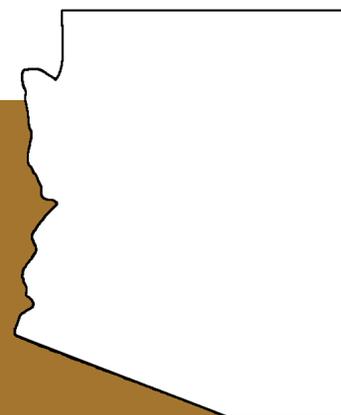


## Hispanic-Serving Community Colleges and STEM Degree Attainment in Arizona

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This research brief focuses on STEM degrees conferred in Arizona 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.



## 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 intentionality in this project that explicitly references two-year HSIs due to the nuance of minority-serving institutions (MSIs), particularly in 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 for the state of Arizona, 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%.

## State Demographics

The demographics in Arizona provide an outlook of the demographic transformation taking place nationwide. In Arizona there was an estimated population of 6,641,928 in 2015. Whites numbered about 3,752,853 or 56.5%), followed by Latinxs (6,641,928 or 30.3%), American Indians and Alaska Natives (265,099 or 4.0%), Blacks/African Americans (264,119 or 4.0%), and Asians (194,757 or 2.9%) (U.S. Census Bureau, 2011-2015). Within this demographic context, Latinxs in Arizona are overrepresented in the proportion of population than the national average. Given that nationwide Latinxs make about 18% of the total population, the state of Arizona provides glimpses of the future demographic composition of the U.S. (Pew Research Center, 2019).

Furthermore, the overall population of people of color is increasingly diverse, totaling more than 44% of the state's population. Arizona is heading toward a majority-minority state without a racial majority. This has serious implications for higher education access and opportunity as Latinxs and other historically marginalized communities continue to make up an increasingly important part of the higher education landscape.

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## Considering Institutional Type and Criteria for HSCCs

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. The options selected in each category are “two-year public,” “private not-for-profit,” and “private for-profit” in the sector category; “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. 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 41 community colleges in Arizona.

### Institutional Type

As noted above, Arizona has experienced a demographic shift, particularly when it comes to Latinxs. Out of the 1,998 community colleges in our data, Arizona is home to 41 two-year institutions. From this number, 24 were identified as HSCCs, 12 as emerging HSCCs, and five as non-HSCCs. This means that HSCCs accounted for 58.5% of community colleges in Arizona, while emerging HSCCs represented 29.2% of these institutions. As of 2015, 87.8% of the two-year institutions in our data were HSCCs and emerging HSCCs in Arizona. Given the large Latinx population in Arizona, the substantial number of HSCCs and emerging HSCCs is not surprising.

**Table 1. Eligibility of HSCCs by control of institution in Arizona**

Control of institution	Eligibility of HSCCs 2015 in Arizona			
	Non-HSCCs Count	HSCCs Count	Emerging HSCCs Count	Total
Public	3	9	8	20
Private not-for-profit	-	-	-	-
Private for-profit	2	15	4	21
<b>Total Institutions</b>	<b>5</b>	<b>24</b>	<b>12</b>	<b>41</b>

Nationally, we noticed a growing number of private for-profit institutions and a similar proportion of institutional control was shown in the Arizona data as well (Zamani-Gallaher, Yeo, Velez, Fox, & Samet, 2019). Out of the 41 institutions in Arizona, 51% (21) of them were private, for-profit institutions (Figure 1). There were no nonprofit institutions that were private. Among 24 HSCCs, 63% (15) were private, for-profit institutions and 37.5% (9) were public institutions (Figure 1).

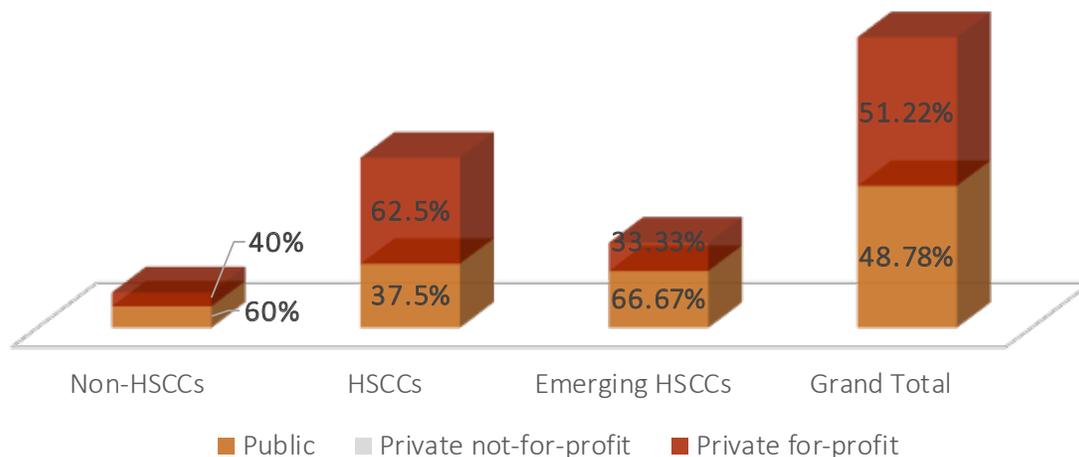


Figure 1. Community colleges by control of institution in Arizona

### Minority-Serving Institution Status at HSCC and Emerging HSCCs

In our project, the minority serving institution (MSI) status was used to see whether there were other federal designations cross-listed with the HSI designation. We use the federal government designations for Asian-American and Native American Pacific Islander-Serving institutions (AANAPISIs) and Predominantly Black Institutions (PBIs). AANAPISIs have Asian-American and Native American Pacific Islander student enrollment rates of at least 10%, while the enrollment rate of African-Americans or Black students is at least 40% (U.S. Department of Education, 2017).

Besides HSCCs and emerging HSCCs, there were no other types of designated MSIs such as AANAPISIs and PBIs from 2015 data in Arizona. While there were no more enrollment-based federal designations of MSIs, among the five non-HSCCs in Arizona there was one tribal college named Tohono O’Odham Community College.

### HSCC Student Demographics

In this section, the student demographics are described based on 12-month enrollment with an unduplicated headcount and degrees/awards conferred drawn from IPEDS. In 2015 there was a total of 337,990 students enrolled in two-year institutions in Arizona. Approximately 94% of students were enrolled in Hispanic-serving community colleges. Specifically, 48.25% (163,076) of students were enrolled in HSCCs and 45.86% (155,010) were enrolled in emerging HSCCs. White students made up 46.82% (158,254) of the total enrollment, followed by Latinxs (28.83% or 97,439), Black/African Americans (6.24% or 21,091), and Asians (3.13% or 10,571).

Out of the total students enrolled, 45% (151,432) were men and 55% (186,558) were women. In general, the enrollment of women was slightly higher than men across racial groups. The largest gender gap was found within the Latinx student population, a 6% gap between women and men. (See Figure 3).

In Arizona, community colleges awarded a total of 20,843 degrees, with Whites earning a total of 52.41% (10,924) of them, followed by Latinxs (27.58% or 5,749), Blacks/African Americans (5.38% or 1,122), and Asians (3.42% or 713). Whites therefore earned more than 50% of the degrees awarded in Arizona. Out of the total degrees conferred in 2015, 54% (11,335) of the degrees went to women and 46% (9,508) went to men. Regarding the enrollment gender demographics, women’s enrollment was slightly higher than men across racial groups, except for Black/African Americans (575 for men and 547 for women). Across institutional types, HSCCs granted 55.99% (11,670) of the total degrees, followed by emerging HSCCs (8,226 or 39.47%) and non-HSCCs (947 or 4.54%) (See figure 4).

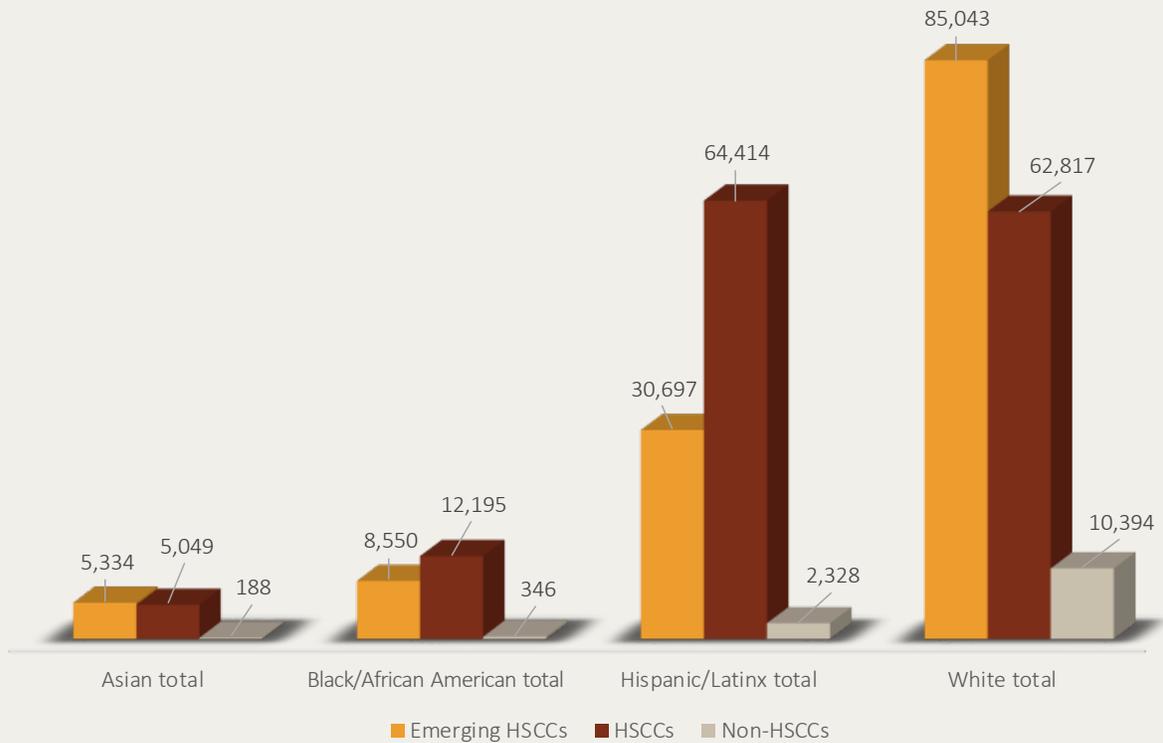


Figure 2-1. 2015 student racial demographics based on 12-month enrollment by institutional type in Arizona

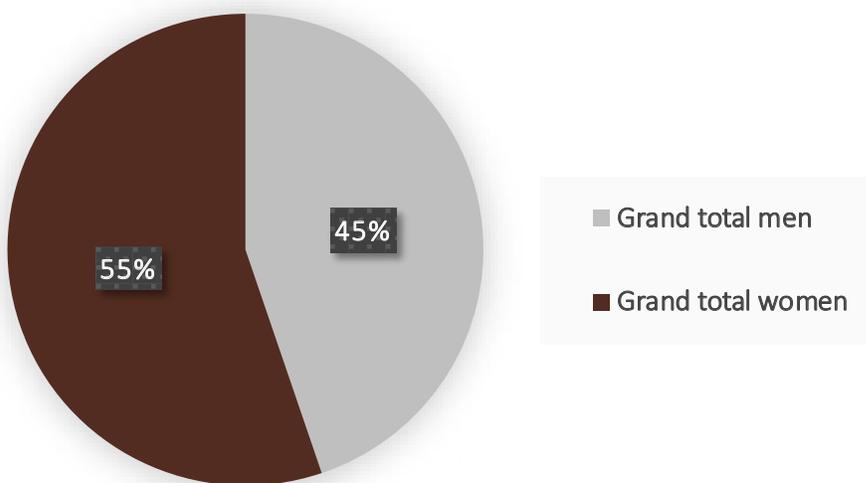
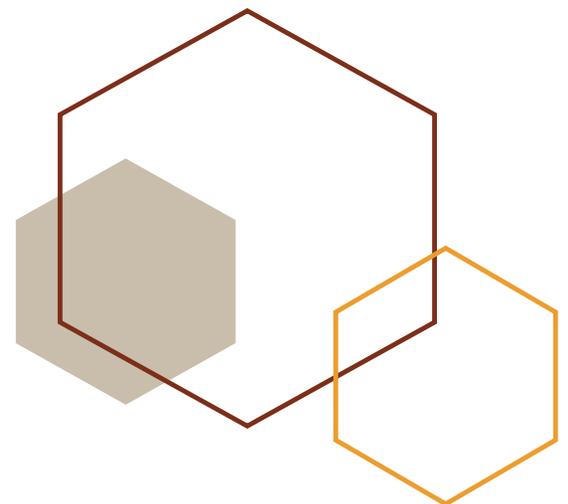


Figure 2-2. 2015 student enrollment by gender in Arizona



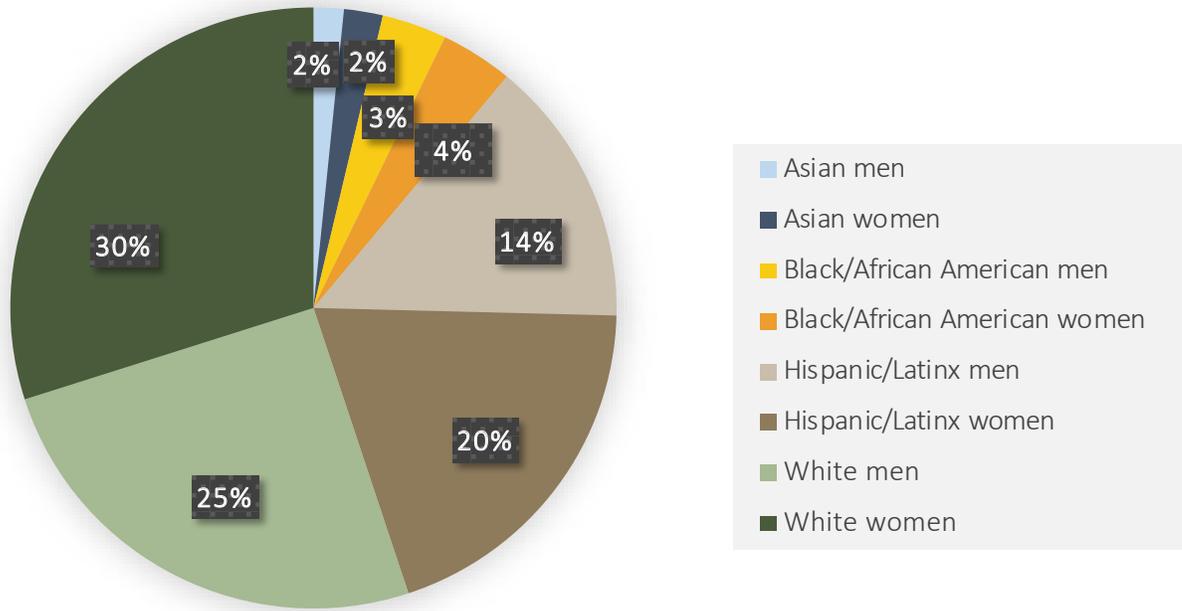


Figure 3. 2015 student enrollment by gender and race in Arizona

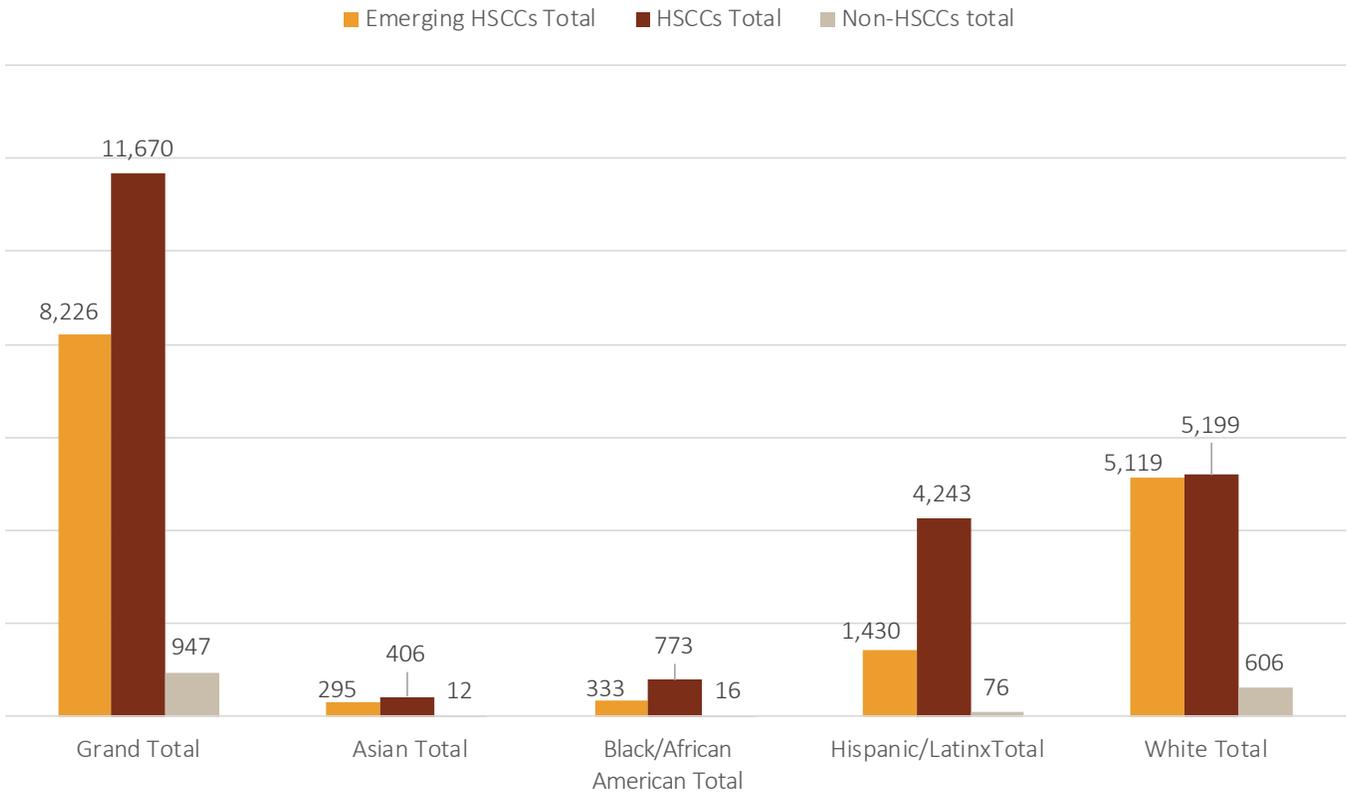


Figure 4. First major total associate degrees conferred by race and institutional type in Arizona in 2015

## Participation in STEM by Race, Ethnicity, and Gender

Science, technology, engineering and mathematics (STEM) programs were classified using the National Science Foundation Classification of Instructional Program (CIP) Code Crosswalk for STEM disciplines (Louis Stokes Alliances for Minority Participation, 2018). By following the NSF 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 Arizona, community colleges conferred 2,903 STEM degrees in 2015, which accounted for 13.93% of the total degrees awarded in the state (see Figure 5-1). Among 2,903 STEM degrees, 67.89% (1,971) of the degrees were awarded at HSCCs (see Figure 5-2). Specifically, Whites earned 54.29% (1,576) of the STEM degrees, followed by Latinxs (23.32% or 677, Blacks/African Americans (7.10% or 206), and Asians (5.13% or 149). Women earned only 25% (728) of the STEM degrees conferred, while men earned 75% (2,175) (see Figure 5-3). Regarding gender, Arizona ranked lower than the national average in conferring STEM degrees to women and trailed other states such as California and Illinois, which conferred almost 50% of their degrees to women (Zamani-Gallaher et al., 2019a, 2019b).

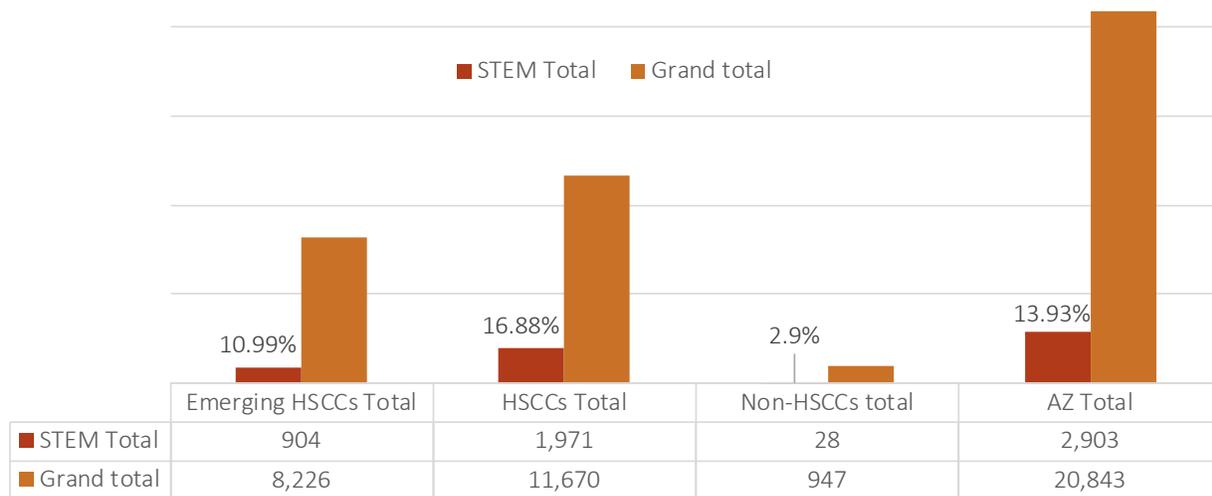


Figure 5-1. Total STEM degrees conferred by institutional types in Arizona in 2015

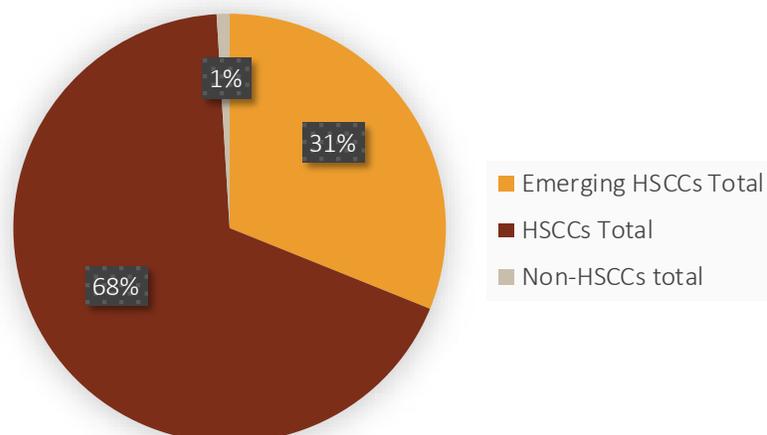


Figure 5-2. 2015 STEM degrees conferred by institutional types in Arizona

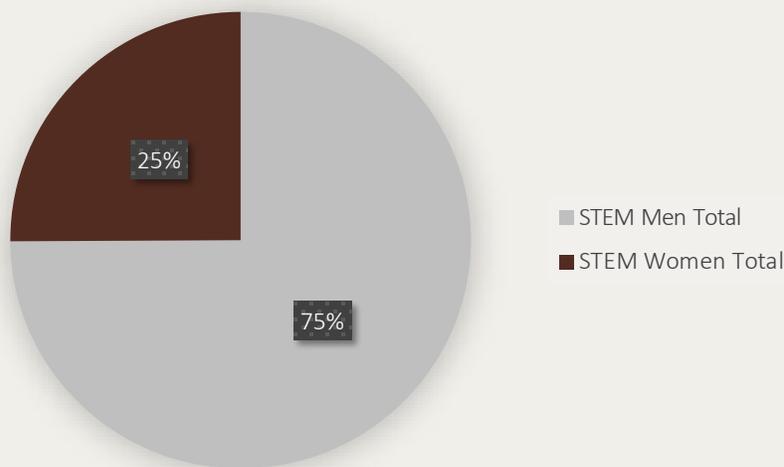


Figure 5-3. 2015 STEM degrees conferred by gender in Arizona

## HSCCs

HSCCs awarded 55.99% (11,670) of the total degrees conferred in Arizona. Whites earned 44.55% (5,199) of the degrees in HSCCs, followed by Latinxs (36.36% or 4,243), Blacks/African Americans (6.62% or 773), and Asians (3.48% or 406). Out of the total degrees awarded by HSCCs, men were conferred 42.75% (4,989) and women were conferred 57.25% (6,681). STEM degrees conferred at HSCCs accounted for 16.88% (1,971) of the total STEM degrees awarded. Of the STEM degrees conferred by HSCCs in 2015, Whites earned 52.12% (1,027) followed by Latinxs (26.38% or 520), Blacks/African Americans (8.47% or 167), and Asians (4.62% or 91). The percentage of Latinxs who earned STEM degrees at HSCCs in Arizona is below the national percentage for HSCCs (39.06%; Zamani-Gallaher et al., 2019a). Out of the STEM degrees conferred by HSCCs, men were conferred a whopping 76.31% (1,504), compared to 23.69% (467) conferred to women (Figure 6). While women earned 54% of the total degrees conferred in Arizona, they earned less than 25% of the STEM degrees at HSCCs. This figure is also considerably lower than the national STEM degrees conferred to women in HSCCs (41%; Zamani-Gallaher et al., 2019a).

## Emerging HSCCs

Emerging-HSCCs awarded 39.47% (8,226) of the total degrees conferred in Arizona. Whites earned 62.23% (5,119) of the degrees in emerging HSCCs, followed by Latinxs (17.38% or 1,430), Blacks/African Americans (4.05% or 333), and Asians (3.57% or 295). Out of the total degrees awarded at emerging HSCCs, men were conferred 49.95% (4,109) and women were conferred 50.05% (4,117) of the degrees. Out of the total degrees conferred, only 10.99% (904) of them were given at emerging-HSCCs in STEM. Whites earned 59.07% (534) of the STEM degrees, followed by Latinxs (17.15% or 155), Asians (6.31% or 57), and Blacks/African Americans (4.20% or 38). Out of the STEM degrees conferred by emerging-HSCCs, men were conferred 71.35% (645) and women were conferred 28.65% (259; Figure 6).

## Non-HSCCs

Non-HSCCs awarded 4.54% (947) of the total degrees conferred in Arizona. Whites earned 63.99% (606) of the degrees in non-HSCCs, followed by Latinxs (8.03% or 76), Blacks/African Americans (1.69% or 16), and Asians (1.27% or 12). Out of the total degrees awarded at non-HSCCs, men were conferred 43.29% (410) and women were conferred 56.71% (537). In STEM degrees conferred, non-HSCCs awarded 2.9% (28) out of the total degrees conferred in non-HSCCs. Whites earned 53.57% (15) of the STEM degrees, followed by Latinxs (7.14% or 2), Asians (3.57% or 1), and Blacks/African Americans (3.57% or 1). Out of the STEM degrees conferred by non-HSCCs, men were conferred 92.86% (26) and women were conferred 7.14% (2).

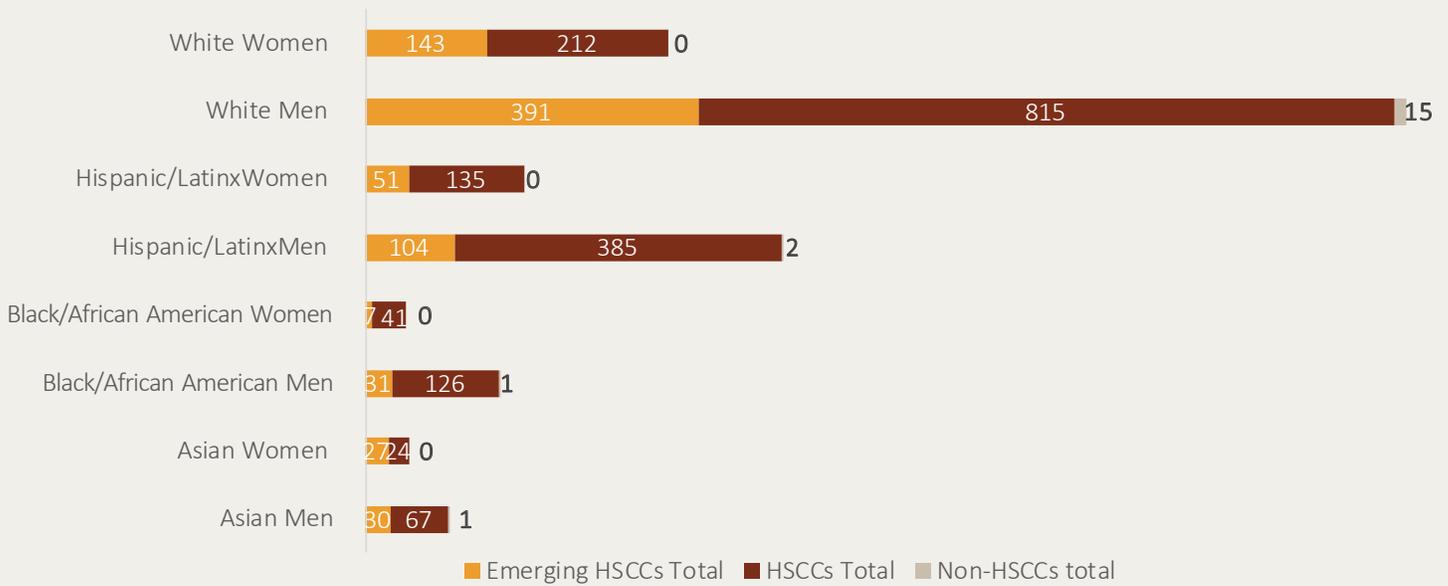


Figure 6. 2015 STEM degrees conferred by gender and race in Arizona

## Underrepresentation in STEM

In Arizona there was a total of 2,903 associate degrees in STEM awarded in 2015. Within that number, there were 2,175 (75%) received by men and 728 (25%) degrees received by women. Overall, the top three STEM fields in Arizona were physical sciences (31.35% or 910), computer and information sciences (19.50% or 566), and engineering technologies (13.37% or 388) (see Figure 7). There were substantial disparities for gender and race in all three fields. Combined, these STEM fields accounted for 64.21% of the STEM degrees conferred in Arizona.

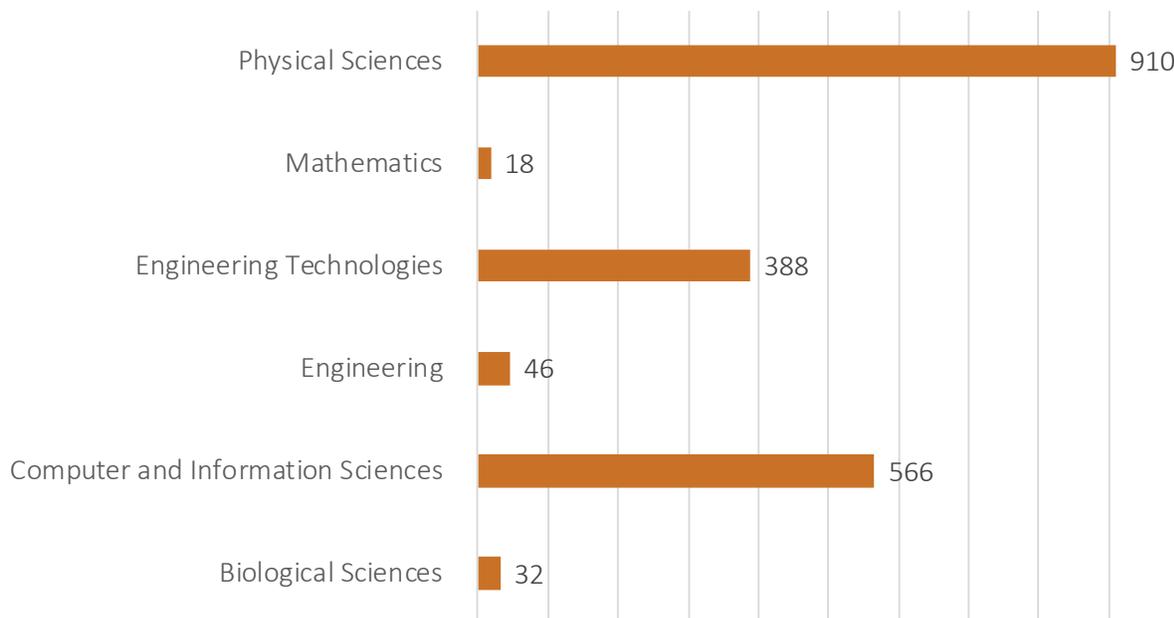


Figure 7. Top contributing STEM fields in Arizona

**Physical Sciences**

There were 910 total degrees awarded in physical sciences at HSCCs and emerging-HSCCs, 500 and 410 respectively (see Figure 8-1). Whites earned 48.24% (439) of the STEM degrees, followed by Latinxs (27.14% or 247), Asians (8.02% or 73), and Blacks/African Americans (4.51% or 41). Men were conferred 59.89% or 545 and women were conferred 40.11% or 365 of the Physical Sciences degrees. Specifically, the majority by race/ethnicity and gender were White men (30%) and 162 White women (18%). Latinx men accounted for 15% and Latinx women 11%. Asian men and women were comparable 4% of degree earners in the Physical Sciences at HSCCs while Black men conferred just under nearly 3% of degrees in Black women only received 1% of degrees in this field. (see Figure 8-2).

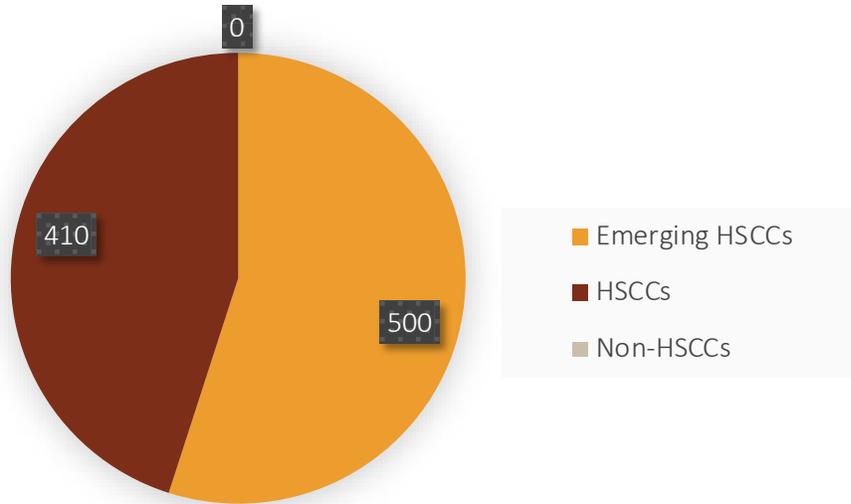


Figure 8-1. Physical Sciences degrees conferred by institutional type in Arizona

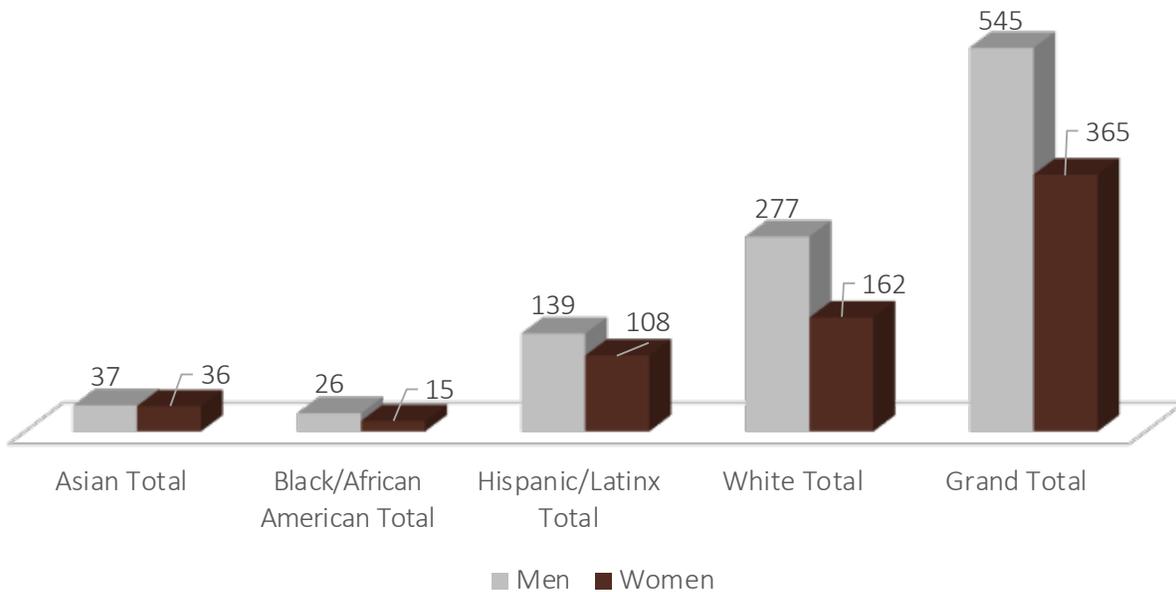


Figure 8-2. Physical Sciences degrees conferred by race and gender in Arizona

## Computer and Information Sciences

HSCCs conferred 98% of the computer and information sciences degrees in Arizona. Among institutional types, HSCCs conferred 53.71% (304) of the total computer and informational sciences degrees, followed by emerging-HSCCs (44.35% or 251) and non-HSCCs (1.94% or 11). At HSCCs, Whites earned 53.00% (300) of the STEM degrees, followed by Latinxs (24.73% or 140), Blacks/African Americans (7.24% or 41), and Asians (4.59% or 26) (see Figure 9-1). Men were conferred 85.51% (484) and women were conferred 14.49% (82) of the STEM degrees in Arizona. Specifically, there were 256 White men and 44 White women, 124 Latinx men and 16 Latinx women, 20 Asian men and six Asian women, 34 Black/African American men and seven Black/African American women who received degrees in this field (see Figure 9-2).

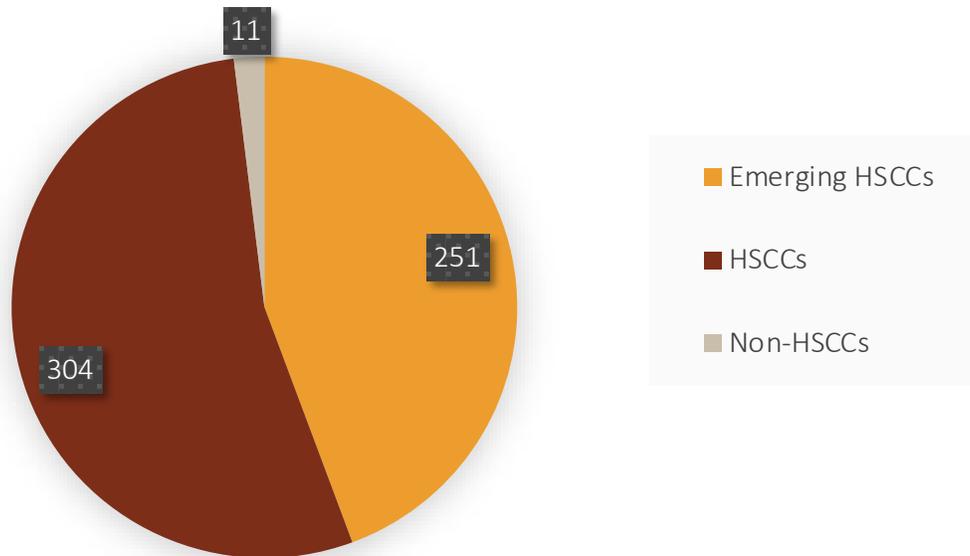


Figure 9-1. Computer Information Sciences degrees conferred by institutional type in Arizona

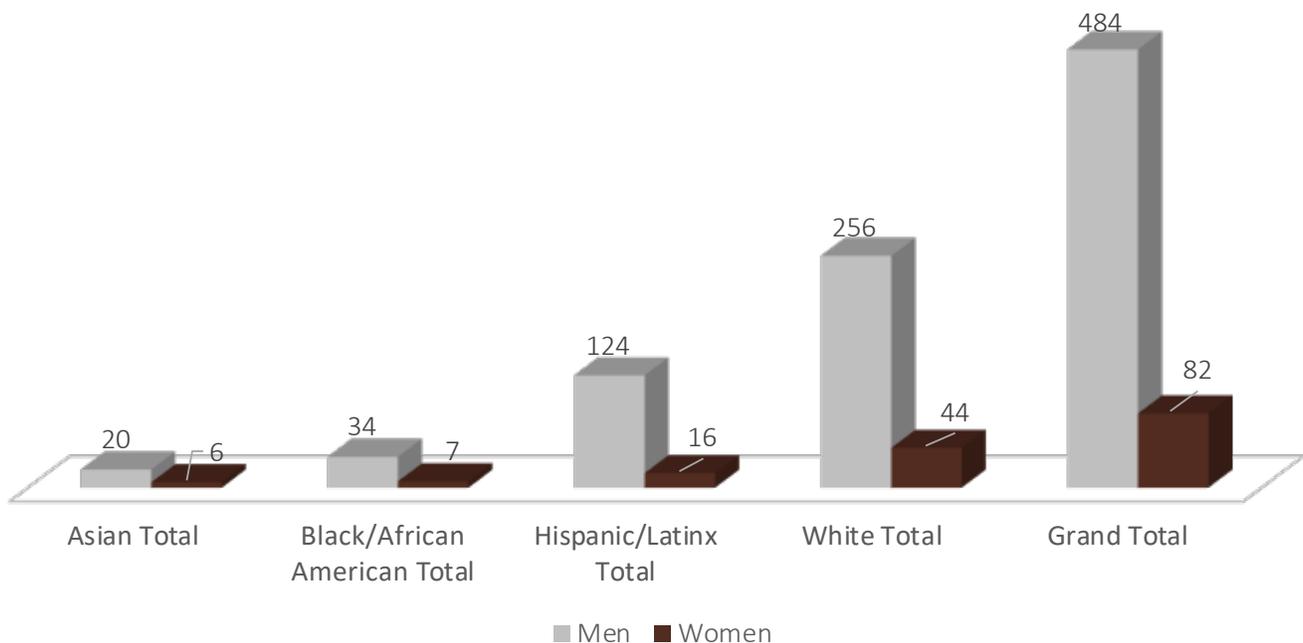


Figure 9-2. Computer Information Sciences degrees conferred by race and gender in Arizona

## Engineering Technologies

In 2015, HSCCs awarded 99% of their degrees in the field of engineering technologies in Arizona. Out of the total engineering technologies awarded, 61.60% (239) were given by HSCCs, followed by emerging-HSCCs (37.63% or 146) and non-HSCCs (0.77% or 3; Figure 10-1). In Arizona, Whites earned 55.67% (216) of the engineering technologies degrees, followed by Latinxs (22.42% or 87), Blacks/African Americans (7.47% or 29), and Asians (3.35% or 13). Gender-wise, 87.63% (340) of degrees were conferred to men and women earned only 12.37% (48) in engineering technologies. Specifically, there were 187 White men and 29 White women, 79 Latinx men and 8 Latinx women, 28 Black/African American men and 1 Black/African American woman who received degrees in this field (Figure 10-2).

When considering the three highest contributing associate majors in Arizona, the top three STEM fields were physical sciences (31.35 % or 910), computer and information Sciences (19.50% or 566), and engineering technologies (13.37% or 388). Interdisciplinary studies was ranked higher in other states. Compared to engineering technologies and computer and informational sciences, physical sciences showed relatively smaller gaps in gender. Interestingly, zero degrees were awarded in interdisciplinary studies in Arizona.

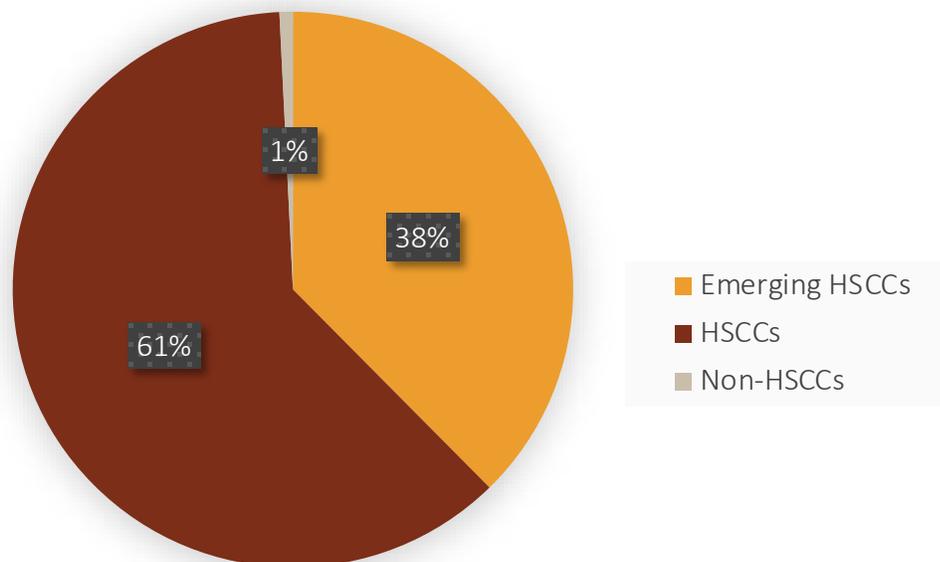


Figure 10-1. Engineering Technologies degrees conferred by institutional type in Arizona

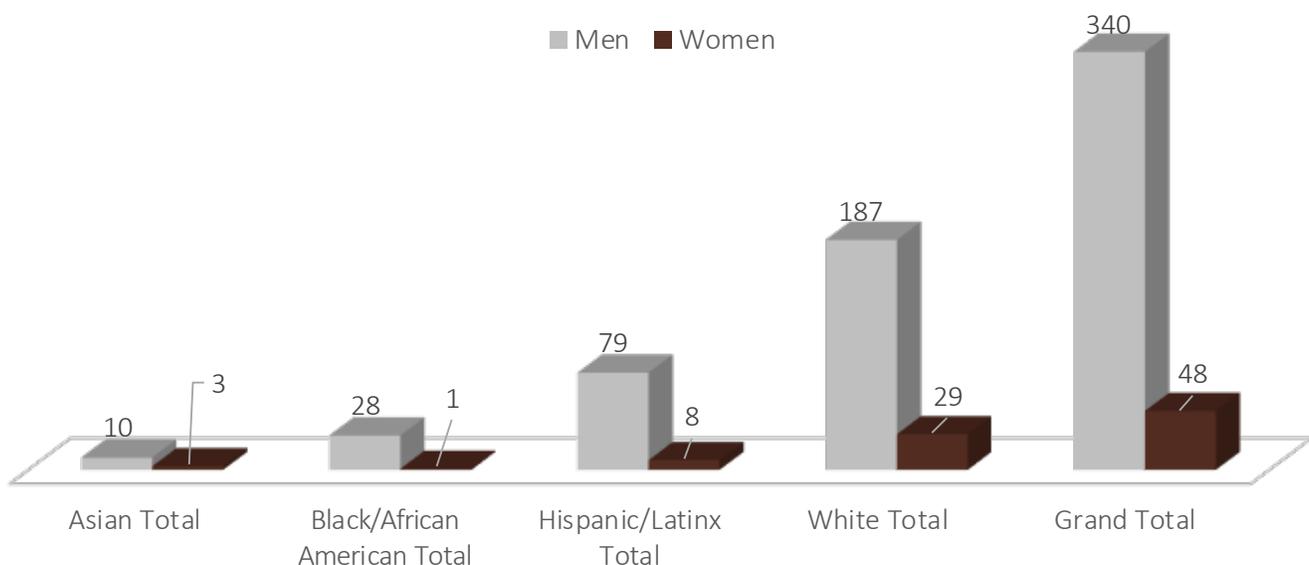


Figure 10-2. Engineering Technologies degrees conferred by race and gender in Arizona

## Summary

In summary, almost seven out of 10 two-year institutions in 2015 were designated as Hispanic Serving Institutions in Arizona.

- HSCCs awarded the majority of their conferred degrees to students of color (Figure 10)
- HSCCs and emerging-HSCCs accounted for almost 96% of the total degrees awarded in Arizona
- Women continue to be disproportionately underrepresented within the STEM fields, only receiving 25% of the STEM degrees conferred (Figure 5-3 & Figure 15), despite earning more than 55% of the total degrees awarded in Arizona.
- Given that HSCCs awarded more than half of the total degrees, they continue to increase access and opportunity to students of colors, especially Hispanic students.

In the future, these institutional types will continue to play a significant role in the education of students of color as they work toward attaining STEM degrees.

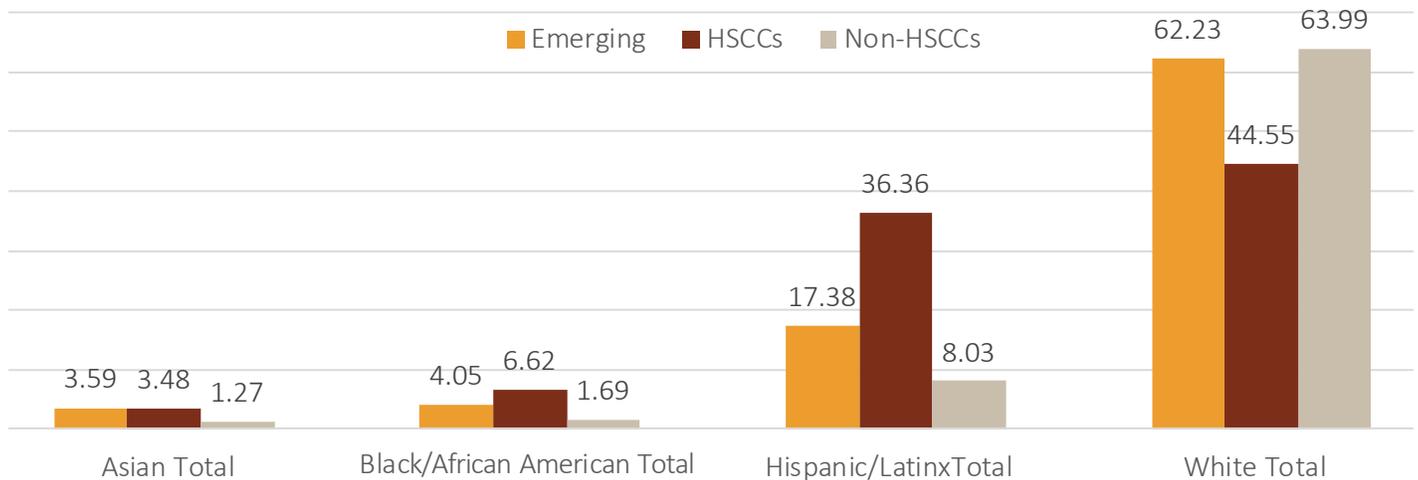


Figure 11. First major total associate degrees conferred (%) by race and institutional type in Arizona in 2015

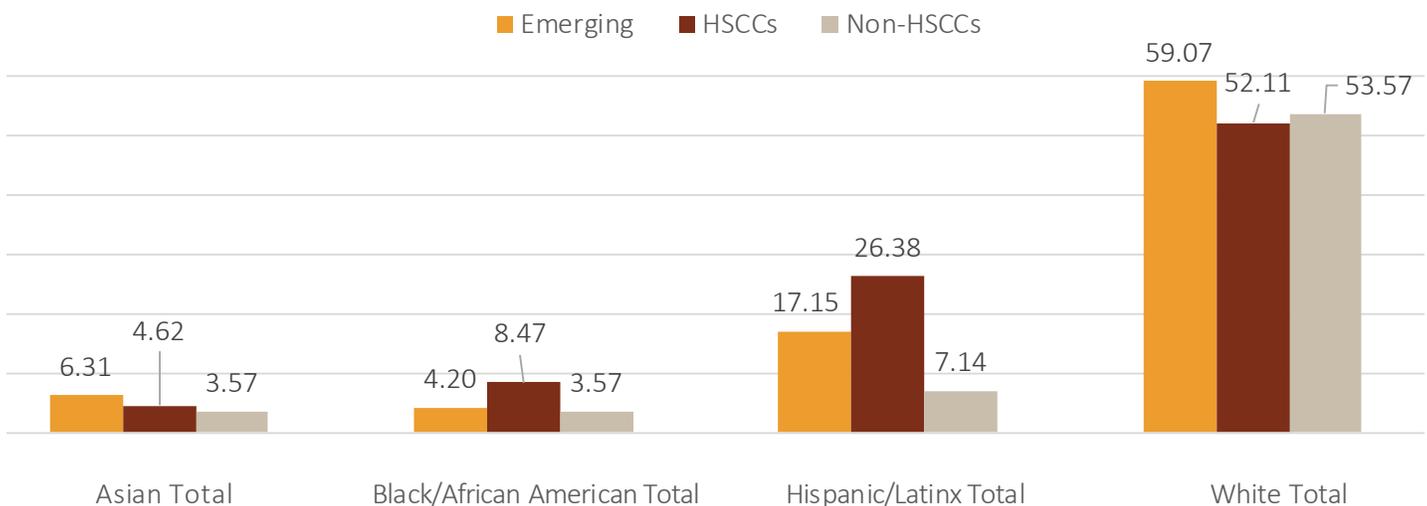


Figure 12. STEM First major associate degrees conferred (%) by race and institutional type in Arizona in 2015

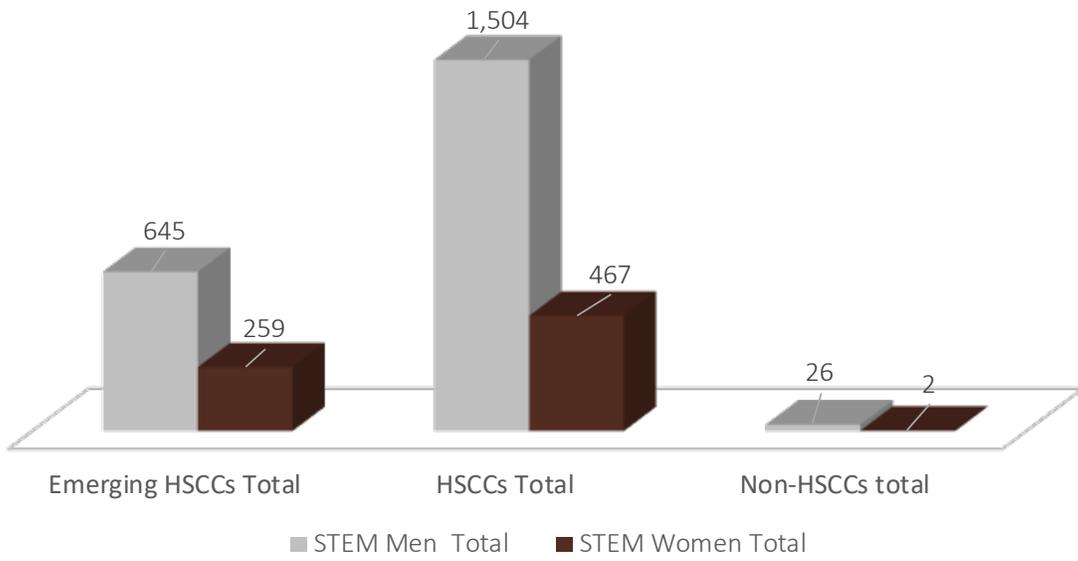


Figure 13. First major associate degrees in STEM conferred by gender and institutional type in Arizona in 2015

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### Notes.

1. The percentage of racial/ethnic groups on the figures and texts are not added up to 100% due to the exclusion of other racial/ethnic groups.



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