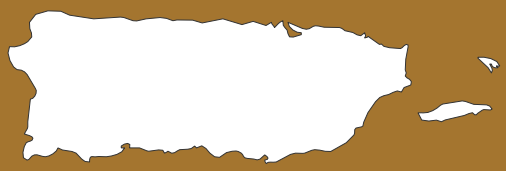
PUERTO RICO

HISPANIC-SERVING COMMUNITY COLLEGES
STEM PIPELINES

Hispanic-Serving Community Colleges and STEM Degree Attainment in Puerto Rico

by Angel L. Velez, HyeJin Tina Yeo, Eboni M. Zamani-Gallaher, and Jason A. Keist

This research brief focuses on STEM degrees conferred in Puerto Rico by race and gender at three institutional types: Hispanic-Serving Community Colleges (HSCCs), which are 2-year institutions with 25% Hispanic student enrollment or more; Emerging HSCCs, which are 2-year institutions with 15% to 24.9% Hispanic student enrollment; and Non-HSCCs, which are institutions with less than 15% Hispanic student enrollment.



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Introduction

The Hispanic-serving community colleges STEM Pipelines (HSCC-STEM) study is a research project that explores the transitions to and through Hispanic-serving two-year institutions for underrepresented minoritized STEM students. The literature largely notes Hispanic-serving institutions (HSIs) as four-year colleges and universities (Garcia, 2018; Núñez, Crisp, & Elizondo, 2016). As the discourse primarily engages four-year-centered and full-time- equivalent student-enrollment framing of HSIs, this should not be the default given the critical influence of HSIs that are community colleges. Hence, there is an intentionality in this project that explicitly references two-year HSIs due to the nuances of minority-serving institutions (MSIs) and minority-serving community college (MSCC) contexts (Fox, Thrill, & Zamani-Gallaher, 2017). Thus, in order to better capture STEM pathway of underrepresented minoritized part-time students, HSCCs are any associate degree-granting postsecondary institutions that have at least 25% enrollment of full- and part-time Latinx students (Zamani-Gallaher, Yeo, Velez, Fox, & Samet, 2019).

This brief uncovers the most viable HSCC STEM pathways for Latinxs and other underrepresented minoritized students as well as which fields they are more likely to persist in, and the promising practices at HSCCs that provide transfer pathways leading to further education—on ramps to STEM baccalaureates. The following information provides a profile outlining STEM degrees conferred by race and gender in three types of institutions: HSCCs, which are institutions with 25% or more Latinx student enrollment; emerging HSCCs, which are institutions with 15% to 24% Latinx student enrollment; and non-HSCCs, which are institutions that have a Latinx enrollment rate of less than 15%.

Demographics in Puerto Rico

Puerto Rican demographics differ greatly from the population in the continental U.S. In the archipelago of Puerto Rico, almost 96% of the population are Puerto Ricans, while another 3% are subgroup Latinxs such as Dominicans, and 1% are non-Latinxs. In 2015, the estimated population in Puerto Rico was 3,583,073 (U.S. Census Bureau, 2019).

During the last decade, however, the population of Puerto Rico has continued to decline due to a long economic crisis, specifically after the impact of the Irma and Maria hurricanes and the subsequent political crisis. As of 2019, Puerto Rico's population stands at 3.2 million, which is its lowest number in 40 years (Flores & Krogstad, 2019). This is having an impact on higher education enrollments across Puerto Rico's higher education landscape.

Postsecondary Context and the HSCC Landscape

This brief contains 2015 data from the Integrated Postsecondary Education Data System (IPEDS). Two-year institutions were selected by using both the IPEDS and the Carnegie classifications. Three categories were used for the selection criteria of IPEDS: sector, highest degree offered, and institutional.

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The options selected in each category are “two-year public,” “private not-for-profit,” and “private for-profit” in the sector category; an “associate’s degree” option in the highest degree offered category; “and degree-granting, associate’s and certificates” and “degree-granting, not primarily baccalaureate or above” options in the institutional category. Based on these criteria, 1,623 institutions were obtained.

A category labeled “baccalaureate/associate’s colleges” was selected in the Carnegie classification 2015 (Basic). The “associate’s dominant,” “baccalaureate/associate’s colleges,” and “mixed baccalaureate/associate’s” options were chosen for a total of 403 drawn institutions.

Lastly, two datasets drawn from IPEDS and Carnegie classifications were merged and four overlapping institutions were deleted. Considering the high number of HSCCs in Puerto Rico, 23 institutions were included in our data while institutions in other U.S. territories were not included. Thus, a total of 2,022 institutions were obtained for this study. For the descriptive analysis, 1,998 institutions nationwide were used due to the exclusion of 18 invalid institutions. This brief focuses on 23 community colleges in Puerto Rico. It is important to note that this number might be different from the numbers that Puerto Rico identified as community colleges due to different classification criteria. This study includes institutions that conferred more than 10% of degrees at the baccalaureate level or higher (fewer than 90% associate’s degrees) as well as institutions that conferred associate’s degrees as the highest degree-level offering.

Institutional Type

Since every higher education institution in Puerto Rico is considered an HSI, the institutional type in Puerto Rico is a unique context. Out of the 1,998 total community colleges in our data, Puerto Rico has 23 two-year institutions. This means that 100% of institutions in Puerto Rico enrolled more than 25% Latinx students. While other U.S. states have a greater number of HSCCs and emerging HSCCs, Puerto Rico has the highest enrollment percentages of Latinx students. Given that 99% of the population identified as Latinx, the Puerto Rican context provides an important case for understanding HSCCs.

During the past three decades there has been a significant increase nationally in the growth of private for-profit institutions (Deming, Goldin, & Katz, 2012).

In our data, a similar proportion of these institutions was shown within the Puerto Rico context as well. In Puerto Rico there were 10 (43.4%) private for-profits, eight (34.7%) private non-profits, and five (21.7%) public two-year institutions. In the U.S., private for-profit HSCCs account for 46.3% of the institutions, followed by public HSCCs (46.1%) and private non-profit HSCCs (7.5%) (Zamani-Gallaher et al., 2019). While the number of private for-profit HSCCs is similar to the U.S. context, the percentages of private non-profit institutions in Puerto Rico is four times larger and public institutions are more than two times smaller than in the continental U.S. (See Figure 1).

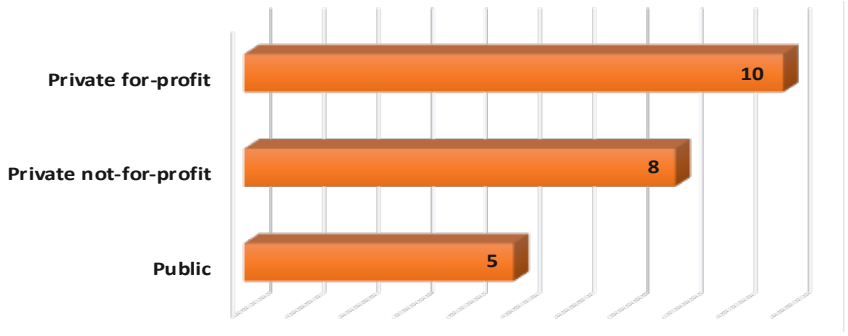


Figure 1. Control of institution of HSCCs in Puerto Rico

HSCC Student Demographics and Participation in STEM

In this section, the student demographics are described based on a 12-month enrollment period, with an unduplicated headcount and degrees/awards conferred that were drawn from IPEDS. In 2015 there was a total enrollment of 44,080 students. Out of the total student enrollment in Puerto Rico's HSCCs, 52.5% (23,156) were women and 47.5% (20,924) were men. Puerto Rico HSCCs conferred a total of 2,604 degrees. Women earned 53.0% (1,382) and men received 46.9% (1,222) of the total degrees awarded in Puerto Rico in 2015 (see Figure 2).

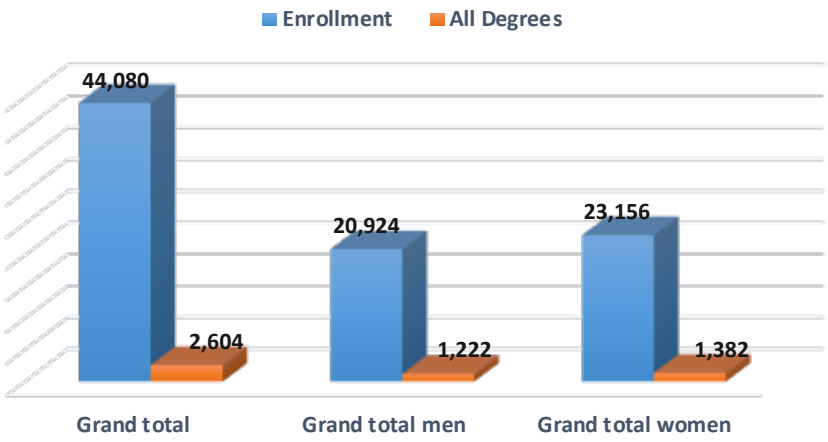
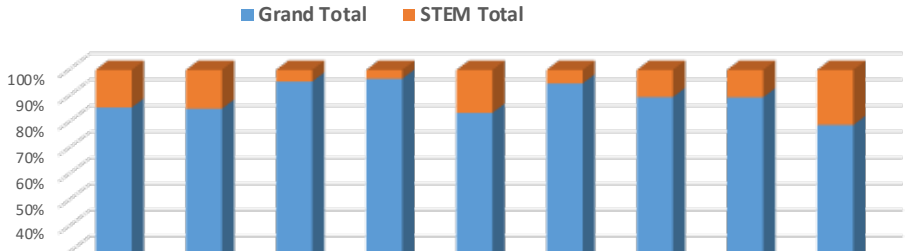


Figure 2. 2015 Student enrollment and first major total associate degrees conferred by gender in Puerto Rico

Science, technology, engineering and mathematics (STEM) programs were classified using the National Science Foundation (NSF) Classification of Instructional Program (CIP) Code Crosswalk for STEM disciplines (Louis Stokes Alliances for Minority Participation, 2018). By following the NSF Louis Stokes Alliances for Minority Participation (LSAMP) STEM category, STEM programs were aggregated into 11 STEM fields: agricultural sciences, natural resources and conversation, architecture, computer and information sciences, engineering, engineering technologies, biological sciences, mathematics, interdisciplinary studies, physical sciences, and business and management.

In 2015 Puerto Rico HSCCs conferred 698 STEM degrees, which represents 23.3% of the total degrees awarded (see Figure 3). In comparison, STEM awards in the continental U.S. accounted for only 11.4%, which means Puerto Rico STEM awards were two times larger than in the continental U.S. (Zamani-Gallaher et al., 2019).



	Arizona	California	Colorado	Florida	Illinois	New Mexico	New York	Texas	Puerto Rico
STEM Total	1,971	18,115	124	1,181	1,904	491	1,835	6,717	698
Grand Total	11,670	103,490	2,626	33,747	9,663	8,955	15,758	57,021	2,604

Figure 3. Comparison of 2015 STEM degrees conferred by state

Of the 698 STEM degrees awarded in the archipelago of Puerto Rico, women earned 21.7% (152) and men received 78.2% (546). While total STEM-degree percentages are larger in Puerto Rico, the gender inequalities in STEM awards are noticeable (Figure 3). On average, Puerto Rico's STEM attainment for women is lower than the average for women earning STEM credentials in the continental U.S. (Zamani-Gallaher et al., 2019). So while women earned more overall degrees than men in Puerto Rico, the gender gap shows that 56% more men than women earned STEM degrees. More efforts must therefore be implemented to ensure that women are entering and graduating from STEM fields.

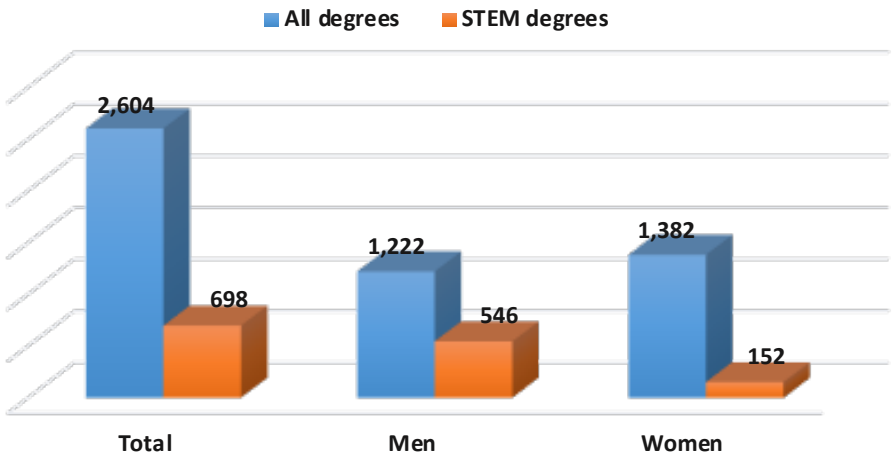


Figure 4. 2015 STEM degrees conferred by gender in Puerto Rico

Underrepresentation in Top Three STEM Fields by Gender

The top three STEM fields in Puerto Rico in 2015 were engineering technologies (495), computer and information sciences (60), and biological sciences (56). In total, these three STEM fields account for 87.5% (611) of the STEM degrees in Puerto Rico (see Figure 5).

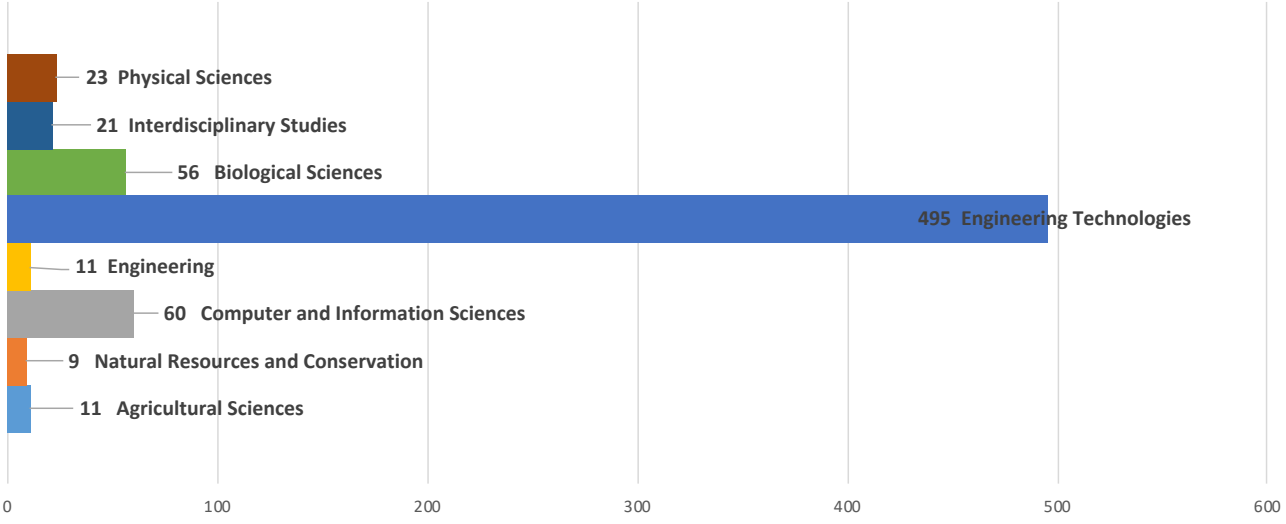


Figure 5. 2015 STEM degrees conferred by Classification of Instructional Program (CIP) in Puerto Rico

In engineering technologies, which is by far the largest STEM field of degrees earned at HSCCs in Puerto Rico, 88.6% (439) were earned by men and 11.3% (56) were earned by women (see Figure 6). The large gap showing men earning credentials in engineering technologies is highly noticeable and noteworthy. The gender disparities in this field are almost identical to the national average in the continental U.S. (Zamani-Gallaher et al., 2019). More positively, Puerto Rico awarded 5.7% of the engineering technologies degrees given in the U.S. In 2015, engineering technologies accounted for 70.9% of the STEM degrees awarded in Puerto Rico, compared to the 17.1% in the continental U.S.

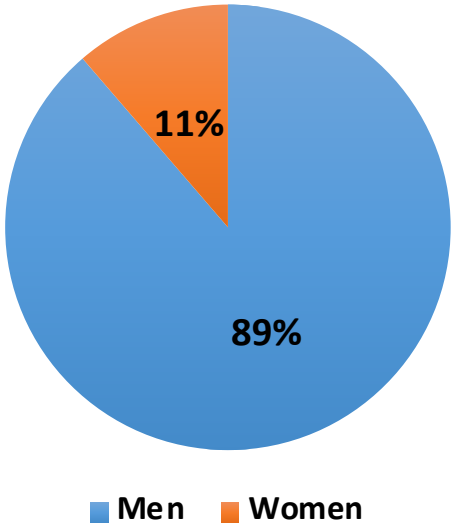


Figure 6. Engineering Technologies degrees conferred by gender in Puerto Rico

The second largest STEM degrees awarded in Puerto Rico was computer and informational sciences, a field in which there is a substantial gender disparity. Men accounted for 73.3% (44) of the degrees awarded in this field, while women earned 26.6% (16). These percentages closely resemble the national average for this field in the continental U.S. Computer and informational sciences represent 8.5% of the total STEM degrees awarded in Puerto Rico, compared to 20.0% in the continental U.S.

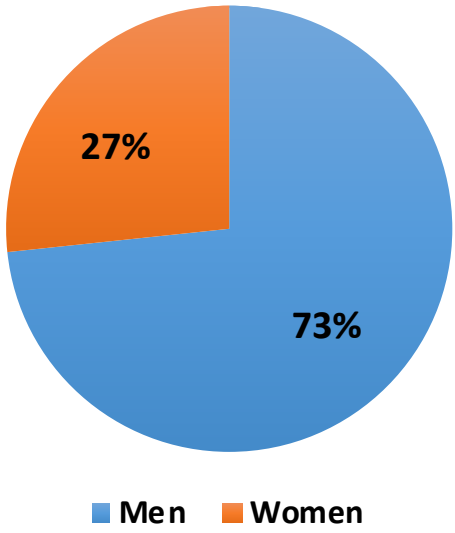


Figure 7. Computer and Information Sciences degrees conferred by gender in Puerto Rico

Lastly, biological sciences is the only one of the top STEM fields in which Puerto Rican women earned more degrees than men. A similar trend occurred in Texas (Texas draft Cite). Women were awarded 75.0% (42) of the biological sciences degrees while men were awarded 25.0% (14). Biological sciences represented 8.0% of the total STEM degrees conferred in Puerto Rico, compared to 5.7% of the biological sciences in the continental U.S.

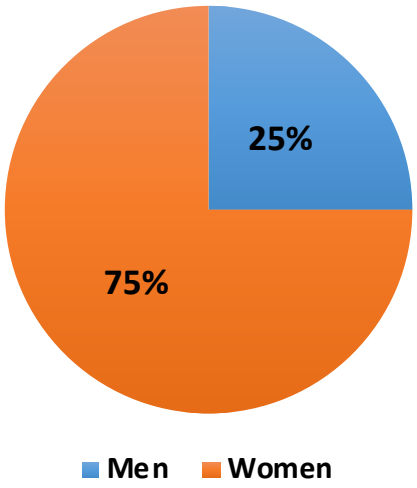


Figure 8. Biological Sciences degrees conferred by gender in Puerto Rico

Summary

HSCCs in Puerto Rico play an important role in educating STEM students.

- In Puerto Rico, 23.3% of the degrees awarded were in STEM, compared to 11.4% in the continental U.S.
- Puerto Rico awards 5.6% of the engineering technologies degrees awarded in the entire U.S. and accounted for 70.9% of Puerto Rico's STEM degree output.
- Women continue to be underrepresented in almost every STEM field and only account for 21.7% of STEM-degree recipients, which is well below the 38.7% figure in the continental U.S.

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Notes.

1. Racial/ethnic categories in the data followed the IPEDS categories using their data collection and reports. The groups used to categorize are as follows: Black or African American, American Indian or Alaska Native, Asian, Native Hawaiian or Pacific Islander, Hispanic, White, two or more races, race/ethnicity unknown, nonresident alien. Among these, this research focused on four groups: Blacks or African Americans, Asian Americans, Hispanic Americans or Latinx, White Americans. In addition, this research intentionally identified Black/African American and Hispanic as Latinx (i.e., gender nonconforming), and all groups included in this analysis reflect domestic racial/ethnic diversity, not international student enrollments.

2. The percentage of racial/ethnic groups within the figures and texts do not add up to 100% due to the exclusion of other racial/ethnic groups.

OFFICE OF COMMUNITY COLLEGE RESEARCH AND LEADERSHIP
University of Illinois at Urbana-Champaign
Champaign Office: 51 Gerty Drive, Champaign, IL 61820
Chicago Office: 200 South Wacker Drive,
19th Floor, Chicago, IL 60606
Website: http://occrl.illinois.edu
Email: occrl@illinois.edu
Phone: 217-244-9390