

Native American Participation among Bachelors in Physical Sciences and Engineering

Results from 2003–13 data of the National Center for Education Statistics

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

Hispanic Participation among Bachelor's in the Physical Sciences and Engineering (10/2014)

Underrepresented Minorities in High School Physics (6/2015)

African American Participation among Bachelor's in the Physical Sciences and Engineering (11/2015)

Using National Center of Education Statistics, this report summarizes Native American recipients of bachelor's degrees among 16 physical science and engineering fields.

Across all disciplines, the number of Native American bachelor's degree recipients has increased by 16% over the last decade. This increase is pointedly less than the national average growth of 36% over the same time period (**Table 1**). The number of bachelor's degrees earned by Native Americans in the United States peaked in 2010, but fewer degrees were earned in the next 3 years; this is a troubling trend echoed across several of the physical sciences and engineering fields. If these growth trends continue, Native Americans will be further under-represented in many of the physical sciences.

Table 1

Native Americans among Bachelors Degree Recipients, 2003 & 2013

	Number of Bachelor's All Fields		Change '03 -'13 %
	2003	2013	
All US Bachelor's Degree Recipients	1,365,694	1,861,034	36
Native American Bachelor's Degree Recipients in the US	9,314	10,768	16

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Almost 11,000 Native Americans earned bachelor's degrees in the United States during the 2012-13 academic year. This represents a slight increase in degrees over the last decade (16%). The percentage increase in degrees is much less than decadal rates recorded in 2010 when AIP reported a 40% increase in bachelor's degrees earned by Native Americans (Czujko, 2010).

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

Overall, there was only a small increase in bachelor's degrees earned in the physical sciences by Native Americans between 2003 and 2013.

Table 2

Number of Bachelor Degrees Earned by Native Americans in Physical Science, 2003 & 2013

Physical Sciences	Degrees Earned 2003 #	Degrees Earned 2013 #
Chemistry	78	72
Physics	17	26
Earth Sciences	18	26
Atmospheric Sciences	4	5
Astronomy	4	5
Ocean Sciences	2	2
Other Physical Sciences	2	4
All Physical Sciences	125	140

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The largest increase in physical science degrees between 2003 and 2013 is in physics (Table 2). However, this can be misleading if not viewed in long-term context, because numbers vary widely each year. Examples of the variation of bachelor's degrees earned by Native Americans between 2003 and 2013 are presented in Table 3, which displays raw numbers for bachelor's degrees earned by Native Americans on an annual basis.

Relative size of the seven analyzed fields in the physical sciences varies significantly. Chemistry is the largest field within the physical sciences, with an average of 77 degrees earned by Native Americans each year.

Conversely, ocean sciences is considerably smaller, with an average of less than one degree earned by Native Americans each year.

In the earth sciences, the number of bachelor’s degrees earned by Native Americans increased over the last decade. The trends in **Table 3** show the variability in number of earth science degrees earned by Native Americans year to year, with a peak in 2012. In total, 319 new bachelor’s degrees in earth sciences were earned by Native Americans between 2003 and 2013.

The number of physics degrees earned by Native Americans in the United States has increased slightly since 2003. 2010 represents the largest number of physics bachelor’s degrees earned by Native Americans over the last decade; the number of degrees earned since has decreased (**Table 3**). Between 2003 and 2013, Native Americans earned a total of 296 bachelor’s degrees in physics.

The number of Native Americans completing bachelor’s degrees shows great variability within each field.

Table 3

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

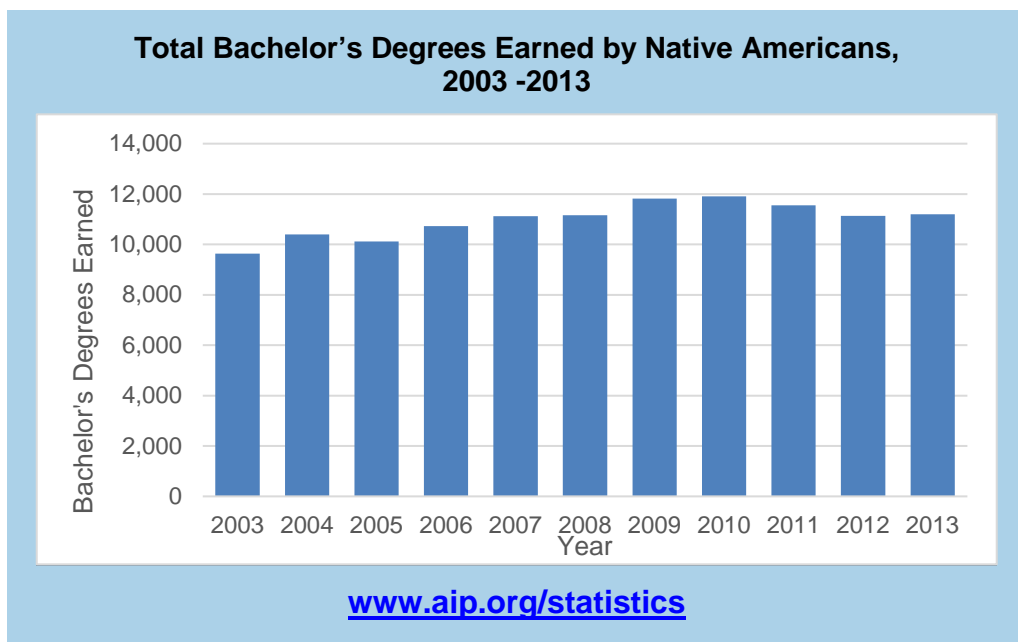
	Chemistry	Earth Sciences	Physics	Atmospheric Science	Astronomy	Ocean Sciences	Other Physical Sciences
2003	78	18	17	4	4	2	2
2004	56	30	21	1	1	0	6
2005	74	23	34	1	3	1	2
2006	82	37	26	1	1	0	4
2007	99	21	23	4	1	1	4
2008	86	26	22	2	1	0	4
2009	100	24	32	4	2	1	6
2010	72	39	39	4	3	1	5
2011	73	29	31	2	1	0	2
2012	60	46	25	3	3	0	2
2013	72	26	26	5	5	2	4
Total	852	319	296	31	25	8	41
Yearly Average	77	29	27	3	2	1	4

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Native Americans earned relatively few degrees, 105 total, in Atmospheric Science, Astronomy, Ocean Sciences, and other physical sciences. These numbers stayed relatively stable throughout the decade.

Figure 1 shows this trend over time. This report highlights and assesses changes in number of degrees earned across different fields relative to the overall growth of Native Americans in higher education. Note: there are more total degrees earned than total degree recipients (**Table 1**) due to multiple degrees earned by the same individual.

Figure 1

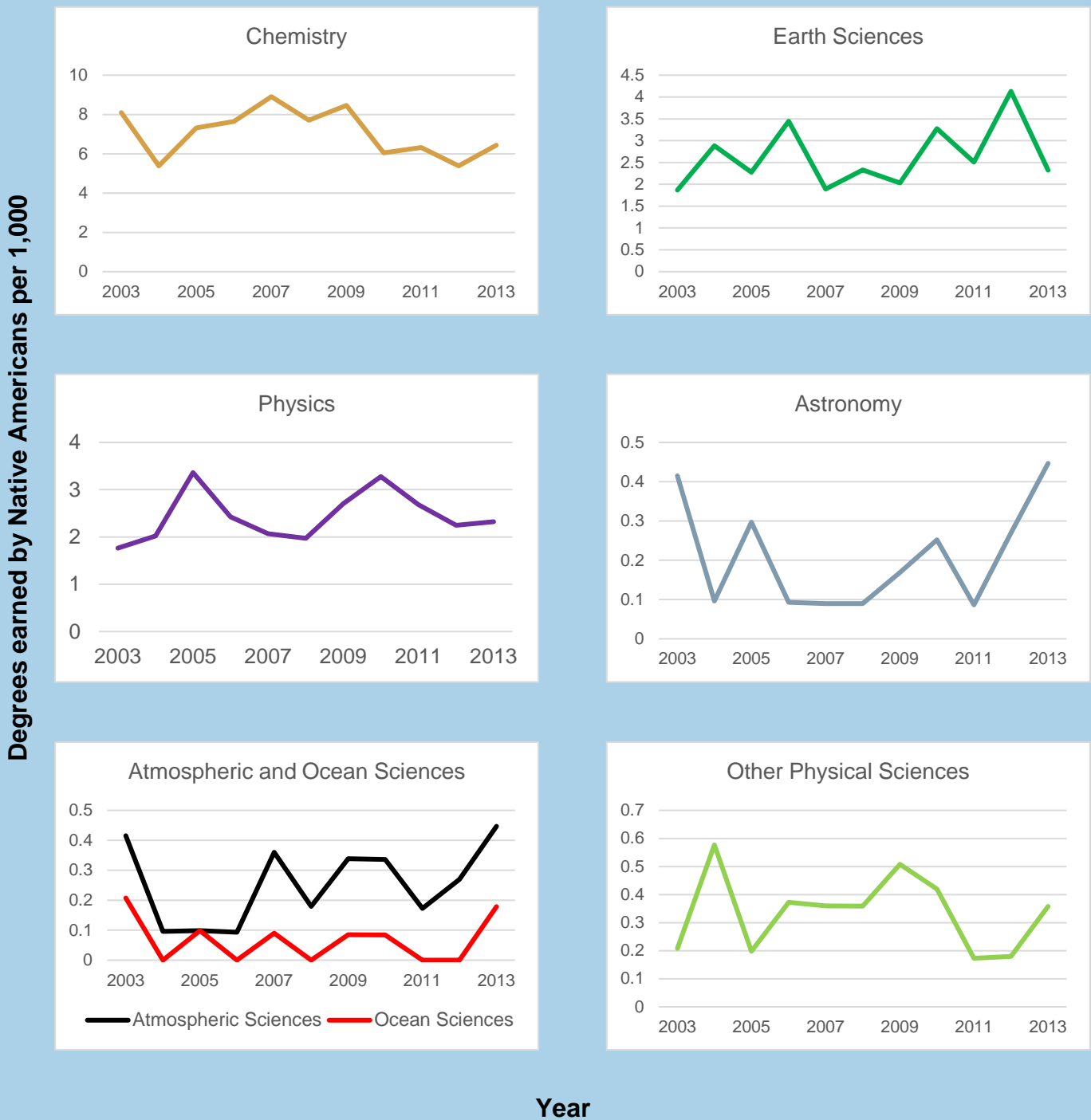


In 2003, Native Americans earned 9,367 total bachelor's degrees compared to 11,191 total bachelor's degrees in 2013.

Figure 2 displays numbers of degrees earned by Native Americans per 1,000 physical science degrees. These calculations allow for comparison of degrees earned over time within each discipline, accounting for overall growth in the number of degrees. Note differences in scale of each y-axis. The figures graphically represent changes in degrees earned over time and highlight overall trends. **Table 4** shows a comparison of these changes in bachelor's degrees earned by Native Americans for each discipline.

Figure 2

Number of Bachelor Degrees Earned in Physical Science Fields Per 1,000 Degrees, 2003-2013



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Finally, we can look at a static comparison of bachelor’s degrees earned by Native Americans. **Table 4** retains cross-field comparisons by showing degrees earned per 1,000. However, rates are compared exclusively for 2003 and 2013; thus, much of the recorded variability highlighted in **Table 3** and **Figure 1** is excluded from analysis. This analysis provides relative overall trends in degree attainment.

This simplified analysis shows that from 2003 to 2013 Native Americans lost representation in chemistry. Gains were made in physics, earth sciences, and other physical sciences. There was no meaningful change in degrees earned by Native Americans in astronomy, atmospheric science, and ocean sciences. Overall, there was a small downward trend in representation of Native Americans among bachelor’s degrees in physical science fields.

Table 4

Number of Bachelor Degrees Earned by Native Americans in Physical Science Fields for every 1,000 Degrees Earned, 2003 & 2013

	Degrees Earned 2003	Degrees Earned 2013	Gain, Loss, or No Change
Chemistry	8.1	6.4	Loss
Physics	1.8	2.3	Gain
Earth Sciences	1.9	2.3	Gain
Atmospheric Science	0.4	0.4	No Change
Astronomy	0.4	0.4	No Change
Ocean Sciences	0.2	0.2	No Change
Other Physical Sciences	0.2	0.4	Gain
All Physical Sciences	13	12.5	Loss

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Overall, there was a small downward trend in representation of Native Americans among bachelor’s degrees in physical science fields.

Participation in Engineering: Exploring Bachelors in Nine Engineering Fields

Between 2003 and 2013, the number of Native Americans earning bachelor’s degrees increased in five of nine identified fields of engineering; however, growth for Native Americans was smaller in most of these fields than it was overall (**Table 5**). For example, the number of bachelor’s degrees earned by Native Americans in civil engineering

increased by 21%, a rate much lower than the rate of 69% in the total population. However, in industrial engineering and engineering technologies, the rate of growth for Native Americans was more than the rate for the total population. The largest growth rate over the decade 2003-13 was in industrial engineering, followed by other engineering and mechanical engineering. The rate of growth stayed relatively stagnant in aerospace engineering and chemical engineering. Materials engineering had the greatest decrease, with a decrease of 67% between 2003 and 2013. Between 2003 and 2013, there was a 17% increase in bachelor's degrees earned by Native Americans in all engineering fields.

Table 5

Number of Bachelor's Degrees Earned: Total Numbers and Percent Change, 2003-2013

Engineering Field	All Degrees Earned		Native American Earned Degrees	
	Degrees in 2013 #	Change '03-'13 %	Degrees in 03-13 Average #	Change '03-'13 %
Aerospace	3,571	74	14	0
Chemical	8,933	61	33	0
Civil	15,929	69	71	21
Electrical	18,630	(-11)	63	(-29)
Mechanical	22,443	59	82	41
Materials	1,465	49	3	(-67)
Industrial	4,815	22	18	67
Engineering Technologies	18,427	17	155	29
Other Engineering	12,805	75	52	59
All Engineering Fields	107,018	34	490	17

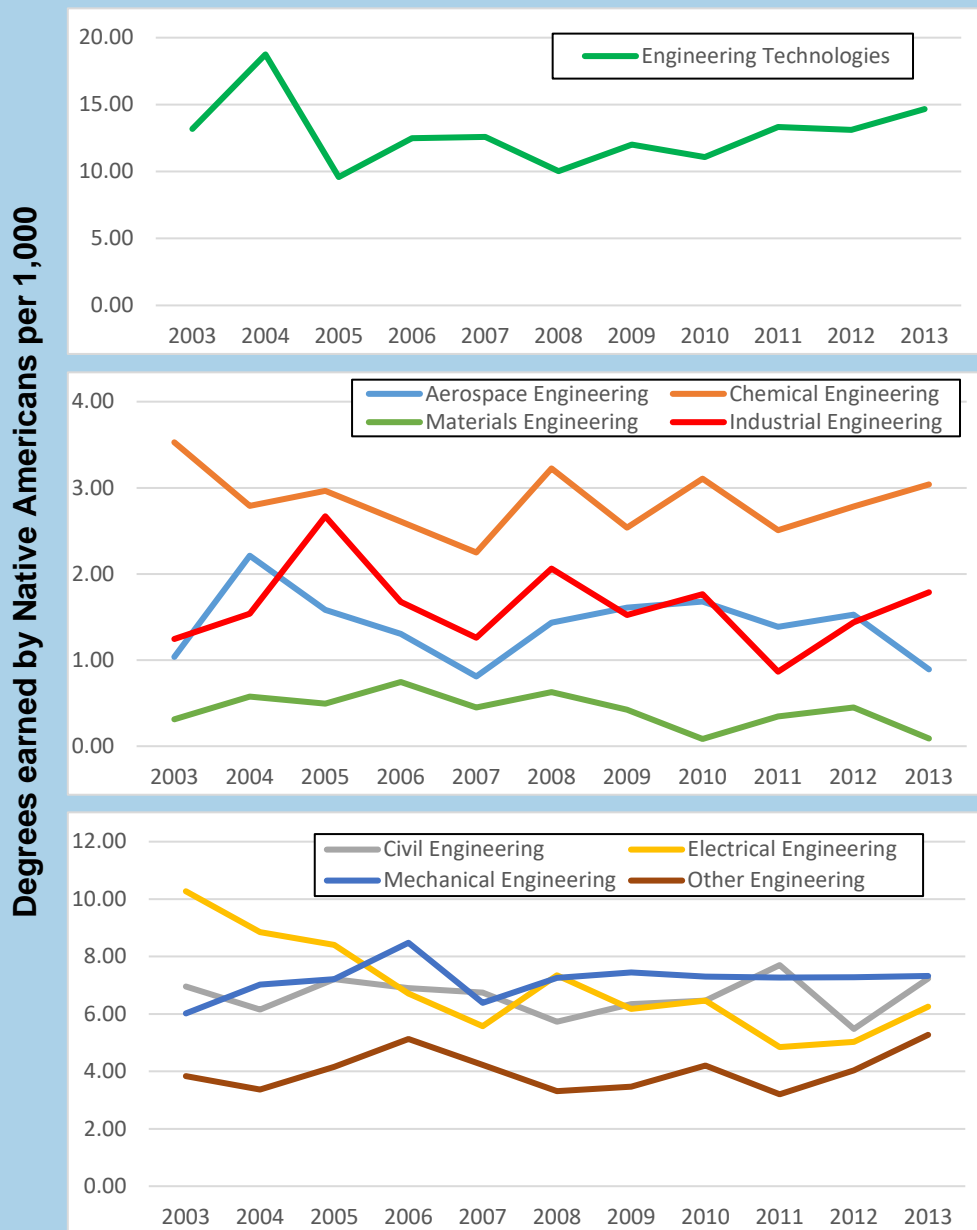
More Native Americans earned bachelor's degrees in five out of nine engineering fields. However, most of these increases are occurred at rates significantly lower than seen in the total population.

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Figure 3 displays numbers of degrees earned by Native Americans per 1,000 degrees earned by Native Americans. The year-to-year variability in engineering may be less than in the physical sciences because the number of degrees is larger in engineering.

Figure 3

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



Much as we saw great variability in number of bachelor's degrees earned by Native Americans in physical science fields over the decade 2003-13, there has also been variability in the number of bachelor's degrees earned by Native Americans in engineering fields.

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Rates of Bachelor’s Degrees Earned: Comparison of Native Americans to the Total US Population

Native Americans are not proportionally represented within most of the physical sciences and engineering fields. Physics is a good example. When looking across all degrees earned in the United States, more than three out of every 1,000 degrees earned is in physics. For every 1,000 bachelor’s degrees earned by Native Americans, only slightly more than two are in physics. These calculations allow for comparison of representation within each discipline for bachelor’s degrees earned by Native Americans and the total population, which includes all races.

In 2013, Native Americans earned substantially more engineering technologies bachelor’s degrees, per 1,000 degrees, than the total bachelor’s degree recipient population.

Table 6 compares degrees earned by Native Americans to all degrees earned by discipline in the physical sciences and engineering. In oceanography, atmospheric sciences, and engineering technology, Native Americans earn proportionally more bachelor’s degrees than the total population. Native Americans remain underrepresented in all other fields except other physical sciences, where they are equally represented.

Table 6

Number of Bachelor’s Degrees by Field per 1,000 Total Degrees Earned in 2013

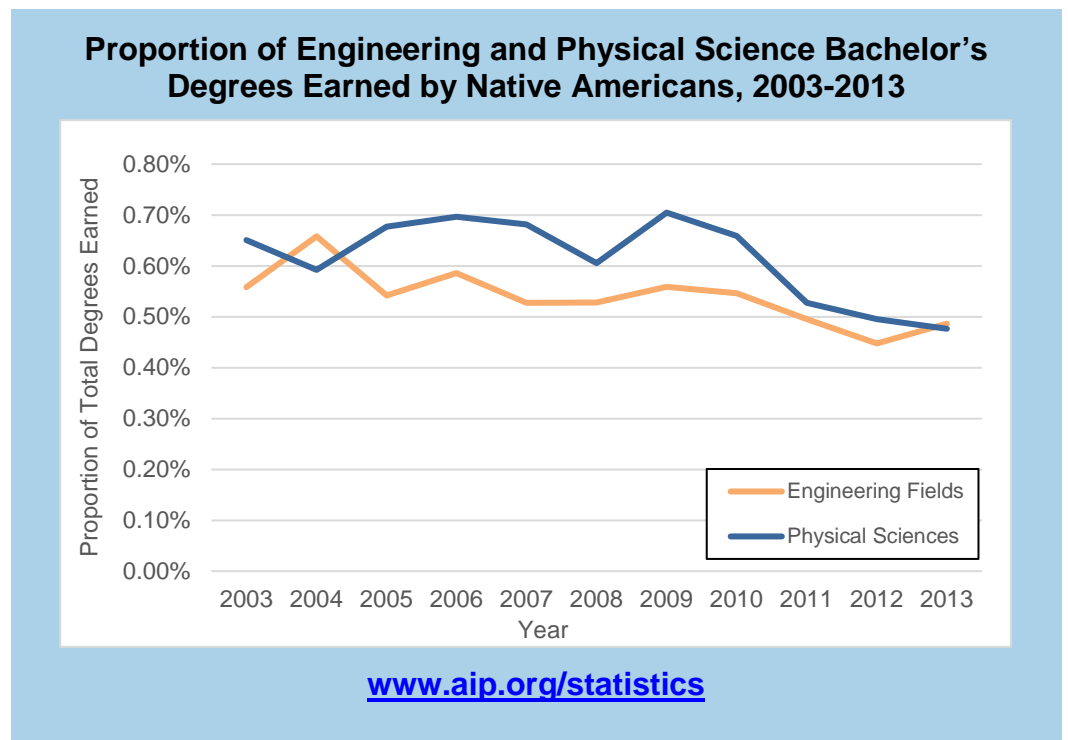
Field of Study	Total Population/ All Races	Native Americans	Field of Study	Total Population/ All Races	Native Americans
Earth Sciences	2.81	2.32	Engineering Technology	9.41	14.65
Astronomy	0.21	0.15	Civil Engineering	8.14	7.24
Chemistry	7.60	6.43	Aerospace Engineering	1.82	0.89
Atmospheric Sciences	0.39	0.45	Mechanical Engineering	11.46	7.33
Physics	3.45	2.32	Chemical Engineering	4.56	3.04
Oceanography	0.13	0.18	Other Engineering	6.54	5.27
Other Physical Sciences	0.4	0.4	Electrical Engineering	9.51	6.26
			Industrial Engineering	2.46	1.79
			Materials Science & Engineering	0.75	0.09

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Conclusion

Overall, Native Americans are earning physical science and engineering bachelor’s degrees at lower rates than the total population. For every 1,000 degrees earned by Native Americans 41, were earned in engineering and 12 were earned in the physical sciences, compared to 54 and 15 by the total population, respectively. **Figure 4** shows the trends in degrees earned by Native Americans in engineering fields and the physical sciences as a percent of total degrees earned. Reporting the proportion of degrees earned shows a clear downward trend for Native Americans among degree recipients. If trends continue at their current rates, underrepresentation in these fields will only increase for Native Americans.

Figure 4



References

Czujko, R. 2010. Native Americans Among Degree Recipients in Physics and Geoscience.
<https://www.aip.org/sites/default/files/statistics/minorities/nativeamerican-pg-08-1.pdf>

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