Full-Time, First-Time Students Who Began Their Studies in Fall 2004 and Received a Degree or Award Within 150% of "Normal Time" (Fall 2010) to Completion for Their Program

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

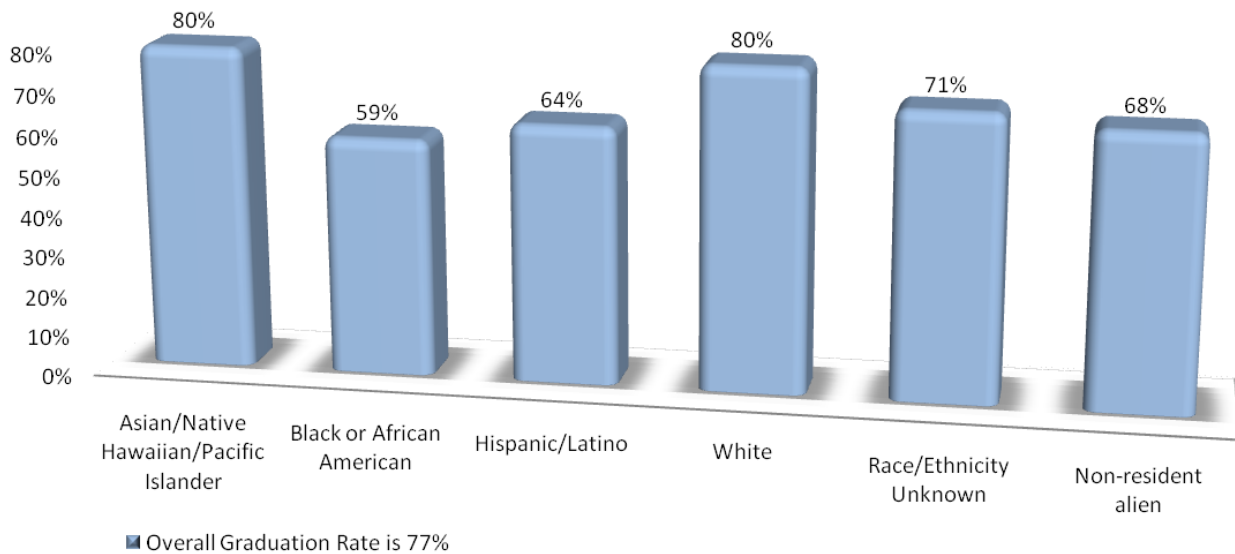
### Massachusetts Institute of Technology 6-Year Graduation Rate by Race/Ethnicity for Students Pursuing Bachelor's Degrees



Percentage of Full-Time, First-Time Students Who Began Their Studies in Fall 2004 and Received a Degree or Award Within 150% of "Normal Time" (Fall 2010) to Completion for Their Program

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

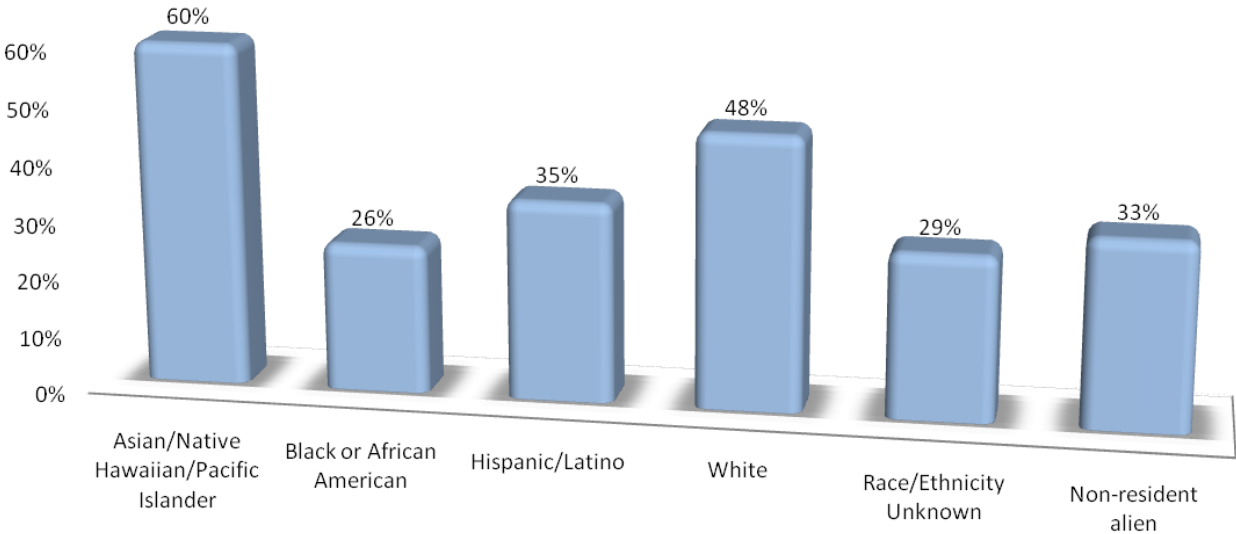
### Michigan State University 6-Year Graduation Rate by Race/Ethnicity for Students Pursuing Bachelor's Degrees



Percentage of Full-Time, First-Time Students Who Began Their Studies in Fall 2004 and Received a Degree or Award Within 150% of "Normal Time" (Fall 2010) 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

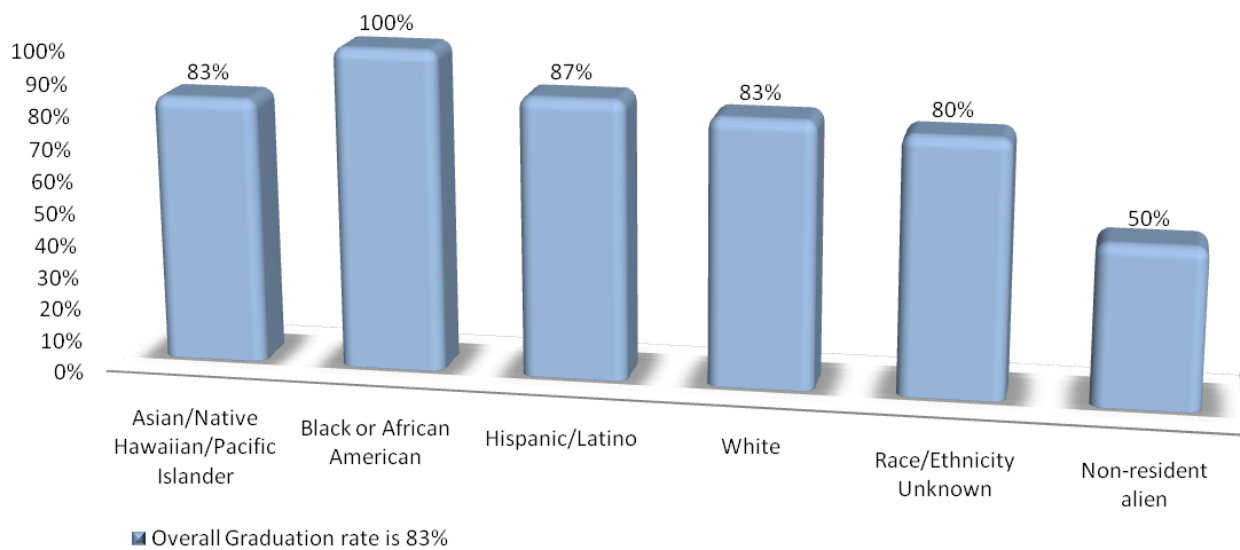


Overall Graduation Rate is 41%

Percentage of Full-Time, First-Time Students Who Began Their Studies in Fall 2004 and Received a Degree or Award Within 150% of "Normal Time" (Fall 2010) to Completion for Their Program

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

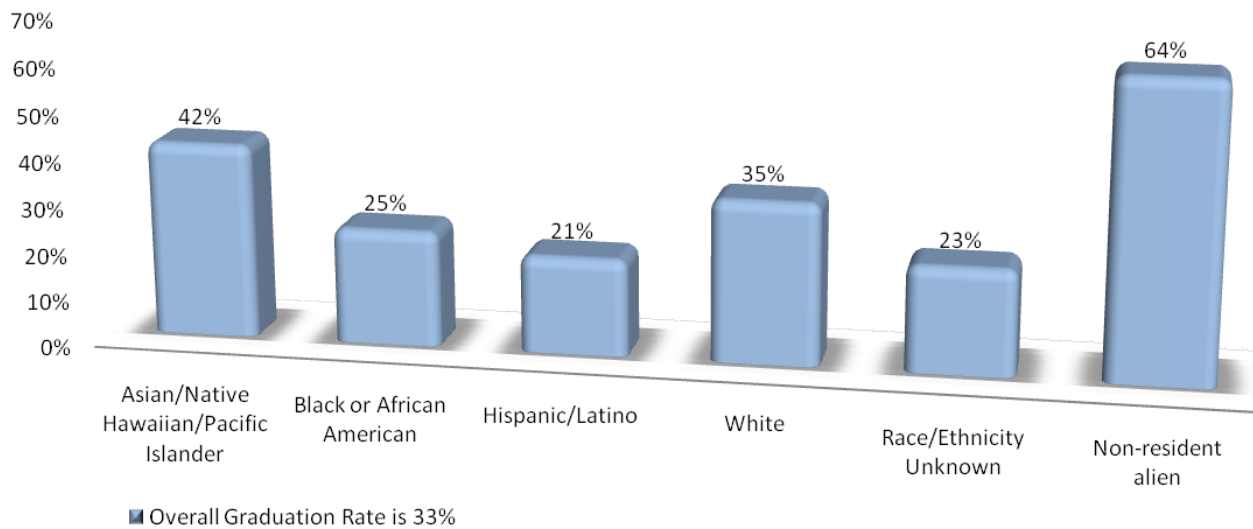
### Scripps College 6-Year Graduation Rate by Race/Ethnicity for Students Pursuing Bachelor's Degrees



Percentage of Full-Time, First-Time Students Who Began Their Studies in Fall 2004 and Received a Degree or Award Within 150% of "Normal Time" (Fall 2010) to Completion for Their Program

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

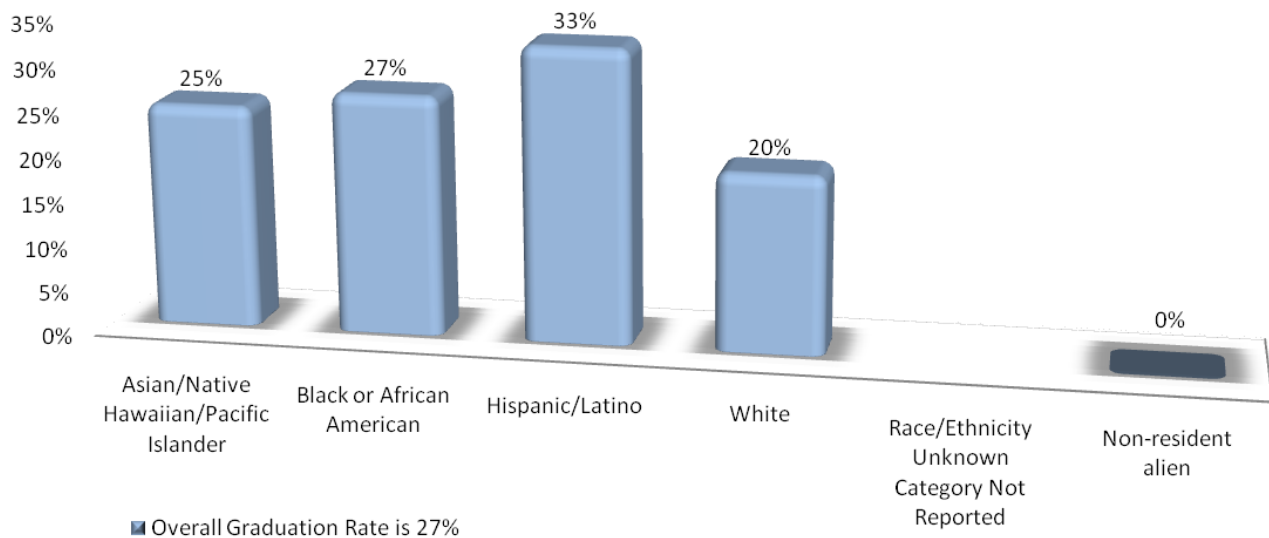
### Southeastern Louisiana University 6-Year Graduation Rate by Race/Ethnicity for Students Pursuing Bachelor's Degrees



Percentage of Full-Time, First-Time Students Who Began Their Studies in Fall 2004 and Received a Degree or Award Within 150% of "Normal Time" (Fall 2010) to Completion for Their Program

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

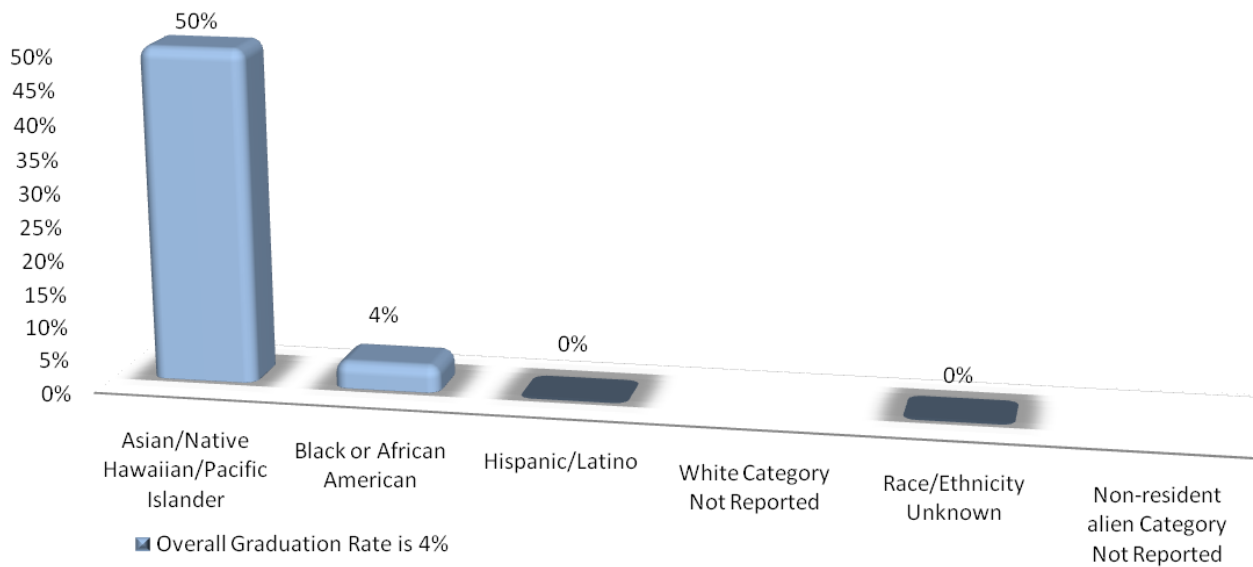
### Southern University and A & M College 6-Year Graduation Rate by Race/Ethnicity for Students Pursuing Bachelor's Degrees



**Percentage of Full-Time, First-Time Students Who Began Their Studies in Fall 2004 and Received a Degree or Award Within 150% of "Normal Time" (Fall 2010) 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

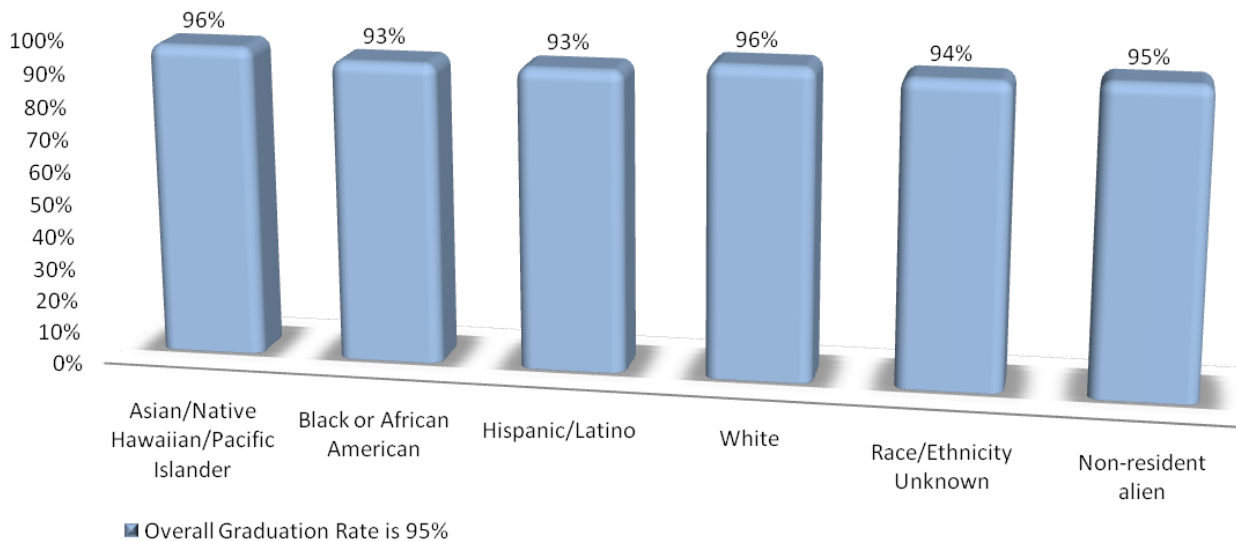


**Percentage of Full-Time, First-Time Students Who Began Their Studies in Fall 2004 and Received a Degree or Award Within 150% of "Normal Time" (Fall 2010) to Completion for Their Program**

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



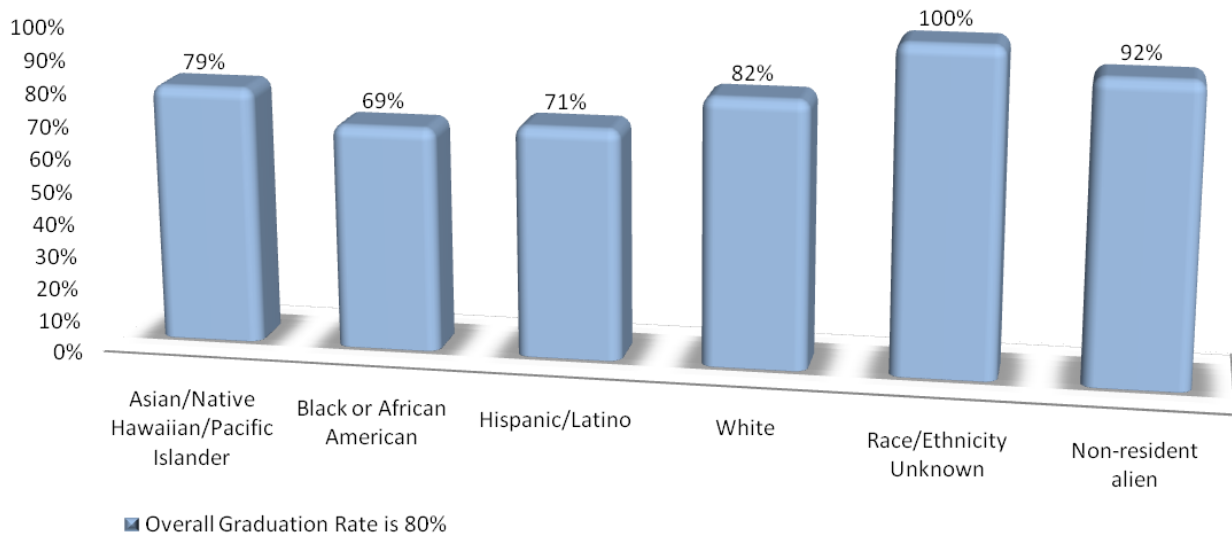
### Stanford University 6-Year Graduation Rate by Race/Ethnicity for Students Pursuing Bachelor's Degrees



Percentage of Full-Time, First-Time Students Who Began Their Studies in Fall 2004 and Received a Degree or Award Within 150% of "Normal Time" (Fall 2010) to Completion for Their Program

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

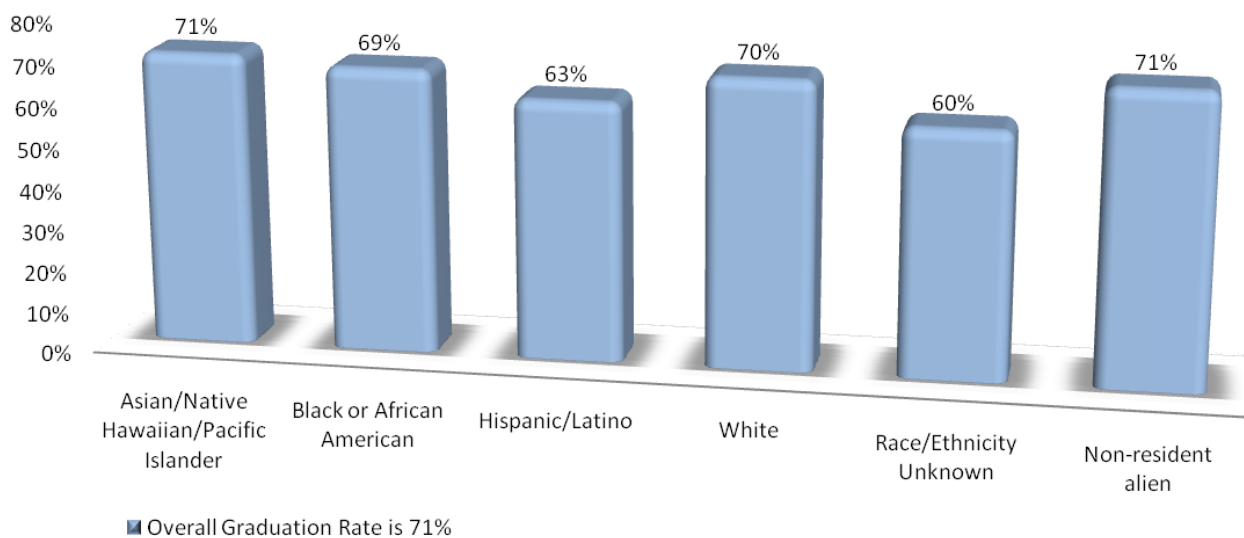
### Texas A & M University 6-Year Graduation Rate by Race/Ethnicity for Students Pursuing Bachelor's Degrees



Percentage of Full-Time, First-Time Students Who Began Their Studies in Fall 2004 and Received a Degree or Award Within 150% of "Normal Time" (Fall 2010) to Completion for Their Program

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

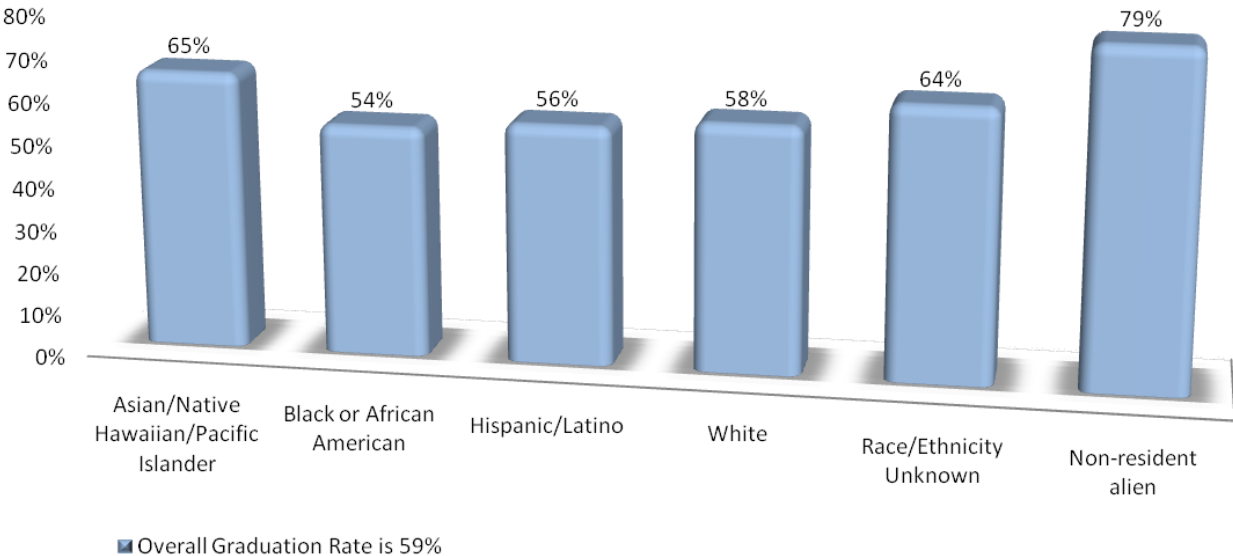
## Tulane University of Louisiana 6-Year Graduation Rate by Race/Ethnicity for Students Pursuing Bachelor's Degrees



Percentage of Full-Time, First-Time Students Who Began Their Studies in Fall 2004 and Received a Degree or Award Within 150% of "Normal Time" (Fall 2010) to Completion for Their Program

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

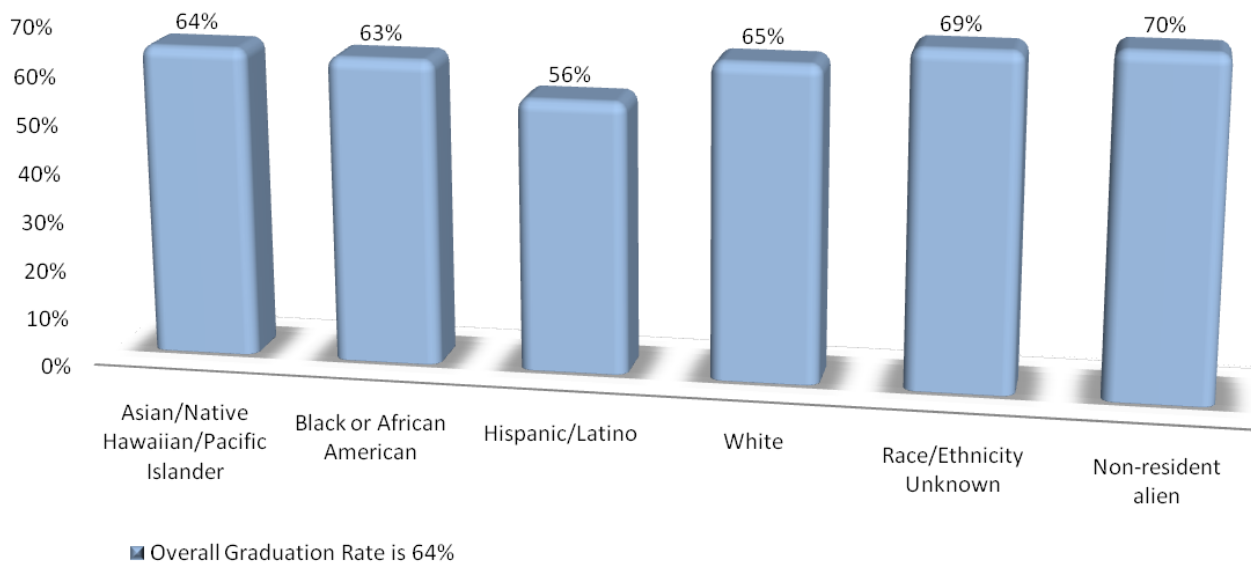
### The University of Tampa Florida-Main Campus 6-Year Graduation Rate by Race/Ethnicity for Students Pursuing Bachelor's Degrees



Percentage of Full-Time, First-Time Students Who Began Their Studies in Fall 2004 and Received a Degree or Award Within 150% of "Normal Time" (Fall 2010) to Completion for Their Program

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

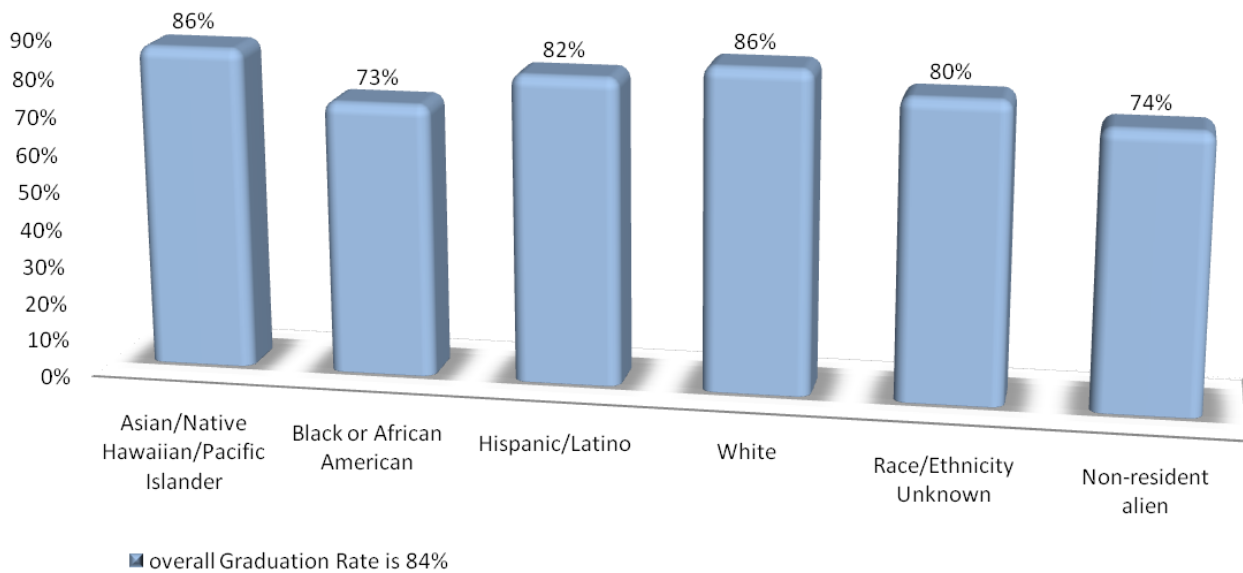
## University of Central Florida 6-Year Graduation Rate by Race/Ethnicity for Students Pursuing Bachelor's Degrees



Percentage of Full-Time, First-Time Students Who Began Their Studies in Fall 2004 and Received a Degree or Award Within 150% of "Normal Time" (Fall 2010) to Completion for Their Program

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

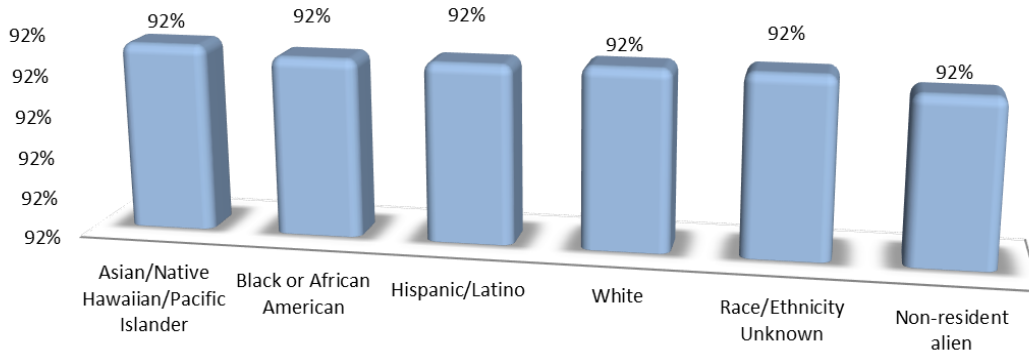
## University of Florida 6-Year Graduation Rate by Race/Ethnicity for Students Pursuing Bachelor's Degrees



Percentage of Full-Time, First-Time Students Who Began Their Studies in Fall 2004 and Received a Degree or Award Within 150% of "Normal Time" (Fall 2010) 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

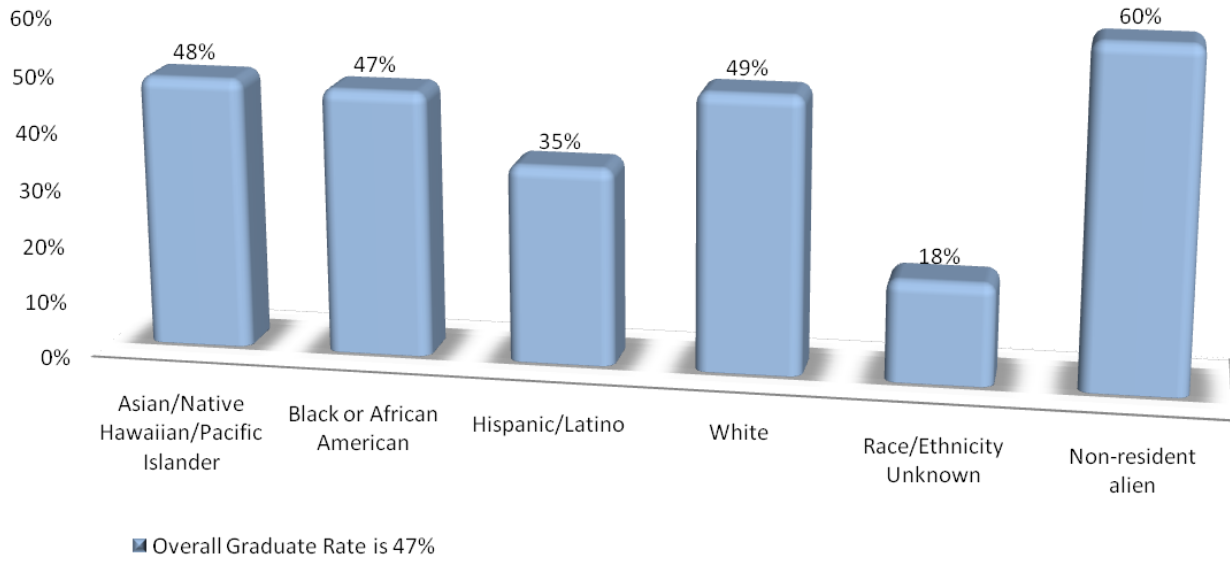


■ Overall Graduation Rate is 89%

Percentage of Full-Time, First-Time Students Who Began Their Studies in Fall 2004 and Received a Degree or Award Within 150% of "Normal Time" (Fall 2010) to Completion for Their Program

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

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

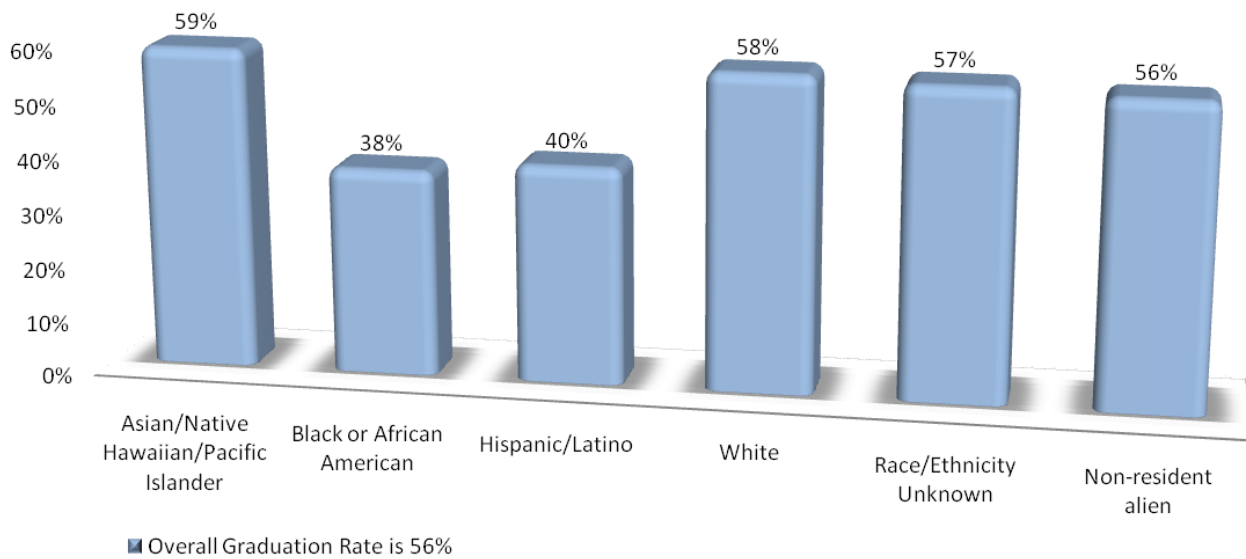


Percentage of Full-Time, First-Time Students Who Began Their Studies in Fall 2004 and Received a Degree or Award Within 150% of "Normal Time" (Fall 2010) to Completion for Their Program

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



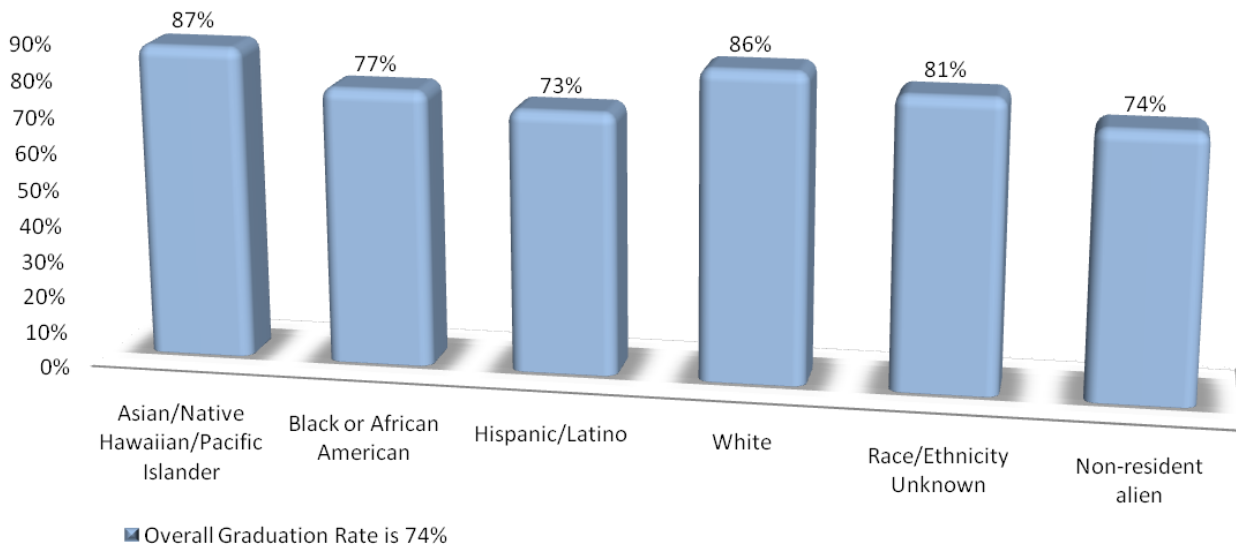
### University of Illinois at Chicago 6-Year Graduation Rate by Race/Ethnicity for Students Pursuing Bachelor's Degrees



Percentage of Full-Time, First-Time Students Who Began Their Studies in Fall 2004 and Received a Degree or Award Within 150% of "Normal Time" (Fall 2010) to Completion for Their Program

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

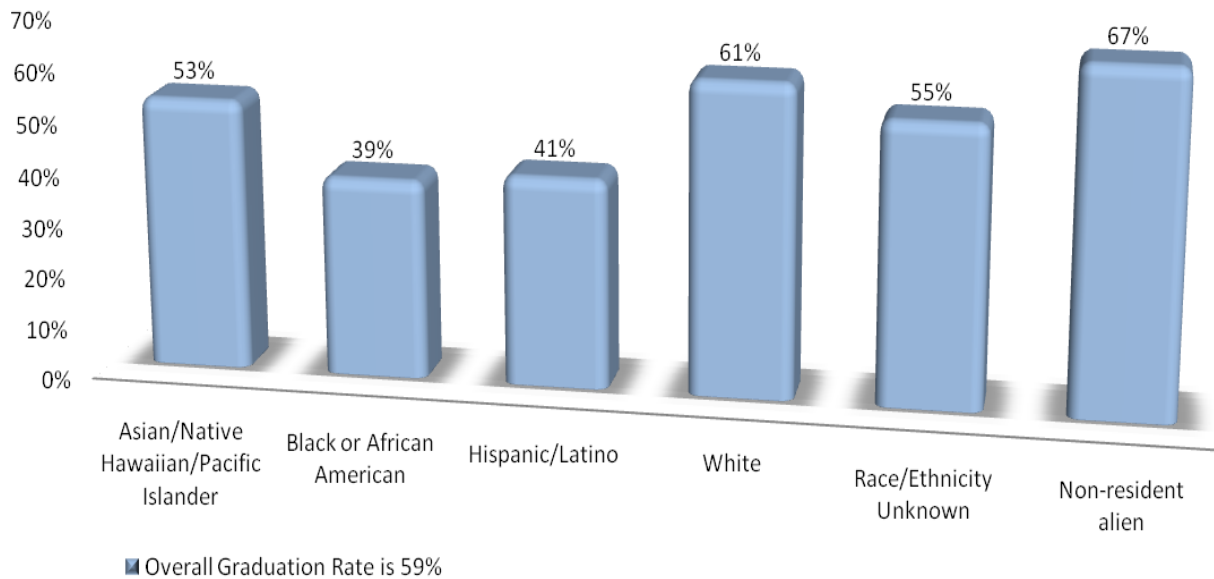
### University of Illinois at Urbana-Champaign 6-Year Graduation Rate by Race/Ethnicity for Students Pursuing Bachelor's Degrees



Percentage of Full-Time, First-Time Students Who Began Their Studies in Fall 2004 and Received a Degree or Award Within 150% of "Normal Time" (Fall 2010) to Completion for Their Program

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

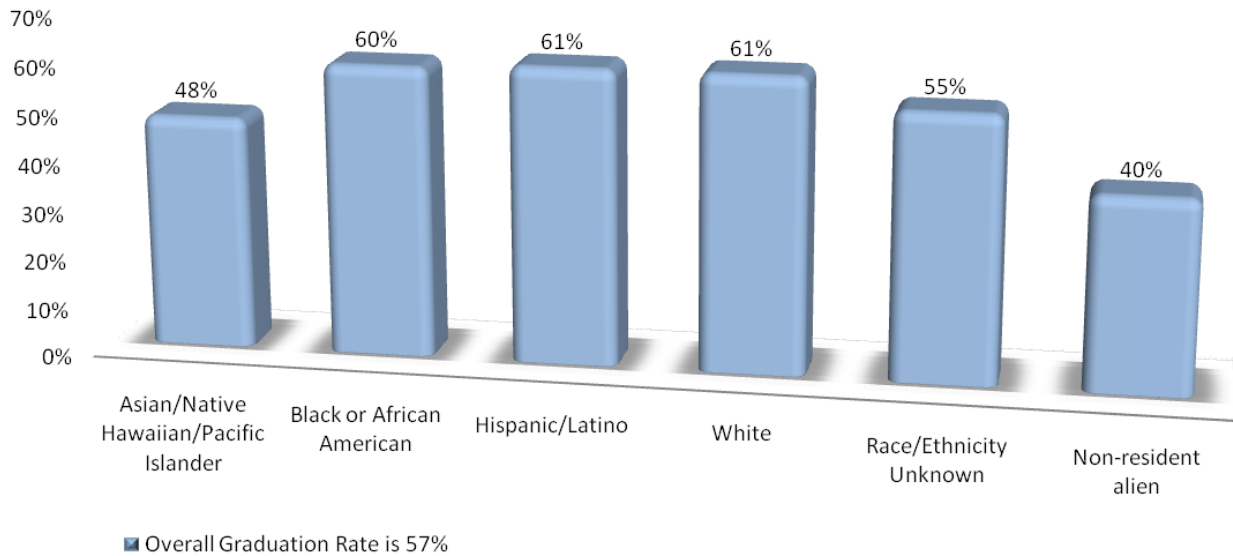
## University of Kentucky 6-Year Graduation Rate by Race/Ethnicity for Students Pursuing Bachelor's Degrees



Percentage of Full-Time, First-Time Students Who Began Their Studies in Fall 2004 and Received a Degree or Award Within 150% of "Normal Time" (Fall 2010) to Completion for Their Program

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

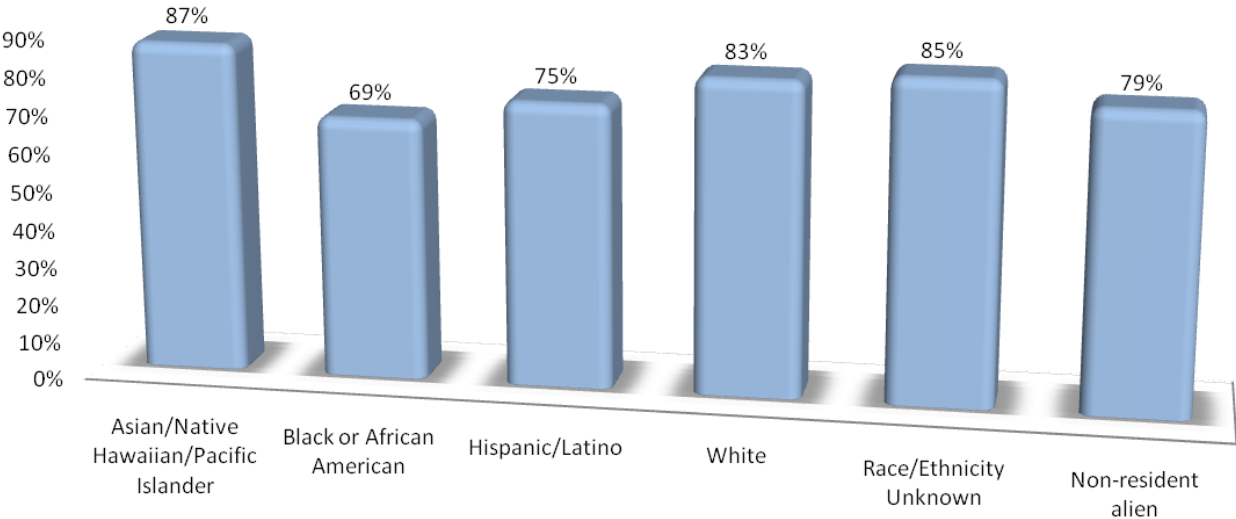
### University of Maryland-Baltimore County 6-Year Graduation Rate by Race/Ethnicity for Students Pursuing Bachelor's Degrees



Percentage of Full-Time, First-Time Students Who Began Their Studies in Fall 2004 and Received a Degree or Award Within 150% of "Normal Time" (Fall 2010) 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

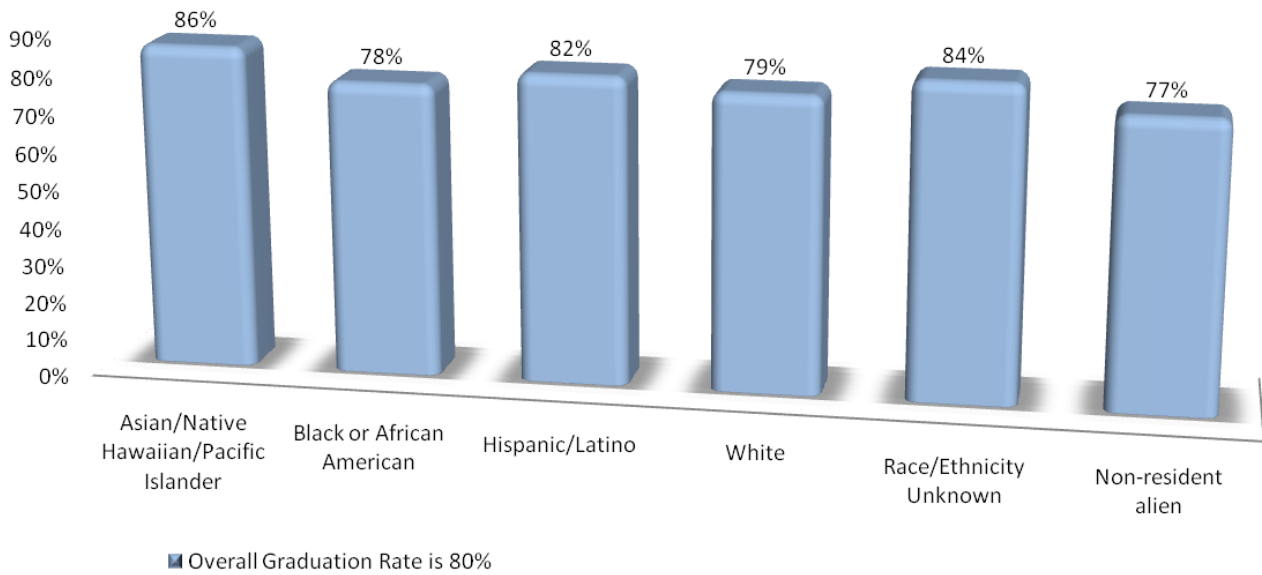


■ Overall Graduation Rate is 81%

Percentage of Full-Time, First-Time Students Who Began Their Studies in Fall 2004 and Received a Degree or Award Within 150% of "Normal Time" (Fall 2010) to Completion for Their Program

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

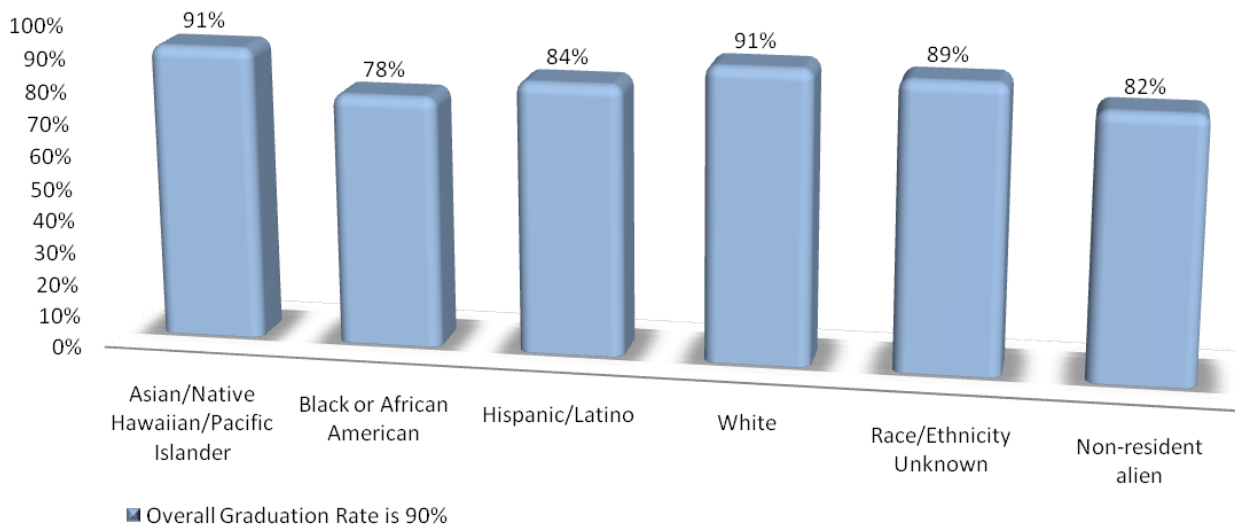
## University of Miami 6-Year Graduation Rate by Race/Ethnicity for Students Pursuing Bachelor's Degrees



Percentage of Full-Time, First-Time Students Who Began Their Studies in Fall 2004 and Received a Degree or Award Within 150% of "Normal Time" (Fall 2010) to Completion for Their Program

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

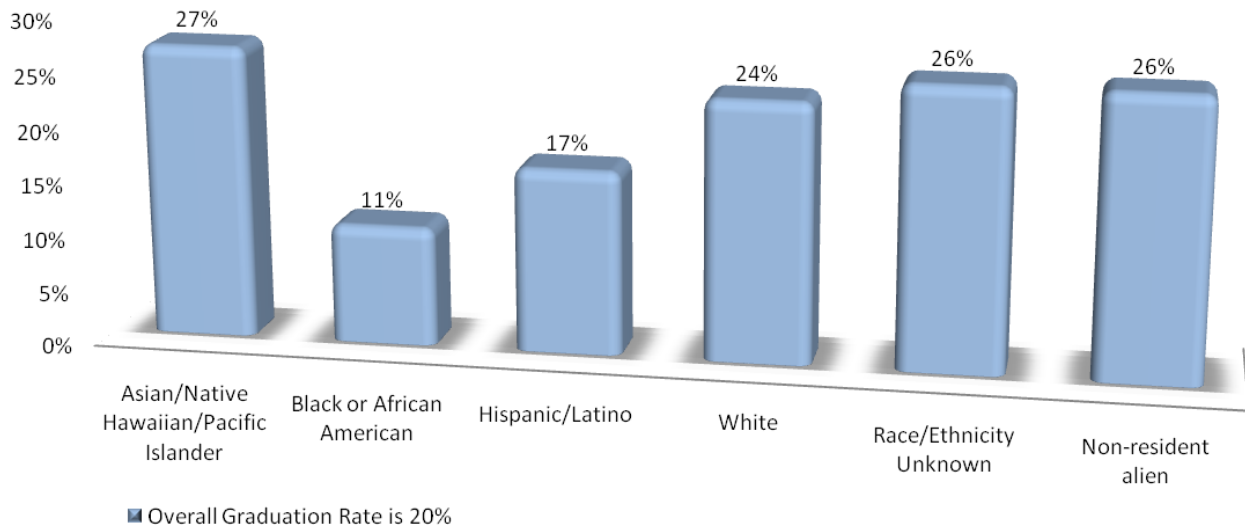
### University of Michigan-Ann Arbor 6-Year Graduation Rate by Race/Ethnicity for Students Pursuing Bachelor's Degrees



Percentage of Full-Time, First-Time Students Who Began Their Studies in Fall 2004 and Received a Degree or Award Within 150% of "Normal Time" (Fall 2010) to Completion for Their Program

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

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

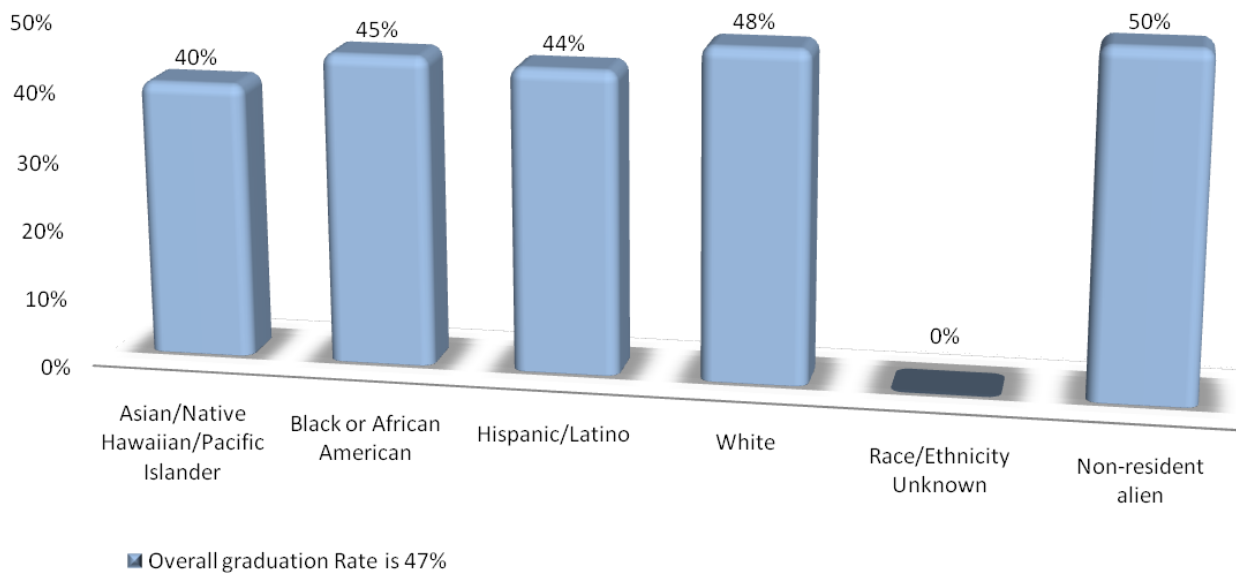


Percentage of Full-Time, First-Time Students Who Began Their Studies in Fall 2004 and Received a Degree or Award Within 150% of "Normal Time" (Fall 2010) to Completion for Their Program

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



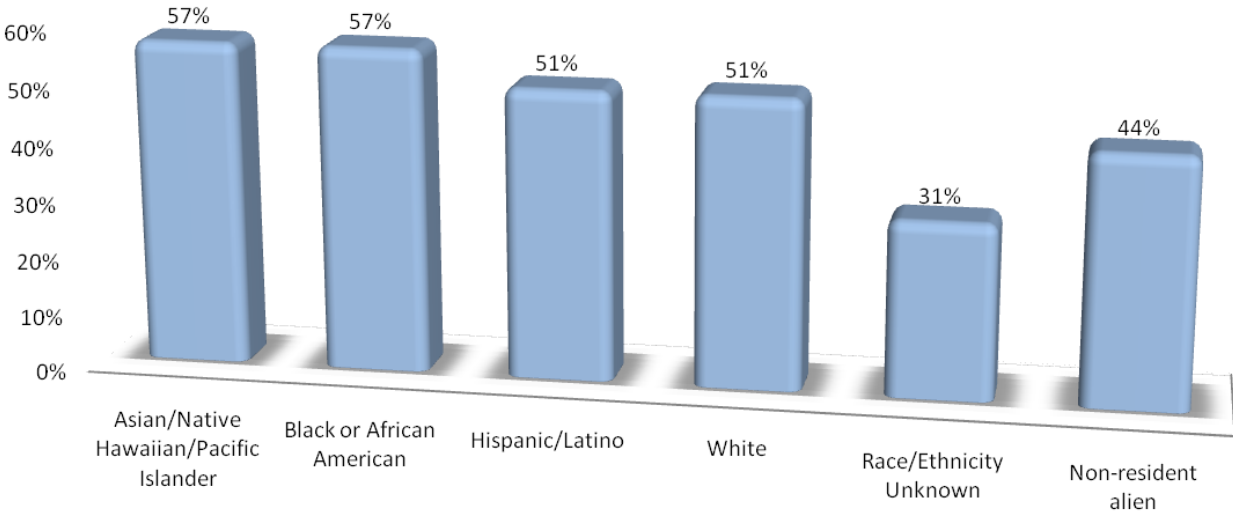
## University of North Florida 6-Year Graduation Rate by Race/Ethnicity for Students Pursuing Bachelor's Degrees



Percentage of Full-Time, First-Time Students Who Began Their Studies in Fall 2004 and Received a Degree or Award Within 150% of "Normal Time" (Fall 2010) 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

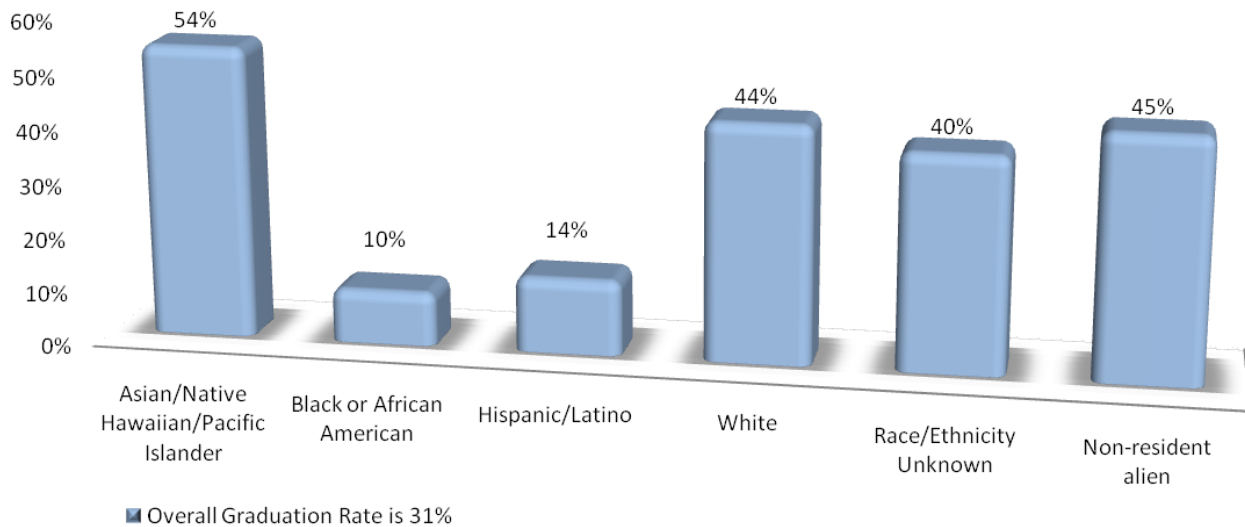


■ Overall Graduation Rate is 51%

Percentage of Full-Time, First-Time Students Who Began Their Studies in Fall 2004 and Received a Degree or Award Within 150% of "Normal Time" (Fall 2010) to Completion for Their Program

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

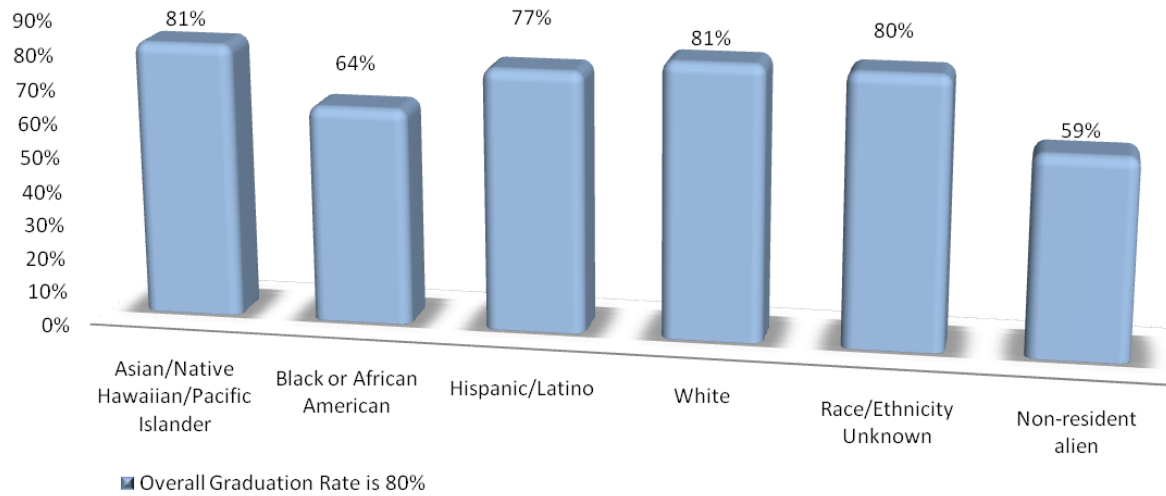
### Wayne State University 6-Year Graduation Rate by Race/Ethnicity for Students Pursuing Bachelor's Degrees



Percentage of Full-Time, First-Time Students Who Began Their Studies in Fall 2004 and Received a Degree or Award Within 150% of "Normal Time" (Fall 2010) to Completion for Their Program

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

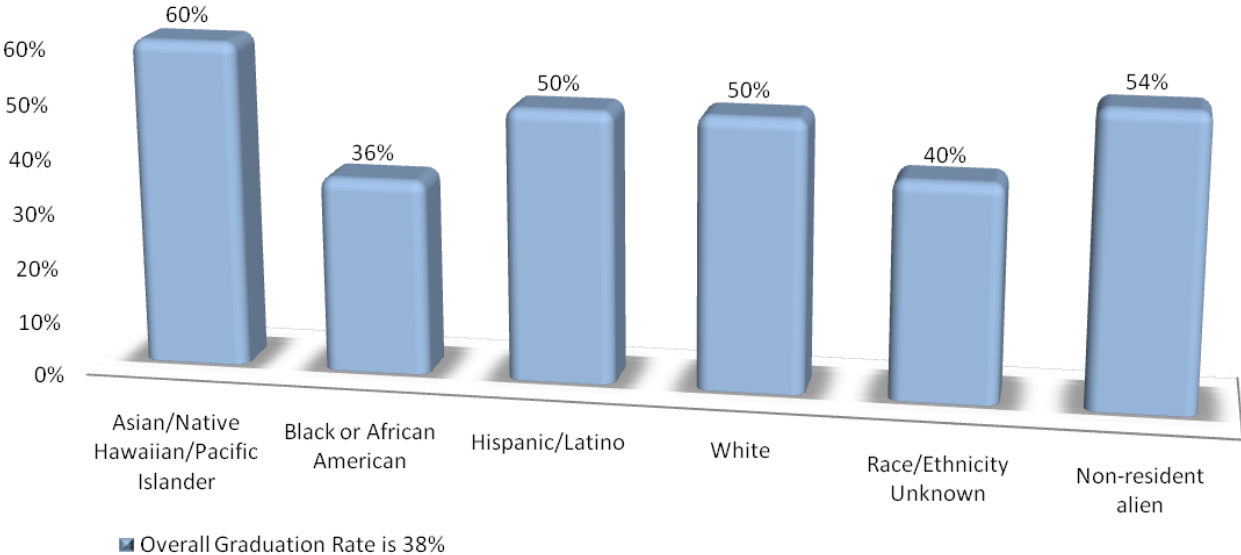
### Virginia Polytechnic Institute and State University 6-Year Graduation Rate by Race/Ethnicity for Students Pursuing Bachelor's Degrees



Percentage of Full-Time, First-Time Students Who Began Their Studies in Fall 2004 and Received a Degree or Award Within 150% of "Normal Time" (Fall 2010) to Completion for Their Program

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

### Xavier University of Louisiana 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 2004 and Received a Degree or Award Within 150% of "Normal Time" (Fall 2010) to Completion for Their Program

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