Electronic and Computer Engineering Technology (ECET)

2019
ANNUAL REPORT OF PROGRAM DATA

UNIVERSITY of HAWAIʻI®
MAUI COLLEGE

1. Program Description

a) Statement and brief description of the program including a listing of the program level Student Learning Outcomes (SLOs).

Description
The Electronic & Computer Engineering Technology (ECET) program leads to an Associate in Science (AS) degree and provides students with the skills and knowledge required for entry level employment within high-technology industry as electronic/electro-optic technicians, renewable energy technicians, telecom technicians, and network system administrators. Students learn fundamental engineering concepts, computer programming, mathematics, and physics relevant to a wide variety of industries on Maui. Training, equipment, and supplies are provided for 3-D printing and circuit board fabrication. Software applications for circuit simulation, CAD, finite element analysis, and microprocessor control are utilized. The program requires written and verbal proficiencies and emphasizes laboratory competencies. Internship and job placement opportunities in a variety of engineering technology positions are provided.

Program level Student Learning Outcomes
PLO1: analyze, design, and implement electro-optic systems, control systems, instrumentation systems, communication systems, computer systems, or power systems;
PLO2: apply project management techniques to electrical/electronic(s) and computer systems;
PLO3: utilize appropriate mathematics at the level of algebra and trigonometry to solve technical problems;
PLO4: demonstrate critical engineering technology skills and experiences such as: making existing technology operate, creating/selecting new technology, troubleshooting, calibrating, characterizing, and optimizing;
PLO5: demonstrate engineer's way of thinking, analyzing technology as systems;
PLO6: demonstrate engineer professional skills such as communication and managing projects;
PLO7: demonstrate proficiency in the general education college core requirements: creativity, critical thinking, oral and written communication, information retrieval, quantitative reasoning;
PLO8: demonstrate a respect for diversity and a knowledge of contemporary professional, societal and global issues; and
PLO9: commit to quality, timeliness, and continuous improvement.

b) Program Mission
The mission of the ECET program is to provide students with relevant and rigorous training and education needed for entry-level engineering technology positions in Maui County, and to give graduates mobility within the field and the ability to adapt as the field changes.

The ECET program works closely with its high-technology industry advisory board to ensure students gain skills required for employment with local companies. In this respect, the program builds upon skills, duties and tasks considered critical by these prospective employers.

c) Date Program Website Last Reviewed/Updated.

January 2018

d) Date Program Page Reviewed/Updated in Catalog.
October 2019

2. Analysis of the Program

a) Strengths and weaknesses in terms of demand, efficiency, and effectiveness based on an analysis of the Quantitative Indicators. CTE programs must include an analysis of Perkins Core indicators for which the program did not meet the performance level. Include Significant Program Actions (new certificates, stop outs, gain/loss of positions, results of prior year's action plan).

Demand Health

The demand health, which states that the program is cautionary, is based on the number of new and replacement positions in the county prorated (#2), and the number of AS ECET graduates (#20a). We believe that the demand health does not reflect the reality.

The CIP code chosen for the ECET program (15.202) restricts positions to electrical and electronics engineering technicians. However, ECET graduates are also hired for positions related to information technology, which refers to a different CIP code. If we were to include all possible positions, the ratio of new and replacement positions in the county prorated to the number of AS ECET graduates would be higher.

Efficiency Health

The efficiency health, which states that the program is cautionary, is based on the fill class rate (#10), and the majors to FTE BOR Appointed Faculty (#12). We believe that the student/faculty ratio (#12), i.e., the ratio of the number of majors (#3) to the FTE BOR appointed faculty (#11) does not reflect the reality.

#3: There are 25 "active" ECET majors enrolled in courses as part of the ECET program in fall 2018. An active ECET major is a student who is/was enrolled in ETRO 105, the entry-level ECET course, and who follows the ECET program map. Table 1 below shows the number of active students enrolled in the ECET program in fall 2018 and spring 2019 (The number in parenthesis represents the cohort, i.e., the year students enroll in ETRO 105).

Table 1. ECET active majors, fall 2018- spring 2019

Fall 2018		***Spring 2019***	
ECET active students			
year 1 (2018)	9	year 1 (2018)	8
year 2 (2017)	12	year 2 (2017)	11

year 3 (2016)	1	year 3 (2016)	1
year 4 (2014)	2	year 4 (2014)	2
year 5 (2010)	1	year 5 (2010)	1
Total ECET	25	Total ECET	23

According to the data provided by the UH system, 43 students are listed as ECET majors. This number represents the number of active ECET majors (as defined above) plus the number of students who declare ECET as their major but do not have the prerequisite, i.e., MATH 103, in order to enroll in ETRO 105, or who enroll by mistake. We do not know if the remaining 18 students (43 minus 25) will make it to the ECET program in the coming years.
#12: On the other hand, three ETRO faculty teach ETRO courses. One faculty teaches exclusively lower-division courses, whereas two faculty teach both lower- and upper-division courses (approximately .34 FTE each for lower-division). The number of FTE BOR appointed faculty (#11) is misleading, showing only one faculty, when there should be 1.68 FTE. Therefore, the student/faculty ration does not reflect the reality.

Effectiveness Health
The effectiviness health, which states that the program is cautionary, is based on persistence fall to spring (#19) and unduplicated degrees/certificates awarded (#20). We believe that the persistence fall to spring does not reflect the reality.
From, Table 1, the retention rate fall to spring is 92% (not 64%).

b) Discuss course offering modality including online, hybrid, and skybridge.
The ECET program does not offer online, hybrid or skybridge ETRO courses.

c) Highlight new innovative student support efforts including FYE, etc.
N/A

3. Program Student Learning Outcomes

a) List of the Program Student Learning Outcomes
PLO1: analyze, design, and implement electro-optic systems, control systems, instrumentation systems, communication systems, computer systems, or power systems;
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PLO3: utilize appropriate mathematics at the level of algebra and trigonometry to solve technical problems;
PLO4: demonstrate critical engineering technology skills and experiences such as: making existing technology operate, creating/selecting new technology, troubleshooting, calibrating, characterizing, and optimizing;
PLO5: demonstrate engineer's way of thinking, analyzing technology as systems;
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PLO7: demonstrate proficiency in the general education college core requirements: creativity, critical thinking, oral and written communication, information retrieval, quantitative reasoning;
PLO8: demonstrate a respect for diversity and a knowledge of contemporary professional, societal and global issues; and
PLO9: commit to quality, timeliness, and continuous improvement.

b) Program Student Learning Outcomes that have been assessed in the year of the Annual Review of Program Data.

PLO7: demonstrate proficiency in the general education college core requirements: creativity, critical thinking, oral and written communication, information retrieval, quantitative reasoning.

c) Describe the assessment activity

Written laboratory reports and an oral presentation were assessed in ETRO 161, Introduction to Optics and Photonics.

Written laboratory reports:
ETRO 161 curriculum includes labs. Across the semester, students engage in three-hour laboratory experiments. A written lab report that follows strict guidelines is due the following week. It is a writing exercise (like an essay for an English class), where students need to articulate their thoughts in a scientific way. Clarity, rigor, and logical reasoning, are assessed.

Oral presentation:
The end of the semester project requires each student (or a team of two) to research a telescope of her/his choice, preferably located in Hawai`i, and create PowerPoint slides that include broad general information and technical information. The oral presentation is assessed following a scoring rubric.

d) Describe assessment results

The laboratory report turned out to be challenging. The oral presentation was mostly a success.

e) Describe any changes that have been made as a result of the assessments

It was clear that ECET students were not well prepared for the laboratory report: they lacked the written technical skills and scientific rigor indispensable to write a teachnical lab report. ENG 225 (Writing for Science and Technology) could be a good fit. This course is already in the catalog, and Derick Snyder, English faculty whom I talked to, would love to teach this class. ECET students could choose ENG 225 or ENG 210 as their Humanities elective. ENG 225 will be submitted for approval as an option to ENG 210 in fall 2019.

4. Action Plan

a) Describe the action plan for the next academic year, including resource, curricular, professional development, or other next steps.

Curricular

ICS 184 (Introduction to Networking) has been offered as an alternative to ETRO 140 (Fundamentals of Computer Networking) for the last two years. In order to institutionalize the course, 184 will be added, as an option, to ETRO 140 on the ECET program map.

English faculty is eager to offer ENG 225 (Writing for Science and Technology) that will better serve students engaged in science and science-related topics. ENG 225 will be added, as an option, to ENG 210 (Research Writing). These changes will trigger a change in the total number of credits for the AS ECET and BAS ENGT. All changes will be submitted in fall 2019 for approval by STEM faculty, Curriculum Committee, Academic Senate, and chancellor.

ECET collaboration with ENGT

Each year, the American Astronautical Society (AAS) organizes the CanSat competition, a student design-build-launch competition for space-related topics. This competition is open to teams from universities and colleges, and ENGT seniors have been participating for the last two years. In fall 2019 and spring 2020, for the first time, ECET sophomore will engage in the CanSat competition along with ENGT seniors. ECET and ENGT majors will regroup into two teams and meet on Fridays, 9:00-11:45 am, year-round, under the supervision of Dr. Park. Teams must be able to design and build a space-type system, following the approved competition guide, and then compete against each at the end of two semesters to determine the winners. If selected, the teams will travel to Virginia in June for the final phase of the competition. ECET students will receive credit for ETRO 296 (Special Projects in ECET). The goal of this collaboration between ECET and ENGT majors is to attract ECET majors into the ENGT program.

Relocation of equipment

The Laser Milling Machine and Printed Circuit Board machine hosted in the Vocational building will need to be relocated in KAA 202 (closer to the electronics lab) and recalibrated. These machines are instrumental to the program: they are used for courses (ETRO 212, ETRO 296) and various projects throughout the year.

Resources

Materials: The ECET program relies on the Pre-Engineering Education Collaborative Phase 2 (PEEC II) grant, the Hawai`i Space Grant Consortium (HSGC), and the UH Foundation accounts to purchase new and replacement materials, and renew MATLAB software license. Annual budget: $13,500.
STEM provides funds for software license renewals (Multisim, Labview, Solidworks): $4,000
(Note: The overall budget is shared with the ENGT program.)

Instructors: Courses required for the AS degree in ECET will be taught by ETRO faculty (48.68 TE's), ICS faculty (7 TE's), and General Education faculty (9 TE's). Lecturers are needed to teach MATH 119 (4 TE's) and PHYS 105 (5.5 TE's). ETRO BOR appointed faculty will teach all ETRO courses.

Recruitment
Plan on attending outreach activities to increase awareness and interest in the 2+2 (2-year ECET + 2-year ENGT) BAS ENGT program.

b) Include how the actions within the plan support the college‘s mission. In addition to the overall action plan for the program, include specific action plans for any Perkins Core Indicator for which the program did not meet the performance level.

5. Resource Implications

(Physical, human, financial)

Materials and software
New and replacement materials: $20,000
Software license renewals (Matlab, Multisim, Labview, and Solidworks): $5,000.
Total: $25,000

Instructors
UHMC BOR appointed faculty is available to teach ETRO, ICS, PHYS, MATH, and General Education courses as part of the ECET program. ETRO BOR appointed faculty teaches all ETRO courses: there is currently no need for lecturers.

Appendix: ARPD data

College: University of Hawai'i Maui College
Program: Electronics & Computer Engineer Tech
Status: Report Complete

Program Quantitative Indicators

STEM Major

Overall Program Health: Cautionary

Workforce Alignment: Classification of Instructional Programs (CIP) -to- Standard Occupational Classification (SOC)

Electronics & Computer Engineer Tech
CIP Code = 15.1202

17-3023 - Electrical and Electronics Engineering Technicians

Print ARPD

	Demand Indicators	2016 - 17	2017 - 18	2018 - 19	Demand Health
1.	New & Replacement Positions (State)	66	68	65	
*2.	New & Replacement Positions (County Prorated)	6	6	4	
3.	Number of Majors	73	67	43	
3a.	Number of Majors Native Hawaiian	16	18	9	
3b.	Fall Full-Time	47%	46%	43%	
3c.	Fall Part-Time	53%	54%	57%	
3d.	Fall Part-Time who are Full-Time in System	1%	0%	2%	
3e.	Spring Full-Time	43%	43%	44%	Cautionary
3f.	Spring Part-Time	57%	57%	56%	
3g.	Spring Part-Time who are Full-Time in System	0%	0%	3%	
4.	SSH Program Majors in Program Classes	546	576	452	
5.	SSH Non-Majors in Program Classes	2,237	1,865	1,959	
6.	SSH in All Program Classes	2,783	2,441	2,411	
7.	FTE Enrollment in Program Classes	93	81	80	
8.	Total Number of Classes Taught	47	44	47	

NOTE: New & Replacement jobs updated (View Methodology).

Efficiency Indicators		2016 - 17	2017 - 18	2018 - 19	Efficiency Health
9.	Average Class Size	19	18	17	Cautionary
*10.	Fill Rate	84.1%	74.4%	71.6%	
11.	FTE BOR Appointed Faculty	1	1	1	
*12.	Majors to FTE BOR Appointed Faculty	73	67	43	
13.	Majors to Analytic FTE Faculty	73	67	43	
13a.	Analytic FTE Faculty	5	5	5	
14.	Overall Program Budget Allocation	$206,979	$395,833	$0	
14a.	General Funded Budget Allocation	$206,855	$278,333	$0	
14b.	Special/Federal Budget Allocation	$0	$0	$0	
14c.	Tuition and Fees	$124	$117,500	$0	
15.	Cost per SSH	$90	$0	$0	
16.	Number of Low-Enrolled (<10) Classes	11	13	15	

Effectiveness Indicators		2016 - 17	2017 - 18	2018 - 19	Effectiveness Health
17.	Successful Completion (Equivalent C or Higher)	79%	75%	76%	Cautionary
18.	Withdrawals (Grade = W)	65	51	38	
*19.	Persistence Fall to Spring	68%	71%	64%	
19a.	Persistence Fall to Fall	37%	45%	34%	
*20.	Unduplicated Degrees/Certificates Awarded	31	23	23	
20a.	Degrees Awarded	10	8	6	
20b.	Certificates of Achievement Awarded	13	9	9	
20c.	Advanced Professional Certificates Awarded	0	0	0	
20d.	Other Certificates Awarded	19	13	13	
21.	External Licensing Exams Passed	0	0	0	
22.	Transfers to UH 4-yr	2	2	2	
22a.	Transfers with credential from program	0	0	1	
22b.	Transfers without credential from program	2	2	1	

Distance Indicators		2016 - 17	2017 - 18	2018 - 19	
23.	Number of Distance Education Classes Taught	19	14	13	
24.	Enrollments Distance Education Classes	499	313	280	
25.	Fill Rate	105%	77%	75%	
26.	Successful Completion (Equivalent C or Higher)	84%	88%	81%	
27.	Withdrawals (Grade = W)	25	10	1	
28.	Persistence (Fall to Spring Not Limited to Distance Education)	66%	22%	56%	

Perkins Indicators		Goal	Actual	Met	
29.	1P1 Technical Skills Attainment	93	87.5	Not Met	
30.	2P1 Completion	55	31.25	Not Met	
31.	3P1 Student Retention or Transfer	81.9	100	Met	
32.	4P1 Student Placement	66.25	66.67	Met	
33.	5P1 Nontraditional Participation	23.5	21.13	Not Met	
34.	5P2 Nontraditional Completion	23	30	Met	

Performance Indicators		2016 - 17	2017 - 18	2018 - 19	
35.	Number of Degrees and Certificates	23	17	15	
36.	Number of Degrees and Certificates Native Hawaiian	3	3	2	
37.	Number of Degrees and Certificates STEM	25	18	16	
38.	Number of Pell Recipients[1]	12	11	5	
39.	Number of Transfers to UH 4-yr	2	2	2	

*** Used in Rubric to determine Health Indicator**

Date Last Modified: 2019-10-15 11:43:05

Glossary/Rubric