

## 2019 UAA ANSEP Graduation Study

### UAA Bachelor of Science Degrees Awarded in Engineering and other STEM Majors

Comparisons: AY2000-2007 and AY2011-2018, by Race and Ethnicity

#### Background

American Indian and Alaska Native 18- to 24-year-olds have the lowest high school completion rates compared to other 18- to 24-year-old racial and ethnic cohorts in the U.S. (NCES, 2019a). This is similar to postsecondary graduation rates. According to the National Center for Education Statistics (NCES, 2019b), “the 6-year graduation rate for first-time, full-time undergraduate students who began their pursuit of a bachelor’s degree at a 4-year degree-granting institution in fall 2010 was the highest for Asian students (74 percent), followed by White students (64 percent), students of Two or more races (60 percent), Hispanic students (54 percent), Pacific Islander students (51 percent), Black students (40 percent), and American Indian/Alaska Native students (39 percent).”

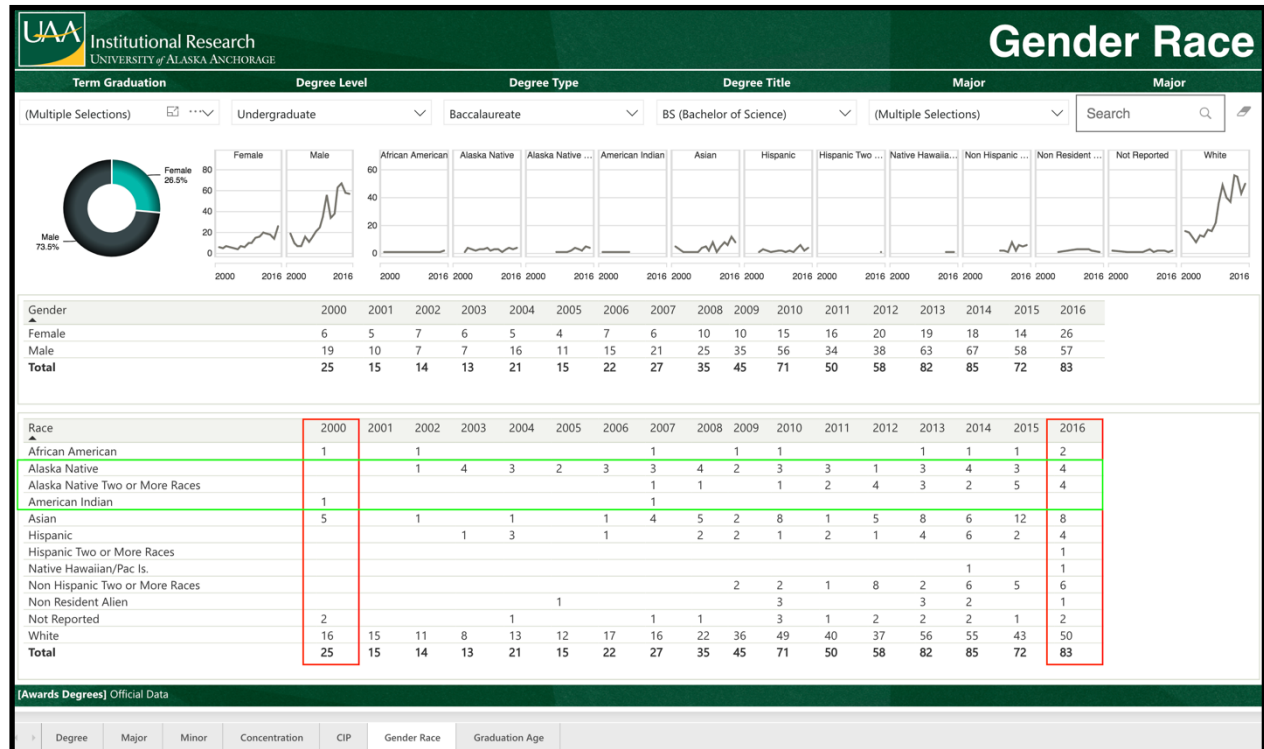
**Engineering.** U.S. and UAA graduation data were compared to understand what progress UAA has made in its efforts to recruit, retain, and graduate Alaska Native and American Indian engineering undergraduates. The numbers of Alaska Native and American Indian graduates earning UAA Bachelor of Science (BS) degrees in engineering are combined in this section for the purpose of comparing U.S. and UAA data. UAA awarded 68 BS degrees in engineering from academic year (AY) 2000 to AY2016 to undergraduates who self-identified as American Indian or Alaska Native alone or in combination with another race or ethnicity, 66 self-identified as Alaska Native alone or in combination with another race or ethnicity and two self-identified as American Indian (UAA Institutional Research, 2019a) (see figure 1).

According to NSF (2019), the annual number of bachelor’s degrees in engineering awarded to U.S. citizens and permanent residents attending postsecondary institutions in the U.S. increased from 54,955 in AY2000 to 98,859 in AY2016, an increase of 80%. The number of engineering bachelor’s degree awarded annually to American Indian or Alaska Native undergraduates attending postsecondary institutions in the U.S. decreased by 3.7% during that same time, from 326 in AY2000 to 314 in AY2016, being the only racial/ethnic engineering degree cohort to experience a decrease.

There was more than a threefold increase in the annual number of all bachelor’s degrees in engineering awarded to undergraduates attending UAA when comparing these same years, from 25 in AY2000 to 83 in AY2016 (UAA Institutional Research, 2019a, 2019b) (see figures 1 and 2). There was an eightfold increase in the annual number of bachelor’s degrees in engineering awarded to Alaska Native or American Indian students attending UAA during these same years, from 1 in AY2000 to 8 in AY2016 (UAA Institutional Research, 2019a) (see figure 1).

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Figure 1. UAA Bachelor of Science degrees awarded in engineering majors, all awards by self-identification of race and ethnicity: Academic Year 2000 compared to Academic Year 2016.



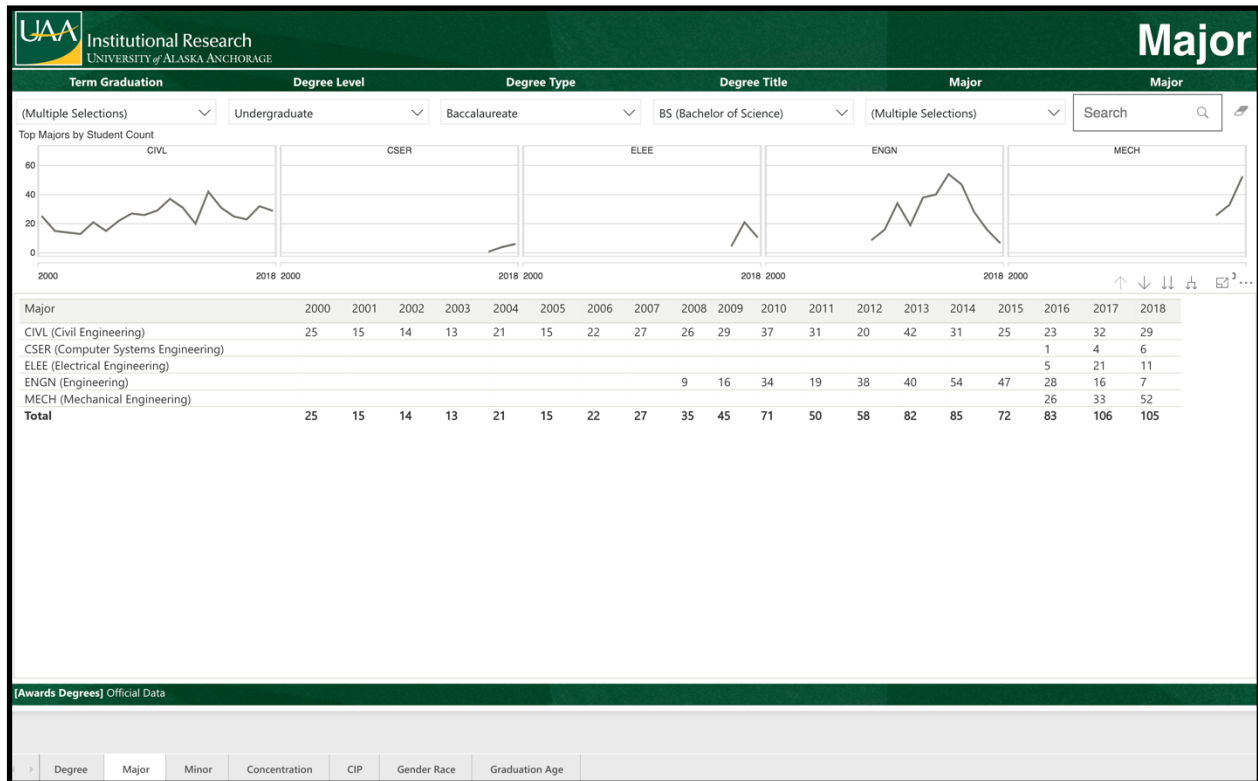
Notes: UAA Bachelor of Science engineering degree included in the AY2000 data set was: Civil Engineering. UAA Bachelor of Science engineering degrees included in the AY2016 data set were: Civil Engineering, Computer Systems Engineering, Electrical Engineering, Engineering, and Mechanical Engineering. Data retrieved from UAA Institutional Research SharePoint, May 1, 2019.

### Attainment of UAA Bachelor of Science STEM Degrees

**Engineering Majors.** Prior to the academic year (AY) 2008, the only BS degree in engineering awarded by UAA was in Civil Engineering. UAA had its first students graduate with its new BS in Engineering during AY2008. In AY2016, UAA awarded its first BS degrees in three additional majors: Computer Systems Engineering, Electrical Engineering or Mechanical Engineering. UAA awarded an all-time high of 106 BS degrees in all engineering majors in AY2017 followed by 105 awards in AY2018 (UAA Institutional Research, 2018b) (see figure 2).

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Figure 2. UAA Bachelor of Science degrees awarded in engineering majors, all awards: Academic Years 2000 through 2018.



Notes: UAA Bachelor of Science engineering degrees included in the AY2000-2018 data set were: Civil Engineering, Computer Systems Engineering, Electrical Engineering, Engineering, and Mechanical Engineering. Data retrieved from UAA Institutional Research SharePoint, February 15, 2019.

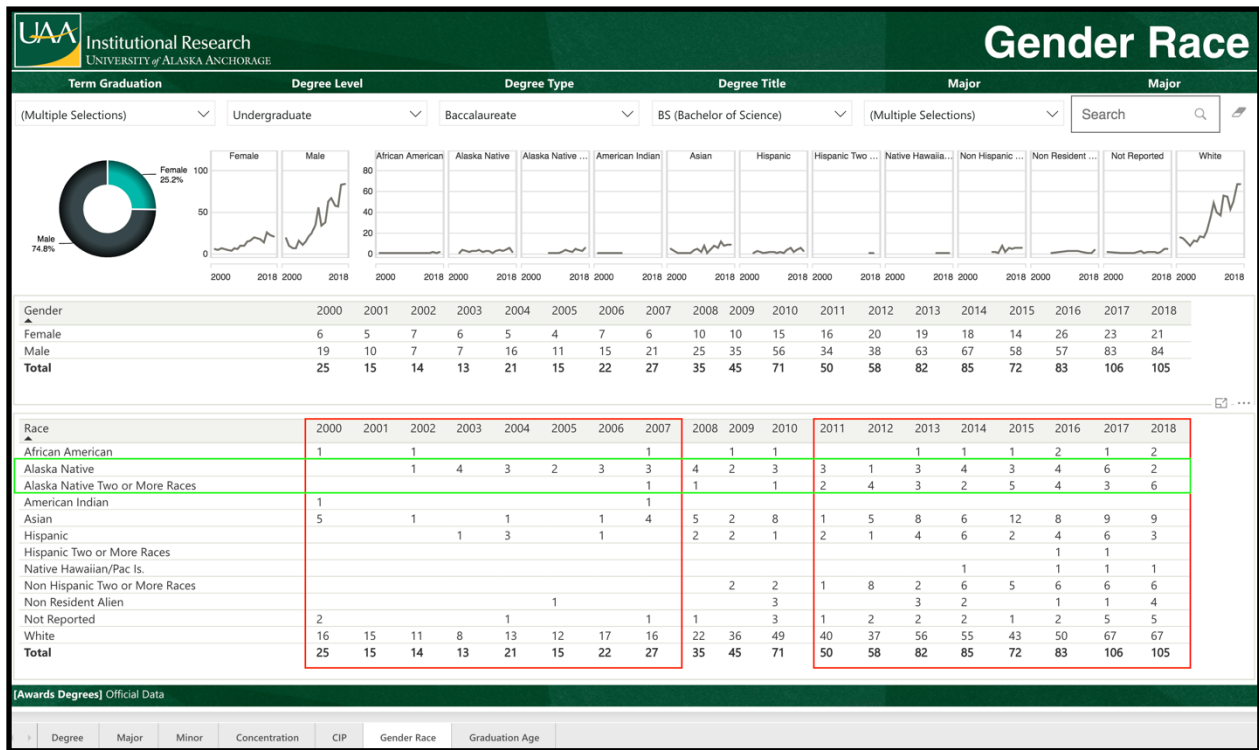
From AY2000 to AY2018, UAA awarded a total of 944 BS degrees in engineering, with 83 degrees awarded to Alaska Native undergraduates. “Alaska Native” is defined from this point forward in the text as Alaska Native alone or in combination with other races and ethnicities (see figure 3).

Further analyses were conducted to determine whether UAA Alaska Native undergraduates were earning BS degrees in engineering at the same rate as UAA undergraduates of other races and ethnicities after the number of UAA engineering degree options and the annual number of BS degree awards in engineering increased.

Two eight-year cohorts were chosen for comparison. The AY2000-2007 graduating cohort was compared to the AY2011-2018 graduating cohort by race (see figure 3). The AY2000-2007 graduating cohort was chosen as Civil Engineering was the only BS degree in engineering awarded by UAA during that time. The AY2011-2018 graduating cohort was chosen to analyze the most recent graduation data that included awards in five BS engineering majors.

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Figure 3. UAA Bachelor of Science degrees awarded in engineering majors, by self-identification as Alaska Native (alone or in combination with another race or ethnicity) or another race or ethnicity: Academic Years 2000-2007 compared to Academic Years 2011-2018.



Notes: UAA Bachelor of Science engineering degree included in the AY2000-2007 cohort was: Civil Engineering. UAA Bachelor of Science engineering degrees included in the AY2011-2018 cohort were: Civil Engineering, Computer Systems Engineering, Electrical Engineering, Engineering, and Mechanical Engineering. Data retrieved from UAA Institutional Research SharePoint, May 1, 2019. UAA degrees awarded during the summer semester may occasionally appear in the preceding academic year in the UAA SharePoint data base and in the subsequent academic year in UAA Banner S data. Race designations in SharePoint in the distribution of "Alaska Native" or "Alaska Native Two or more races" may occasionally differ from Banner SI data.

UAA awarded a total of 152 BS degrees in engineering during cohort years AY2000-2007. The number of UAA BS degrees in engineering awarded increased during cohort years AY2011-2018, with a total of 641 awards. A Chi-square test and a Fisher exact test were calculated to compare the number of UAA BS degrees in engineering that were awarded to the Alaska Native undergraduates to the number of UAA BS degrees in engineering that were awarded to the undergraduates of other races and ethnicities during cohort years AY2000-2007 and AY2011-2018. A significant difference was not found, at  $p < .05$ , between the AY2000-2007 and AY2011-2018 cohorts. Therefore, as the total number of UAA BS degrees in engineering increased during AY2011-2018, Alaska Native undergraduates continued to earn BS degrees in engineering at the same rate as undergraduates of other races and ethnicities when compared to the AY2000-2007 graduating cohort (see table 1).

Table 1. UAA Bachelor of Science degrees awarded in engineering majors, by self-identification as Alaska Native (alone or in combination with another race or ethnicity) or another race or ethnicity: Academic Years 2000-2007 compared to Academic Years 2011-2018\*\*.

Bachelor of Science Degrees Awarded	UAA Engineering Major Cohorts*		
	AY2000-2007	AY2011-2018	Total
Alaska Native (alone or in combination with another race)	17	55	72
Another race or ethnicity	135	586	721
Total Awards	152	641	793

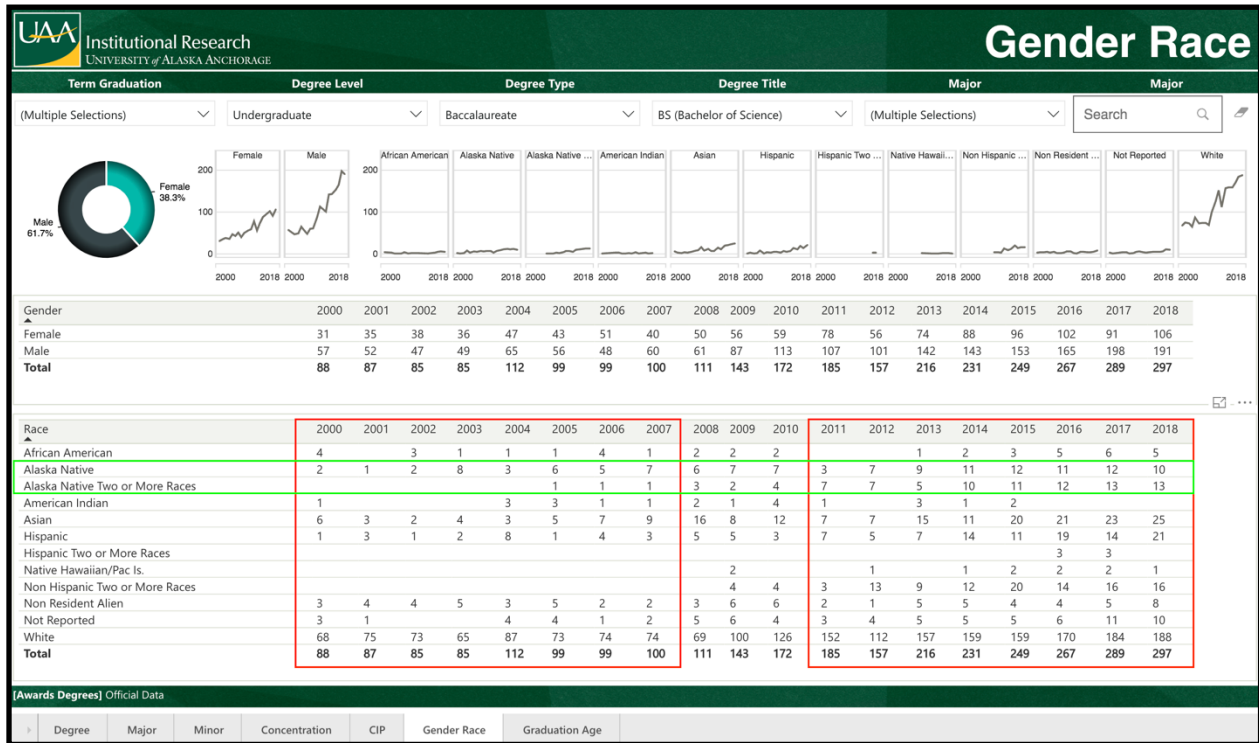
*Notes: \*UAA Bachelor of Science engineering degree included in the AY2000-2007 cohort was: Civil Engineering. UAA Bachelor of Science engineering degrees included in the AY2011-2018 cohort were: Civil Engineering, Computer Systems Engineering, Electrical Engineering, Engineering, and Mechanical Engineering. Data retrieved from UAA Institutional Research, May 1, 2018. \*\* $\chi^2 = 1.0091$ ,  $p$ -value is .315113. Result is not significant at  $p < .05$ . The Chi-square statistic with the Yates correction is 0.7183. The  $p$ -value is .396687. Not significant at  $p < .05$ . The Fisher exact test statistic value is 0.3455. Result is not significant at  $p < .05$ .*

**STEM Majors.** The ten UAA BS STEM majors included in the AY2000-2007 graduating cohort were: Biological Sciences, Chemistry, Civil Engineering, Computer Science, Geological Sciences, Geomatics, Mathematics, Natural Sciences, Surveying and Mapping (discontinued after AY2001), and Technology. UAA BS degrees in Computer Systems Engineering, Construction Management, Electrical Engineering, Engineering, Environment and Society, and Mechanical Engineering were added after AY2007. The fifteen UAA BS STEM majors included in the AY2011-2018 graduating cohort were: Biological Sciences, Chemistry, Civil Engineering, Computer Science, Computer Systems Engineering, Construction Management, Electrical Engineering, Engineering, Environment and Society, Geological Sciences, Geomatics, Mathematics, Mechanical Engineering, Natural Sciences, and Technology. These BS STEM degrees were recognized as STEM majors by the National Science Foundation and Louis Stokes Alliances for Minority Participation Program (LSAMP, 2015). From AY2000 to AY2018, the UAA College of Engineering, College of Arts and Sciences, and Community and Technical College awarded a total of 3072 BS degrees in these STEM majors, with 219 degrees awarded to Alaska Native undergraduates (see figure 4).

Further analyses were conducted to determine whether UAA Alaska Native undergraduates were earning BS degrees in the selected STEM majors at the same rate as UAA undergraduates of other races and ethnicities after the number of UAA STEM degree options and the annual number of BS degree awards in these STEM majors increased. The AY2000-2007 graduating cohort was compared to the AY2011-2018 graduating cohort by race and ethnicity (see figure 4).

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Figure 4. UAA Bachelor of Science degrees awarded in STEM majors, all awards by self-identification as Alaska Native (alone or in combination with another race) or another race or ethnicity: Academic Years 2000-2007 compared to Academic Years 2011-2018.



Notes: UAA Bachelor of Science STEM degrees included in the AY2000-2007 cohort were: Biological Sciences, Chemistry, Civil Engineering, Computer Science, Geological Sciences, Geomatics, Mathematics, Natural Sciences, Surveying and Mapping, and Technology. UAA Bachelor of Science STEM degrees included in the AY2011-2018 cohort were: Biological Sciences, Chemistry, Civil Engineering, Computer Science, Computer Systems Engineering, Construction Management, Electrical Engineering, Engineering, Environment and Society, Geological Sciences, Geomatics, Mathematics, Mechanical Engineering, Natural Sciences, and Technology. Data retrieved from UAA Institutional Research SharePoint, May 1, 2019. UAA degrees awarded during the summer semester may occasionally appear in the preceding academic year in the UAA SharePoint data base and in the subsequent academic year in UAA Banner S data. Race designations in SharePoint in the distribution of "Alaska Native" or "Alaska Native Two or more races" may occasionally differ from Banner SI data.

UAA awarded a total of 755 BS degrees in the selected STEM majors during cohort years AY2000-2007, with a total of 37 Alaska Native graduates. UAA awarded a total of 1,891 BS degrees awarded in the selected STEM majors during cohort years AY2011-2018, with a total of 153 Alaska Native graduates. A Chi-square test and a Fisher exact test were calculated to compare the number of UAA BS degrees in these STEM majors awarded to Alaska Native undergraduates to the number of UAA BS degrees in the STEM majors that were awarded to the undergraduates of other races and ethnicities during AY2000-2007 and AY2011-2018. A significant difference was found, at  $p < .05$ , between the AY2000-2007 and AY2011-2018 graduating cohorts. Therefore, the Alaska Native undergraduates earned UAA BS degrees in the selected STEM majors at a significantly higher rate than the undergraduates of other races and ethnicities in the AY2011-2018 cohort when compared to the AY2000-2007 cohort (see table 2).

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Table 2. UAA Bachelor of Science degrees award in STEM majors, by self-identification as Alaska Native (alone or in combination with another race or ethnicity) **or** another race or ethnicity: Academic Years 2000-2007 compared to Academic Years 2011-2018\*\*.

Bachelor of Science Degrees Awarded	UAA STEM Major Cohorts*		Total
	AY2000-2007	AY2011-2018	
Alaska Native (alone or in combination with another race or ethnicity)	37	153	190
Another race or ethnicity	718	1,738	2,456
Total Awards	755	1,891	2,646

*Notes: \*UAA Bachelor of Science STEM degrees included in the AY2000-2007 cohort were: Biological Sciences, Chemistry, Civil Engineering, Computer Science, Geological Sciences, Geomatics, Mathematics, Natural Sciences, Surveying and Mapping, and Technology. UAA Bachelor of Science STEM degrees included in the AY2011-2018 cohort were: Biological Sciences, Chemistry, Civil Engineering, Computer Science, Computer Systems Engineering, Construction Management, Electrical Engineering, Engineering, Environment and Society, Geological Sciences, Geomatics, Mathematics, Mechanical Engineering, Natural Sciences, and Technology. Data retrieved from UAA Institutional Research, May 1, 2019. \*\* $\chi^2 = 8.2396$ ,  $p$ -value is .004099. Result is significant at  $p < .05$ . The chi-square statistic with Yates correction is 7.7679. The  $p$ -value is .005318. Significant at  $p < .05$ . The Fisher exact test statistic value is 0.0035. Result is significant at  $p < .05$ .*

### Summary and Conclusions

In a 2015 Urban Institute evaluation of ANSEP, Bernstein, et al. (2015a) described “The ANSEP Model”.

ANSEP began in 1995 by initially focusing on engineering undergraduate students at the University of Alaska Anchorage. Since then, the program has expanded to include additional University of Alaska campuses; to incorporate programming for middle school, high school, and postgraduate students; and to add natural and life sciences as a key component of its programming. Since its initial focus on college-level students, ANSEP has transformed into a multistage model because many Alaska Native students arrived at college unprepared and were unaware of STEM programs and careers. With University Success as its anchor component, ANSEP developed its first precollege component, Summer Bridge, for students coming into the university. As the need to help prepare students before they reached college became more apparent, the program then reached further back to high school students through Acceleration Academy, and subsequently to middle school students through Middle School Academy and STEM Career Explorations. ANSEP also provides the Graduate Success component, supporting participants who continue on to graduate-level studies. Thus, the ANSEP model provides a pipeline of potential STEM workers for Alaska starting in middle school and continuing through graduate school. (p. 3)



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This current study of UAA graduation data found that the number of Alaska Native UAA graduates earning BS degrees in engineering during AY2011-2018 (55) was more than triple the number of Alaska Native UAA graduates earning BS degrees in engineering during AY2000-2007 (17). The Alaska Native undergraduates earned UAA BS degrees in engineering at the same rate, at  $p < .05$ , as undergraduates of other races and ethnicities during AY2011-2018 when compared to the AY2000-2007 graduation cohort. A 2019 review of UAA Banner SI student data found that 88% of all UAA Bachelor of Science engineering degree recipients from AY2000 to AY2018 who self-identified as Alaska Native alone or in combination with other races and ethnicities were Alaska Native Science & Engineering Program (ANSEP) University Success undergraduates who received one or more ANSEP scholarships while attending UAA.

This study also found that the number of Alaska Native undergraduates earning BS STEM degrees, including engineering, during AY2011-2018 (153) was more than quadruple the number of Alaska Native undergraduates earning BS STEM degrees, including engineering, during AY2000-2007 (37). The increase in UAA STEM BS degrees awarded to Alaska Native undergraduates was significantly higher, at  $p < .05$ , than the increase in the UAA STEM BS degrees awarded to undergraduates of other races and ethnicities in the AY2011-2018 graduation cohort when compared to the AY2000-2007 graduation cohort. Further analyses of the UAA Alaska Native STEM graduates and their relationship to ANSEP is forthcoming.

The annual number of Alaska Native undergraduates earning UAA BS degrees in engineering increased from AY2000 to AY2016 while the national annual data was flat or slightly decreased for Alaska Native or American Indian recipients of BS degrees in engineering. The annual number of engineering bachelor's degrees awarded in the U.S. increased 80% for all U.S. citizens and permanent residents from AY2000 to AY2016. The number of bachelor's degrees in engineering awarded annually to Alaska Native or American Indian recipients decreased by 3.7% while Black or African American recipients increased 37.1% and White recipients increased 65.5%. Asian, Native Hawaiian, and other Pacific Islander recipients increased 74.9% and Hispanic or Latino recipients increased 178.2% (NSF, 2019). The annual number of engineering bachelor's degrees awarded at UAA increased 232% from AY2000 to AY2016 for all recipients, and 700% for Alaska Native or American Indian recipients. Additionally, Diverse: Issues in Higher Education (2018) ranked UAA as tied for sixth place in its list of *Top 100 Producers of Bachelor's Degrees* for engineering awards during AY2017 to undergraduates who self-identified as Native American [Alaska Native or American Indian].

Over the past ten years, UAA has expanded its degree options for undergraduate engineering and other STEM majors and has been successful in its efforts to recruit, retain, and graduate more undergraduates pursuing Bachelor of Science degrees in these majors. ANSEP was established in 1995 and has developed a successful and growing longitudinal model, including K-12 academic preparation, supporting UAA's mission and core values to recruit, retain, and graduate increasing numbers of Alaska Native students earning UAA BS degrees in engineering and other STEM majors preparing them to work in high-demand job areas in Alaska.



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