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One Physics Ellipse • College Park, MD 20740 • 301.209.3070 • stats@aip.org

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Hispanic Participation among Bachelor's in Physical Sciences and Engineering

Results from 2002-2012 data of the National Center for Education Statistics

Laura Merner

REPORTS ON PHYSICAL SCIENCES & MINORITIES

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

African American Bachelor's in Physical Sciences and Engineering (Forthcoming)

Native American Bachelor's in Physical Sciences and Engineering (Forthcoming)

Hispanic, Black, and Native American Women Bachelor's in Physical Sciences and Engineering (Forthcoming)

From 2002 to 2012 Hispanics earning bachelor's degrees in the US increased by 85%, while the number of all earned degrees increased by 38%.

Hispanics have been increasing their representation across the physical sciences and engineering at an outstanding rate. More broadly, from 2002-2012 there has been a significant increase in bachelor's degrees earned by Hispanics in the US (Table 1). These statistics are important because Hispanics are considered an under-represented minority (URM) group across the physical sciences and engineering. The National Center for Education Statistics collects data on the ethnicity of all bachelor's degree recipients. This report summarizes Hispanic recipients of bachelor's degrees among 15 fields in the physical sciences and engineering.

Table 1

Hispanics among Bachelor's Degree Recipients, 2012 & 2002

	Number of Bachelor's All Fields		Change '02 –'12
	2002	2012	%
All US Bachelor's Degree Recipients	1,308,970	1,810,647	38
Hispanic Bachelor's Degree Recipients in the US	95,492	176,699	85

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More than 175,000 Hispanics earned bachelor's degrees in the US during the 2011-12 academic year. This represents a significant increase in degrees over the last decade (85%). More so, the rate of increase in bachelor's degrees exceeds decadal rates recorded just four years ago when the American Institute of Physics (AIP) reported a 69% increase.

When compared with all bachelor's degrees earned in the US, Hispanics show significant growth rates, 38% and 85%, respectively. Within physical science and engineering fields, Hispanics have displayed growth in all of the 15 identified disciplines. It is important to note that these dramatic growth rates in Hispanics earning bachelor's degrees is coupled with significant growth of young Hispanics among the total US population. Between 2002 and 2012 Hispanics were the fastest growing group in the United States. However, growth rates of Hispanics earning bachelor's degrees exceeds national growth rates among the college-age group in the US.

THE SURVEY OF BACHELOR'S DEGREES

The Higher Education General Information Survey (HEGIS) and the Integrated Postsecondary Education Data System (IPEDS) data collection is conducted by the Department of Education's National Center for Education Statistics (NCES).

Participation in Physical Sciences: Exploring Bachelor's in Physics, Astronomy, Chemistry and the Geosciences

Overall, bachelor's degrees earned by Hispanics have had a greater increase by percentage from 2002 to 2012, compared with the total bachelor's degree population. Physics and astronomy bachelor's degrees have grown at nearly twice the rate within the Hispanic community. Growth was even more significant for degrees in atmospheric sciences and earth sciences. Chemistry degrees among Hispanics have also increased at a rate higher than the total population.

Physical science degrees for Hispanics have increased at rates greater than the total population in five of the six identified fields.

Table 2

Number of Bachelor Degrees Earned in Physical Science Fields: Total Numbers and Percent Change, 2002-2012

Physical Sciences	All Degrees Earned		Hispanic Degrees	
	Degrees in 2012 #	Change '02-'12 %	Degrees in 2012 #	Change '02-'12 %
Chemistry	14,598	45	1,083	59
Physics	6,177	54	342	107
All Geosciences*	6,059	47	328	134
Earth Science	5,088	51	279	147
Atmospheric Sciences	740	38	36	260
Astronomy	448	37	21	75
Ocean Sciences**	231	17	13	13
All Physical Sciences	**27,282**	**47**	**1774**	**78**

*All Geosciences includes: Atmospheric Sciences, Earth Sciences and Ocean Sciences
**Ocean Sciences is calculated using a 2-year average

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Physical Science Fields: Ranked by number of Bachelor's Degrees (largest to smallest)

1. Chemistry
2. Physics
3. Earth Sciences
4. Atmospheric Sciences
5. Astronomy
6. Ocean Sciences

The following analysis explores Hispanic bachelor's degree recipients in the US across six physical science fields. Between 2002 and 2012 there have been increases across most of the physical science fields, however, when assessing these statistics it is critical to take into account the overall size of these fields. **Table 2** lists these disciplines ranked by degree production based on the total population. Chemistry is nearly as large as all other physical science disciplines put together. Conversely, ocean sciences is just 1.5% the size of Chemistry.

The number of Hispanics completing bachelor's degrees in physics in the United States is increasing. 2012 represents the largest graduating class of Hispanics in physics in the past decade.

The number of **physics** bachelor's degrees earned by Hispanics in the US has increased dramatically since 2002. As seen in **Table 2**, the number of Hispanics that earned physics bachelor's degrees has doubled over the last 11 years. 2012 represents the largest number of degrees earned by Hispanics over the last decade (342 degrees). Between 2002 and 2012 a total of 2,638 new degrees were earned in physics, averaging out to approximately 240 new degrees per year for Hispanics over the 11 years.

There was a 59% increase in **chemistry** bachelor's degrees earned from 2002 to 2012 by Hispanics in the US. Generally, the number of degrees earned has been increasing each year, with 1083 Hispanic degree recipients in 2012 (**Figure 1**). A total of 9,002 chemistry degrees were earned by Hispanics in the US during the last decade.

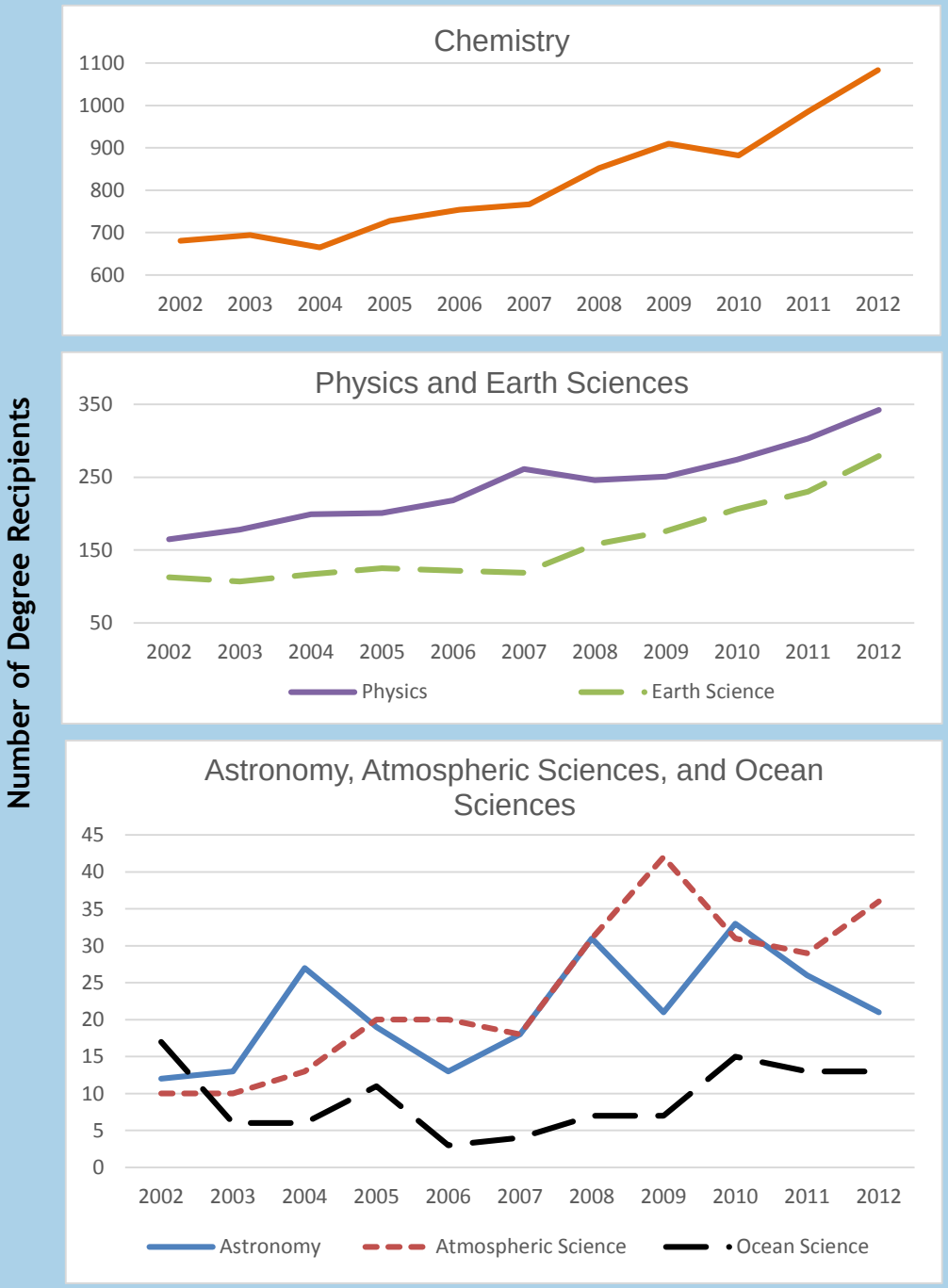
There has been a 75% increase in **astronomy** bachelor's degrees earned from 2002 to 2012 by Hispanics in the US. Degrees earned peaked in 2010, with 33 new graduates. On average, 21 degrees were received by Hispanics each year over the last decade. Between 2002 and 2012, 234 new astronomy degrees were earned by Hispanics.

Bachelor's degrees in the **geosciences** have increased over the last decade, resulting in a 134% increase in geoscience degrees earned by Hispanics. Geosciences is a composite classification that encompasses atmospheric sciences, earth science and ocean sciences. **Atmospheric sciences** degrees earned by Hispanics increased during the last decade by 260%. In the **earth sciences**, degrees earned by Hispanics have steadily increased from 2002–2012, with an increase of 147%. In total, 1,752 degrees were earned in earth science. **Ocean sciences** degrees among Hispanics in the US increased only 13% from 2002 to 2012, using a two year average. The ocean science field is defined as physical oceanography.

Trends in the physical sciences predominately show growth for Hispanic bachelor's degree recipients in the US. In 2012 more degrees were earned by Hispanics in Chemistry alone than all physical science degrees combined in 2002. This highlights the immense growth across the physical sciences.

Figure 1

Trends in Bachelor's Degrees Earned by Hispanics in Physical Science Fields, 2002-2012



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

Degree rates for Hispanics in the US increased in all of the nine identified fields of engineering, accounting for an **overall increase of 64% across engineering**. There is variability among the fields in rate of growth, ranging from an increase of 183% in materials science & engineering compared to an increase of 21% in electrical engineering. Notably, the number of Hispanics earning degrees doubled in five out of the nine fields (Table 3).

Table 3

Number of Bachelor's Degrees Earned in Engineering Fields: Total Numbers and Percent Change, 2002-2012

Engineering Field	All Degrees Earned		Hispanic Earned Degrees	
	Degrees in 2012 #	Change '02-'12 %	Degrees in 2012 #	Change '02-'12 %
Mechanical	21,052	57	1,719	109
Engineering Technologies	18,344	16	1,575	32
Electrical	17,570	(-8)	1,715	21
Civil	15,229	71	1,588	107
Other Engineering	12,083	75	661	126
Chemical	8,367	40	608	72
Industrial	4,724	18	542	45
Aerospace	3,614	104	282	174
Materials Science and Engineering	1,349	41	99	183
All Engineering Fields	**102,334**	**33**	**8,789**	**64**

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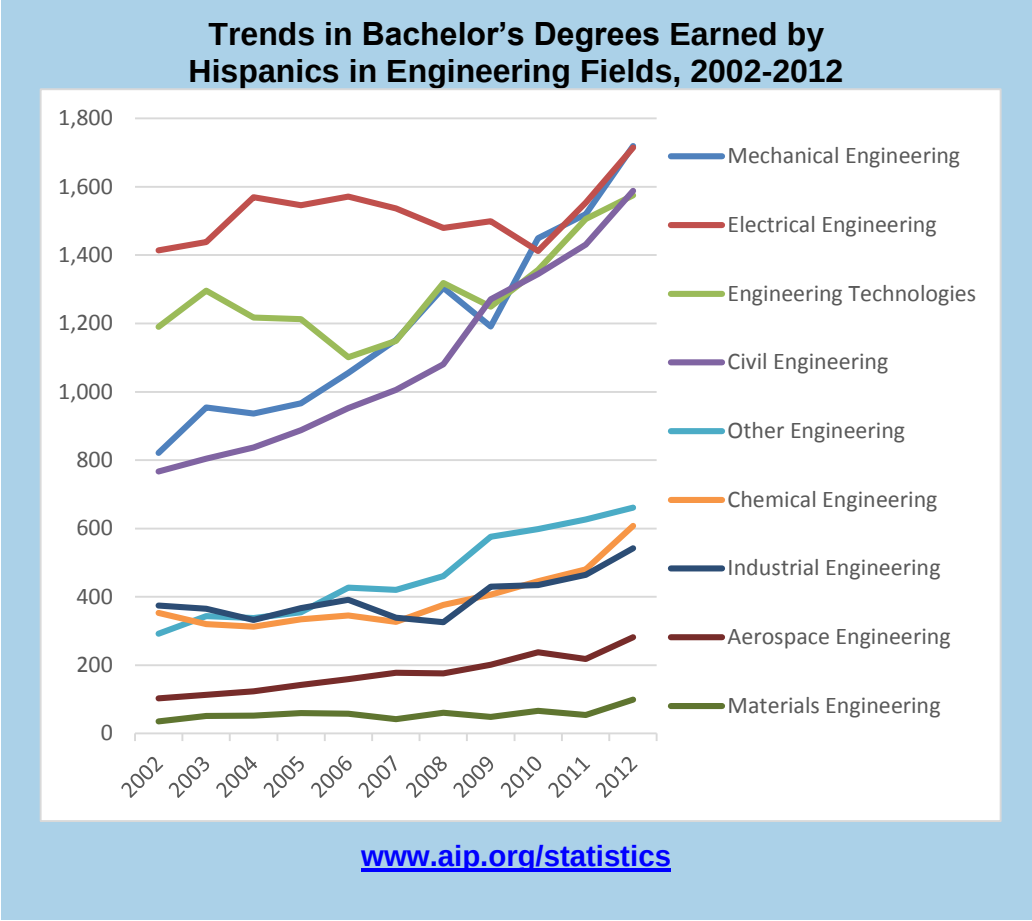
In over half of the engineering fields Hispanic earned degrees more than doubled.

Hispanic degree recipients in engineering are increasing in all fields.

Over the last decade there has been enormous growth in engineering degrees received by Hispanics in the US (Figure 2). The largest growth rates are seen in materials and aerospace engineering. Much of the growth in **materials science & engineering** is accounted for in a large degree earning class in 2012. **Aerospace engineering** shows consistent growth. The following analysis explores Hispanic degree recipients in engineering fields.

Figure 2



In 2012 nearly 9,000 engineering bachelor's degrees were earned by Hispanics in the US, compared to just over 5,000 engineering degrees earned by Hispanics in 2002.

Aerospace engineering bachelor's degrees received by Hispanics in the US has steadily increased over the last decade with a change of 174%. **Other engineering**, an academic degree classification that encompasses all fields not individually identified in this report, has also increased dramatically with a 126% increase for Hispanics in the US.

Civil engineering and **Mechanical engineering** bachelor's degrees earned by Hispanics have increased steadily and more than doubled from 2002 to 2012. **Industrial engineering** remained largely stable over the last decade with a spike in bachelor's degrees earned during 2012. **Chemical engineering** degrees increased by 72%. **Engineering technologies** degrees have increased by 32% for Hispanics in the US.

Notably, **electrical engineering** bachelor's degrees earned by Hispanics increased at a rate of 21% between 2002 and 2012. This is significant when compared to larger trends in electrical engineering, which has seen an overall decrease of degrees by 8% from 2002 to 2012 when examining all bachelor's degrees earned.

Rates of Bachelor's Degrees Earned: Comparison of Hispanics in the US to the Total US Population

Hispanics are succeeding across the physical sciences and engineering. These fields, however, represent a small number of the total number of bachelor's degrees earned in the US. For example, when looking across all degrees earned in the US only 3 out of every 1000 degrees earned is in physics. For every 1000 bachelor's degrees earned by Hispanics, 2 are in physics. These comparisons assist in understanding the rate of degrees earned by Hispanics and the total population, which includes all races.

Hispanics in the US are receiving more civil engineering bachelor's degrees, on average, than the total degree recipient population.

Table 4 compares degrees earned by Hispanics in the US to all degrees earned for each discipline within the physical sciences and engineering. Hispanics are advancing in several engineering fields including: **engineering technology, civil, electrical, and industrial engineering**. In these four fields Hispanics are earning bachelor's degrees at approximately the same proportion as the total population. Among bachelor's degree recipients, Hispanics are least represented proportionally in **astronomy, atmospheric sciences, and earth sciences.** Overall, Hispanics are still underrepresented in the physical sciences and engineering.

Table 4

Comparison of Degrees Earned by Total Population and Hispanics in the United States: Bachelor's Degrees in Field per 1,000 Total Degrees, 2012

Field of Study	Total Population/ All Races	Hispanic
Chemistry	8	6
Physics	3	2
Geosciences Total*	3	2
Earth Sciences	3	1.5
Atmospheric Sciences	0.4	0.2
Astronomy	0.2	0.1
Ocean	0.1	0.07

*Geosciences Total includes: Atmospheric Sciences, Earth Sciences and Ocean Sciences

Field of Study	Total Population/ All Races	Hispanic
Mechanical Engineering	12	10
Electrical Engineering	10	10
Engineering Technology	10	9
Civil Engineering	8	9
Other Engineering	7	4
Chemical Engineering	5	3.4
Industrial Engineering	3	3
Aerospace Engineering	2	1.6
Materials Science & Engineering	1	0.6

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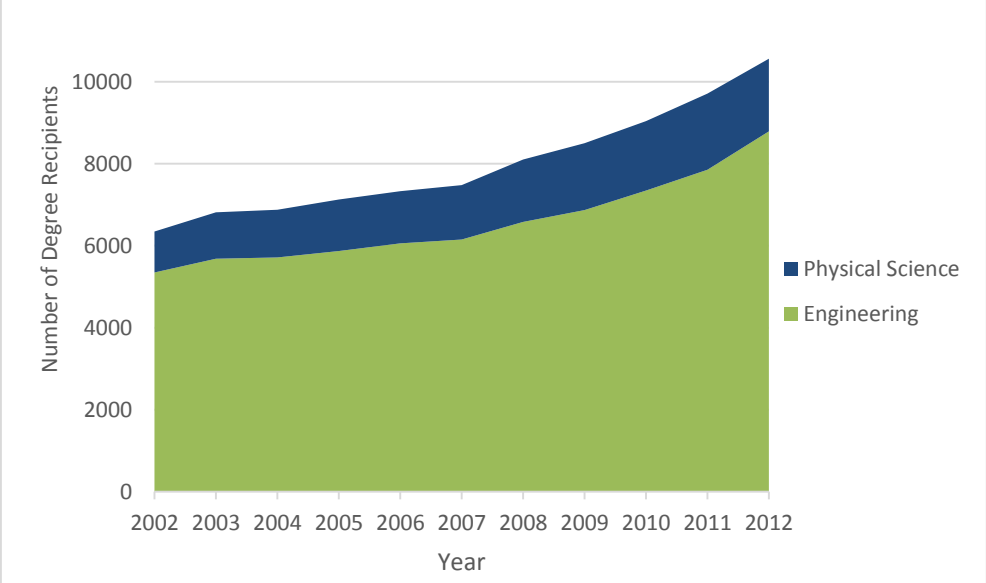
Conclusion

This report has examined the representation of Hispanics among bachelor's degree recipients in the physical sciences and engineering in the US. The data show that while overall Hispanics are still underrepresented among degree recipients, there has been an increased attainment of bachelor's degrees that is encouraging. Trends across the physical sciences and engineering among Hispanics earning bachelor's degrees show meaningful increases. In 2012, more than 10,500 Hispanics earned bachelor's degrees in the physical sciences and engineering (Figure 3). Cumulatively, approximately 88,000 new bachelor's degrees were earned in the physical sciences and engineering by Hispanics in the US between 2002 and 2012.

Trends across the physical sciences and engineering among Hispanics earning bachelor's degrees show a remarkable increase with nearly 90,000 new degrees earned between 2002 and 2012.

Figure 3

Growth in Physical Sciences and Engineering among Hispanics Earning Bachelor's Degrees in the United States, 2002-2012



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In the **physical sciences** there was an increase of 77% in number of bachelor's degrees earned by Hispanics in the US from 2002 to 2012; during this time over 15,500 new bachelor's degrees were earned by Hispanics in the physical sciences. In **engineering**, there was an overall increase of 64% in number of degrees earned by Hispanics in the US from 2002 to 2012. Between 2002 and 2012 over 72,000 new engineering bachelor's degrees were earned by Hispanics.

References

Hispanic Americans Among Degree Recipients in Physics and Geoscience, American Institute of Physics, Statistical Research Center. http://www.aip.org/statistics/reports/hispanic-americans-among-degree-recipients

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

Survey Methodology

The bachelor's degree data in this **focus on** were compiled 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. Data points are corrected for by IPEDS based on comparisons with the 2010-11 submission. These data are made publicly available by IPEDS through partnership with the National Science Foundation. Raw data can be accessed at: www.ncsesdata.nsf.gov

Staff 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 August of 2014. For most fields of study percent change calculations are based on degrees earned in 2002 and compared to 2012. Ocean sciences percent change calculations were based on a two-year average. Averages were calculated for degrees earned in 2002, 2003 and 2011, 2012. These two averages were used to calculate percent change. This method was selected based on the small number of degrees and notable variability from year to year for degrees earned by Hispanics in ocean sciences. It's important to note that using raw numbers statistics report a decline in degrees earned in oceans sciences. The two-year average produces a more representative picture of trends in oceans sciences degree attainment by Hispanics in the US.

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