CTE Program Review – Annual Program Update for 2021-2022
PART A

SECTION 1: BASIC PROGRAM INFORMATION

Program Name: **Electronic Engineering Technology**

Program Faculty Department Chair(s): **Sanda Williams**

Program SAC Chair(s): **Scott Lowrey**

Program Dean: **Carrie Weikel-Delaplane**

Pathway Dean: **Karen Sanders**

Please highlight where your classes are offered.

Classes/Services offered at: CA / RC / SE / **SY** / NB / HC / WCC / Metro / CLIMB / OMIC / Other:

1A. Program Structure

- Do you have a Competitive Entry or Admissions Process?
  - ___ Competitive, based on admission criteria
  - ___ Competitive due to limited capacity, based on order of application
  - _**X**__ Open entry
  - _**X**__ Other __**Students must meet course and program prerequisites**_____

SECTION 2: REFLECTING ON DATA

All data cited below can be found here:
https://www.pcc.edu/institutional-effectiveness/program-profiles/
***Note the row of Tabs just below your Bookmarks Bar. Begin on the Home Tab. This is where you will choose your selection criteria for your data. Return to the Home Tab whenever you want to change your selection criteria. See the Help and Data Dictionary Tabs as well as the Data Directions Document included in the email with this template for more information.

Please include data from at least the last three years and up to the last five years. A 3-year review is recommended. SACs may have unique circumstances and reasons for looking more or less broadly.

2A. Enrollments (SFTE) per year; Location (where course is taught); Modality

SEE Student FTE Tab.

2A1. Does this data suggest any questions that the SAC would like to pursue?

Relative to the past 3 years, enrollment for the latest year was down roughly 5% overall in the EET school. But this is not unexpected given the effects of Covid-19 which have caused many students to purposefully delay school enrollment until educational institutions return to a more normal environment.

The Biomed Equipment class enrollment has been trending down over the past 4 years. This is a bit of a mystery given the rapid increase in the number of biotech companies over the same period. The SAC should spend some time discussing root cause of the apparent declining interest.

Since most classes were only offered remotely over the past year, it is too early to study the differences between on-campus and remote enrollment. However, the SAC will be interested in comparing the 2 modalities when the data becomes meaningful.

2A2. Do the data suggest adjustments be made in your program, such as schedule or course offerings, with regards to enrollment? If yes, what ideas/strategies do you have that you would like to implement or have help with?

Given the rapidly growing area of renewable energy, we are expecting more students to target the Renewable Energy Systems option. We are still in the early days of renewables and we recognize the need will be accelerating for graduates with the electronic engineering skills applicable to solar cells, wind turbines and energy storage.

2A3. Are there other data reports that you would find informative/useful with regards to enrollment? How would this information support decision-making for the program?

We are pleased to offer the 4 EET program options (Biomed, Robotics, Renewable and Wireless) which are all growing fields in the electronic industry. It may be useful for the SAC to study any available estimated employment numbers in these categories such that we may direct our resources appropriately going forward.

2B. Course Success Rates

Data Definition: Success rate represents the percentage of students who successfully complete a course. It is calculated as:

$$\%\ S = \frac{\text{Number of students receiving a grade of A, B, C, P, PR, or CM}}{\text{Number of students receiving a grade of A, B, C, D, F, P, NP, I, W, PR, CM, N, UP}}$$

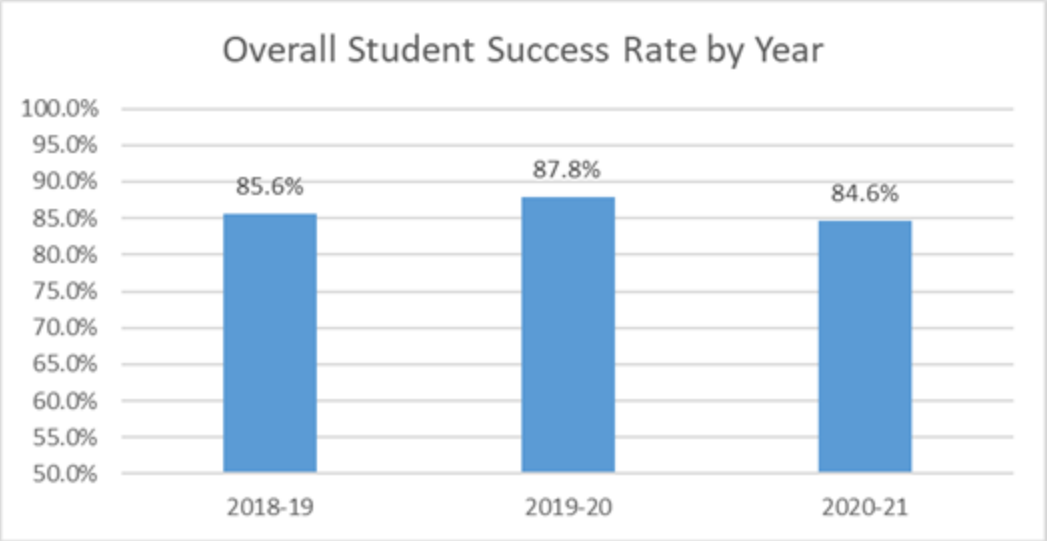
PR, CM, N, and UP are non-credit grades used in the Adult Basic Education program.

Success rates for gender and race are not calculated when the enrollment is less than 5. For any success rate that is not calculated, the total for that column is also not calculated.

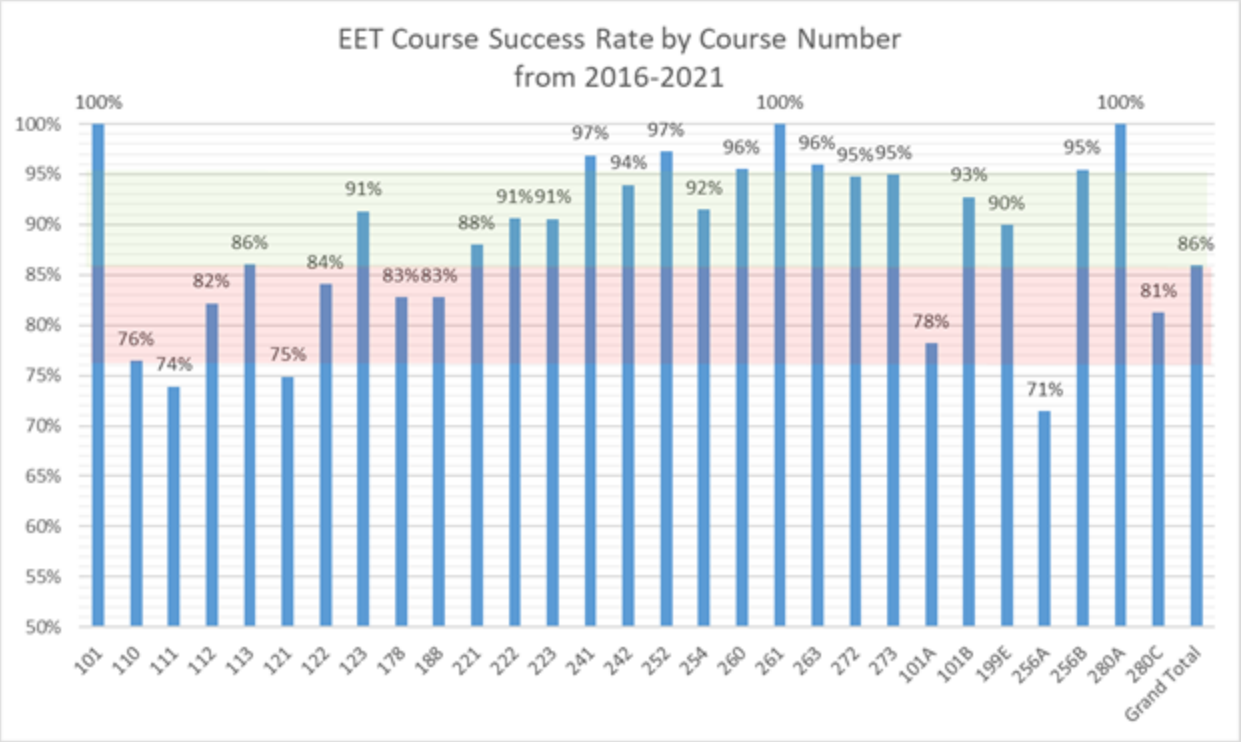
% Success By Course and Modality

SEE Modality Tab

First, per the chart below, the success rate for students in all EET Classes has been very steady over the last three years.



2B1a. Are there any courses with lower or higher pass rates than others (over time, over many sections, or a notably higher or lower rate)? If so, which ones?



For currently offered classes:

More than 10% Lower than Average

EET111 - Electrical Circuit Analysis I

EET121 – Digital Systems 1

EET256A – Capstone Project 1

More than 10% Higher than Average

EET241 - Programming for Electronics

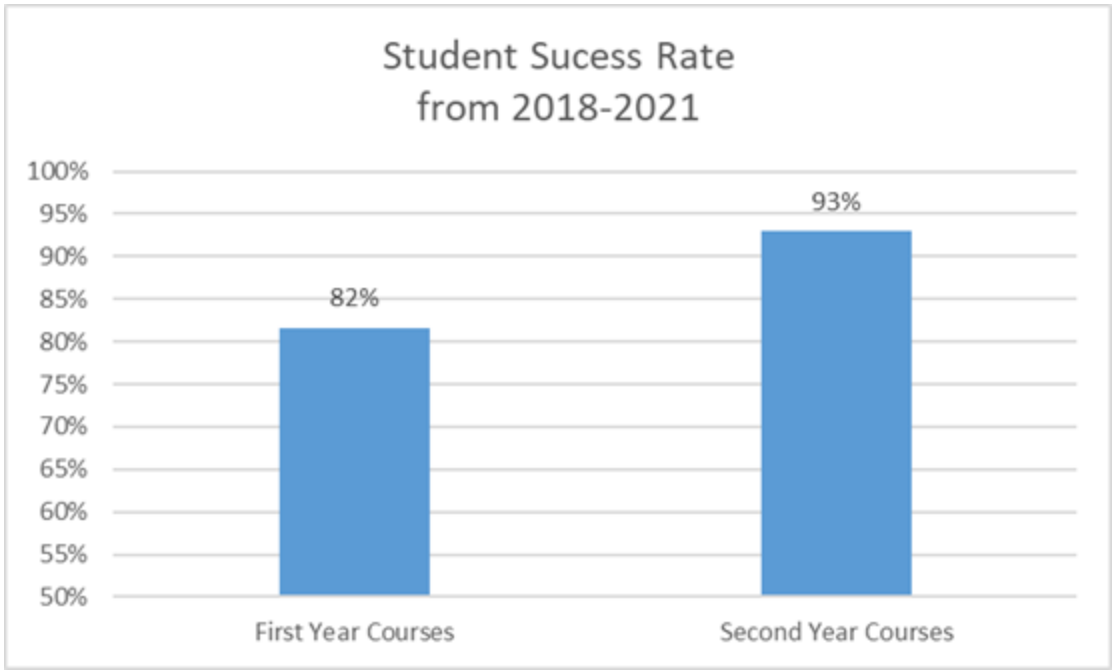
EET252 - Electromechanical Systems Fundamentals

EET261 - Biomedical Equipment II

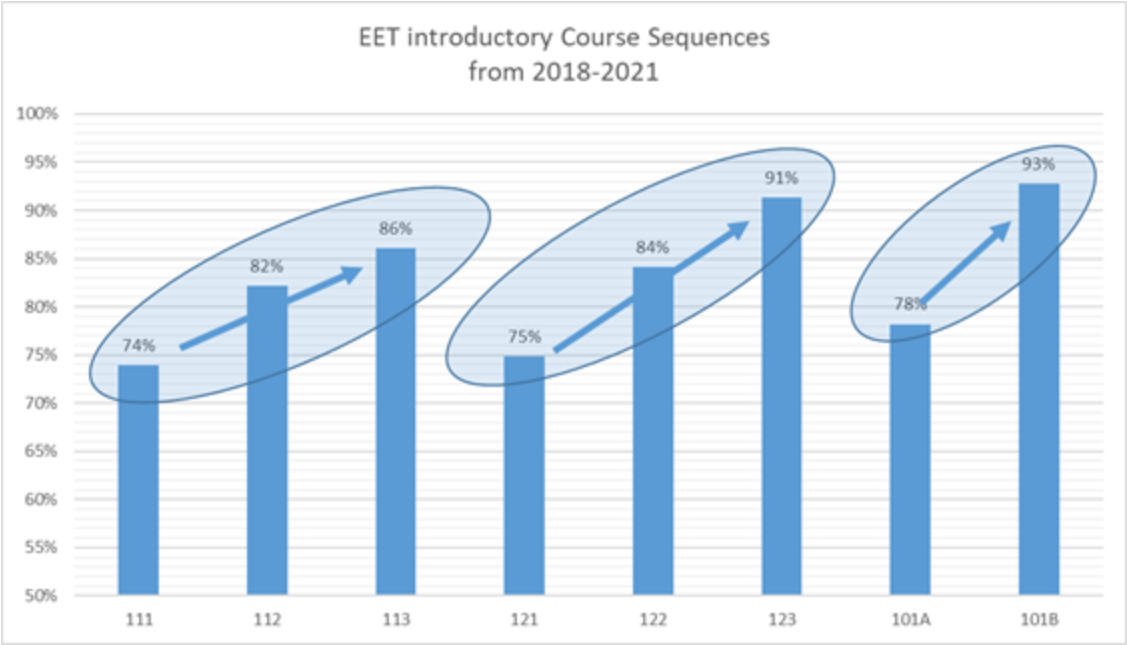
EET 280A - Cooperative Education: Electronics Engineering Technology

2B1b. Are there any modalities with lower or higher pass rates than others (over time, over many sections, or a notably higher or lower rate)? If so, which ones?

Two trends stand out here. First, there is a much higher success rate in second year classes than first year classes (see chart below).



Secondly, for first year class sequences, there is a climbing success rate through the class sequence (see chart below).



2B2. Strategy Insights

What strategies have you used to maintain high success rates? What can be learned that might be applied to courses with lower success rates? What are possible actions to be taken to understand/address lower success rates? Please clearly explain how your discipline intends to explore content/curriculum, pedagogy/teaching, course material selection, etc. using culturally responsive teaching approaches throughout the next year. Try to identify a realistic one year goal.

There are a number of measures taken in EET to maintain high success rates.

- **Student study groups: Students have the opportunity to work with classmates both inside and outside of class. Many classes use small-group activities to encourage teamwork and community-building. Lab activities, in particular, allow students to work together on projects.**

- **Tutoring: Some students benefit from instruction outside the scheduled classes, or from people other than the instructor. The EET department offers tutoring opportunities for students, either with instructors or other tutors with expertise in the subject area.**

- **Outreach to other subject areas: EET instructors interact with students and instructors in other subject areas both for recruiting purposes and to "cross-pollinate." For instance, in previous years EET instructors worked with Automotive Repair instructors in a shared-class situation to allow students to compare specific electrical designs and requirements that occur in automotive environments. First-year courses tend to be more foundational and theoretical (covering basic concepts), and second-year courses are more practical, and students likely relate better to that knowledge to real world jobs (covering hands-on experiments and detailed calculations).**

Some possible actions:

We do find that first-year students are sometimes limited by their math abilities, and so we may see a weeding-out process so that the students who continue into the second year are more successful in the more math-intensive courses. This also applies to the next courses in first year course sequences. Although EET and the Math Department do collaborate on needed math skills, actions that we can take based on these observations include:

- **Improved collaboration with the math department to make the materials more relevant for EET. This suggestion was also included in last year's APU, but we haven't made progress on it under the pandemic conditions.**
- **Provide math instructors with sample problems based on EET concepts that they can use in their classes. This suggestion was also included in last year's APU, but we haven't made progress on it under the pandemic conditions.**
- **Make available to students entering the Circuit Analysis sequence (and Digital Systems sequence?) a math proficiency self-test. Results of this self-test could be used to provide focus with any needed math tutoring.**

For the introductory Lab sequence, there is likely a significant learning curve for students without hands on experience with Electronic Lab equipment vs. students that enter with a Hobbyist or work experience background.

Enrollment and % Success By Course and Student Demographics

SEE Gender, Race, and Pell Tabs

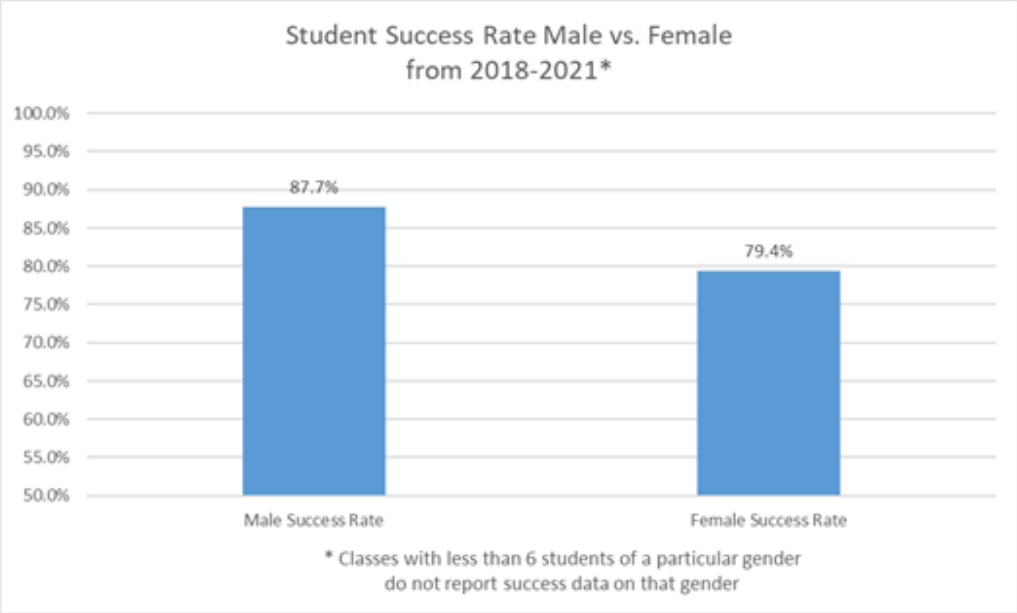
2B3. The data may indicate a pattern of inequities (in gender, race, or Pell eligibility) in student enrollment or success. Please clearly explain how your program intends to explore content/curriculum, pedagogy/teaching, course material selection, etc. using culturally

responsive teaching approaches throughout the next year. Try to identify a realistic one year goal.

As the data shows, success rates are fairly comparable between Male and Female students, although it has a larger discrepancy than reported last year. We do not have a large enough sample of non-Binary students to reach a conclusion about their success rates.

The success rates for Female students may be affected by the way the data was collected. If a class had an enrollment five or less in a certain category, the success rate was not calculated in order to protect student privacy by avoiding situations in which individual students' results could be deduced. Because the number of Female students is still much lower than the number of Male students, nearly all of the classes which do not have reported success rates are for Female students. For this reason, it is difficult to reach conclusions about the slightly lower success rate for female students overall.

For context, 47% of Female Student enrollments are missing from the Success Rate data.



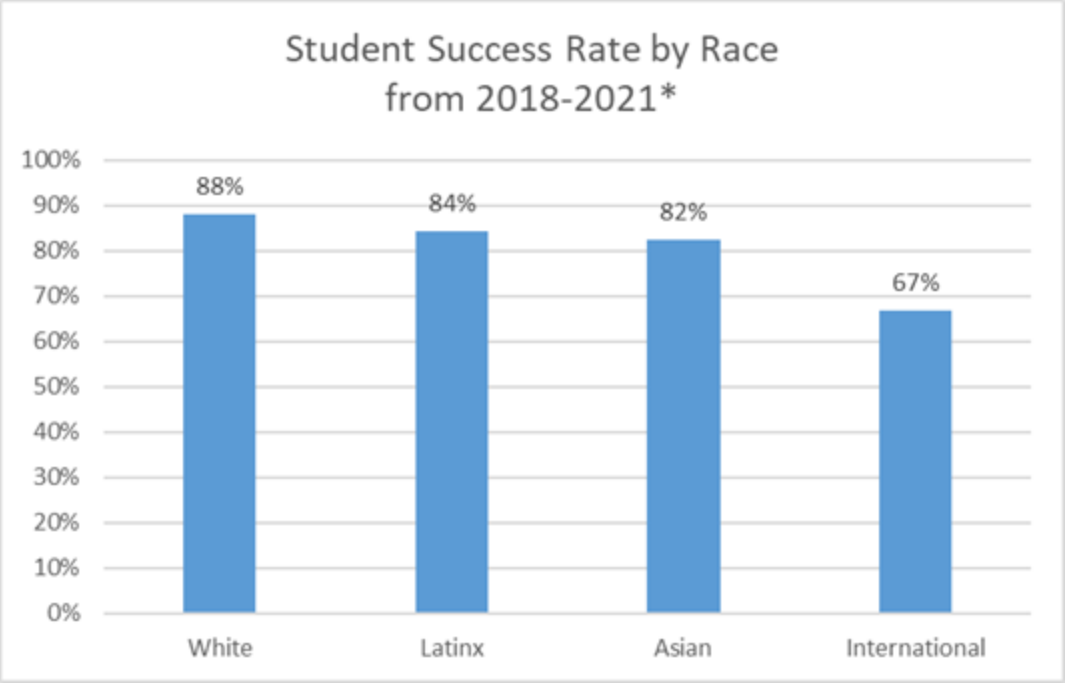
As the data shows, success rates are fairly comparable between different Race students. Due to the missing data for classes with an enrollment of five or less students in a certain category, the following Race groups have this much missing data:

100%: Black, NHoPI, Mixed Race and Native American Students

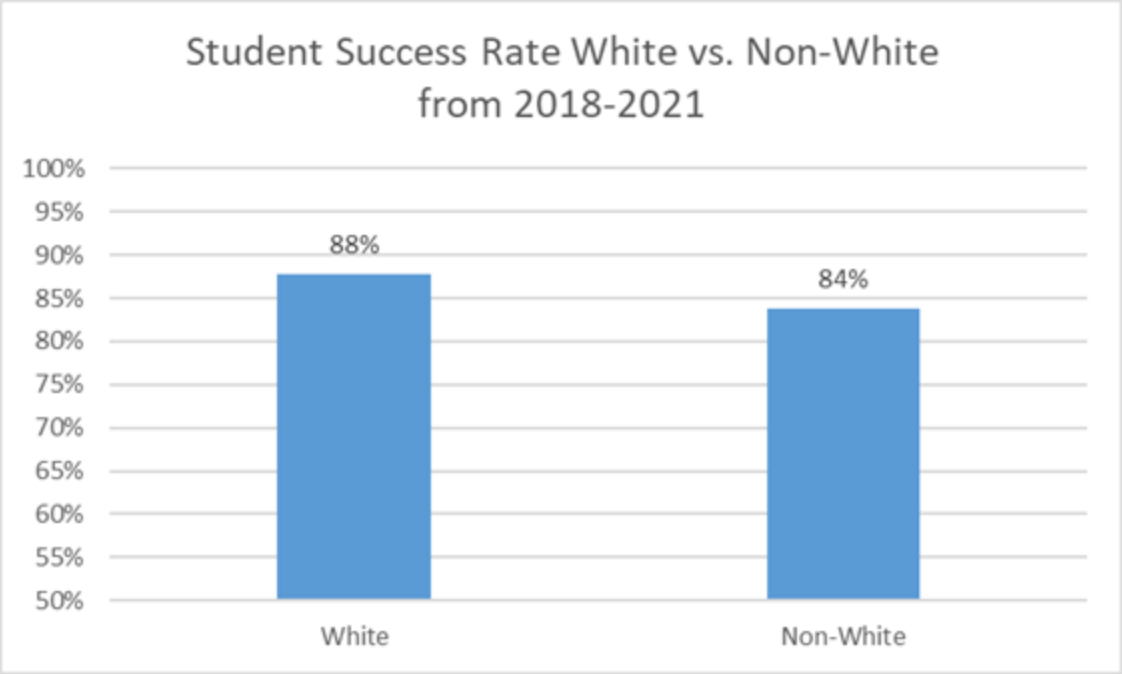
96% of International Student enrollments

88% of Asian Student enrollments

39% of Latinx Students enrollments

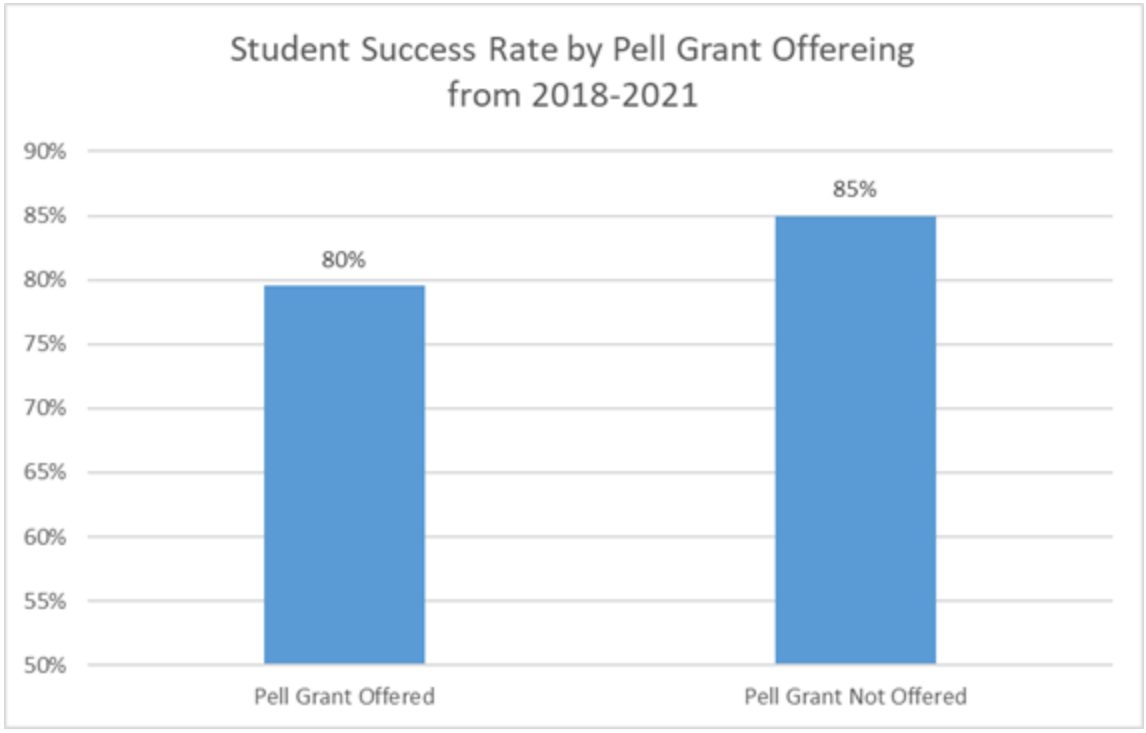


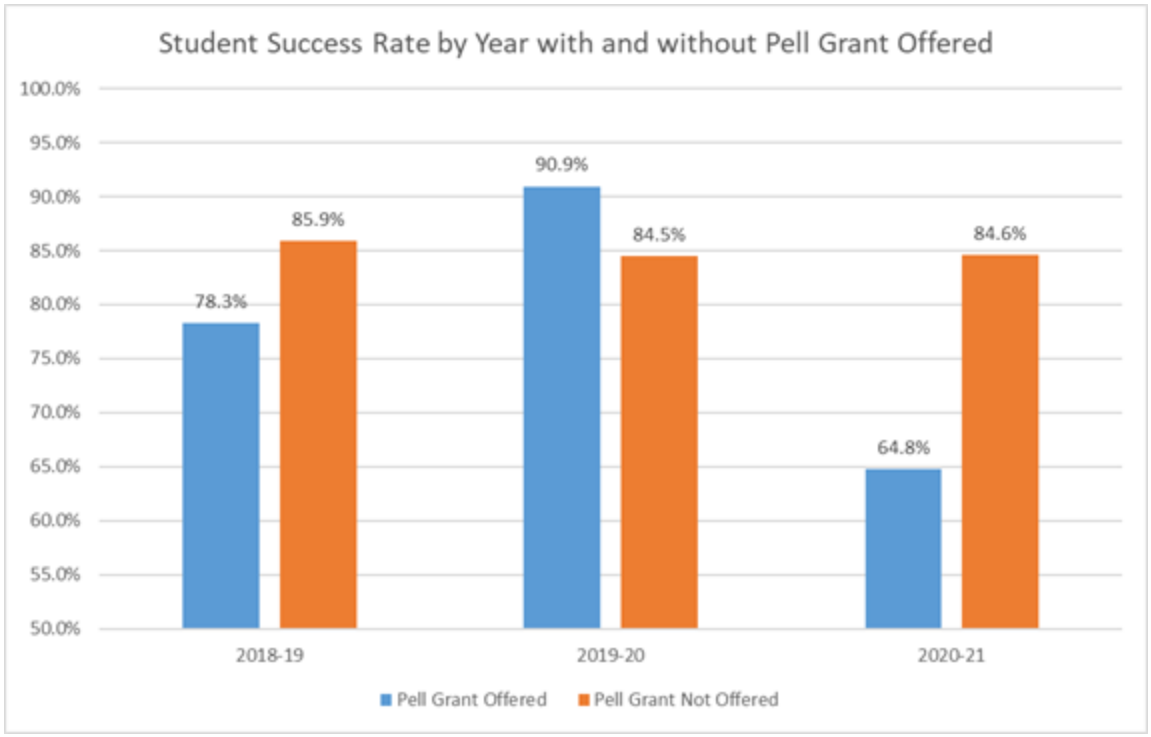
Due to this missing data, a better comparison is White students vs. Non-White students. As the data shows, success rates are fairly comparable between these two groups.



As the data show, success rates are fairly comparable between students with and without Pell Grant offerings. Also, the data show a significantly greater difference in

academic year 2020-2021. If you remove this unusual year of data, the success rate is essentially identical. It seems unnecessary to have any strategy to address this difference at this time.





There are a number of measures taken in EET to address these differences and achieve equitable success for all students, and further measures are planned.

- **Female leadership: The department chair and the dean for EET are female and can provide balance in the instruction for this field that is still dominated by males.**
- **Internationalization activities: Through collaboration with the Internationalization Steering Committee, EET classes have participated in a Speed-Culturing event to promote cross-cultural communication.**

2B4. What support does your SAC need to fully explore inequities in enrollment or student success? For example, are there any other data reports you would find useful to have related to student success?

In the future, EET instructors will continue outreach to students and instructors inside and outside of PCC. We will also work on doing more exit interviews with students who leave the program to understand why they are leaving and what we can do to improve the program.

It would be very valuable to be able to analyze success data for all classes, including group data with an enrollment of five or less for all groups being analyzed.

There are several additional factors that could be evaluated, but no data has been provided. Examples of this would be:

- **Prerequisite or corequisite requirements, and from which other departments**
- **Full time or part time students**
- **Evening vs. day classes**
- **Full time or part time Instructors leading the class**

2C. CTE Completions

SEE Awards Tab

2C1. Is the program independently tracking student completions? Feel free to share your data sets here. Are there any program practices that positively influence completions? Are there any program practices that could be revised in order to more positively influence completions? Please explain.

The program does not independently track student completions. We rely on the school's institutional excellence dataset to track degree and certificate completions. Our academic advisor, who's Perkins funded position expired last year, had maintained an informal list of self-reported student completion.

Last year we started a new program of making lab equipment available to students to use at home funded by a Perkins grant. The EET program has a strong hands-on component that was impossible to carry-out with remote instruction but now students are able to do this work at home, at their convenience. While completions are down from last year, we feel that this equipment loan program has helped retain students through this period.

2C2. If different from your internal tracking (if you do it), what conclusions or observations are suggested by the graduation data provided in the Awards Tab?

Although we don't do our own internal tracking we do recognize that completions are down significantly from the previous year. Fewer students are following through with the program according to schedule and dropping out or postponing completion. We believe this is due to these factors:

Our students require a higher level of interactive support from faculty, staff and other students. Many have challenges with time management and study skills. The remote environment is not favorable for these students.

Much of the program is "hands-on". Although the students do have lab equipment at home, demonstrating and supervising "hands-on" activities is very difficult in the remote environment. Some students get frustrated at not being able to build their skills as much as they would like.

2C3. Is your program aware of any external influences that strongly affect program completion? For example, labor market impacts, business partnerships, or internship availability, etc. Please explain.

The lack of internship opportunities was a big factor this year, especially with the biomed program. Hospitals suspended their internship programs. The program's internship

program is a big draw for our biomed students. The lack of that may have caused some students to drop out or postpone their program.

The labor market has heated up over the last year with employers increasing their pay to attract and retain employees. One of the reasons students come into the program is to get better paying jobs. If the general labor market is offering increased wages and opportunities, it decreases the short term motivation for students to enroll or stay in the program.

2C4. Are you able to get information about graduate job placement/salaries for recent graduates? If so, please describe how you get that information, and what you have learned.

In previous years, our former program advisor Linda Browning had been collecting job placement information for graduates. After Linda's retirement, and in the midst of the last year's re-organization, this task has not yet been picked up by another person.

The information was collected by self-reporting from students, and therefore may not be complete. It included employers and job titles, but not salaries. We have seen students placed at companies including Flir, Synopsis, Providence, Maxim, Lam Research, Qorvo,Intel, Tokyo Electron, and Peace Health. Job titles include Integration Technician, Test Engineering Technician, Biomedical Technician, Assembler, RF Technician, Manufacturing Technician, Engineer/Field Technician, and Field Service Engineer.

SECTION 3: REFLECTION ON ASSESSMENT OF STUDENT LEARNING

3A1. Learning Assessment Reports

X Multi Year Plan current and complete
X 2021 Summary Data Report submitted
X 2021 CTE Learning Assessment Report submitted

X 2021 TSA submitted (Please check if TSA submitted)

Program Notes: If any of the above forms above was not submitted, please explain why. Feel free to add additional notes/ context as appropriate.

The COVID-19 pandemic continues to create challenges for all aspects of instruction, including assessments. For the most part, assessments for 2021-22 will focus on the same outcomes that were used in previous years. Specific assessments are done using exams (for instance in EET 112 and EET 122), lab reports (EET 113 and EET 222), projects (EET 242), and oral presentations (EET 123 and EET 223).

The table below shows the results for the outcomes that were assessed in 2020-21.

Degree Outcome	Assessment Setting & Method	Success Rate
Predict and characterize analog circuit behavior by applying analog circuit analysis techniques.	**Final Exam for EET112. The exam for this class is intended to test this very skill. A sample exam is included.**	**94%**
Assess and create desired digital logic circuit outputs by employing digital logic methods of reduction and analysis.	**Final Exam for EET122. The exam for this class is intended to test this very skill.**	**84%**
Simulate, force, and measure DC and AC circuit quantities by using industry standard software and test equipment.	**Lab Final in EET113. A rubric was used in grading this experiment. The final may involve constructing or debugging an existing circuit. It will require the student to take measurements and use test equipment to verify proper circuit functionality.**	**95%**
Carry out instructions and	**EET242 Project. Results collected from**	**100%**

automate highly repetitive or monotonous tasks by utilizing programming skills.	**the lecture instructor.**	

Upon review, the EET SAC agreed that in general these results are acceptable and do not call for specific actions. The success rate for the Digital Logic Circuits (EET 122) outcome was slightly lower than the others, and has been noted by the instructors.

All of the outcomes listed above will also be assessed for 2021-22 as well. The following table includes other outcomes that were not assessed in 2020-21, but will be assessed in succeeding years.

Degree Outcome	Assessment Setting & Method	Next Assessment Year
Model and troubleshoot non-linear circuits and systems.	**Lab Reports from EET222. The lab reports are graded on a rubric. For this assessment only the data sections will be used.**	**2021-22**
Communicate effectively both at the individual level and within team settings.	**Oral Presentations in 3rd (EET123) and 6th (EET223) terms. These presentations will be graded using the same rubric. For this assessment only the areas of the rubric that pertain to communication will be evaluated.**	**2021-22**
Communicate in a medical setting using proper medical terminology.	**EET261 instructor needs to work out an assessment method for 2022-23.**	**2022-23**
Troubleshoot and operate electronic biomedical equipment.	**EET261 instructor needs to work out an assessment method for 2022-23.**	**2022-23**
Construct interfaces to electronically control mechanical systems.	**EET273 instructor needs to work out an assessment method for 2021-22.**	**2021-22**
Troubleshoot and debug alternative power generation systems by utilizing interdisciplinary skills.	**EET110 instructor needs to work out an assessment method for 2022-23.**	**2022-23**

Configure and identify different data and wireless communication systems.	**Need to work out a way to get assessment results from a CIS class.**	**2021-22**

3A2. Assessment Reflection

Please respond to the question below, which relates to your SAC's 2020-2021 Learning Assessment Report to the Learning Assessment Council (LAC).

Commendations: This assessment was related to a discussion that occurred after their Annual Program Update, tying assessment to that event. The SAC questioned whether the difference in 1st year students compared to 2nd year students might be due to COVID, a valid concern as teaching moved from F2F to remote. Instructor input helped the SAC see that a change in preparation for the EET classes, specifically math, might make a difference. This helped the SAC see collaboration with the Math SAC as a viable way to increase math foundations for their students.

Suggestions/Comments: The SAC may want to reassess this outcome again post collaboration with the Math SAC to see if this improves student learning in the EET classes. Disaggregation of the data further than just the final exam score may help the SAC to see trends in other areas addressed by different questions on the exam.

Questions: Are there any other changes to instruction within the EET classes that would also increase student success on the final exam? Maybe input from the advisory committee also?

SAC Response: The SAC definitely needs to follow up with the math department with the previously described strategies to improve students' preparedness. With regard to other changes to instruction to increase students' success on final examinations, instructors have been sharing experiences with each other through regularly scheduled department meetings to learn how their colleagues have been successful (or unsuccessful) with different strategies.

SECTION 4: ADDITIONAL ACHIEVEMENTS, CHALLENGES or OPPORTUNITIES

4A. Is there anything further you would like to share about your program's achievements at this time?

The EET program was able to successfully navigate the last two years of hardship from the Covid 19 pandemic. Not only were we able to survive, but we also thrived. The EET program applied for a grant of approximately $70,000 and used these funds to purchase lab test equipment for students to be able to do lab assignments from home, thus maintaining the quality of hands-on training of our students. In addition, we navigated the hardship of the pandemic with a lot of flexibility, keeping our students safe in remote classes.

4B. Are there any challenges not described above that you would like to note here?

Many hands-on-oriented programs lost a significant number of students or closed down due to the inability of maintaining the same quality of training as they had before the pandemic.

We are currently pioneering the offering of a long-distance cohort in addition to the on-campus cohorts. There are still challenges related to the reopening phase due to the pandemic: small class sizes, class cancelations, faculty coverage, keeping people safe while taking classes with us, and adjusting to the new PCC reorganizational changes. There are also still challenges related to finding a sustainable way for long-distance training for hands-on classes. We are in the process of improving our online training, finding new ways for assessments that are more suitable to online training, and developing new lab assignments as needed. We are determined to address all challenges as they come up.

4C. Do you see any opportunities in the near or long term that you would like to share?

The EET program is currently exploring the offering of two cohorts - one via long-distance and one in person. We plan to expand nationally and even internationally and secure new national and international collaborations. This, in itself, is a very big project that will take place over many years. Before we do this, we plan to improve the training that we offer by tapping into new emerging jobs and industries for our students.

SECTION 5: INDUSTRY AND EXTERNAL ACCREDITATION GUIDANCE

5A. Advisory Committee

Please check your Advisory Committee list at Spaces. If it is not up to date, submit the current list to academicaffairs@pcc.edu and we can update Spaces for you.

Advisory committee roster is current as of: February 2021

Please summarize feedback/input that you have received from your Advisory Committee over the past two years, and outline actions that resulted from this feedback.

The EET department meets with the advisory board twice a year. The attendance is very good and the meetings are sparkling with aliveness and participation. Our board members are really interested in the EET program and all its options. We consult with them on any significant change to make sure we still meet the needs of that respective industry. The advisory board recommended new developments in imaging equipment, biomedical Information, dental equipment and engineering design support. There was also feedback on possible developments in the energy efficiency area. They are all under consideration and significant progress was made to get the new developments ready for the formal approval process. At times we bring to their attention course changes for feedback or consult on the skills needed for certain jobs. The advisory board also provides feedback on the quality of our graduates who work for their companies or transferred to OIT into their 4-year BSEET degree. They all provided positive feedback - our students are very well prepared. Advisory board members also give support with mock interviews, co-op sites placements, guest speakers and we hope that when we will be back fully on campus our students will be able to continue doing field trips.

Are there any examples of successes you have had working with your Advisory Committee that you would like to highlight?

Some of the advisory board members provided feedback on the new curriculum developments highlighted above in the new areas of imaging, biomedical informatics and dental equipment until we got the course and curriculum changes to a viable format. They helped with securing new co-op sites and recommending other companies that could get involved in this new project. There are promises of possible equipment donations and student scholarships. Some even offered to share their industrial training curriculums that we could use as reference. Great collaborations that could also be marketed together.

Does the SAC have any suggestions for ways that the Program and Pathway Deans could support the SAC and the Advisory Committee to work together effectively?

The Program and Pathway Deans could review and expedite the approval of new curriculum/course changes. They could help us recruit new members as it comes to their attention. They can keep in mind our interests and facilitate collaboration in new emerging areas.

5B. Accreditation

- Do you have professional or programmatic accreditation? (This is a separate accreditation from PCC's institutional accreditation by NWCCU).

The EET program at PCC does not have an accreditation body.