

African American Participation among Bachelors in the Physical Sciences and Engineering

Results from 2003-2013 Data of the National Center for Education Statistics

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REPORTS ON PHYSICAL SCIENCES & MINORITIES

African Americans & Hispanics among Physics & Astronomy Faculty (7/2014)

Hispanics Bachelors in Physical Sciences and Engineering (10/2014)

Native American Bachelors in Physical Sciences and Engineering (Forthcoming)

Hispanic, Black, and Native American Women Bachelors in Physical Sciences and Engineering (Forthcoming)

A study monitoring the number of bachelor's degrees earned in the US between 2003-2013 finds African Americans remain under-represented in the physical sciences and engineering fields. African Americans are seeing growth in the total number of bachelor's degrees earned (**Table 1**), but this increase is not keeping pace with growth in the physical sciences and engineering. At this rate, it could take upwards of 100 years before African Americans represent 20% of all bachelor's degree recipients and even longer in the physical sciences and engineering.

Table 1

African Americans among Bachelor's Degree Recipients, 2003 & 2013

	Number of Bachelors All Fields		Change '03 - '13 %
	2003	2013	
All US Bachelor's Degree Recipients	1,423,725	1,865,429	31
African American Bachelor's Degree Recipients in the US	120,175	168,981	41

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As **Table 1** shows, nearly 170,000 African Americans earned bachelor's degrees in the US during the 2012-13 academic year. Though this number represents an increase for African Americans over the last decade (41%), this growth is not driven by increased representation in the physical sciences and engineering. Using data collected on the ethnicity of all bachelor's degree recipients from the National Center for Education Statistics from 2003-2013, this report presents findings on African American recipients of bachelor's degrees among 15 fields in the physical sciences and engineering.

Participation in Physical Sciences: Exploring Bachelors in Physics, Astronomy, Chemistry and the Geosciences

Between 2003 and 2013, the number of bachelor's degrees in the physical sciences grew at a faster rate than the number bachelor's degrees earned by African Americans in these fields (**Table 2**). For African Americans, the greatest increases were in earth sciences (147%) and atmospheric sciences (75%), which are relatively small fields. Chemistry, the largest of the physical sciences disciplines, saw a modest increase (40%). The number of physics degrees earned by African Americans remained flat despite a 58% growth in the field overall.

Table 2

Number of Bachelor's Degrees Earned in Physical Science Fields: Total Numbers and Percent Change, 2003 & 2013				
Physical Sciences	All Degrees Earned		African American Degrees	
	Degrees in 2013 #	Change '03-'13 %	Degrees in 2013 #	Change '03-'13 %
Earth Sciences	5,500	63	107	147
Atmospheric Sciences	760	34	21	75
Chemistry	14,814	49	1,072	40
Physics	6,725	58	153	1
Astronomy	413	33	5	**
Oceanography	247	75	7	**
All Physical Sciences	28,459	53	1,365	39

** Due to low population numbers, percent change was not calculated

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The number of physical science degrees earned by African Americans has increased most significantly within earth sciences.

The following analysis explores African American bachelor's degree recipients in the US across six physical science fields. **Table 2** shows the percentage change between 2003-2013 in degree recipients in these fields as well as the number of degrees earned in 2013.

African Americans made the greatest gains in the **earth sciences** with an increase of 147% (**Table 2**).

Atmospheric sciences degrees earned by African Americans increased 75% over the 11-year period for a total of 21 degrees awarded in 2013 alone.

The number of **chemistry** bachelor's degrees earned across all groups in the US has been increasing steadily from 2003-2013. Over this period, chemistry bachelor's degrees earned by African Americans increased 40% (**Table 2**) for a total of 10,034 chemistry degrees in 11 years (**Figure 1**).

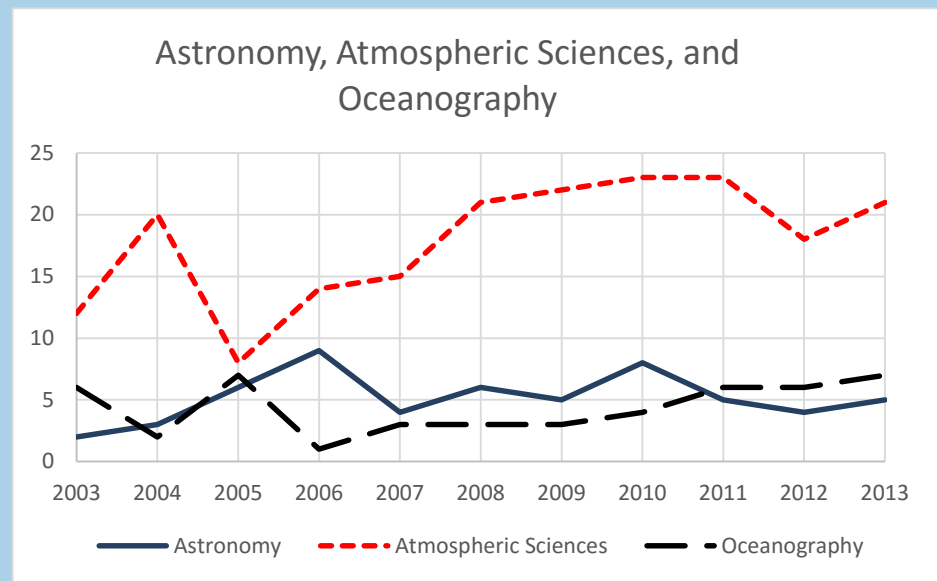
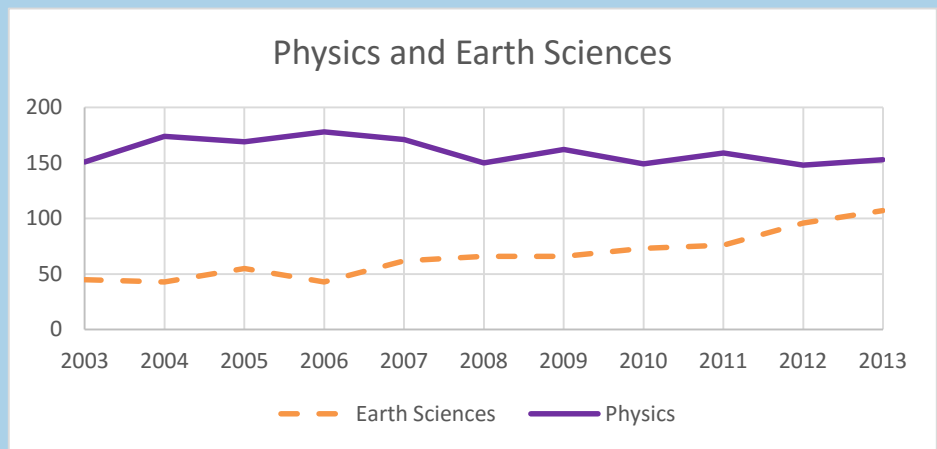
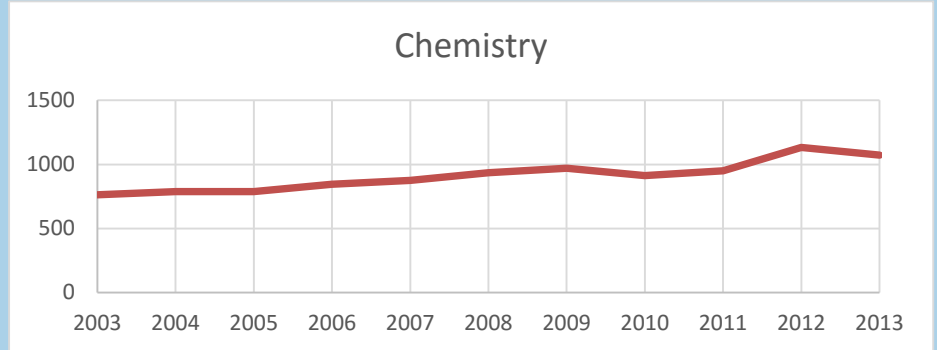
The number of bachelor's degrees in **physics** earned by African Americans in the US has remained stagnant since 2003. As seen in **Figure 1**, the number of physics bachelor's degrees peaked in 2006 and then fell to 2003 levels. Between 2003 and 2013 a total of 1,764 new degrees were earned in physics, averaging out to approximately 160 new degrees per year for African Americans over the 11-year period.

Degrees earned by African Americans in **astronomy** and **oceanography** may have increased slightly from 2003 to 2013, but due to the low population numbers the exact percent change was not calculated (**Table 2**). On average, 5 African Americans earned astronomy degrees each year between 2003 and 2013 for a total of 57 bachelor's degrees. In total, African Americans earned 48 oceanography degrees over the 11-year period.

Figure 1

Trends in Bachelor's Degrees Earned by African Americans in Physical Science Fields, 2003-2013

Number of Bachelor's Degree Recipients



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The number of African American bachelor's degree recipients in physical sciences shows modest growth.

Participation in Engineering: An In-depth Look at Nine Engineering Fields

Between 2003 and 2013, bachelor’s degrees earned in engineering by African Americans in the US increased 10%. However, the increase was significantly less than gains in engineering degrees seen across all US bachelor’s degree recipients. There were 2 fields in engineering where growth in African American bachelor’s degrees exceeded growth across all US bachelor’s degree recipients: civil engineering and engineering technologies. In looking at the number of engineering degrees received by African Americans over this 11-year period, the disciplines with the largest increase in degrees earned were civil and mechanical engineering (Table 3). The following analysis explores African American bachelor’s degree recipients in the US in the 9 identified fields of engineering presented in Table 3 and Figure 2.

Table 3

Number of Bachelor’s Degrees Earned in Engineering Fields: Total Numbers and Percent Change, 2003 & 2013				
Engineering Field	All Degrees Earned		African American Earned Degrees	
	Degrees in 2013 #	Change '03-'13 %	Degrees in 2013 #	Change '03-'13 %
Civil	15,856	69	540	84
Mechanical	22,410	59	696	47
Aerospace	3,571	74	93	43
Materials Science and Engineering	1,453	59	32	39
Chemical	8,933	61	360	14
Other Engineering	12,718	74	411	11
Engineering Technologies	16,006	4	1,593	7
Electrical	18,341	(-13)	1,114	(-15)
Industrial	4,783	21	235	(-15)
All Engineering Fields	100,500	29	5,074	10

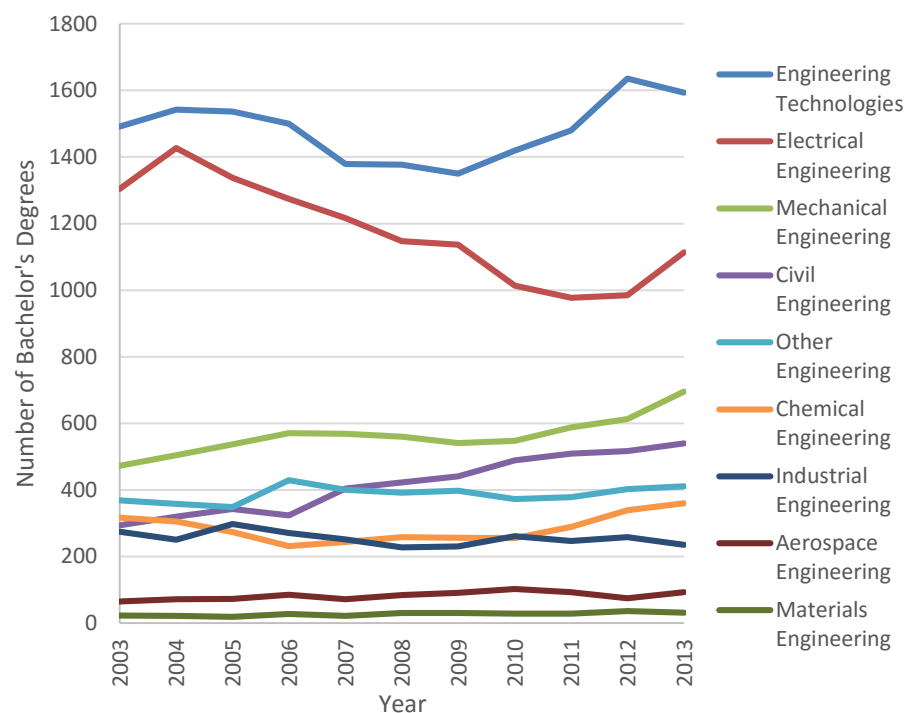
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African Americans earning bachelor’s degrees in engineering are outpaced by all bachelor’s degree recipients during the same time period.

Civil engineering had the most significant increase (84%) in number of bachelor's degrees earned by African Americans, whereas for the general population, civil engineering came in second behind aerospace and what IPEDS refers to as "other engineering" (**Table 3**).

Figure 2

Trends in Bachelor's Degrees Earned by African Americans in Engineering Fields, 2003-2013



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In 2013, over 5,000 engineering bachelor's degrees were earned by African Americans in the US. This represents an increase of just 10% overall.

Engineering technology degrees account for 32% of all the engineering degrees earned by African Americans between 2003 and 2013.

For African Americans, **mechanical engineering** (47%) and **aerospace** (43%) came in second and third. **Materials science and engineering** followed close behind with a percentage increase of 39%. **Other engineering fields** (11%) and **engineering technologies** (7%) rounded off the list with the smallest increases.

Two fields decreased significantly. From 2003-2013 the number of degrees earned by African Americans in **electrical** and **industrial engineering** decreased by 15%.

Rates of Bachelor’s Degrees Earned: Comparison of African Americans to All US Bachelor’s Degree Recipients

African Americans are receiving fewer bachelor’s degrees in physical sciences and engineering, on average, than the total degree recipient population. **Table 4** compares degrees earned in 2013 by African Americans to all bachelor’s degrees earned for each discipline within the physical sciences and engineering during the same time period. African Americans continue to be marginally represented in all fields except engineering technology where African Americans are keeping pace with the US average.

Table 4

**Comparison of Degrees Earned by African Americans to All US Bachelor’s Degree Recipients
Bachelor’s Degrees in Field per 1,000 Total Degrees, 2013**

Field of Study	All US Bachelor’s recipients	African Americans	Field of Study	All US Bachelor’s recipients	African Americans
Chemistry	8	6	Engineering Technology	10	10
Oceanography	0.1	0.04	Electrical Engineering	10	7
Geosciences Total*	3	0.8	Chemical Engineering	5	2
Physics	4	1	Civil Engineering	8	3
Atmospheric Sciences	0.4	0.1	Mechanical Engineering	12	4
Earth Sciences	3	0.6	Industrial Engineering	3	1
Astronomy	0.2	0.02	Aerospace Engineering	2	0.6
			Other Engineering	7	2
			Materials Science & Engineering	1	0.2

*Geosciences total includes: Atmospheric Sciences, Earth Sciences and Oceanography

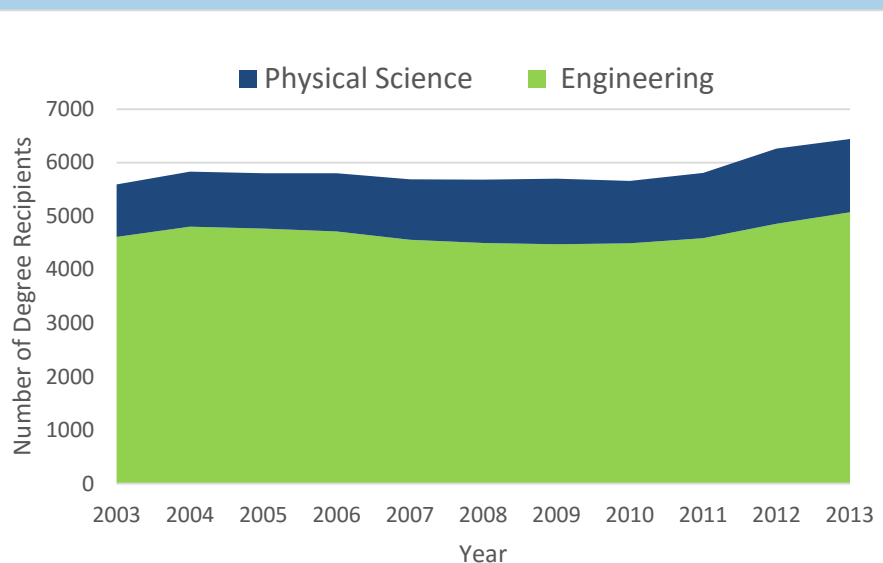
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Conclusion

African Americans remain under-represented in the physical sciences and engineering. The number of African Americans earning bachelor's degrees in the physical sciences and engineering has shown a slight increase, with 65,000 new degrees earned between 2003 and 2013 (Figure 3). Of all the fields examined in this report, engineering technology is the only field in which African Americans are earning bachelor's degrees at approximately the same proportion as all US bachelor's degree recipients (Table 4). **Though there were increases in specific disciplines between 2003 and 2013, the current growth rate shows no sign of a change in status for African Americans in the physical sciences and engineering.**

Figure 3

Physical Sciences and Engineering Bachelor's Degrees among African Americans in the United States, 2003-2013



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Though there were increases in specific disciplines from 2003-2013, the current growth rate shows no sign of a change of status for African Americans in the physical sciences and engineering.

References

US Department of Education. Institute of Education Sciences, National Center for Education Statistics.

Survey Methodology

This **focus on** contains bachelor's degree data from the Integrated Postsecondary Education Data System (IPEDS). IPEDS collects institution-level data from postsecondary institutions in the United States (50 states and the District of Columbia) and other US jurisdictions using a web-based survey. These data are made publicly available by IPEDS through a partnership with the National Science Foundation. Raw data can be accessed at: www.ncsesdata.nsf.gov.

Staff members at The American Institute of Physics analyzed IPEDS data on bachelor's degree attainment based on the most up to date resources. Data were downloaded for this study in February of 2015. Percentage change calculations are based on degrees earned in 2003 and 2013. Disciplines were defined based on standardized detailed classifications settings determined using the WebCASPAR search function.

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