

El Camino Community College

PROGRAM REVIEW 2019

Industrial Technology

Electronics and Computer Hardware Technology



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SECTION 1

Overview of the Program

El Camino's ECHT (Electronics and Computer Technology Program) is the only remaining, traditional legacy, regional community college general electronics program in existence west of the 57 freeway. This means for the most of the LA area, we are the only Electronics Program available to the students. The program provides students with marketable job skills in the traditional electronics and the computer hardware fields.

Demand for skilled Electronics Technicians is currently at an all time high. Many of our students are able to find jobs before they finish the program. This does make our program completion numbers look low, but it does provide for the students seeking a career in Electronics.

Another interesting aspect we're seeing is that companies are sending Engineers in the Industry to take classes in our program. While the Engineers may know theory, they lack the hands on experience and trouble shooting skills. We've received feedback from Industry that even just a few classes in our program really helps the Engineers and Managers do their job. This trend of seeing students from Industry take classes here is very likely to continue and increase in the near future.

In a way this program could be considered two different programs rolled into a single program. On one side is the Traditional Electronics Program aimed at the student wanting to become a Technician in the electronics field. On the other side is the Computer Hardware Technician dealing with Information Technology support.

The El Camino College's Electronic and Computer Hardware Technology Program faculty have integrated Project Based Learning into many of their courses. This seems to engage students in more critical thinking, thus developing skill sets that are very attractive to our regional employers. We have students currently participating in our program, traveling as far as the City of Commerce. This may not sound far, but consider the square mileage, and the number of other community colleges filling these students needs

ECC's Electronics and Computer Hardware Department Strengths:

- The, El Camino's Electronic Program has reputation that it prepares students for both the needs of local industry, in regards to electronic training, in entry level jobs, as well in advanced skill upgrades.
- The ECHT department offers sixteen general and specialized electronics courses. Many of these courses are offered every semester.
- Offers students options: transfer, skill upgrade, career exploratory.
- Our students can transfer to local CSU's Industrial or Engineering Technology programs, as well pursue either an Associates or Certificates in the program with academic "rigor" and affordable cost (CSULB, CSULA, Cal Poly Pomona, Arizona State University, and the Oregon Institute of Technology)

- We provide critical job training to our local and regional partners that are now requiring their employees to pursue either a certificate, or eventually an Associate's Degree, as a condition of employment
- Two areas of study emphasize either general electronics technology or digital systems technology, which could lead to a program or "stackable" certificates and or an Associate Degrees.
- Most students will be able to complete various certificates and a possible AS degree within a three year period. There're two distinct pathways of study for our students.
- Other local colleges have closed or discontinued their electronics related programs, the ECHT service area has expanded to include areas previously served by Santa Monica College, Long Beach City College, and Harbor College. Capacity issues will need to be considered to meet the larger service area.
- The ECHT Program provides both day and night programs to meet the needs of full-time, part-time, and returning students.
- One very strong aspect of this program is that it promotes critical thinking and problem solving. Students are taught systematic approaches to diagnose, troubleshoot, repair, and maintain all manner of electronic systems, components, and various classifications of electronic assemblies.

A) Describe the degrees and/or certificates offered by the program.

The certificates are stackable, that is should a student chose to obtain a lower level certificate, the option is always open for them to obtain a higher level certificate. This helps the student working toward a higher level who is working in the field. As they progress toward a degree or higher certificate, they can use the lower level certificates they earn along the way to show progress toward their objective, which could result in a pay increase.

Electronics Technician Certificate of Accomplishment:

ECHT-11	Introduction to Electronics (3)
ECHT-22	Basic Electronic Fabrication (3)
ECHT-110	Introduction to Direct and Alternating Current Circuits (3)
ECHT-120	Semiconductor Circuits I (3)
ECHT-140	Computer Systems and Hardware Technology (4) ***
Total = 16 Units	

Robotics Certificate of Accomplishment:

ECHT-11	Introduction to Electronics (3)
ECHT-22	Basic Electronic Fabrication (3)
ECHT-130	Digital Systems and Computer Logic (3)
ECHT-191	Introduction to Microprocessors and Interfacing (3)
Total = 12 Units	

CompTIA Computer Hardware Technician Certificate of Accomplishment:

ECHT-144	CompTIA A+ Certification Preparation for Computer HW Systems (4)
ECHT-146	CompTIA Network+ Certification Prep for Comp. HW Systems (4) ***

ECHT-148 CompTIA Security+ Certification Prep for Comp. HW Systems (4) ***
Total = 12 Units

Computer Hardware Technician Certificate of Accomplishment:

ECHT-11 Introduction to Electronics (3)
ECHT-140 Computer Systems and Hardware Technology I (4) ***
ECHT-142 Computer Systems and Hardware Technology II (4) ***
ECHT-144 CompTIA A+ Certification Preparation for Computer HW Systems (4)***
Total = 15 Units

Electronics Engineering Technician Certificate of Achievement:

ECHT-11 Introduction to Electronics (3)
ECHT-22 Basic Electronic Fabrication (3)
ECHT-110 Introduction to Direct and Alternating Current Circuits (3)
ECHT-120 Semiconductor Circuits I (3)
ECHT-130 Digital Systems and Computer Logic (3)
ECHT-140 Computer Systems and Hardware Technology (4) ***
Plus 2 courses from:
ECHT-95 Cooperative Work Experience Education (2 – 4)
ECHT-142 Computer Systems and Hardware Technology II (4) ***
ECHT-144 CompTIA A+ Certification Prep for Computer HW Systems (4) ***
ECHT-191 Introduction to Microprocessors and Interfacing (3)
Total = 27 – 30 Units

Computer Hardware Technician Certificate of Achievement:

ECHT-11 Introduction to Electronics (3)
ECHT-22 Basic Electronic Fabrication (3)
ECHT-110 Introduction to Direct and Alternating Current Circuits (3)
ECHT-130 Digital Systems and Computer Logic (3)
ECHT-140 Computer Systems and Hardware Technology (4) ***
ECHT-142 Computer Systems and Hardware Technology II (4) ***
ECHT-144 CompTIA A+ Certification Prep for Computer HW Systems (4) ***
Plus 2 courses from:
ECHT-95 Cooperative Work Experience Education (2 – 4)
ECHT-191 Introduction to Microprocessors and Interfacing (3)
CIS-13 Computer Information Systems (3)
CIS-40 Personal Computer Operations (3)
Total = 29 – 31 Units

AS Degree, Electronics Technology Option:

ECHT-11 Introduction to Electronics (3)
ECHT-22 Basic Electronic Fabrication (3)
ECHT-110 Introduction to Direct and Alternating Current Circuits (3)
ECHT-120 Semiconductor Circuits I (3)
ECHT-122 Semiconductor Power Devices (3)
ECHT-124 Operational Amplifiers and Linear Devices (3)

ECHT-130 Digital Systems and Computer Logic (3)
 ECHT-140 Computer Systems and Hardware Technology (4) ***
 Plus 1 course from:
 ECHT-95 Cooperative Work Experience Education (2 – 4)
 ECHT-142 Computer Systems and Hardware Technology II (4) ***
 ECHT-144 CompTIA A+ Certification Prep for Computer HW Systems (4) ***
 ECHT-191 Introduction to Microprocessors and Interfacing (3)
 Total = 27 – 29 Units

AS Degree, Computer Technology Option:

ECHT-11 Introduction to Electronics (3)
 ECHT-22 Basic Electronic Fabrication (3)
 ECHT-110 Introduction to Direct and Alternating Current Circuits (3)
 ECHT-130 Digital Systems and Computer Logic (3)
 ECHT-140 Computer Systems and Hardware Technology (4) ***
 ECHT-142 Computer Systems and Hardware Technology II (4) ***
 ECHT-144 CompTIA A+ Certification Prep for Computer HW Systems (4) ***
 Plus 2 courses from:
 ECHT-95 Cooperative Work Experience Education (2 – 4)
 ECHT-191 Introduction to Microprocessors and Interfacing (3)
 CIS-13 Computer Information Systems (3)
 CIS-40 Personal Computer Operations (3)
 Total = 29 – 31 Units

*** = All 4 unit computer classes will be changed to 3 units in Fall 2020.

B) Explain how the program fulfills the college's mission and aligns with the strategic initiatives.

The mission of El Camino College is to make a positive difference in people's lives by providing a comprehensive educational programs and services that promote student learning and success in collaboration with our diverse communities.

STRATEGIC INITIATIVES

1. Student Learning:

A number of resources are used to improve student learning. Lectures make use of the overhead projector, videos, and demos projected to the screen. The labs are supported with the test equipment found in industry. In addition we make use of simulation software (Multisim) to enable the students to test and understand a simulation of the circuit.

2. Student Success and Support:

The ECHT-11, Beginning Electronics Class, is the class where the students have the most problems. To help overcome the initial problems we have a tutor to help the students

with the concepts and math. In order to meet the student's busy schedules, this is offered at different times and dates.

3. Collaboration:

We are working with the Contextual Math Group to help develop Math Courses that will help the students better learn the math behind the electronics problems. In addition we are working with the Internship Program to provide a path to employment for students. Also, we work with Northrup Grumman to provide high reliability soldering training required by industry.

4. Community Responsiveness:

We continue to have contacts with industry throughout the year that are looking to hire students. These job offers are passed to the students. In addition we are talking with industry to make sure that the skills we offer are in line with their needs. In addition we are working with Northrup Grumman to help students learn high reliability soldering skills. Additional partners will be added as the internship program is brought online.

5. Institutional Effectiveness:

As stated in #4, we are talking with the people in industry to make sure that we are offering the skills the industry requires. One very special area in terms of increasing student retention is offering tutoring services for the beginning students. The highest drop out rate appears in the beginning classes and tutoring helps the students get through this initial hurdle.

6. Modernization:

The Computer Program is always working to update the hardware and software to match the current technology used in industry. We are part of the Microsoft Program that allows us to have the latest version of software for our classes. As for the Traditional Electronics, we watch the technology developments and make changes as needed.

C) Discuss the status of recommendations from your previous program review.

1. **Recommendation:** Hire A Replacement Full Time Electronics Instructor
Status: Robert Diaz was hired as a Full Time Instructor in the Fall of 2016
Notes/Comments: Sadly, our Full Time Computer Instructor passed away in the Spring of 2017, thus leaving us with only 2 Full Time instructors.
2. **Recommendation:** Provide a one time allocation of \$100,000 to upgrade the equipment in the Computer Repair Program.
Status: Edison did provide \$100,000 for upgrade of our equipment. Part of this did go toward computer equipment.

Notes/Comments: The equipment was purchased.

3. **Recommendation:** The College provides \$5,000/year for facility to attend conferences to stay relevant to our technology.
Status: Incomplete
Notes/Comments: This puts our Facility at a disadvantage because they never receive the extra training and exposure offered.
4. **Recommendation:** Provide for at least 1 full size classroom/laboratory for labs and demonstrations. This would provide better student understanding and success.
\$100,000.
Status: Incomplete
Notes/Comments: The lack of space will limit future expansion of the program.
5. **Recommendation:** Raise the “overhead” cabinets in all electronics classrooms. Students have problems with eye washes and cleaning under the present configuration. This represents a safety issue for the collage. \$5,000
Status: Incomplete
Notes/Comments: This is a safety issue that should not be ignored.
6. **Recommendation:** Purchase Telecommunications and dedicated Electronics Test Equipment (Lab Volt for 24 students)
Status: Incomplete
7. **Recommendation:** Prepare to replace the retiring full-time electronic technician.
Status: Replacement hired.
8. **Recommendation:** Develop a “pool” of qualified part-time faculty with very specific specialties.
Status: While we do have a small “pool” of possible part-time instructors, this pool is untested and the list is growing old.
Notes/Comments: We need to update our list to see if the people are still interested.
9. **Recommendation:** Hire more “Tech Arts” tutors for days/nights and some weekends to provide student and instructional support.
Status: We currently have 1 tutor for the ECHT-11 classes.
10. **Recommendation:** Offer courses that could lead to an FCC General Class License as well as Special Endorsements and Renewals.
Status: Incomplete

SECTION 2

Analysis of Research Data

A) Head count of students in the program

For the academic year 2017 to 2018 there were 275 students enrolled in the program. When broken down by ethnicity and sex, we see the following:

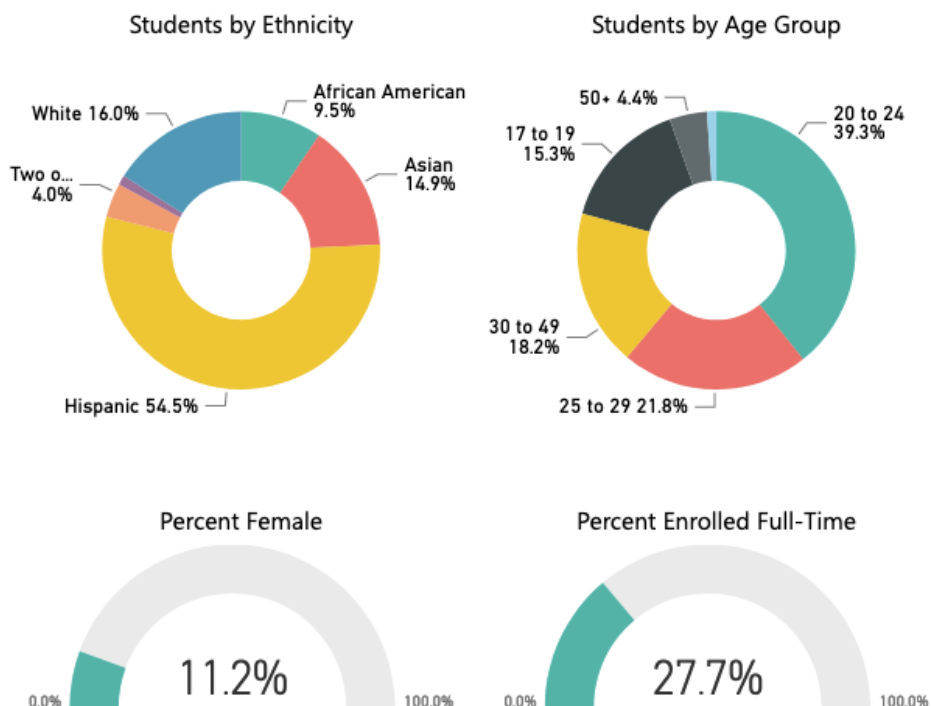
Group	ECHT	ECC
Hispanic	54.5%	51.9%
White	16.0%	12.9%
Asian	14.9%	13.6%
African American	9.5%	12.7%
Other/Mixed	5.1%	8.9%
Female	11.2%	50.1%

As far as representation by ethnicity, the ECHT program is generally close to the ECC population. However, if we examine this by sex, females are underrepresented by the program.

275

Students

Program Demographics displayed for the selected program/term combination in the most recent completed academic year (2017-18).



Increasing females in the program will be critical for the future. Thankfully we have WIT (Women In Technology) and the Society of Woman Engineers to help act as an outreach and an encouragement to women who are considering or are in the program. For the future this means working closer with WIT plus the Society of Woman Engineers and encouraging female students to be in contact with both.

B) Course grade distribution

Semester	Class	A	B	C	D	F	W	Total
2017 Summer	ECHT-11	6	3	3	0	1	1	14
2017 Summer	ECHT-95	5	3	0	0	0	0	8
2017 Fall	ECHT-11	19	11	5	1	2	11	49
2017 Fall	ECHT-22	11	0	1	0	1	5	18
2017 Fall	ECHT-110	9	5	2	2	0	8	26
2017 Fall	ECHT-120	11	3	2	0	0	2	18
2017 Fall	ECHT-130	16	3	0	0	0	0	19
2017 Fall	ECHT-140	9	7	0	0	1	4	21
2017 Fall	ECHT-146	11	1	0	0	0	2	14
2018 Spring	ECHT-11	9	12	9	0	4	10	44
2018 Spring	ECHT-22	5	6	1	1	6	7	26
2018 Spring	ECHT-110	5	4	2	1	2	1	15
2018 Spring	ECHT-124	16	3	1	0	0	3	23
2018 Spring	ECHT-130	16	2	0	0	0	2	20
2018 Spring	ECHT-140	9	3	1	0	0	1	14
2018 Spring	ECHT-142	6	1	0	0	0	9	16
2018 Spring	ECHT-191	7	5	2	0	0	1	15
TOTALS		170	72	29	5	17	67	360
Percent		47.2	20.0	8.1	1.4	4.7	18.6	100

Overall, 75.3% of the students pass the classes with a C or higher, while 6.1% of the students end up with a D or lower and 18.6% drop out. The highest numbers of D, F, and W appear in the beginning Electronics Classes. We are working with tutors to help reduce that amount. The details for each class are as follows:

Grade Distribution

Course	Term	Instructional Method	A	B	C	D	F	Pass	No Pass	W	Total	Success Rate	Retention Rate
EAEC-55/ABC	2013/SP	On Campus	2	0	0	0	0	0	0	0	2	100.0%	100.0%
ECHT-11	2014/FA	On Campus	32	11	8	2	6	0	0	20	79	64.6%	74.7%
ECHT-11	2014/SU	On Campus	4	3	2	1	1	0	0	6	17	52.9%	64.7%
ECHT-11	2015/FA	On Campus	14	10	12	3	10	0	0	13	62	58.1%	79.0%
ECHT-11	2015/SP	On Campus	17	11	7	3	3	0	0	11	52	67.3%	78.8%
ECHT-11	2015/SU	On Campus	7	5	1	2	0	0	0	0	15	86.7%	100.0%
ECHT-11	2016/FA	On Campus	26	11	3	1	8	0	0	16	65	61.5%	75.4%
ECHT-11	2016/SP	On Campus	14	10	7	3	4	0	0	7	45	68.9%	84.4%
ECHT-11	2016/SU	On Campus	3	4	1	0	0	0	0	7	15	53.3%	53.3%
ECHT-11	2017/FA	On Campus	19	11	5	1	2	0	0	11	49	71.4%	77.6%
ECHT-11	2017/SP	On Campus	10	8	4	3	3	0	0	14	42	52.4%	66.7%
ECHT-11	2017/SU	On Campus	6	3	3	0	1	0	0	1	14	85.7%	92.9%
ECHT-11	2018/SP	On Campus	9	12	9	0	4	0	0	10	44	68.2%	77.3%
ECHT-110	2014/FA	On Campus	2	3	4	1	1	0	0	5	16	56.3%	68.8%
ECHT-110	2015/FA	On Campus	3	5	3	2	2	0	0	3	18	61.1%	83.3%
ECHT-110	2015/SP	On Campus	10	1	2	1	1	0	0	7	22	59.1%	68.2%
ECHT-110	2016/FA	On Campus	5	3	2	3	0	0	0	2	15	66.7%	86.7%
ECHT-110	2016/SP	On Campus	7	1	2	0	2	0	0	0	12	83.3%	100.0%
ECHT-110	2017/FA	On Campus	9	5	2	2	0	0	0	8	26	61.5%	69.2%
ECHT-110	2018/SP	On Campus	5	4	2	1	2	0	0	1	15	73.3%	93.3%
ECHT-120	2014/FA	On Campus	11	1	0	0	0	0	0	2	14	85.7%	85.7%
ECHT-120	2015/FA	On Campus	8	5	2	0	0	0	0	1	16	93.8%	93.8%
ECHT-120	2016/FA	On Campus	8	3	2	0	1	0	0	2	16	81.3%	87.5%
ECHT-120	2017/FA	On Campus	11	3	2	0	0	0	0	2	18	88.9%	88.9%
ECHT-122	2015/SP	On Campus	5	3	1	0	0	0	0	2	11	81.8%	81.8%
ECHT-122	2017/SP	On Campus	7	12	3	0	0	0	0	1	23	95.7%	95.7%
ECHT-124	2016/SP	On Campus	22	6	0	0	0	0	0	0	28	100.0%	100.0%
ECHT-124	2018/SP	On Campus	16	3	1	0	0	0	0	3	23	87.0%	87.0%
ECHT-130	2014/FA	On Campus	12	3	2	0	1	0	0	3	21	81.0%	85.7%
ECHT-130	2015/FA	On Campus	21	4	1	0	0	0	0	2	28	92.9%	92.9%

Grade Distribution

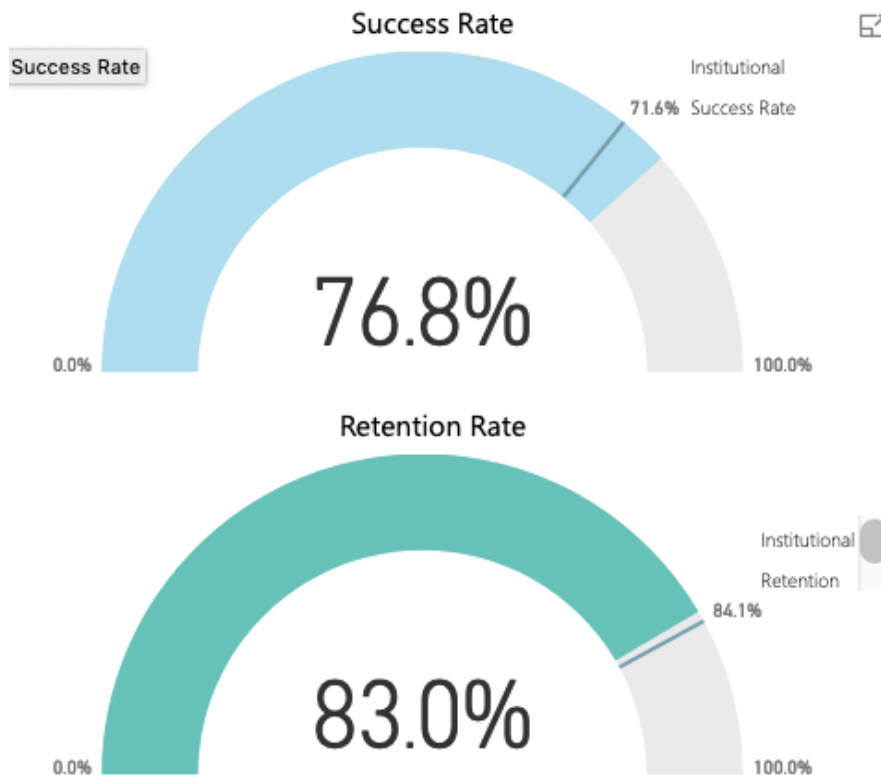
Course	Term	Instructional Method	A	B	C	D	F	Pass	No Pass	W	Total	Success Rate	Retention Rate
ECHT-130	2015/SP	On Campus	13	2	1	0	0	0	0	3	19	84.2%	84.2%
ECHT-130	2016/FA	On Campus	17	0	0	0	0	0	0	0	17	100.0%	100.0%
ECHT-130	2016/SP	On Campus	15	2	0	0	1	0	0	1	19	89.5%	94.7%
ECHT-130	2017/FA	On Campus	16	3	0	0	0	0	0	0	19	100.0%	100.0%
ECHT-130	2017/SP	On Campus	17	3	2	0	1	0	0	2	25	88.0%	92.0%
ECHT-130	2018/SP	On Campus	16	2	0	0	0	0	0	2	20	90.0%	90.0%
ECHT-140	2014/FA	On Campus	0	7	5	5	1	0	0	9	27	44.4%	66.7%
ECHT-140	2015/FA	On Campus	3	10	4	0	1	0	0	6	24	70.8%	75.0%
ECHT-140	2015/SP	On Campus	3	6	4	0	0	0	0	4	17	76.5%	76.5%
ECHT-140	2016/FA	On Campus	2	4	4	1	0	0	0	3	14	71.4%	78.6%
ECHT-140	2016/SP	On Campus	2	6	2	0	0	0	0	0	10	100.0%	100.0%
ECHT-140	2017/FA	On Campus	9	7	0	0	1	0	0	4	21	76.2%	81.0%
ECHT-140	2017/SP	On Campus	2	6	1	0	3	0	0	1	13	69.2%	92.3%
ECHT-140	2018/SP	On Campus	9	3	1	0	0	0	0	1	14	92.9%	92.9%
ECHT-142	2014/FA	On Campus	1	3	5	0	3	0	0	6	18	50.0%	66.7%
ECHT-142	2016/FA	On Campus	8	4	4	0	1	0	0	0	17	94.1%	100.0%
ECHT-142	2018/SP	On Campus	6	1	0	0	0	0	0	2	9	77.8%	77.8%
ECHT-144	2015/SP	On Campus	4	3	1	5	1	0	0	2	16	50.0%	87.5%
ECHT-144	2017/SP	On Campus	12	6	4	0	1	0	0	2	25	88.0%	92.0%
ECHT-146	2015/FA	On Campus	11	4	3	1	2	0	0	3	24	75.0%	87.5%
ECHT-146	2017/FA	On Campus	11	1	0	0	0	0	0	2	14	85.7%	85.7%
ECHT-148	2016/SP	On Campus	9	0	2	1	1	0	0	3	16	68.8%	81.3%
ECHT-191	2015/SU	On Campus	8	6	2	0	0	0	0	0	16	100.0%	100.0%
ECHT-191	2016/SU	On Campus	10	2	1	0	0	0	0	0	13	100.0%	100.0%
ECHT-191	2017/SP	On Campus	11	6	3	0	0	0	0	3	23	87.0%	87.0%
ECHT-191	2018/SP	On Campus	7	5	2	0	0	0	0	1	15	93.3%	93.3%
ECHT-22	2014/FA	On Campus	13	2	1	0	1	0	0	3	20	80.0%	85.0%
ECHT-22	2015/FA	On Campus	14	4	0	0	1	0	0	5	24	75.0%	79.2%
ECHT-22	2015/SP	On Campus	19	3	0	0	0	0	0	3	25	88.0%	88.0%

Grade Distribution

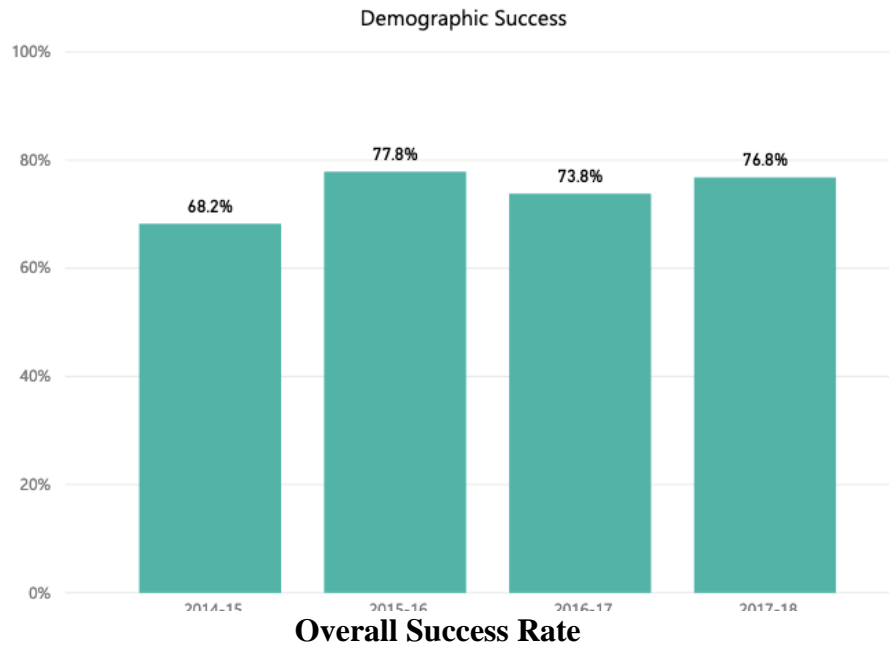
Course	Term	Instructional Method	A	B	C	D	F	Pass	No Pass	W	Total	Success Rate	Retention Rate
ECHT-22	2015/SP	On Campus	19	3	0	0	0	0	0	3	25	88.0%	88.0%
ECHT-22	2016/FA	On Campus	11	0	1	1	5	0	0	4	22	54.5%	81.8%
ECHT-22	2016/SP	On Campus	13	4	1	1	0	0	0	3	22	81.8%	86.4%
ECHT-22	2017/FA	On Campus	11	0	1	0	1	0	0	5	18	66.7%	72.2%
ECHT-22	2017/SP	On Campus	12	2	0	1	0	0	0	7	22	63.6%	68.2%
ECHT-22	2018/SP	On Campus	5	6	1	1	6	0	0	7	26	46.2%	73.1%
ECHT-95	2017/SU	On Campus	5	3	0	0	0	0	0	0	8	100.0%	100.0%
ECHT-95ABCD	2014/SU	On Campus	6	0	2	0	0	0	0	0	8	100.0%	100.0%
ECHT-95ABCD	2015/SP	On Campus	6	0	0	0	0	0	0	0	6	100.0%	100.0%
ECHT-99	2016/FA	On Campus	2	0	0	0	0	0	0	0	2	100.0%	100.0%
ECHT-99	2017/SP	On Campus	1	0	0	0	0	0	0	0	1	100.0%	100.0%
ECHT-99ABC	2014/FA	On Campus	1	0	0	0	0	0	0	1	2	50.0%	50.0%

C) Success rates

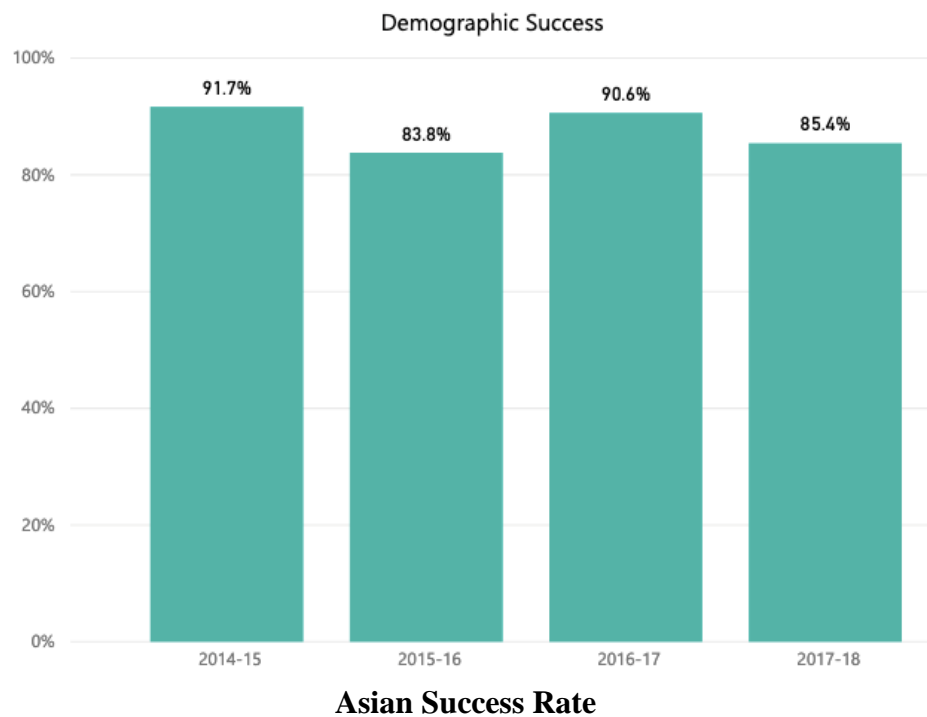
The overall success rate for the ECHT program is 76.8%, which is over 5% higher than the ECC rate of 71.6%. A detailed look at each class reveals that the beginning students have the most trouble. To help overcome that issue, we have a tutor for the ECHT-11 classes. This has proven effective with students who show up for tutoring, because those who take the time to go to tutoring do well on the test, but if the student doesn't show up to the tutoring sessions, this does not help them.



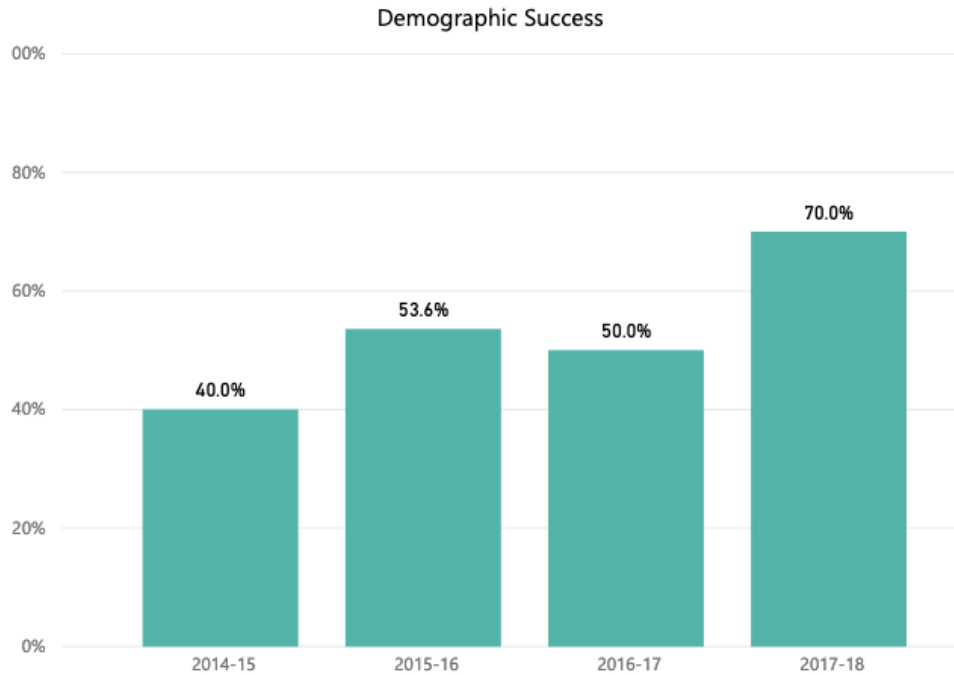
Program Success rates are shown for the demographic groups and terms selected.



As a whole, the program is showing a slight improvement over the years as to improving the success rates. The average for the four years is 78.15%. When broken into the different groups we see the following:

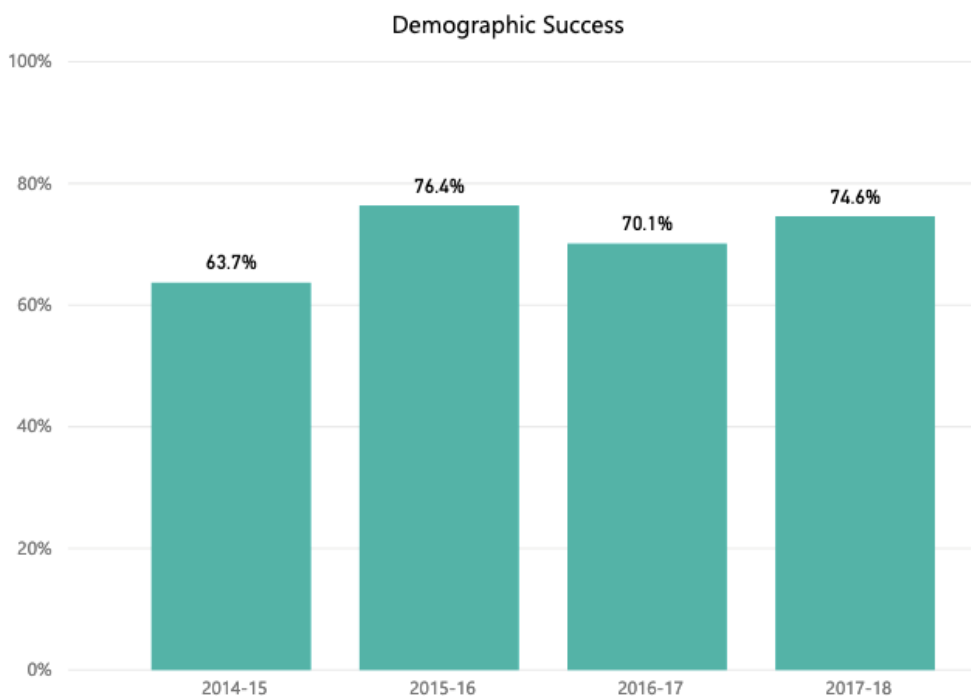


Asian students do very well with an average of 87.875% success rate.



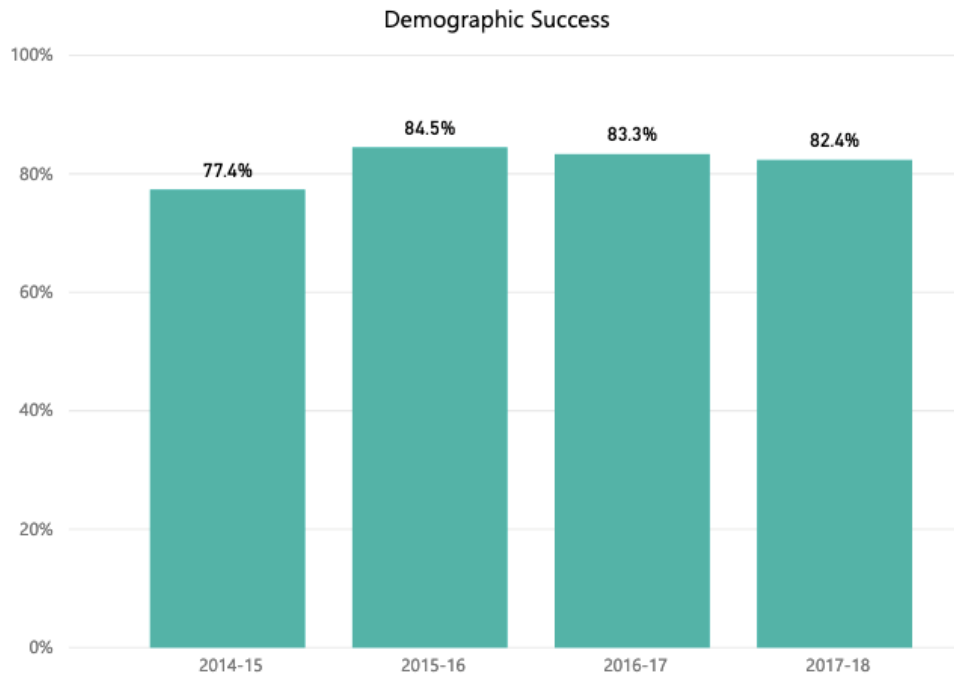
Black Success Rate

Blacks come in with a success rate of 53.4%. However adding a tutoring session for ECHT-11 students has helped improve the overall success rate for African American students. We were not able to offer ECHT-11 tutoring in Fall 2019. We are incorporating new labs and handouts to help students, but because we don't have the data for the Fall 2018 to Spring 2019, we can't be sure how much of an improvement this will make.



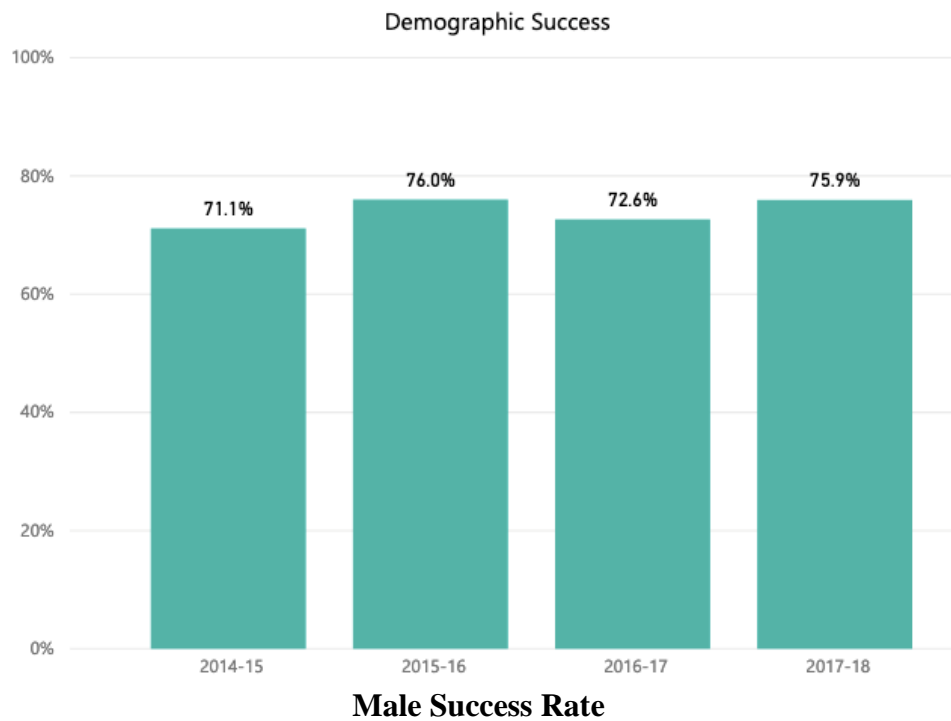
Hispanic Success Rate

Hispanic students come in at 71.2% success rate. This is still under the average, but is close to the average. We see a slight improvement over the years with Hispanic students. Tutoring the ECHT-11 students has helped some, but not as much as the black students.

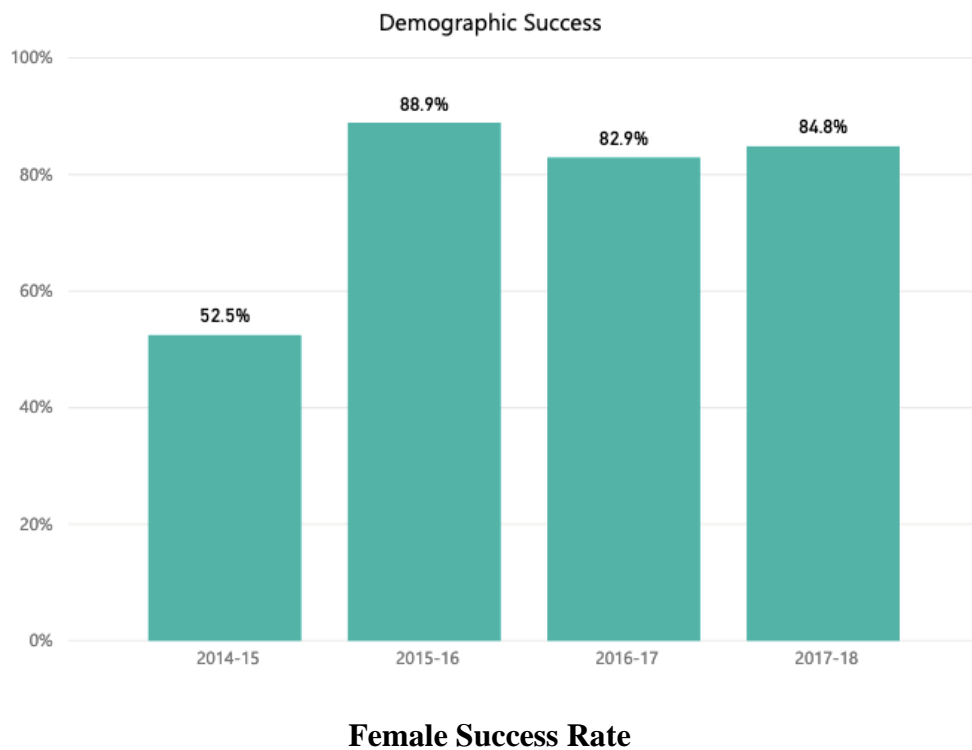


White Success Rate

White students are at an 81.9% success rate.



Looking at just the male students we see the overall success rate is 73.9%.



In contrast, the female students have an average of 77.275% success rate.

We will continue to improve the success rate for all groups. Tutoring is now being offered for two of the beginning classes, ECHT-11 and ECHT-140. Getting the students through the basic material can make or break them in being successful in more advanced classes.

The past textbook for ECHT-11 is being replaced with an internal textbook designed for ECHT-11. It is currently in first print for Fall 2019. The expected cost is around \$12 from the bookstore. This will help with students who can't afford the more expensive textbooks.

Another area to help the students improve is in the form of short videos. Students will be able to copy the videos onto a memory stick to watch at home. However, the textbook and improved labs for ECHT-11 take first priority and the videos will be started in Fall 2020.

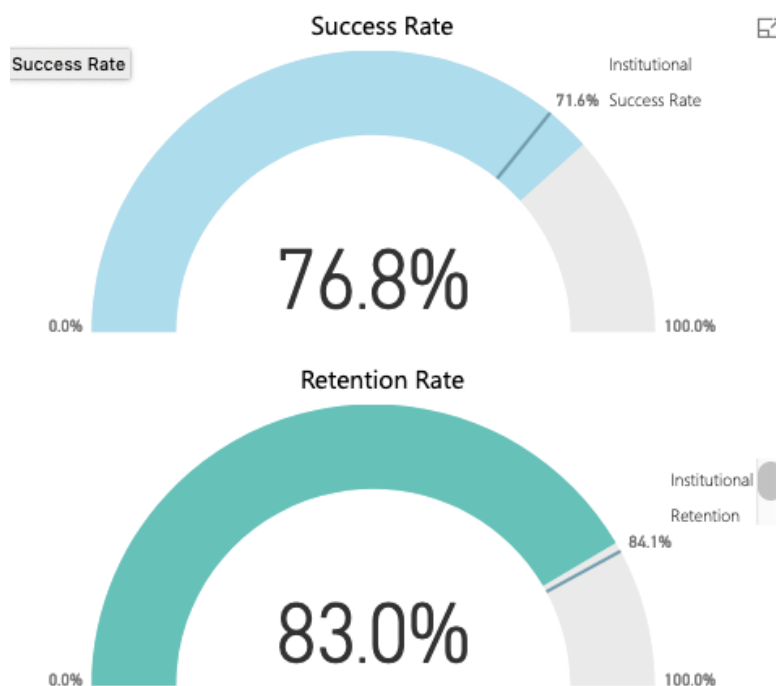
The biggest improvements need to be made with black students. Our aim is to keep or improve on the 2017-2018 year of 70%. We'd like to hit 75% or better by the next Program Review.

Hispanic students are closer to the average than blacks, but there's room for improvement.

Discuss your program's success rates, addressing any issues of student equity and how your program is addressing any performance gaps. Describe any demographic success characteristics and set a success standard for your program.

We'd like to hit 75% or better by the next Program Review.

D) Retention rates - *if applicable, include retention based on placement method*

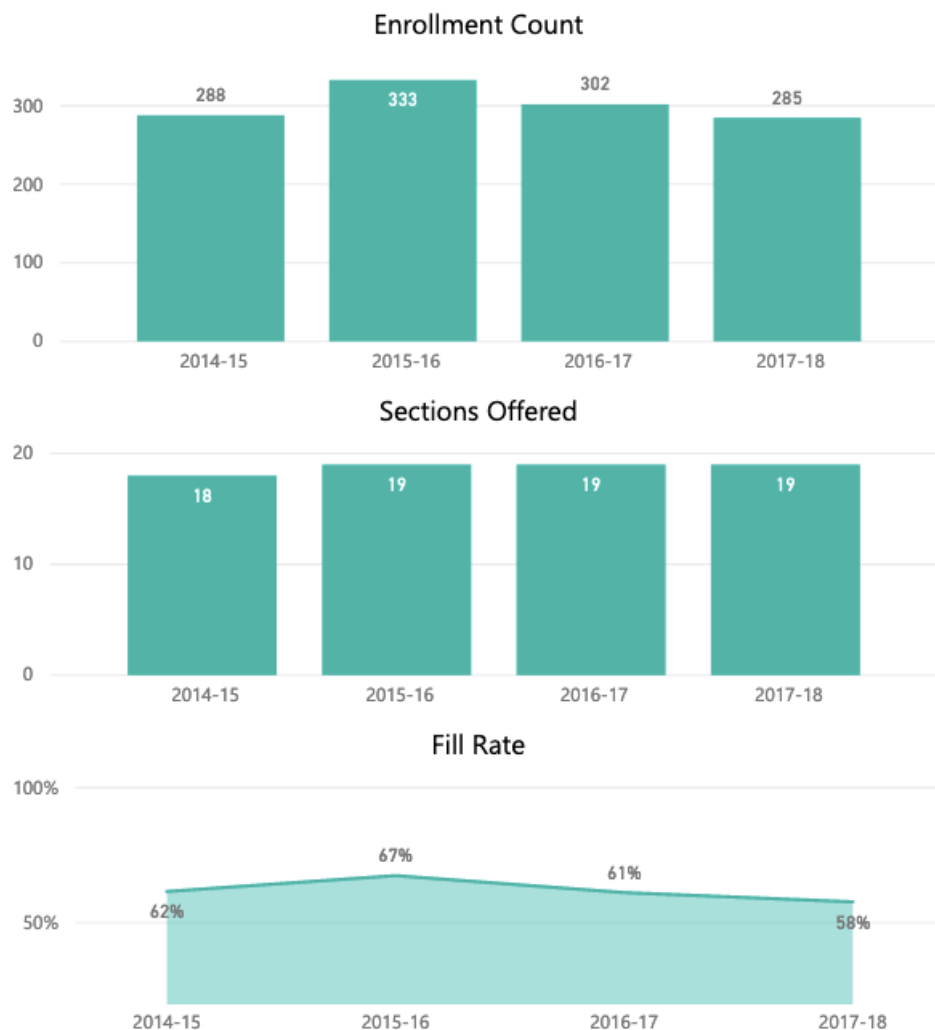


The overall retention rate for the program is 83.0%. This is 1.1% under ECC's number of 84.1%

E) A comparison of success and retention rates in face-to-face classes with distance education classes

N/A: We do not offer Distance Education Classes.

F) Enrollment statistics with section and seat counts and fill rates



Each classroom can hold a maximum of 26 students. This is limited by the number of fixed desks in the room and the limited amount of lab equipment. The move from the old facility to the new facility resulted in the loss of 2 classrooms, as well as floor space in each classroom. Assuming a Monday/Wednesday and a Tuesday/Thursday for night classes, this would limit us to a maximum of 6 night classes per semester.

The good news is that we are not at maximum capacity and the data suggests that we'll remain at around the current capacity for the near future. However any attempt to expand the program with additional classes will be hurting for space and time slots. Hopefully when Fire and Police training move to a new facility additional classroom space will open up.

If we have additional programs, like the intern program that results in additional students we could on average add about 8 to 10 students per class. However this varies on the day/time and class offered. Adding the MTEC-70 and MTEC-75 classes to the program will require placing these classes in the afternoon or AM time slots, because the night slots are mostly maxed out.

G) Scheduling of courses (day vs. night, days offered, and sequence)

As listed in the schedule of classes:

Fall 2016: 3 Day, 1 Afternoon, 6 Night

ECHT-11	D	M/W
ECHT-11	D	Tu/Th
ECHT-110	D	M/W
ECHT-140	A	M/W
ECHT-11	N	Tu/Th
ECHT-22	N	M/W
ECHT-120	N	M/W
ECHT-130	N	Tu/Th
ECHT-140	N	Tu/Th
ECHT-142	N	M/W

Spring 2017: 2 Day, 2 Afternoon, 5 Night

ECHT-11	D	M/W
ECHT-130	D	Tu/Th
ECHT-22	A	M/W
ECHT-140	A	M/W
ECHT-11	N	Tu/Th
ECHT-110	N	M/W
ECHT-122	N	M/W
ECHT-144	N	M/W
ECHT-191	N	Tu/Th

Summer 2017: 1 Night

ECHT-11	N	M/Tu/W/Th
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Fall 2017: 3 Day, 1 Afternoon, 6 Night

ECHT-11	D	M/W
ECHT-11	D	Tu/Th
ECHT-110	D	M/W
ECHT-140	A	M/W

ECHT-11	N	Tu/Th
ECHT-22	N	M/W
ECHT-120	N	M/W
ECHT-130	N	Tu/Th
ECHT-142	N	M/W
ECHT-146	N	Tu/Th

Spring 2018: 2 Day, 1 Afternoon, 6 Night

ECHT-11	D	M/W
ECHT-130	D	Tu/Th
ECHT-22	A	M/W
ECHT-11	N	Tu/Th
ECHT-110	N	M/W
ECHT-124	N	M/W
ECHT-140	N	Tu/Th
ECHT-142	N	M/W
ECHT-191	N	Tu/Th

Summer 2018: 2 Night

ECHT-11	N	M/Tu/W/Th
ECHT-122	N	M/Tu/W/Th

Fall 2018: 2 Day, 2 Afternoon, 5 Night

ECHT-11	D	Tu/Th
ECHT-110	D	M/W
ECHT-11	A	M/W
ECHT-140	A	M/W
ECHT-11	N	Tu/Th
ECHT-22	N	M/W
ECHT-120	N	M/W
ECHT-130	N	Tu/Th
ECHT-146	N	Tu/Th

Spring 2019: 2 Day, 1 Afternoon, 6 Night

ECHT-11	D	M/W
ECHT-130	D	Tu/Th
ECHT-22	A	M/W
ECHT-11	N	Tu/Th
ECHT-110	N	M/W
ECHT-122	N	M/W
ECHT-140	N	Tu/Th
ECHT-142	N	M/W
ECHT-191	N	Tu/Th

Summer 2019: 2 Night

ECHT-11	N	M/Tu/W/Th
ECHT-144	N	M/Tu/W/Th

Fall 2019: 2 Day, 1 Afternoon, 5 Night

ECHT-11	D	Tu/Th
ECHT-110	D	M/W
ECHT-140	A	M/W
ECHT-11	N	Tu/Th
ECHT-120	N	M/W
ECHT-130	N	Tu/Th
ECHT-146	N	Tu/Th
ECHT-22	N	M/W

The majority of are classes are offered at night to better cater to the working students. This provides a path to a better paying job for the students. Students not working prefer the day classes, but are able to come to the night classes. Working students are not able to come to the day classes and would be locked out of our program.

H) Improvement Rates (Course success by placement method, if applicable)

N/A

I) Additional data compiled by faculty.

None

J) Enumerate any related recommendations.

- 1: Promote the program to potential students through better advertising.
- 2: Work more with WIT to attract more female students.
- 3: Provide all the students a copy of the program and options offered.

SECTION 3

Curriculum

Review and discuss the curriculum work done in the program during the past four years, including the following:

- A) Provide the curriculum course review timeline to ensure all courses are reviewed at least once every 6 years.

ELECTRONICS AND COMPUTER HARDWARE TECHNOLOGY CURRICULUM – 2015-2021						
COURSE	2015-2016	2016-2017	2017-2018	2018-2019	2019-2020	2020-2021
Electronics and Computer Hardware Technology 11	2 Year CTE Review		2 Year CTE Review		2 Year CTE Review	
Electronics and Computer Hardware Technology 22	2 Year CTE Review		2 Year CTE Review		2 Year CTE Review	
Electronics and Computer Hardware Technology 110	2 Year CTE Review		2 Year CTE Review		2 Year CTE Review	
Electronics and Computer Hardware Technology 120	2 Year CTE Review		2 Year CTE Review		2 Year CTE Review	
Electronics and Computer Hardware Technology 122	2 Year CTE Review		2 Year CTE Review		2 Year CTE Review	
Electronics and Computer Hardware Technology 124	2 Year CTE Review		2 Year CTE Review		2 Year CTE Review	
Electronics and Computer Hardware Technology 130		2 Year CTE Review		2 Year CTE Review		2 Year CTE Review
Electronics and Computer Hardware Technology 140		2 Year CTE Review		From: 4 units To: 3 units		2 Year CTE Review
Electronics and Computer Hardware Technology 142		2 Year CTE Review		From: 4 units To: 3 units Title change		2 Year CTE Review
Electronics and Computer Hardware Technology 144		2 Year CTE Review		From: 4 units To: 3 units		2 Year CTE Review
Electronics and Computer Hardware Technology 146		2 Year CTE Review		From: 4 units To: 3 units		2 Year CTE Review
Electronics and Computer Hardware Technology 148		2 Year CTE Review		From: 4 units To: 3 units		2 Year CTE Review
Electronics and Computer Hardware Technology 191		2 Year CTE Review		2 Year CTE Review		2 Year CTE Review
Electronics and Computer Hardware Technology 95						
Electronics and Computer Hardware Technology 99						

- B) Explain any course additions to current course offerings.

All the computer classes (ECHT-140, ECHT-142, ECHT-144, ECHT-146, & ECHT-148) will be changed from 4 units to 3 units in the Fall of 2020. This reduces the cost for the students and allows us to have Part Time Instructors teach 2, rather than 1 class.

- C) Explain any course deletions and inactivations from current course offerings.

ECH- 62 Introduction to the Electric Power Industry and ECHT-64 Electric Power Industry Safety were both deleted due to the lack of interest and need for this subject mater.

D) Describe the courses and number of sections offered in distance education. (Distance education includes hybrid classes.)

N/A

E) Discuss how well the courses, degrees, or certificates meet students' transfer or career training needs.

- 1. Have all courses that are required for your program's degrees and certificates been offered during the last two years? If not, has the program established a course offering cycle?**

Yes, at a minimum we offer every course at least every 2 years.

- 2. Are there any concerns regarding program courses and their articulation to courses at other educational institutions?**

No concerns.

- 3. How many students earn degrees and/or certificates in your program? Set an attainable, measurable goal related to student completion of the program's degrees/certificates.**

As stated earlier, the ECHT Program is like two programs rolled into one. The numbers are as follows:

	2013- 2014	2014- 2015	2015- 2016	2016- 2017	2017- 2018
Computer Hardware Electronics Technician	4	2	4	4	5
Electronics Engineering Technician	1	2	2	3	6
Total	5	4	6	7	11

As seen, the number is increasing and we believe that with increased emphases on getting degrees and certificates, future numbers should be in the range of 8 to 12 each year. The low numbers are misleading, because demand is so high for workers in the industry, students obtain jobs before finishing their degrees or certificates.

- 4. Are any licensure/certification exams required for program completion or career entry? If so, what is the pass rate among graduates? Set an attainable, measurable goal for pass rates and identify any applicable performance benchmarks set by regulatory agencies.**

In the Traditional Electronics Program there are no required license/certification exams.

In the computer repair option, many students take the COMPTIA Certification exams for A+, Net+, and Security+. For those students who take the independently administrated exam, Pass Rates are:

1. A+ $\geq 90\%$
2. Net+ $\geq 65\%$
3. Security+ $\geq 65\%$

F) Enumerate any related recommendations.

1: In Fall of 2020 all the ECHT-12x classes are being changed from 4 units to 3 units to help make it easier for students complete the Computer Hardware Program. Make sure all the students are aware of this change.

SECTION 4

Assessment of Student and Program Learning Outcomes (SLOs & PLOs)

- A) Provide a copy of your alignment grid, which shows how course, program, and institutional learning outcomes are aligned. (This will be Appendix A.)**

Please see Appendix A.

- B) Provide a timeline for your course and program level SLO assessments. (This will be Appendix B.)**

Please see Appendix B.

- C) Summarize the SLO and PLO assessment results over the past four years and describe how those results led to improved student learning. Analyze and describe those changes. Provide specific examples.**

The ECHT SLOs focus on critical job skills that are required in industry. Overall we're seeing an improvement in these critical skills as we focus on getting the students to practice these skills and to do it properly.

A good example is found in ECHT-130, SLO-1, DeMorgan's Theorem. Prior to adding changes, about 60% of the students had problems with this skill on a test. However, after switching teaching approach, 85% could do this problem on a test. The change was to include a lab on De Morgan. While students needed help with it as a lab, once they saw how it was done, the majority (85%) remembered this on the test.

- D) Describe how you have improved your SLO/PLO assessment process and engaged in dialogue about assessment results.**

The biggest improvement to the process is making the assessment be a lab, homework assignment, or part of a test. This approach makes sure the assessment is performed and we are able to measure most, if not all, of the students.

- E) Enumerate any related recommendations.**

1: Make sure that all SLO assessments are part of be a lab, homework assignment, or part of a test.

SECTION 5

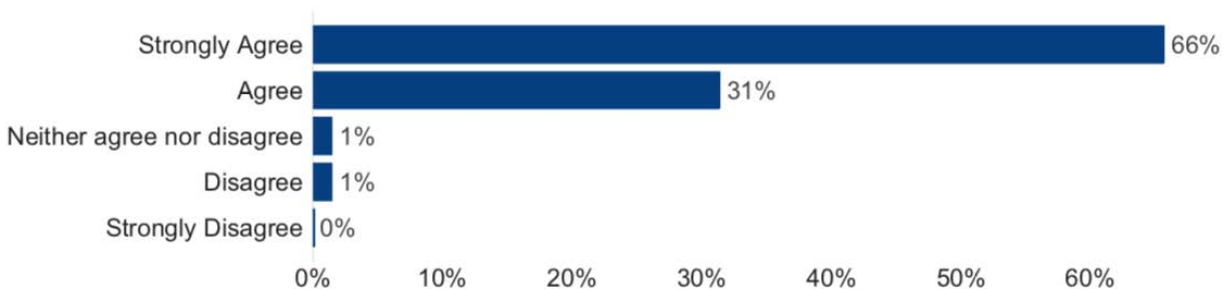
Analysis of Student Feedback

Provide a copy of any feedback reports generated by Institutional Research and Planning or your program. Review and discuss student feedback collected during the past four years including any surveys, focus groups, and/or interviews.

A) Describe the results of the student survey in each of the following areas:

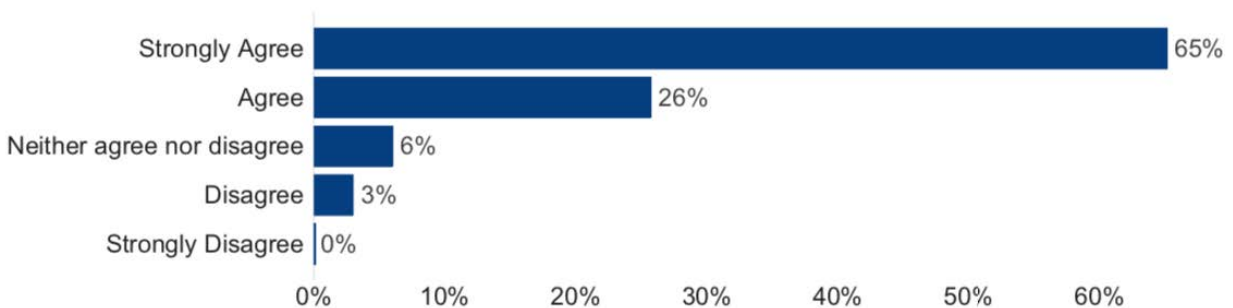
1. Student Support

5. Courses were scheduled on days and times that are convenient to me.



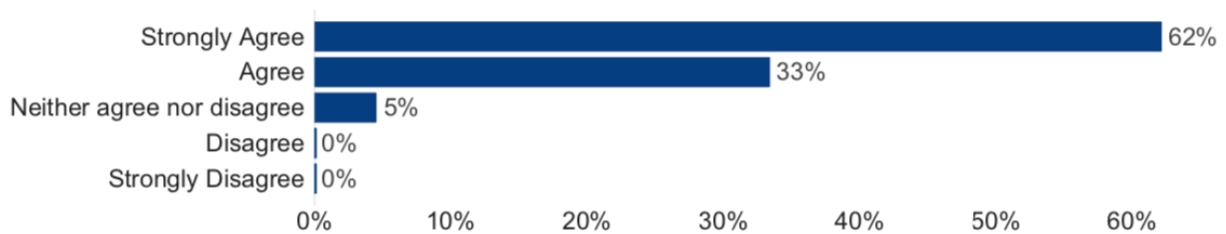
A total of 97% of the students either strongly agree or agree that our classes are scheduled on days and times that work for them. This tells us that the current scheduling is meeting the needs of the majority of the students in the program.

6. I've been able to register for the classes I need within this program.



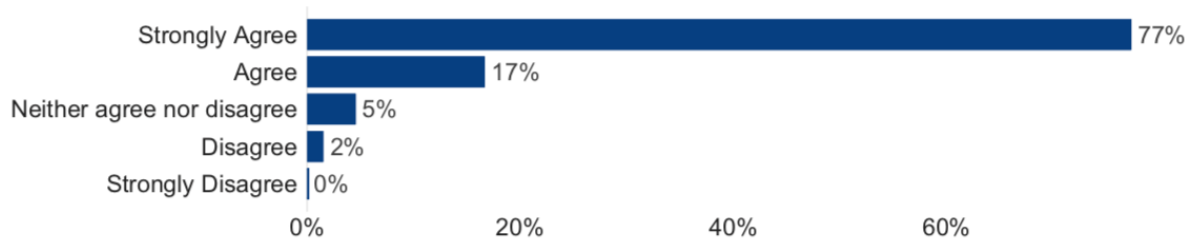
A total of 91% of the students either strongly agree or agree that they are able to register for the classes they need for the program. We do very well with the Traditional Electronics Classes, but currently the Computer Electronics Classes aren't covered as well. The change from 4 units to 3 units in Fall 2020 will make it easier to offer more Computer Electronics Classes. The hiring of a Full Time Computer Electronics Instructor will help even more.

7. The courses within this program have helped me meet the goals I've set for myself.



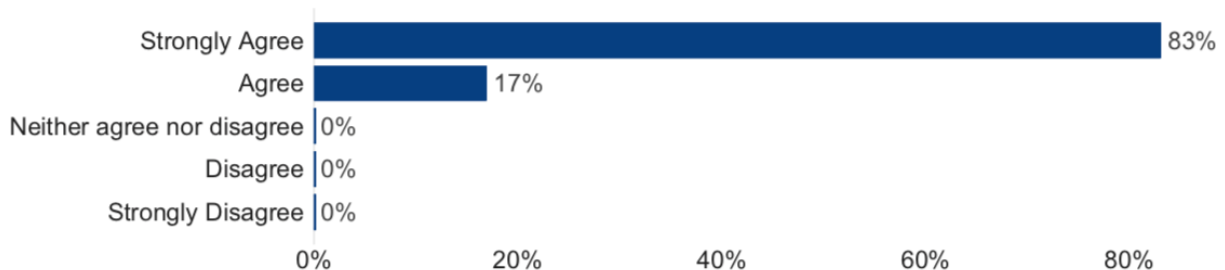
A total of 95% of the students either strongly agree or agree that the program helps them meet their goals. A total of 0% of the students disagreed with this statement. This stands as strong evidence that from the student's standpoint, our program is going in the right direction.

10. Instructors in the ECHT program provide opportunities to actively participate in my classes.



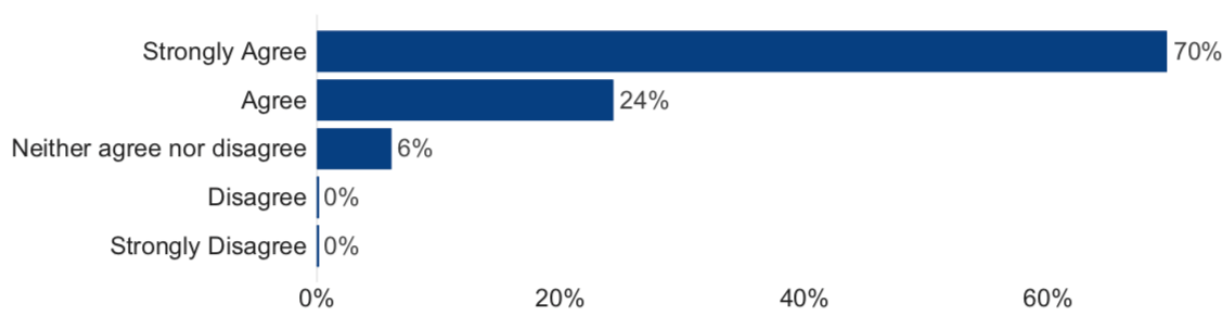
A total of 94% of the students either strongly agree or agree that they have opportunities to actively participate in their classes. This high a number is no surprise, because every class has a lab in addition to lecture. The lab time allows the students to put theory into practice.

11. I feel that ECHT instructors truly want me to succeed.



We have 100% of the students either strongly agree or agree that the instructors want the students to succeed. All of our instructors are focused on teaching the students useful job skills that prepare them for their field of work.

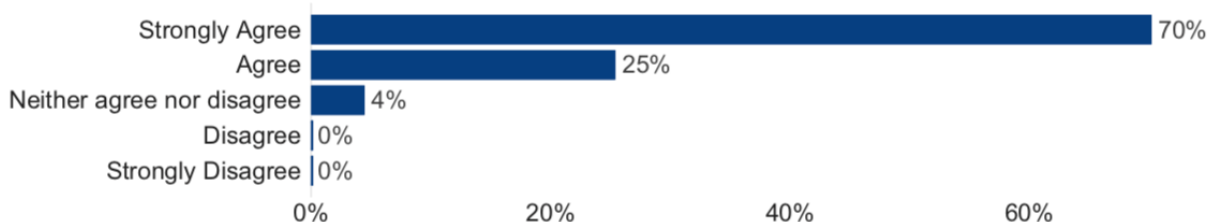
12. Student contributions have been valued by instructors in this program.



A total of 94% of the students either strongly agree or agree that their contributions are valued by the instructors. A total of 0% disagree in either from.

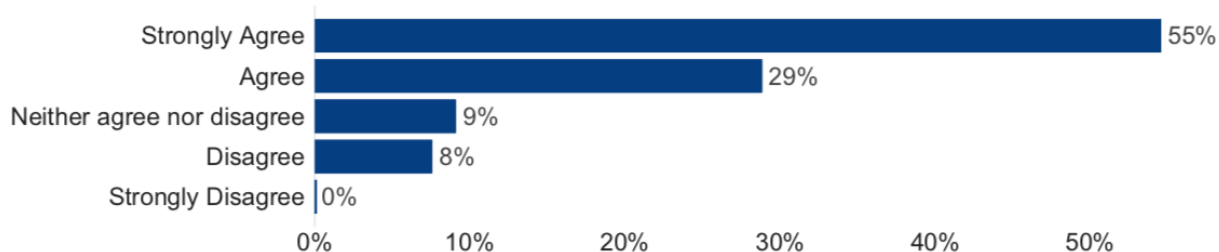
2. Curriculum

4. I feel the curriculum provides me with a solid foundation in electronics technology.



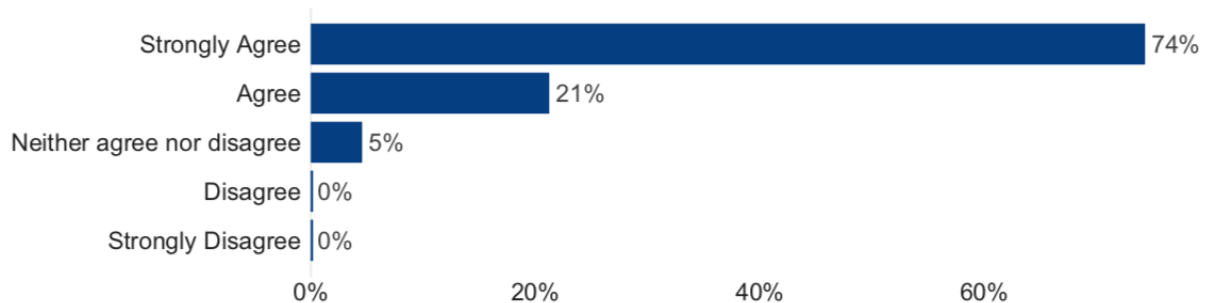
A total of 95% of the students either strongly agree or agree that they are getting a solid foundation in electronics. A total of 0% disagree in either from.

13. There is an appropriate range of courses offered in this program.



A total of 84% of the students either strongly agree or agree that we have an appropriate range of courses in our program. This will require an additional survey to find what courses the 8% feel we need.

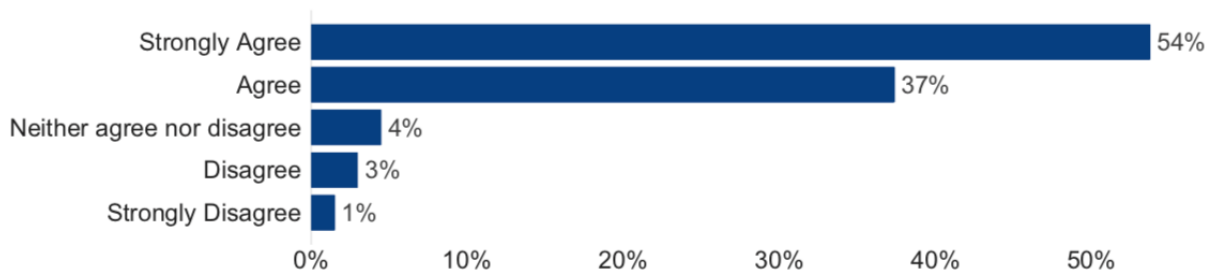
14. Through the time I have been attending various ECHT courses, I'm aware of what I should be able to learn and what skills I should possess after completing courses in the program.



A total of 95% of the students either strongly agree or agree that they are aware of what they should learn and what skills they need to possess. A total of 0% disagreed in any form.

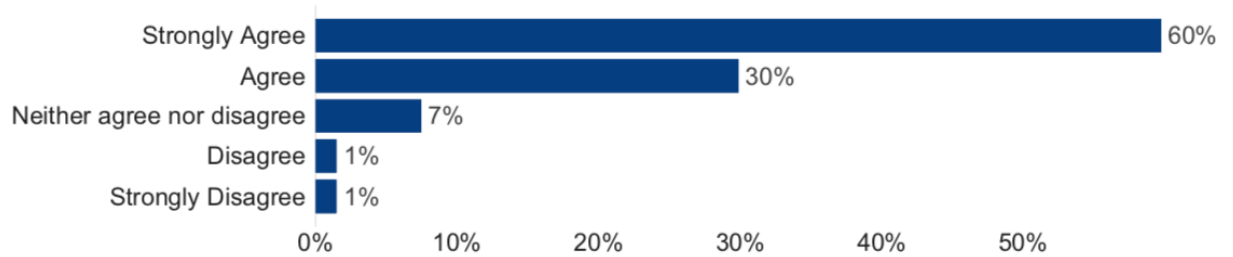
3. Facilities, Equipment, and technology

1. The buildings and classrooms used by this program are satisfactory.



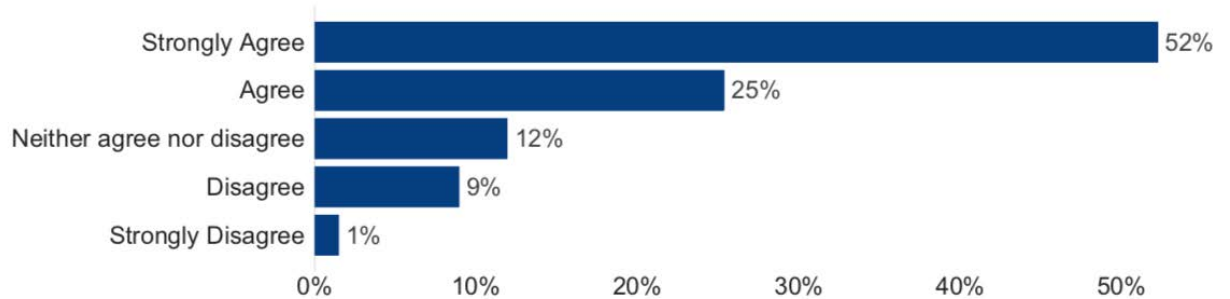
A total of 91% of the students either strongly agree or agree that the building and classroom is satisfactory. However, 4% of the students disagree in some form. While not bad, this does show that those who are not able to get seats in the two center sections are at a disadvantage in seeing the board.

2. I am satisfied with the equipment used in this program.



A total of 90% of the students either strongly agree or agree that they are satisfied with the equipment used in the program. A total of only 2% disagree in some form.

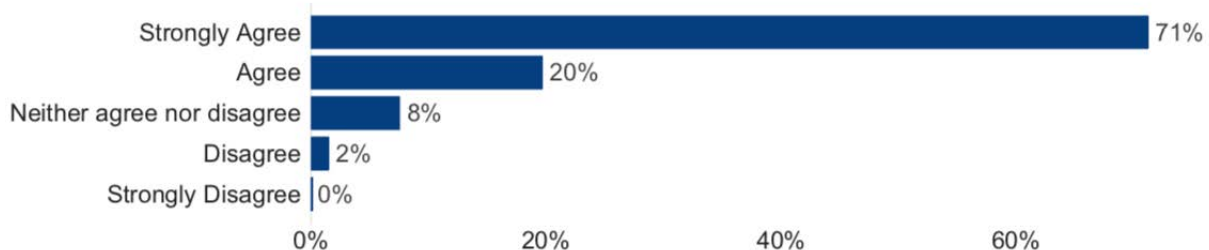
3. I am satisfied with the computers and software used in this program.



A total of 77% of the students either strongly agree or agree that they are satisfied with the computers and software used in the program. A total of 10% disagree in some form. The increase in those disagreeing is likely due to the age of the computers and the slow response time we are getting from the current computers. This problem will continue to grow as the computers begin to fail due to old age.

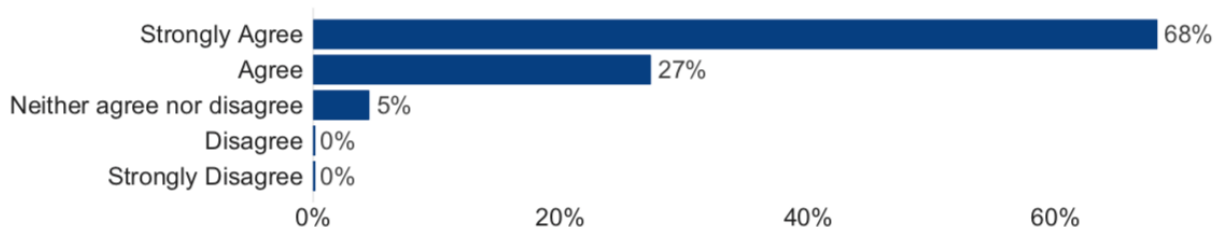
4. Program Objectives

8. The courses in the ECHT program incorporate "skill sets" that I'll expect to use at work.



A total of 91% of the students either strongly agree or agree that the “skill sets” they are learning will be used at work. A total of 2% disagree. . This stands as strong evidence that from the student’s standpoint, our program is going in the right direction.

9. The course materials covered in each ECHT course meets or exceeds the "SLO" statement in the course syllabus.



A total of 95% of the students either strongly agree or agree that our classes meet or exceeds the SLO statements in the course syllabus. This stands as strong evidence that from the student’s standpoint, our program is going in the right direction.

B) Discuss the implications of the survey results for the program.

First and most important, the students see the program as going in the right direction and that it offers them the training they want. The students have a very positive view of the instructors and feel that they are learning valuable skills.

The range of classes is what they want and the majority feel they can get them in the day and time slots they want. Overall, we can safely say that we are satisfying the needs of the majority of the students.

The biggest issue to appear is the computers and software. Roughly 10% were unhappy with what we have. This suggests that the age of the computers and the fact that they are running considerably slower than newer computers is the most likely factor in the 10% number. Hopefully we will be able to replace this systems soon before the computers start to fail due to old age.

C) Discuss the results of other relevant surveys.

N/A There are no other surveys.

D) Enumerate any related recommendations.

- 1: The 54 student computers need to be replaced as soon as possible. We should also replace the 2 instructor computers as well.
- 2: Do a second survey of the students to see what courses they'd like to see added to the program. Then go to the Advisory Board to see if these skill sets are needed. This may result in adding a class or classes to the program.
- 3: Explore what can be done to improve the workbenches so that the students on the extreme left and right will be able to see the blackboard and projector. Explore the possibility of using the rooms across the hall when Fire Technology moves out.

SECTION 6

Facilities and Equipment

A) Describe and assess the existing program facilities and equipment.

Compared to 5 years ago, where we had 5 classrooms and a larger tool room, we are now operating with only 3 class rooms and a smaller tool room. This will put a hard space limit if the program tries to expand in the future.

The other area of concern is that the current computers being used in our class rooms are getting very old and near the end of their product life. These computers need to be replaced soon or as they start to fail, we have nothing to replace them with and this will have a major impact on the program when we're unable to use the computers as part of the program.

B) Explain the immediate (1-2 years) needs related to facilities and equipment. Provide a cost estimate for each need and explain how it will help the program better meet its goals.

The greatest need in the program is the replacement of all the computers in the classroom. Assuming \$1,500 per computer times 26 seats times 3 classrooms, this comes to \$117,000 for just the computers. Add to that wireless keyboards, mice, and additional things, like mouse pads, and the total will come to \$100 per computer or \$7,800. We can expect the total to come to **around \$125,000** for all items. Failure to replace the computers will result in direct impact on all classes in the ECHT Program.

The MTEC-70 and MTEC-75 classes are being moved to the ETEC Program. The equipment used by MTEC is getting rather old and in desperate need of replacement. At the absolute minimum, all the battery packs would need to be replaced. This should cost \$554.70, but would leave us with older parts that were damaged over the years. Just replacing with bare basic kits would come to \$10,799.97; however it would be far better to replace with better stocked kits for \$20,997.97 total. At this time, it is unclear where the money would come from.

C) Explain the long-range (2-4+ years) needs related to facilities and equipment. Provide a cost estimate for each need and explain how it will help the program better meet its goals.

The current class rooms are very poor for lecture. The computer monitors block the view of the blackboard for the students. Hopefully in the near future, when the Police, Fire, and Paramedic Training moves to another facility, we'll be able to make use on the open classes in the same hallway. These class rooms are not restricted by any view of the monitor and the students will get a clear view of the blackboard. This change comes at no cost and the additional class rooms can be shared with other departments.

The ECHT computer classes will be in need of updated computers for building and testing. These are different than the computers used in the class, because the students don't tear those computers apart. These computers are used to teach service and repair of hardware. Assuming 15 computers at \$1,500 per computer, this comes to \$22,500.

D) Enumerate specific recommendations based on the information provided above, as well as any related recommendations (e.g., creating and budgeting for a cycle for ongoing maintenance, repair, and replacement).

- 1: Replace all the computers in the class rooms ASAP before the failure rate prevents us from using any computers..
- 2: Replace the older robot kits used by MTEC-70 and MTEC-75 with new kits.
- 3: In the next few years, plan on replacing the computers used for the ECHT-14x (140, 142, 144, 146, & 148) computer classes with newer models.

SECTION 7

Technology and Software

A) Describe and assess the adequacy and currency of the technology and software used by the program.

Software: For the near future (the next 5 years) Multisim provides us with the circuit simulation we need to help the students understand what's happening in a circuit. This will prove to be successful as long as we maintain the license and update the software.

Hardware Computers: Currently we are already seeing problems with the old and slow computers we now have. Not only are the systems slow, but we're starting to see more failures in the systems. Unless these computers are replaced soon, the number of failed systems will reach a critical point where there won't be enough working computers in the class to support the number of students.

Hardware for the Computer Program: The ECHT-14x series classes makes use of computer technology to teach the students how to service the computers. Thus, everything from cases, mother boards, memory, power supplies, and other parts used in computers will need to be replaced over time.

Hardware Lab Equipment: While all equipment will need to be replaced over time as it fails or is broken beyond repair, the HP Signal Generators are in desperate need of a replacement. The smaller HP Adjustable Power supplies are also in need of replacement, but the need is not as critical as the HP Signal Generators.

B) Explain the immediate (1-2 years) needs related to technology and software. Provide a cost estimate for each need and explain how it will help the program better meet its goals.

The Computers for the classes ITEC-208 & ITEC-209 would need to be replaced as soon as possible. It would cost at least \$1,500 per computer to replace them or $\$1,500 \times 26 \text{ places} \times 2 \text{ classrooms} = \$78,000$.

For the time being, replacing the Computer Hardware for the Computer classes can be put on hold; however allowing for \$500 per lab team $\times 26 \text{ teams}$ would give us \$13,000 for basic hardware as it needs to be replaced.

The HP Signal Generators should be replaced and will cost around \$1,500 per unit $\times 26 \text{ units} = \$39,000$.

Failure to take care of the short term needs of the program will result in students not having access to the basic equipment needed to learn the material.

C) Explain the long-range (2-4+ years) needs related to technology and software. Provide a cost estimate for each need and explain how it will help the program better meet its goals.

Depending on whether we delay spending money for the Computer Classes in the next 2 years or not, the costs per computer would range from \$1,000 to \$1,500 per system. This comes to \$1,000 to \$1,500 x 26 = \$26,000 to \$39,000.

Adjustable Power Supplies vary in price, but Power Supplies in the \$300 range should do the job. Because we have to plan for both classrooms needing the Adjustable Power Supplies at the same time, this comes to \$300 x 26 x 2 = \$15,600.

Failure to take care of the long term needs of the program will result in students not having access to the basic equipment needed to learn the material.

D) Enumerate specific recommendations based on the information provided above, as well as any related recommendations (e.g., creating and budgeting for a cycle for ongoing maintenance, repair, and replacement).

1: Replace all the computers in both ITEC-208 and ITEC-209 as soon as possible. The failure rate on the older computers is starting to make it difficult to teach many of our classes. NOTE: The Chromebooks are unsuitable for our needs, because they are unable to run the PC software we use in our classes. The computers will need to be replaced with a PC with an I7 or I9 with 8G of RAM and a minimum of a 1TB HD.

2: Replace the older HP Signal Generators as soon as possible. We are now down to 6 working units and this prevents the majority of the students from using it during labs. The Signal Generators are so old, that they were in use during the 1970s. We need to update to more current equipment.

3: In the next 1 to 4 years replace the hardware used by the Computer Classes over time. We don't need to replace everything at once, but this could be a running change over time. The failure rate of the hardware will increase over time.

4: Replace the older HP Adjustable Power Supplies in the next 2 to 4 years. Currently, we have working units, but over time, the failure rate of the older units will limit how many students can use an HP Power Supply at one time.

SECTION 8

Staffing

A) Describe the program's current staffing, including faculty, administration, and classified staff.

In April 2017 the ECHT had three Full Time Instructors for the program. The Full Time Instructor who covered all the ECHT Computer classes passed away in May 2017 and has not been replaced. We are currently trying to fill this roll with two Part Time instructors. This has weakened the computer part of the program, because we are not able to offer as many classes as when our Full Time Instructor was alive. When our Full Time Instructor was alive, we could offer 3 classes using one Full Time Instructor with over load or one Full Time Instructor normal load and a Part Time Instructor. Currently we can offer only two classes per semester using two Part Time Instructors and this makes it difficult for the students to take the classes they need to complete the program. Every semester we must offer one ECHT-140 beginning class to meet the needs of the students starting the program, but it takes two years to cycle through all the other computer classes, like ECHT-142, ECHT-144, ECHT-146, and ECHT-148. Hiring a Full Time Computer Electronics Instructor would solve this issue.

The Traditional Electronics Program is current in very good shape with two Full Time Instructors. Between the two Full Time Instructors we are able to offer the critical beginning classes every semester and most of the other advanced classes every year. The ECHT-122 and ECHT-124 classes can be offered one per year, but there are a few times where they become once every two years. However, in the next few years both Full Time Instructors will retire leaving zero Full Time Instructors to drive the program. Without the support of Full Time Instructors, the program will not be able to function properly.

In addition, we have one Full Time Tool Room Technician to service equipment and hand out equipment/parts to the students. We also have a Part Time Attendant to hand out equipment in the off hours when the Full Time Technician is not around.

B) Explain and justify the program's staffing needs in the immediate (1-2 years) and long-term (2-4+ years). Provide cost estimates and explain how the position/s will help the program better meet its goals.

The Immediate needs are for a replacement Full Time Instructor for the Computer Electronics Classes. This plus the change in the computer classes from 4 units to 3 units would allow a Full Time Instructor to offer 3 classes every semester with a normal load. This would allow us to cycle through every computer class every year.

In the Traditional Electronics Program, one Full Time Instructor will retire at the end of December 2021 and the other will retire at the end of June 2022. This means that by Spring of 2022 there will be only one Full Time Instructor and by Summer 2022, there will be zero Full Time Instructors for the Traditional Electronics Program.

The Long Term need is to replace both Traditional Electronics Instructors before Fall 2022. This is the greatest danger to the program, because Part Time Instructors will not be maintaining the program. While the Part time Instructors will teach the classes, who will update curricula, insure all SLOs are entered, or even write the Program Reviews?

C) Enumerate specific recommendations based on the information provided above, as well as any related recommendations.

1: Hire a Full Time Instructor for the Computer Electronics Program ASAP. We need to train him/her before the remaining Full Time Instructors retire.

2: Hire two Full Time Instructors for the Traditional Electronics to replace the two that will retire soon.

SECTION 9

Direction and Vision

A) Describe relevant changes within the academic field/industry. How will these changes impact the program in the next four years?

The field of electronics is very dynamic and subject to constant change. While the basic fundamentals of electronics do not change, the technology we use changes over time. Moore's Law** has been the biggest change to how the industry operates, because as Integrated Circuits and computing power increase over time, the choices of how we design and use the circuits also change over time. While Moore's Law is expected to reach its limit by the year 2020, Intel, AMD and other companies are using 2D and 3D approaches to increase circuit complexity for the future.

In the area of new technology, graphene is expected to provide a major breakthrough for batteries, capacitors, and other electronics. Both Solid State and Lithium Air Batteries are going to offer more power for the same size and weight in the next 5 to 15 years. Both developments are expected to bring about major changes to how we develop and use electric cars and aircraft.

As the cost of consumer electronics drops, the need for servicing these electronics also drops. However, Industrial Electronics still remains costly and because of the nature of this electronics, this will remain an important job market for a very long time. Both testing and production of prototype and production equipment will remain a strong job market for a long time.

The Instructors have already been exposed to major changes in the Industry over the years and continue to watch for these changes. As potential changes start to appear, the Instructors make use of Academic Freedom to address upcoming technology that is not yet part of the curriculum. As Curriculum Reviews come up, any critical changes can be added if needed.

** Moore's Law states that every 1.5 to 2 years the part density of the Integrated Circuits will double. This allows for more powerful and complex circuits in the same space and at the same cost.

B) Explain the direction and vision of the program and how you plan to achieve it.

The fundamentals of electronics never change. What changes is the approach to developing solutions to problems. Overall, we are seeing a shift from analog solutions to more digital solutions. As processing power increases and the cost for processing data decreases, digital becomes the logical choice for solutions. In the long term (10+ years), we will need to increase the student's exposure to more digital technology as we use less and less analog systems.

In the area of computers, both Intel and AMD are working very hard to move to 2D and 3D technology to increase memory speeds and improve performance. Solid State Disk Drives are becoming the technology of choice for high performance systems. At the other end, ARM Technology is redefining the low cost computer. Even servers are switching to ARM because of the reduction in power consumption and cost. As these changes occur, we will need to change our computer classes to include the new material. If ARM Technology becomes the new norm for servers, we may need to add a new computer class to help address this change in the computer industry.

C) Enumerate specific recommendations based on the information provided above, as well as any related recommendations.

- 1: All instructors will need to be watching the industry closely to see what changes are coming. Typically this is done through online newsletters.
- 2: Instructors should go to technology conferences to stay up to date on the latest trends.

SECTION 10

Prioritized Recommendations

A) Provide a single, prioritized list of recommendations and needs for your program/ department (drawn from your recommendations in sections 2-8). Include cost estimates and list the college strategic initiative that supports each recommendation. Use the following chart format to organize your recommendations.

	Recommendations	Cost Estimate	Strategic Initiatives
1.	Hire a Full Time Instructor for the Computer Electronics Program ASAP. We need to train him/her before the remaining Full Time Instructors retire.	Salary for Full Time Inst.	Student Learning
2.	Hire two Full Time Instructors for the Traditional Electronics to replace the two that will retire soon.	Salary for 2 Full Time Inst.	Student Learning
3.	The 54 student computers need to be replaced as soon as possible. NOTE: The Chromebooks are unsuitable for our needs, because they are unable to run the PC software we use in our classes. The computers will need to be replaced with a PC with an I7 or I9 with 8G of RAM and a minimum of a 1TB HD.	\$1,500 per computer	Modernization
4.	Explore what can be done to improve the workbenches so that the students on the extreme left and right will be able to see the blackboard and projector. Explore the possibility of using the rooms across the hall when Fire Technology moves out.	Unknown	Modernization
5.	Replace the older robot kits used by MTEC-70 and MTEC-75 with new kits.	\$11,000 to \$21,000	Modernization
6.	Replace the older HP Signal Generators as soon as possible.	\$1,500 per Signal Generator	Modernization
7.	In the next 1 to 4 years replace the hardware used by the Computer Classes over time. We don't need to replace everything at once, but this could be a running change over time.	\$13,000 to \$39,000	Modernization
8.	Replace the older HP Adjustable Power Supplies in the next 2 to 4 years.	\$15,600	Modernization
9.	Promote the program to potential students.	Minor Cost	Student Success & Support
10.	In Fall of 2020 all the ECHT-12x classes are being changed from 4 units to 3 units to help make it easier for students complete the Computer Hardware Program. Make sure all	Minor Cost	Student Success & Support

	the students are aware of this change.		
11.	Work more with WIT to attract more female students.	Minor Cost	Student Success & Support
12.	Provide all the students a copy of the program and options offered.	Minor Cost	Student Success & Support
13.	Make sure that all SLO assessments are part of be a lab, homework assignment, or part of a test.	Minor Cost	Student Success & Support
14.	Do a second survey of the students to see what courses they'd like to see added to the program. Then go to the Advisory Board to see if these skill sets are needed. This may result in adding a class or classes to the program.	Minor Cost	Student Success & Support
15.	All instructors will need to be watching the industry closely to see what changes are coming. Typically this is done through online newsletters	Minor Cost	Student Success & Support
16.	Instructors should go to technology conferences to stay up to date on the latest trends.	Varies, but assume \$5,000	Student Success & Support

B) Explain why the list is prioritized in this way.

Highest priority is given to things that will help keep the program strong and running. Next is items that could help improve the program and last of all things that if not done could have a negative impact on the program. Failure to make the improvements will impact the program in strong negative ways.

Appendix A

ALIGNMENT GRIDS

INDUSTRY AND TECHNOLOGY

Institutional (ILO), Program (PLO), and Course (SLO) Alignment

INDUSTRY AND TECHNOLOGY					
Institutional (ILO), Program (PLO), and Course (SLO) Alignment					
Program: Electronics and Computer Hardware Technology		Number of Courses: 16	Date Updated: 09.18.2014	Submitted by: SueEllen Warren, ext. 4519 Renee Newell, ext. 3308	
ILOs	1. Critical Thinking Students apply critical, creative and analytical skills to identify and solve problems, analyze information, synthesize and evaluate ideas, and transform existing ideas into new forms.	2. Communication Students effectively communicate with and respond to varied audiences in written, spoken or signed, and artistic forms.	3. Community and Personal Development Students are productive and engaged members of society, demonstrating personal responsibility, and community and social awareness through their engagement in campus programs and services.	4. Information Literacy Students determine an information need and use various media and formats to develop a research strategy and locate, evaluate, document, and use information to accomplish a specific purpose. Students demonstrate an understanding of the legal, social, and ethical aspects related to information use.	
SLO-PLO-ILO ALIGNMENT NOTES:					
Mark boxes with an 'X' if: SLO/PLO is a major focus or an important part of the course/program; direct instruction or some direct instruction is provided; students are evaluated multiple times (and possibly in various ways) throughout the course or are evaluated on the concepts once or twice within the course.					
DO NOT mark with an 'X' if: SLO/PLO is a minor focus of the course/program and some instruction is given in the area but students are not formally evaluated on the concepts; or if the SLO/PLO is minimally or not at all part of the course/program.					
PLOs		PLO to ILO Alignment (Mark with an X)			
		1	2	3	4
PLO #1 Safely Operating Industry Equipment Upon successful completion of this program, students will be able to identify and safely operate/manipulate various types of electronic hand tools and test equipment.		X	X	X	
PLO #2 Using industry Level Skills Upon successful completion of this program, students will be able to, accurately identify and analyze various types of Electronic/Electrical Circuits using both calculations, simulation, and test and measurements.		X	X		X
PLO #3 Using Industry Reporting and Analysis Protocols Upon successful completion of this program, students will be able to incorporate data and analysis reporting protocols, using either "paper" or "paperless" environments, similar to data reporting and analysis used by many Electronics Manufacturers and Service Organizations.		X	X		X

SLOs	SLO to PLO Alignment (Mark with an X)	COURSE to ILO Alignment *FOR OFFICE USE ONLY*			
		P1	P2	P3	
ECHT 11 Introduction to Electronics: SLO #1 Measuring Voltages and Currents Measuring Voltage and Current The student will make basic "in-circuit" measurements: Alternating Current/Direct Current (AC/DC), Voltages and Currents, and Resistance, using both a Bench and Portable Digital Multimeter (DMM).	X	X	X	X	
ECHT 11 Introduction to Electronics: SLO #2 Experimental Data and Analysis Reporting The students will be able to incorporate experimental data and analysis reporting protocols, using either "paper" or "paperless" environments, similar to data reporting and analysis used by many Electronics Manufacturers and Service Organizations.	X	X	X	X	X
ECHT 11 Introduction to Electronics: SLO #3 Circuit Analysis Calculations The students will be able to use various circuit analysis calculations to predict basic circuits operation.		X	X	X	
ECHT 110 Introduction to Direct and Alternating Current Circuits: SLO #1 Measuring Voltage, Current & Resistance The student will make advanced "in-circuit" measurements : Alternating Current/Direct Current (AC/DC), Voltages, Currents, and Resistance, using both a Bench and Portable Digital Multimeter (DMM).	X	X	X	X	
ECHT 110 Introduction to Direct and Alternating Current Circuits: SLO #2 Direct & Alternating Currents The student will use an Electronic Simulation Software Package similar to Multi-SIM or "p" Spice to supplement both the understanding and analysis of Direct and Alternating Current Circuits.	X	X	X	X	X
ECHT 110 Introduction to Direct and Alternating Current Circuits: SLO #3 Circuit Analysis Calculations The students will be able to use various circuit analysis calculations to predict basic circuits operation.		X	X	X	
ECHT 120 Semiconductor Circuits I: SLO #1 In-Circuit Measurements The student will make basic "in-circuit" measurements using Bench and Portable Digital Multimeter (DMM), Oscilloscope, and Voltage Ohm (VOM), Milliamp Meter on Solid-State Systems.		X	X	X	
ECHT 120 Semiconductor Circuits I: SLO #2 Experimental Data and Analysis Reporting The student will be able to use various circuit analysis calculations to predict basic circuit operation.	X	X	X	X	X
ECHT 120 Semiconductor Circuits I: SLO #3 Advanced In-Circuit Measurements The student will make advanced "in-circuit" measurements using Bench and Portable Digital Multimeter (DMM), Oscilloscope, and Voltage Ohm (VOM), Milliamp Meter on Solid-State-Systems.	X	X	X	X	

SLOs	SLO to PLO Alignment (Mark with an X)	COURSE to ILO Alignment *FOR OFFICE USE ONLY*			
		P1	P2	P3	
ECHE 122 Semiconductor Circuits II: SLO #1 Measuring Voltages and Currents Measuring Voltage and Current The student will make basic "in-circuit" measurements: Alternating Current/Direct Current (AC/DC), Voltages and Currents, and Resistance, using both a Bench and Portable Digital Multimeter (DMM).	X	X	X	X	
ECHE 122 Semiconductor Circuits II: SLO #2 Field Effect Amplifier Given a schematic diagram of a basic Field Effect Amplifier, the students will be able to assemble, test and measure the circuit for its operational parameters.		X	X	X	X
ECHE 122 Semiconductor Circuits II: SLO #3 Experimental Data and Analysis Reporting The students will be able to incorporate experimental data and analysis reporting protocols, using either "paper" or "paperless" environments, similar to data reporting and analysis used by many Electronics Manufacturers and Service Organizations.		X	X	X	
ECHE 124 Operational Amplifiers and Linear Integrated Circuits: SLO #1 Operational Amplifier Given a schematic diagram of a basic Operational Amplifier (Op) with negative feedback, the students will be able to assemble, test and measure the circuit for its operational parameters.	X	X	X	X	
ECHE 124 Operational Amplifiers and Linear Integrated Circuits: SLO #2 Advanced In-Circuit Measurements The student will make advanced "in-circuit" measurements using Bench and Portable Digital Multimeter (DMM), Oscilloscope, and Voltage Ohm (VOM), Milliamp Meter, on Advanced Solid-State-Systems.		X	X	X	X
ECHE 124 Operational Amplifiers and Linear Integrated Circuits: SLO #3 Experimental Data and Analysis Reporting The students will be able to incorporate experimental data and analysis reporting protocols, using either "paper" or "paperless" environments, similar to data reporting and analysis used by many Electronics Manufacturers and Service Organizations.		X	X	X	
ECHE 130 Digital Systems and Computer Logic I: SLO #1 DeMorgan's Theorem The student will use DeMorgan's Theorem to reduce a Boolean Statement in its simplest terms.		X	X	X	
ECHE 130 Digital Systems and Computer Logic I: SLO #2 Basic Function Gates The student will use discrete NOR and NAND Gates to construct all seven basic function gates (NOT, OR, NOR, AND, NAND, EXOR, and EXNOR).		X	X	X	X
ECHE 130 Digital Systems and Computer Logic I: SLO #3 Experimental Data and Analysis Reporting The students will be able to incorporate experimental data and analysis reporting protocols, using either "paper" or "paperless" environments, similar to data reporting and analysis used by many Electronics Manufacturers and Service Organizations.		X	X	X	

SLOs	SLO to PLO Alignment (Mark with an X)	COURSE to ILO Alignment *FOR OFFICE USE ONLY*			
		P1	P2	P3	
ECHT 140 Computer Systems and Hardware Technology I: SLO #1 Course Notebook The students will assemble and maintain a five-section course notebook.			X	X	
ECHT 140 Computer Systems and Hardware Technology I: SLO #Component Handling Techniques The student will be able to demonstrate their knowledge in proper component handling techniques, especially regarding (ESD), Electrostatic Discharge.	X		X	X	X
ECHT 140 Computer Systems and Hardware Technology I: SLO #3 Computer Estimate and Configuration The student will be able to demonstrate their ability to cost out and configure either a Business or "Gaming" Computer per customer specifications.			X	X	
ECHT 142 Computer Systems and Hardware Technology II: SLO #1 Course Notebook The students will assemble and maintain a five-section course notebook.			X	X	
ECHT 142 Computer Systems and Hardware Technology II: SLO #2 Troubleshooting Techniques The student will be able to demonstrate advanced skill levels in their knowledge of repairing computer systems using system troubleshooting techniques introduced within the scope of the class.	X		X	X	X
ECHT 142 Computer Systems and Hardware Technology II: SLO #3 OEM Specifications The student will be able to demonstrate their knowledge in using commercially available diagnostic tools to verify a system meets original equipment manufacturer (OEM) specifications.			X	X	
ECHT 144 CompTIA A+ Certification Preparation for Computer Hardware Systems: SLO #1 Course Notebook The students will assemble and maintain a five-section course notebook.			X	X	
ECHT 144 CompTIA A+ Certification Preparation for Computer Hardware Systems: SLO #2 CompTIA Industry Certification The student will acquire a knowledge base to prepare to take the A+ Certification Exam through CompTIA, an industry recognized certification.	X		X	X	X
ECHT 144 CompTIA A+ Certification Preparation for Computer Hardware Systems: SLO #3 Electricity & Electronics The student will acquire knowledge in safety and the basics of electricity and electronics, micro-computer hardware and components.			X	X	

SLOs	SLO to PLO Alignment (Mark with an X)	COURSE to ILO Alignment *FOR OFFICE USE ONLY*			
		P1	P2	P3	
ECHT 146 CompTIA Network+ Certification Preparation for Computer Hardware Systems: SLO #1 Course Notebook The students will assemble and maintain a five-section course notebook.	X				
ECHT 146 CompTIA Network+ Certification Preparation for Computer Hardware Systems: SLO #2 CompTIA Network+ Certification Exam Students will develop the skills and knowledge required for passing the CompTIA Network+ Certification exam. Topics include set up configuration and troubleshooting of networking hardware devices. Other areas explored include networking topology, cabling, wireless devices, network standards, protocols and security.	X				
ECHT 146 CompTIA Network+ Certification Preparation for Computer Hardware Systems: SLO #3 Open Systems Interconnection Students will demonstrate their knowledge of Open Systems Interconnection (OSI), the seven layers of the OSI model, protocol and data packets, and the standard network model.	X				
ECHT 148 CompTIA Security+ Certification Preparation for Computer Hardware Systems: SLO #1 Course Notebook The students will assemble and maintain a five-section course notebook.	X				
ECHT 148 CompTIA Security+ Certification Preparation for Computer Hardware Systems: SLO #2 Information Security Students will demonstrate their knowledge of information security, system threats and risks, protecting systems, network vulnerabilities, network defenses, wireless network security, security audits and policies, cryptographic methods, and the basics of computer forensics.	X				
ECHT 148 CompTIA Security+ Certification Preparation for Computer Hardware Systems: SLO # Cybersecurity Students will demonstrate their knowledge of "Chain of Custody" handling procedures of physical evidence in matters of cybersecurity.	X				
ECHT 191 Introduction to Microprocessors and Interfacing: SLO #1 Machine Assembly Language Students will demonstrate their knowledge of fundamentals of machine assembly language.	X				
ECHT 191 Introduction to Microprocessors and Interfacing: SLO #2 Digital & Analog Interfacing Students will demonstrate their use of software to simulate hardware and digital and analog interfacing.	X				
ECHT 191 Introduction to Microprocessors and Interfacing: SLO #3 Microprocessors and Microcontrollers Students will demonstrate their knowledge of microprocessors and microcontrollers as they relate to industrial and consumer equipment.	X				
ECHT 192 Robotics and Machine Control: SLO #1 Testing, Operating and Debugging After completing structured assignments that introduce basic concepts and applications, and of a Microcontroller/Microprocessor, the student use the information learned to successfully test, operate, program, and debug a Microcontroller/Microprocessor.	X				

SLOs	SLO to PLO Alignment (Mark with an X)	COURSE to ILO Alignment *FOR OFFICE USE ONLY*			
		P1	P2	P3	
ECHT 22 Basic Electronic Fabrication: SLO #1 Tools & Test Equipment Upon successful completion of this course, students will be able to identify and safely operate/manipulate various types of electronic hand tools and test equipment.	X	X			
ECHT 22 Basic Electronic Fabrication: SLO #2 Experimental Data and Analysis Reporting The students will be able to incorporate experimental data and analysis reporting protocols, using either "paper" or "paperless" environments, similar to data reporting and analysis used by many Electronics Manufacturers and Service Organizations.	X		X		X
ECHT 22 Basic Electronic Fabrication: SLO #3 Low Voltage Power Supply Upon successful completion of this course, students will be able to produce a functional low voltage, direct current (DC) power supply project sample that meets predetermined specifications and which could be potentially mass produced.			X	X	
ECHT 62 Introduction to the Electric Power Industry: SLO #1 Electrical Theory Students will demonstrate a basic knowledge of power generation, transmission, and basic electrical theory.			X		X
ECHT 64 Electric Power Industry Safety: SLO #1 OSHA Safety Exam Students will be able to successfully pass the examination for the OSHA (30 Hour) safety-training certificate.	X		X		X

Appendix B

SLO/PLO TIMELINES

COURSE SLO ASSESSMENT 4-YEAR TIMELINE				
Course ID	Course Name	Course SLO Title	Course SLO Assessment Cycle	Course SLO Statement
ECC: ECHT 11	Introduction to Electronics	SLO #1 Measuring Voltages and Currents	2013-14 (Fall 2013)	Measuring Voltage and Current The student will make basic "in-circuit" measurements: Alternating Current/Direct Current (AC/DC), Voltages and Currents, and Resistance, using both a Bench and Portable Digital Multimeter (DMM)
ECC: ECHT 11	Introduction to Electronics	SLO #1 Measuring Voltages and Currents	2013-14 (Spring 2014)	Measuring Voltage and Current The student will make basic "in-circuit" measurements: Alternating Current/Direct Current (AC/DC), Voltages and Currents, and Resistance, using both a Bench and Portable Digital Multimeter (DMM)
ECC: ECHT 11	Introduction to Electronics	SLO #1 Measuring Voltages and Currents	2017-18 (Fall 2017)	Measuring Voltage and Current The student will make basic "in-circuit" measurements: Alternating Current/Direct Current (AC/DC), Voltages and Currents, and Resistance, using both a Bench and Portable Digital Multimeter (DMM)
ECC: ECHT 11	Introduction to Electronics	SLO #2 Experimental Data and Analysis Reporting	2013-14 (Spring 2014)	The students will be able to incorporate experimental data and analysis reporting protocols, using either "paper" or "paperless" environments, similar to data reporting and analysis used by many Electronics Manufacturers and Service Organizations
ECC: ECHT 11	Introduction to Electronics	SLO #2 Experimental Data and Analysis Reporting	2017-18 (Fall 2017)	The students will be able to incorporate experimental data and analysis reporting protocols, using either "paper" or "paperless" environments, similar to data reporting and analysis used by many Electronics Manufacturers and Service Organizations
ECC: ECHT 11	Introduction to Electronics	SLO #3 Circuit Analysis Calculations	2013-14 (Spring 2014)	The students will be able to use various circuit analysis calculations to predict a basic circuits operation
ECC: ECHT 11	Introduction to Electronics	SLO #3 Circuit Analysis Calculations	2017-18 (Fall 2017)	The students will be able to use various circuit analysis calculations to predict a basic circuits operation
ECC: ECHT 11	Introduction to Electronics	SLO #3 Circuit Analysis Calculations	2018-19 (Fall 2018)	The students will be able to use various circuit analysis calculations to predict a basic circuits operation
ECC: ECHT 110	Introduction to Direct and Alternating Current Circuits	SLO #1 Measuring Voltage, Current & Resistance	2015-16 (Spring 2016)	The student will make advanced "in-circuit" measurements: Alternating Current/Direct Current (AC/DC), Voltages, Currents, and Resistance, using both a Bench and Portable Digital Multimeter (DMM).
ECC: ECHT 110	Introduction to Direct and Alternating Current Circuits	SLO #1 Measuring Voltage, Current & Resistance	2017-18 (Fall 2017)	The student will make advanced "in-circuit" measurements: Alternating Current/Direct Current (AC/DC), Voltages, Currents, and Resistance, using both a Bench and Portable Digital Multimeter (DMM).
ECC: ECHT 110	Introduction to Direct and Alternating Current Circuits	SLO #2 Direct & Alternating Currents	2015-16 (Spring 2016)	The student will use an Electronic Simulation Software Package similar to Multi-SIM or "P" Spice to supplement both the understanding and analysis of Direct and Alternating Current Circuits.
ECC: ECHT 110	Introduction to Direct and Alternating Current Circuits	SLO #2 Direct & Alternating Currents	2016-17 (Fall 2016)	The student will use an Electronic Simulation Software Package similar to Multi-SIM or "P" Spice to supplement both the understanding and analysis of Direct and Alternating Current Circuits.
ECC: ECHT 110	Introduction to Direct and Alternating Current Circuits	SLO #2 Direct & Alternating Currents	2018-19 (Fall 2018)	The student will use an Electronic Simulation Software Package similar to Multi-SIM or "P" Spice to supplement both the understanding and analysis of

Course ID	Course Name	Course SLO Title	Course SLO Assessment Cycle	Course SLO Statement
ECC: ECHT 110	Introduction to Direct and Alternating Current Circuits	SLO #2 Direct & Alternating Currents	2018-19 (Fall 2018)	Direct and Alternating Current Circuits.
ECC: ECHT 110	Introduction to Direct and Alternating Current Circuits	SLO #3 Circuit Analysis Calculations	2015-16 (Spring 2016)	The student will be able to use various circuit analysis calculations to predict basic circuit operation.
ECC: ECHT 110	Introduction to Direct and Alternating Current Circuits	SLO #3 Circuit Analysis Calculations	2019-20 (Fall 2019)	The student will be able to use various circuit analysis calculations to predict basic circuit operation.
ECC: ECHT 120	Semiconductor Circuits I	SLO #1 In-Circuit Measurements	2015-16 (Fall 2015)	The student will make basic "in-circuit" measurements using Bench and Portable Digital Multimeter (DMM), Oscilloscope, and Voltage Ohm (VOM), Milliamp Meter on Solid-State Systems.
ECC: ECHT 120	Semiconductor Circuits I	SLO #1 In-Circuit Measurements	2018-19 (Fall 2018)	The student will make basic "in-circuit" measurements using Bench and Portable Digital Multimeter (DMM), Oscilloscope, and Voltage Ohm (VOM), Milliamp Meter on Solid-State Systems.
ECC: ECHT 120	Semiconductor Circuits I	SLO #2 Circuit Analysis Calculations	2016-17 (Fall 2016)	The student will be able to use various circuit analysis calculations to predict basic circuit operation.
ECC: ECHT 120	Semiconductor Circuits I	SLO #2 Circuit Analysis Calculations	2019-20 (Fall 2019)	The student will be able to use various circuit analysis calculations to predict basic circuit operation.
ECC: ECHT 120	Semiconductor Circuits I	SLO #3 Amplifier Operation	2017-18 (Fall 2017)	The student will be able to explain the operation of : clippers, clampers, Amplifier Biasing, Input/Output Impedances, Classes of different types of Bipolar Transistor Amplifiers.
ECC: ECHT 122	Semiconductor Circuits II	SLO #1 Advanced In-Circuit Measurements	2016-17 (Spring 2017)	The student will make advanced "in-circuit" measurements using Bench and Portable Digital Multimeter (DMM), Oscilloscope, and Voltage Ohm (VOM), Milliamp Meter on Solid-State-Systems
ECC: ECHT 122	Semiconductor Circuits II	SLO #2 Field Effect Amplifier	2016-17 (Spring 2017)	Given a schematic diagram of a basic Field Effect Amplifier, the students will be able to assemble, test and measure the circuit for its operational parameters.
ECC: ECHT 122	Semiconductor Circuits II	SLO #3 Experimental Data and Analysis Reporting	2014-15 (Spring 2015)	The students will be able to incorporate experimental data and analysis reporting protocols, using either "paper" or "paperless" environments, similar to data reporting and analysis used by many Electronics Manufacturers and Service Organizations
ECC: ECHT 122	Semiconductor Circuits II	SLO #3 Experimental Data and Analysis Reporting	2018-19 (Spring 2019)	The students will be able to incorporate experimental data and analysis reporting protocols, using either "paper" or "paperless" environments, similar to data reporting and analysis used by many Electronics Manufacturers and Service Organizations
ECC: ECHT 124	Operational Amplifiers and Linear Integrated Circuits	SLO #1 Operational Amplifier	2015-16 (Spring 2016)	Given a schematic diagram of a basic Operational Amplifier (Op) with negative feedback, the students will be able to assemble, test and measure the circuit for its operational parameters
ECC: ECHT 124	Operational Amplifiers and Linear Integrated Circuits	SLO #1 Operational Amplifier	2017-18 (Spring 2018)	Given a schematic diagram of a basic Operational Amplifier (Op) with negative feedback, the students will be able to assemble, test and measure the circuit for its operational parameters
ECC: ECHT 124	Operational Amplifiers and Linear Integrated Circuits	SLO #1 Operational Amplifier	2018-19 (Spring 2019)	Given a schematic diagram of a basic Operational Amplifier (Op) with negative feedback, the students will be able to assemble, test and measure the circuit for its operational parameters

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Course ID	Course Name	Course SLO Title	Course SLO Assessment Cycle	Course SLO Statement
ECC: ECHT 124	Operational Amplifiers and Linear Integrated Circuits	SLO #2 Advanced In-Circuit Measurements	2017-18 (Spring 2018)	The student will make advanced "in-circuit" measurements using Bench and Portable Digital Multimeter (DMM), Oscilloscope, and Voltage Ohm (VOM), Milliamp Meter, on Advanced Solid-State-Systems.
ECC: ECHT 124	Operational Amplifiers and Linear Integrated Circuits	SLO #3 Experimental Data and Analysis Reporting	2015-16 (Spring 2016)	The students will be able to incorporate experimental data and analysis reporting protocols, using either "paper" or "paperless" environments, similar to data reporting and analysis used by many Electronics Manufacturers and Service Organizations.
ECC: ECHT 124	Operational Amplifiers and Linear Integrated Circuits	SLO #3 Experimental Data and Analysis Reporting	2017-18 (Spring 2018)	The students will be able to incorporate experimental data and analysis reporting protocols, using either "paper" or "paperless" environments, similar to data reporting and analysis used by many Electronics Manufacturers and Service Organizations.
ECC: ECHT 124	Operational Amplifiers and Linear Integrated Circuits	SLO #3 Experimental Data and Analysis Reporting	2018-19 (Spring 2019)	The students will be able to incorporate experimental data and analysis reporting protocols, using either "paper" or "paperless" environments, similar to data reporting and analysis used by many Electronics Manufacturers and Service Organizations.
ECC: ECHT 130	Digital Systems and Computer Logic I	SLO #1 DeMorgan's Theorem	2015-16 (Fall 2015)	The student will use DeMorgan's Theorem to reduce a Boolean Statement in its simplest terms.
ECC: ECHT 130	Digital Systems and Computer Logic I	SLO #1 DeMorgan's Theorem	2018-19 (Fall 2018)	The student will use DeMorgan's Theorem to reduce a Boolean Statement in its simplest terms.
ECC: ECHT 130	Digital Systems and Computer Logic I	SLO #2 Seven Basic Function Gates	2015-16 (Spring 2016)	The student will use discrete NOR and NAND Gates to construct all seven basic function gates (NOT, OR, NOR, AND, NAND, EXOR, and EXNOR)
ECC: ECHT 130	Digital Systems and Computer Logic I	SLO #2 Seven Basic Function Gates	2019-20 (Fall 2019)	The student will use discrete NOR and NAND Gates to construct all seven basic function gates (NOT, OR, NOR, AND, NAND, EXOR, and EXNOR)
ECC: ECHT 130	Digital Systems and Computer Logic I	SLO #3 Experimental Data and Analysis Reporting	2017-18 (Fall 2017)	The students will be able to incorporate experimental data and analysis reporting protocols, using either "paper" or "paperless" environments, similar to data reporting and analysis used by many Electronics Manufacturers and Service Organizations
ECC: ECHT 140	Computer Systems and Hardware Technology I	SLO #1 Course Notebook Students	2016-17 (Spring 2017)	The students will assemble and maintain a five-section course notebook.
ECC: ECHT 140	Computer Systems and Hardware Technology I	SLO #2 Component Handling Techniques	2016-17 (Spring 2017)	The student will be able to demonstrate their knowledge in proper component handling techniques, especially regarding (ESD), Electrostatic Discharge.
ECC: ECHT 140	Computer Systems and Hardware Technology I	SLO #3 Computer Estimate and Configuration	2016-17 (Spring 2017)	The student will be able to demonstrate their ability to cost out and configure either a Business or "Gaming" Computer per customer specifications.
ECC: ECHT 142	Computer Systems and Hardware Technologies II	SLO #1 Course Notebook	2017-18 (Spring 2018)	The students will assemble and maintain a five-section course notebook.
ECC: ECHT 142	Computer Systems and Hardware Technologies II	SLO #2 Troubleshooting Techniques	2017-18 (Spring 2018)	The student will be able to demonstrate advanced skill levels in their knowledge of repairing computer systems using system troubleshooting techniques introduced within the scope of the class.
ECC: ECHT 142	Computer Systems and Hardware Technologies II	SLO #3 OEM Specifications	2017-18 (Spring 2018)	The student will be able to demonstrate their knowledge in using commercially available diagnostic tools to verify a system meets original equipment manufacturer (OEM) specifications.
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Course ID	Course Name	Course SLO Title	Course SLO Assessment Cycle	Course SLO Statement
ECC: ECHT 144	CompTIA A+ Certification Preparation for Computer Hardware Systems	SLO #1 Course Notebook	2016-17 (Spring 2017)	The students will assemble and maintain a five-section course notebook.
ECC: ECHT 144	CompTIA A+ Certification Preparation for Computer Hardware Systems	SLO #2 CompTIA Industry Certification	2016-17 (Spring 2017)	The student will acquire a knowledge base to prepare to take the A+ Certification Exam through CompTIA, an industry recognized certification.
ECC: ECHT 144	CompTIA A+ Certification Preparation for Computer Hardware Systems	SLO #3 Electricity & Electronics	2016-17 (Spring 2017)	The student will acquire a knowledge in safety and the basics of electricity and electronics, micro-computer hardware and components.
ECC: ECHT 146	CompTIA Network+ Certification Preparation for Computer Hardware Systems	SLO #1 Course Notebook	2017-18 (Fall 2017)	The students will assemble and maintain a five-section course notebook.
ECC: ECHT 146	CompTIA Network+ Certification Preparation for Computer Hardware Systems	SLO #2 CompTIA Network+ Certification Exam	2017-18 (Fall 2017)	Students will develop the skills and knowledge required for passing the CompTIA Network+ Certification exam. Topics include set up configuration and troubleshooting of networking hardware devices. Other areas explored include networking topology, cabling, wireless devices, network standards, protocols and security.
ECC: ECHT 146	CompTIA Network+ Certification Preparation for Computer Hardware Systems	SLO #3 Open Systems Interconnection	2017-18 (Fall 2017)	Students will demonstrate their knowledge of Open Systems Interconnection (OSI), the seven layers of the OSI model, protocol and data packets, and the standard network model.
ECC: ECHT 148	CompTIA Security+ Certification Preparation for Computer Hardware Systems	SLO #1 Course Notebook	2013-14 (Fall 2013)	The students will assemble and maintain a five-section course notebook.
ECC: ECHT 148	CompTIA Security+ Certification Preparation for Computer Hardware Systems	SLO #1 Course Notebook	2017-18 (Summer 2018)	The students will assemble and maintain a five-section course notebook.
ECC: ECHT 148	CompTIA Security+ Certification Preparation for Computer Hardware Systems	SLO #1 Course Notebook	2018-19 (Spring 2019)	The students will assemble and maintain a five-section course notebook.
ECC: ECHT 148	CompTIA Security+ Certification Preparation for Computer Hardware Systems	SLO #2 Information Security	2017-18 (Summer 2018)	Students will demonstrate their knowledge of information security, system threats and risks, protecting systems, network vulnerabilities, network defenses, wireless network security, security audits and policies, cryptographic methods, and the basics of computer forensics
ECC: ECHT 148	CompTIA Security+ Certification Preparation for Computer Hardware Systems	SLO #2 Information Security	2018-19 (Spring 2019)	Students will demonstrate their knowledge of information security, system threats and risks, protecting systems, network vulnerabilities, network defenses, wireless network security, security audits and policies, cryptographic methods, and the basics of computer forensics
ECC: ECHT 148	CompTIA Security+ Certification Preparation for Computer Hardware Systems	SLO #3 Cybersecurity	2017-18 (Summer 2018)	Students will demonstrate their knowledge of "Chain of Custody" handling procedures of physical evidence in matters of cybersecurity.
ECC: ECHT 148	CompTIA Security+ Certification Preparation for Computer Hardware Systems	SLO #3 Cybersecurity	2018-19 (Spring 2019)	Students will demonstrate their knowledge of "Chain of Custody" handling procedures of physical evidence in matters of cybersecurity.

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Course ID	Course Name	Course SLO Title	Course SLO Assessment Cycle	Course SLO Statement
ECC: ECHT 148	Computer Hardware Systems	SLO #3 Cybersecurity	2018-19 (Spring 2019)	Students will demonstrate their knowledge of "Chain of Custody" handling procedures of physical evidence in matters of cybersecurity.
ECC: ECHT 191	Introduction to Microprocessors and Interfacing	SLO #1 Machine Assembly Language	2014-15 (Summer 2015)	Students will demonstrate their knowledge of fundamentals of machine assembly language
ECC: ECHT 191	Introduction to Microprocessors and Interfacing	SLO #1 Machine Assembly Language	2016-17 (Spring 2017)	Students will demonstrate their knowledge of fundamentals of machine assembly language
ECC: ECHT 191	Introduction to Microprocessors and Interfacing	SLO #2 Digital & Analog Interfacing	2013-14 (Spring 2014)	Students will demonstrate their use of software to simulate hardware and digital and analog interfacing.
ECC: ECHT 191	Introduction to Microprocessors and Interfacing	SLO #2 Digital & Analog Interfacing	2014-15 (Summer 2015)	Students will demonstrate their use of software to simulate hardware and digital and analog interfacing.
ECC: ECHT 191	Introduction to Microprocessors and Interfacing	SLO #2 Digital & Analog Interfacing	2016-17 (Spring 2017)	Students will demonstrate their use of software to simulate hardware and digital and analog interfacing.
ECC: ECHT 191	Introduction to Microprocessors and Interfacing	SLO #3 Microprocessors and Microcontrollers	2014-15 (Summer 2015)	Students will demonstrate their knowledge of microprocessors and microcontrollers as they relate to industrial and consumer equipment.
ECC: ECHT 191	Introduction to Microprocessors and Interfacing	SLO #3 Microprocessors and Microcontrollers	2016-17 (Spring 2017)	Students will demonstrate their knowledge of microprocessors and microcontrollers as they relate to industrial and consumer equipment.
ECC: ECHT 22	Basic Electronic Fabrication	SLO #1 Tools & Test Equipment	2014-15 (Spring 2015)	Upon successful completion of this course, students will be able to identify and safely operate/manipulate various types of electronic hand tools and test equipment.
ECC: ECHT 22	Basic Electronic Fabrication	SLO #1 Tools & Test Equipment	2017-18 (Spring 2018)	Upon successful completion of this course, students will be able to identify and safely operate/manipulate various types of electronic hand tools and test equipment.
ECC: ECHT 22	Basic Electronic Fabrication	SLO #2 Experimental Data and Analysis Reporting	2014-15 (Spring 2015)	The students will be able to incorporate experimental data and analysis reporting protocols, using either "paper" or "paperless" environments, similar to data reporting and analysis used by many Electronics Manufacturers and Service Organizations.
ECC: ECHT 22	Basic Electronic Fabrication	SLO #2 Experimental Data and Analysis Reporting	2018-19 (Fall 2018)	The students will be able to incorporate experimental data and analysis reporting protocols, using either "paper" or "paperless" environments, similar to data reporting and analysis used by many Electronics Manufacturers and Service Organizations.
ECC: ECHT 22	Basic Electronic Fabrication	SLO #3 Low Voltage Power Supply	2014-15 (Spring 2015)	Upon successful completion of this course, students will be able to produce a functional low voltage, direct current (DC) power supply project sample that meets predetermined specifications and which could be potentially mass produced.
ECC: ECHT 22	Basic Electronic Fabrication	SLO #3 Low Voltage Power	2019-20 (Fall 2019)	Upon successful completion of this course, students will be able to produce a

Course ID	Course Name	Course SLO Title	Course SLO Assessment Cycle	Course SLO Statement
ECC: ECHT 22	Basic Electronic Fabrication	Supply	2019-20 (Fall 2019)	functional low voltage, direct current (DC) power supply project sample that meets predetermined specifications and which could be potentially mass produced.

*PLO ASSESSMENT 4-YEAR TIMELINE REPORT

Unit Name (Division/Program)	PLO Title	PLO Assessment Cycle	PLO Statement
El Camino: PLOs (IND) - Electronics and Computer Hardware Technology	PLO #1 Safely Operating Industry Equipment	2013-14 (Fall 2013)	Upon successful completion of this program, students will be able to identify and safely operate/manipulate various types of electronic hand tools and test equipment.
El Camino: PLOs (IND) - Electronics and Computer Hardware Technology	PLO #1 Safely Operating Industry Equipment	2017-18 (Fall 2017)	Upon successful completion of this program, students will be able to identify and safely operate/manipulate various types of electronic hand tools and test equipment.
El Camino: PLOs (IND) - Electronics and Computer Hardware Technology	PLO #2 Using industry Level Skills	2014-15 (Spring 2015)	Upon successful completion of this program, students will be able to, accurately identify and analyze various types of Electronic/Electrical Circuits using both calculations, simulation, and test and measurements.
El Camino: PLOs (IND) - Electronics and Computer Hardware Technology	PLO #2 Using industry Level Skills	2017-18 (Spring 2018)	Upon successful completion of this program, students will be able to, accurately identify and analyze various types of Electronic/Electrical Circuits using both calculations, simulation, and test and measurements.
El Camino: PLOs (IND) - Electronics and Computer Hardware Technology	PLO #3 Using Industry Reporting and Analysis Protocols	2016-17 (Fall 2016)	Upon successful completion of this program, students will be able to incorporate data and analysis reporting protocols, using either "paper" or "paperless" environments, similar to data reporting and analysis used by many Electronics Manufacturers and Service Organizations.
El Camino: PLOs (IND) - Electronics and Computer Hardware Technology	PLO #3 Using Industry Reporting and Analysis Protocols	2019-20 (Fall 2019)	Upon successful completion of this program, students will be able to incorporate data and analysis reporting protocols, using either "paper" or "paperless" environments, similar to data reporting and analysis used by many Electronics Manufacturers and Service Organizations.
Distinct Count:1	Count:6		

Appendix C

6-YEAR CURRICULUM COURSE REVIEW TIMELINE

ELECTRONICS AND COMPUTER HARDWARE TECHNOLOGY CURRICULUM – 2015-2021						
COURSE	2015-2016	2016-2017	2017-2018	2018-2019	2019-2020	2020-2021
Electronics and Computer Hardware Technology 11	2 Year CTE Review		2 Year CTE Review		2 Year CTE Review	
Electronics and Computer Hardware Technology 22	2 Year CTE Review		2 Year CTE Review		2 Year CTE Review	
Electronics and Computer Hardware Technology 110	2 Year CTE Review		2 Year CTE Review		2 Year CTE Review	
Electronics and Computer Hardware Technology 120	2 Year CTE Review		2 Year CTE Review		2 Year CTE Review	
Electronics and Computer Hardware Technology 122	2 Year CTE Review		2 Year CTE Review		2 Year CTE Review	
Electronics and Computer Hardware Technology 124	2 Year CTE Review		2 Year CTE Review		2 Year CTE Review	
Electronics and Computer Hardware Technology 130		2 Year CTE Review		2 Year CTE Review		2 Year CTE Review
Electronics and Computer Hardware Technology 140		2 Year CTE Review		From: 4 units To: 3 units		2 Year CTE Review
Electronics and Computer Hardware Technology 142		2 Year CTE Review		From: 4 units To: 3 units Title change		2 Year CTE Review
Electronics and Computer Hardware Technology 144		2 Year CTE Review		From: 4 units To: 3 units		2 Year CTE Review
Electronics and Computer Hardware Technology 146		2 Year CTE Review		From: 4 units To: 3 units		2 Year CTE Review
Electronics and Computer Hardware Technology 148		2 Year CTE Review		From: 4 units To: 3 units		2 Year CTE Review
Electronics and Computer Hardware Technology 191		2 Year CTE Review		2 Year CTE Review		2 Year CTE Review
Electronics and Computer Hardware Technology 95						
Electronics and Computer Hardware Technology 99						

NOTE: Because we are a CTE Program, we are under a 2 year review cycle.

APPENDIX D

CAREER AND TECHNICAL EDUCATION (CTE) SUPPLEMENTAL QUESTIONS

CTE programs must conduct a full program review every 4 years. The comprehensive program review includes responses to the CTE supplemental questions below. Every two years (once between full program reviews) these supplemental questions must be answered and submitted to Academic Affairs for posting on the College website.

Use labor market data, advisory committee input/feedback, and institutional and program-level data to respond to the following questions:

- 1. How strong is the occupational demand for the program?** In your response, describe any changes in demand over the past 5 years and discuss the occupational outlook for next 5 years. Provide applicable labor market data (e.g., US Bureau of Labor Statistics, Employment Development Department) that address state and local needs.

By providing students a critical thinking process, ECHT Program has produced successful professional technicians. Our graduates work for regional aerospace firms, consumer electronics service and repair facilities. Many have found in city organizations and municipal repair facilities. Cities that employ our graduates include: Gardena, Hawthorne, Lawndale, Long Beach, Los Angeles, Redondo Beach, Santa Monica; Torrance; municipal employers include: Metropolitan Transit Authority and Los Angeles County. Many of these have further advanced to become experienced team leaders and managers. A few of our students have graduate degrees, MA/MS, even PHD's, have enrolled in our courses to acquire skills to make them more productive as engineers, and in some cases senior scientists.

Title	SOC Code	Hourly 25th	Hourly Median	Hourly 75th	Employment	Projected	Annual Avg. Openings
Los Angeles-Long Beach-Glendale Area							
Aerospace Eng. & Oper. Techs	17-3021	\$26.86	\$33.84	\$39.04	670	630	51
Electrical & Elect. Techs.	17-3023	\$24.77	\$32.10	\$40.05	3,530	3,560	303
Electro-Mechanical Techs.	17-3024	\$24.00	\$29.80	\$36.04	310	300	26
Engineering Techs	17-3026	\$26.11	\$37.03	\$46.00	910	890	74
Semiconductor Processors	51-9141	\$17.24	\$20.34	\$24.46	410	490	55
Totals		\$23.80	\$30.62	\$37.12	5,830	5,870	509

The LMI Data for the jobs over the next 10 years shows a slight growth, but the majority of new hires, about 509 per year, will be replacing the older workers as they retire. The low end of the pay scale, the lowest 25%, is \$17.24 per hour or \$34,480 per year. The upper end of the pay scale top 75% is \$46.00 per hour or \$92,000 per year. The overall average is \$30.62 per hour or \$61,240 per year. With well over 5,800 jobs for just LA County, there is still strong demand for the program. The numbers do not reflect employment in Orange County.

- 2. How does the program address needs that are not met by similar programs in the region?** In your response, identify any distinctive components of the program (e.g., curriculum, facilities, resources) and/or describe any unique contributions the program or its students/graduates make to the community served.

El Camino College's Electronic and Computer Hardware Technology Program, ECHT, is the only remaining, traditional legacy, regional community college general electronics program in existence west of the 57 Freeway. The El Camino College's Electronic and Computer Hardware Technology Program faculty have integrated Project Based Learning into many of their courses. This seems to engage students in more critical thinking, thus developing skill sets that are very attractive to our regional employers. We have students currently participating in our program, traveling as far as the City of Commerce. This may not sound far, but consider the square mileage, and the number of other community colleges filling these students needs

ECC's Electronics and Computer Hardware Department Strengths:

- The, El Camino's Electronic Program has reputation that it prepares students for both the needs of local industry, in regards to electronic training, in entry level jobs, as well in advanced skill upgrades.
- The ECHT department offers sixteen general and specialized electronics courses. Many of these courses are offered every semester.
- Offers students options: transfer, skill upgrade, career exploratory.
- Our students can transfer to local CSU's Industrial or Engineering Technology programs, as well pursue either an Associates or Certificates in the program with academic "rigor" and affordable cost (CSULB, CSULA, Cal Poly Pomona, Arizona State University, and the Oregon Institute of Technology)
- We provide critical job training to our local and regional partners that are now requiring their employees to pursue either a certificate, or eventually an Associate's Degree, as a condition of employment
- Two areas of study emphasize either general electronics technology or digital systems technology, which could lead to a program or "stackable" certificates and or an Associate Degrees.
- Most students will be able to complete various certificates and a possible AS degree within a three year period. There're two distinct pathways of study for our students.
- Other local colleges have closed or discontinued their electronics related programs, the ECHT service area has expanded to include areas previously served by Santa Monica College, Long Beach City College, and Harbor College. Capacity issues will need to be considered to meet the larger service area.
- The ECHT Program provides both day and night programs to meet the needs of full-time, part-time, and returning students.
- One very strong aspect of this program is that it promotes critical thinking and problem solving. Students are taught systematic approaches to diagnose, troubleshoot, repair, and maintain all manner of electronic systems, components, and various classifications of electronic assemblies.

3. What are the completion, success, and employment rates for students in the program?

In your response, identify the standards set by the program and discuss any factors that may impact completion, success, and employment rates among students in the program. Describe the status of any action plans for maintaining/improving rates relative to such benchmarks.

We have approximately 325, taken from course attendance sheets, students currently enrolled in courses in the Academic Year., August 2016-June 2017. Because the National Elections our now behind us, we are predicting a modest increase in technical staffing, especially in electronic automation, electronic hardware associated with both defense and transportation. As a department, we are be looking into accommodating for the growth that is expected. We are involved in a grant funded program, the Career Advancement Academy, which involves cohort teaching and contextualized learning.

Overwhelmingly supported by our Advisory Committee, “soft computer skills”, staying on the cutting edge of technology and the ability to communicate are extremely important to advance in a career as an Electronic Engineering Technician. To achieve this goal, we need to integrate the importance of team-work, and providing solid training that will attract both students and employers.

The Electronics and Computer Hardware Technology Program offers students a quality technical experience that applies from principles of electronics to advanced and I techniques needed to build their skills to be competitive in this “highly competitive “ job market. To be able to prepare our students and meet the above challenges, we are aware of the need for electronic technicians seeking either entry level employment to those seeking either upgrading of technical skills or career exploration. The ECHT department is continuously in updating curriculum to keep abreast of the new technology and training methods.

From student surveys given as part of CETA, the employment rates for out r students is at approximately 78%..Of that rate, approximately 65 percent work in electronics or an allied field of electronics..

4. List any licensure/certification exam(s) required for entry into the workforce in the field of study and report the most recent pass rate(s) among program graduates. In your response, identify any applicable performance benchmarks set by regulatory agencies and describe the status of any action plans for maintaining/improving pass rates relative to such benchmarks.

In the computer repair option, many students take the COMPTIA Certification exams for A+, Net+, and Security+. For those students who take the independently administrated exam, Pass Rates are:

1. A+ \geq 90%
2. Net+ \geq 65%
3. Security+ \geq 65%

One factor on the success rates, the “lag” between the student’s classroom exposure and the actual testing. This problem arises because of the cost for the various examinations. If the examination were to be offered on campus, at a student lower cost, the success rates should go up!

5. **Are the students satisfied with their preparation for employment? Are the employers in the field satisfied with the level of preparation of program graduates?** Use data from student surveys, employer surveys, and other sources of employment feedback to justify your response.

From past Advisory Board meetings, 2019, 2018, 2017, 2016, ..., Board Members, some were students here and many are working in Industry, have stated satisfaction with the program.

In the Nortrop Grumman Training Program, offered every summer, we receive praise for the quality of students that are taking the training there and many of our former students were hired by Nortrop Grumman.

6. **Is the advisory committee satisfied with the level of preparation of program graduates? How has advisory committee input and feedback been used in the past two years to ensure employer needs are met by the program?** Describe the status and impact of any advisory committee recommendations.

From the last Advisory Committee Meeting the following is the summery of key points. The points addressing the employer needs are marked in bold.

Summery Of Key Issues Addressed: 4/23/2019

(1) Both Full Time instructors will retire at the end of Fall 2021 and Spring 2022, we need to have replacement Full Time Instructors ready. If this is not done, the program will suffer. We also need to replace John's position.

(2) The current computers in the rooms are getting very old and need to be replaced. Without replacements, we will reach a point where they no longer function and the program will suffer.

(3) Moving MTEC-70 and MTEC-75 to ECHT will work only if the aging equipment is updated and/or replaced. However, most robotic jobs are found in Texas and New Mexico.

Comments: The board found limited interest in the MTEC-70 and MTEC-75 training.

(4) The ECHT Program is valuable to the Tech Companies in the area both for new employees and helping to train existing employees.

Comments: The board still finds our program useful and helpful to generating trained people for their jobs.

(5) The Apprenticeship Program sounds great, but better coordination is required to make sure everything is executed properly.

Comments: As far as a concept, the board found that the Apprenticeship Program sounds wonderful, but the devil is in the details which we didn't have at the time of the meeting. This will take some effort to make sure that the skills offered cover the needs of many employers and not just one.

(6) The idea of many Mini-Certs is sound and should be helpful for students going through the program to show their boss that they are making progress toward a degree.

Comments: The current Certificate Of Accomplishment (Mini-Cert) is viewed as useful to those in Industry.

(7) The change for the computer classes from 4 units to 3 units makes sense and will help the students and the program.

Comments: The Industry does recognize the need for people with Computer Hardware skills. A reduction in the unit count from 4 units per class to 3 units per class is seen as a step in the right direction.

(8) We need to properly count the Full Time Students in the computer classes. The undercount of students is because the computer classes are under a different TOP Code.

California Education Code 78016 requires that the review process for CTE programs includes the review and comments of a program's advisory committee. **Provide the following information:**

- a. Advisory committee membership list and credentials.

Ananda Ranasinghe Arachchige, Tech. Supervisor, MTA
Paul Castillo, Security Consultant
David Freed, Associate Dean, ITT Tech, Sylmar CA
Ananda Bandom Marshall, ECC Robotics Club
Jeff Padin, Senior Engineer/Scientist, Aerospace Corp.
Scott Simpson, Aerospace Corporation, Engineer
Sam Yim, Senior Electronic Designer, Nortrop Grumman

Paul Akhigbe, El Camino College, Instructor
Bob Diaz, El Camino College, Instructor
Steve Cocca, El Camino College, Instructor
Masoud Zahedi, El Camino College, Instructor
Matthew Hutcherson, El Camino College, Toolroom

- b. Meeting minutes or other documentation to demonstrate that the CTE program review process has met the above Education Code requirement.

Detailed Notes: 4/23/2019

Steve started the meeting with an update on several items like canceling of some classes (ECHT-142 & ECHT-11), the Festo Purchase being canceled, MTEC-70 & MTEC-75 being passed to ECHT, the age and issues of the current MTEC robots, and the retirement age of the two remaining Full Time Instructors.

Scott responded with the fact that we'll need updated equipment for MTEC-70 & MTEC-75 if we really want to continue with that part of the program. It appears to be an impossible task if we fail to update the older equipment for MTEC-70 & MTEC-75. In addition the coming lack of Full Time Instructors is going to have a strong negative impact on the program.

Bob explained that the last semester for him is Fall 2021 and for Steve is Spring 2022. After that, without Full Time replacements, the program will suffer.

Scott agreed and was surprised that a successful program would allowed to dangle like that. This could create a major problem for training students in the near future.

Steve addressed the plan for several small Certs for the students and that these can be stacked and added upon as the students progress.

Scott felt that the mini certs were a great way for students to show employers that they are making progress toward a degree or Major Certificate. Overall, this is a good idea.

Steve addressed the Apprenticeship Program is progressing, but we do need better coordination of how this should come together. The other issue is that we'll need additional equipment to meet the needs of training the students. This will vary depending on what direct(s) we go in.

Scott agreed and stated that the program does sound good, but without a clear direction, coordination, and equipment for training, this could be an issue.

Steve pointed out that our current computers in the classroom are getting very old and need to be replaced. As it stands, we are hoping for a grant to come through for the money to replace them. If that fails, we have no idea what we'll do.

Paul pointed out that Windows 7 support for the existing computers in our classes is coming to an end. Also, Windows 10 is about to be replaced by Windows 12. This will spell trouble for our older systems than may not be able to support Windows 12. We may find that in the future, nothing will run on these computers.

Steve addressed the Northrop Grumman program we have every summer and the training that this provides.

Scott liked the idea of that program and pointed out the problems of finding qualified people. Also, as some companies set up operations that are out of state, it's even harder to find qualified people. The need for good training is still critical.

Bob asked if this had been a lunch meeting would it have been easier to get people from industry to come.

Scott responded with it depends. If they are not on a critical time crunch, it would work, but there are a lot of times where they can't afford the time off to go out to lunch.

Steve pointed out how people working in the Industry, some with Phd's are taking ECHT classes at El Camino. The feedback we get from the companies is that this helps the engineers with their work, because they lacked the practical hands on experience to understand what's going on.

Scott responded positively to this idea. He added that having only theory and no hands on isn't the best way to do the work. This is valuable training for Aerospace.

Steve spoke of the upcoming change to the ECHT Computer classes from 4 units to 3 units. This allows us to have a Part Timer teach 2 instead of 1 class per semester.

Paul pointed out that we're moving toward preparing students to pass the different Industrial Certifications.

Scott agreed that the drop in units is important for our program and the Computer Industrial Certifications are important to Industry for recognizing qualified people.

Steve brought up the idea of changing the MTEC-70 & MTEC-75 to RTEC-70 & RTEC-75. Plus he suggested changes to the classes.

Bob stated that by the time the changes go through, both Steve and Bob will be retired.

Scott wondered who would teach the classes and will we be able to update the equipment by then. He saw some value to the classes, but it was pointed out that the majority of robotic jobs are out of state due to the fact that California is getting too costly for service and support personal. Texas and New Mexico are the top states for these type of support jobs and it's cheaper to fly in the support people when needed. Manufacturing automation is a very different story however and the jobs are more likely to be found in our area.

Scott also added again that for those classes, we'll need funding to purchase additional and/or replacement equipment in order to do those classes properly.

Steve reviewed the key needs of the program: (1) The need to change computer classes from 4 units to 3 units. (2) The need for replacement Full Time Instructors when we both retire. (3) The need to properly count the Full Time Students in the computer classes. The undercount is because the computer classes are under a different TOP Code.

Final Comments:

The ECHT Program fits a strong need for providing Electronics Technicians for Industry. We are the only Program filling this need for most of the LA area. If we are to continue providing this support for Industry and students, additional resources and support will be required. As stated earlier, the two remaining Full Time Instructors will retire soon and without Full Time Instructor Support, the Program will start to fail as Part Time Instructors will not be able to provide the support needed to keep the program running properly and healthy. Both Harbor and Long Beach City Collages closed their Electronics Programs. I would hope that El Camino Does not chose to go down that same path.

Sincerely,

Robert Diaz