University of Hawai`i-Maui College

Annual Report of Program Data 2012

Electronic and Computer Engineering Technology Program

Program Mission Statement

Description

The Electronic & Computer Engineering Technology (ECET) program which leads to an Associate in Science degree provides students with the skills and knowledge required for entry level employment within the high-technology industry as electronic technicians, telecom technicians, network administrators, Windows/Unix system administrators, or high performance computer technicians. The program provides internship and job placement opportunities in a variety of engineering technology positions.

Mission Statement

The mission of the ECET program is to provide students relevant and rigorous training and education for entry-level engineering technology positions in Maui County. It aims also at giving 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 insure 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.

Part I. Quantitative Indicators

1. RESPONSE TO INDICATORS

a. Response to Demand Indicators

- The SOC code 49-2011 (Computer, Automated Teller, and Office Machine Repairers) does not describe the overall employment opportunities available to graduates of the ECET program in Hawai`i. (See table below.) We have repeatedly asked for a change in the SOC codes since 2010.

Maui County Trends

SOC Code	Maui County	Employment		Job Openings (1)
		2008	2018	
15-1041	Computer Support Specialists	40	40	>0 and <10
15-1071	Network and Computer Systems Administrators	80	90	>0 and <10
49-2000	Electrical and Electronic Equipment Mechanics, Installers, and Repairers	220	220	10

[1] *Job Openings refers to the average annual job openings due to growth and net replacement.*

Source: Hawaii Department of Labor, http://www.hiwi.org/gsipub/index.asp?docid=423

- The ECET program has students that have declared ECET as their major, yet never attended any technical classes in the major. The UH system records 81 ECET majors for the 2011-2012 academic year, although 55 students only were actively enrolled in technical classes as part of the ECET program.

As a result, some statistics based on the Number of Majors shown in the Program Quantitative Indicators 2011-2012 are biased.

b. Response to Effectiveness Indicators

The number of degrees awarded in the Program Quantitative Indicators 2011-2012 does not reflect the actual total number of degrees awarded in 2012. It does not take into account the number of students who graduated during summer 2012, an additional 3 for a total of 11. (See table below.)

The number of majors (#3), the new and replacement positions (county prorated) (#2), and the unduplicated degrees (#20) do not reflect the actual numbers. As a result, the effectiveness scores based on those numbers are biased, as well as the overall category health score.

c. Response to Efficiency Indicators

Starting in 2009, the program has implemented a student monitoring system, which tracks students progress and allows faculty to provide counseling and follow-up on any issues that are identified. Students meet with their advisor or counselor at the time they enroll in the ECET program and together they draft a two to three year academic plan that will lead them to the AS. Students are encouraged to follow their personalized academic plan in order to graduate with the AS ECET in a timely manner and eventually pursue with the BAS ENGT degree program. The table below shows that the number of graduates has increased since 2011 to reach a steady pace. (We anticipate about 10 graduates for 2013.)

Number of AS ECET graduates 2005-2012

Year	2005	2006	2007	2008 [(1)]	2009	2010	2011	2012
# of graduates	5	2	4	11	4	5	12	11

[(1)] *2008 number of graduates includes students who graduated in fall 2007*

2. PROGRAM STENGTHS AND WEAKNESSES
a. Strengths

- Students are exposed to and use numerous tools (hardware, software) they will work with in the real world: they are well prepared to enter the workplace as technicians.
- The monitoring system helps students stay on track

b. Weaknesses

- There is not enough equipment: Students have to share it.
- Some equipment becomes obsolete and needs to be replaced in order to stay current to the industry.
- We need more software to match what is currently used in the industry.
- Scheduling of classes is now an issue as some students wish to finish the AS in less than three years in order to start upper division classes. Summer school offerings solve this, but the summer classes are low enrolled.

3. PROGRAM ACTIONS

- **Completion/Retention (in order to meet Perkins Core Indicator 2P1).**

- More and new equipment for a better learning and training environment, and successful academic results
- Tutoring program to help students succeed in their endeavors.

- **Persistence**

Continue implementing academic plans.

- **Graduation**

Revise the ECET program map and curriculum in math to increase persistence and graduation rates. Data shows math in the first two semesters is an indicator for graduation rates.

II. Student Outcome and Goal Achievement

A. Program Learning Outcomes

PLO 1: analyze, design, and implement electro-optic systems, control systems, instrumentation systems, communication systems, computer systems, or power systems;
PLO 2: apply project management techniques to electrical/electronic(s) and computer systems;
PLO 3: utilize appropriate mathematics at the level of algebra and trigonometry to solve technical problems;
PLO 4: demonstrate critical engineering technology skills and experiences such as: making existing technology operate, creating/selecting new technology, troubleshooting, calibrating, characterizing, and optimizing;
PLO 5: demonstrate engineer's way of thinking, analyzing technology as systems;
PLO 6: demonstrate engineer professional skills such as communication and managing projects;

PLO 7: demonstrate proficiency in the general education college core requirements: creativity, critical thinking, oral and written communication, information retrieval, quantitative reasoning;
PLO 8: demonstrate a respect for diversity and a knowledge of contemporary professional, societal and global issues; and
PLO 9: commit to quality, timeliness, and continuous improvement.

B. Analysis of Student Outcome and Goal Achievement

1.

P-SLO	***4***	***7***
Course	ETRO 112	ETRO 293v

Courses assessed:

ETRO 112: Electronic Technology II
ETRO 293v: Internship II

PLO assessed:

PLO 4. Demonstrate critical engineering technology skills and experiences such as: making existing technology operate, creating/selecting new technology, troubleshooting, calibrating, characterizing, and optimizing.
PLO 7. Demonstrate proficiency in the general education college core requirements: creativity, critical thinking, oral and written communication, information retrieval, quantitative reasoning.

Program map

The assessment is based upon the following keys:
I: the PLO is **introduced** in the course
R: The PLO is **reinforced** in the course
E: the PLO is **evaluated** in the course

PLO	***ETRO 101***	***ETRO 102***	***ETRO 105***	***ETRO 110***	***ETRO 112***	***ETRO 140***	***ETRO 161***	***ETRO 193v***	***ETRO 201***	***ETRO 205***	***ETRO 240***	***ETRO 293v***	***ETRO 298***	***MATH 107***	***PHYS 105***
1	I, E	I, E	R, E	R, E	R, E	I, R, E	R, E	I, R	I	R	I, R, E	R	E	R	R
2													I, R, E		
3	I, E	I, E	R, E	R, E	R, E	R, E	R, E		I	R	R, E			I, R, E	R, E
4	I, E	I, E	R, E	R, E	R, E	R, E	R, E	R	I	R, E	R, E	R	E		
5	I	I	R	R	R	R	R	I, R	I	R	R	R	E	I, R	
6						I		I, R, E			R	R, E	E		
7	I	I	R	R	R	R	R	R, E	R	R	R	R, E	E	R	R
8								I, E				R, E	R, E		
9	I	I	R	R	R	R	R	I, E	R	R	R	R, E	R, E	R	R

Assessment Plan:
PLO # 2 and #5 were planned for assessment in spring 2012. This has been postponed until spring and fall 2013, hence the new assessment plan:

PLO	*Spring 11*	*Fall 11*	*Spring 12*	*Fall 12*	*Spring 13*	*Fall 13*	*Spring 14*	*Fall 14*	*Spring 15*	*Fall 15*
1	ETRO 110							ETRO 201		
2						ETRO 112				ETRO 140
3							ETRO 105		ETRO 161	
4		ETRO 112		ETRO 101						
5					ETRO 112				ETRO 240	
6					ETRO 298				ETRO 298	
7		ETRO 293v					ETRO 293v			
8					ETRO 293v		ETRO 293v			
9					ETRO 293v		ETRO 293v			

2. Assessment Strategy/Instrument

Tools used to assess PLO #4 in ETRO 112 :

- Homework assignments (8): The assigned problems dealt with theoretical and applicable concepts and were picked from the text book. Some of the homework assignments included an additional extra credit problem.
- Tests (2): The tests covered topics that were discussed in class.
- Laboratory activities (6): The laboratory activities covered topics that were discussed in class.
- Project (1): The project covered topics that were discussed in class.

Tools used to assess PLO #7 in ETRO 293v :

- Supervisor feedback.
- Student interviews.

PLO # 2 and #5 were planned for assessment in spring 2012. This has been postponed until spring and fall 2013.

3. Expected Level of Achievement

Expectation	***Exceeds***	***Meets***	***Needs Improvement***	***Insufficient Progress***
Letter grade	A-B	C	D	F
Percentage	80% ≥	70% ≥	60% ≥	≤59%

4. Results of Program Assessment

Program Learning Outcome (PLO)				
PLO 4. Demonstrate critical engineering technology skills and experiences such as: making existing technology operate, creating/selecting new technology, troubleshooting, calibrating, characterizing, and optimizing	***Exceeds***	***Meets***	***Needs Improvement***	***Insufficient Progress***
Assessment tool: Homework	26			
Assessment tool: Laboratory activities	20	1		
Assessment tool: Project	5			
Assessment tool: Tests	8	1	2	
Overall assessment on this PLO	59	2	2	0
Overall assessment on this PLO- Percentage	93.7%	3.2%	3.2%	0%

Program Learning Outcome (PLO)				
PLO 7. Demonstrate proficiency in the general education college core requirements: creativity, critical thinking, oral and written communication, information retrieval, quantitative reasoning.	***Exceeds***	***Meets***	***Needs Improvement***	***Insufficient Progress***
Overall assessment on this PLO	2	1	1	1
Overall assessment on this PLO- Percentage	40%	20%	20%	20%

C. Action Plan

Program strengths:
The curriculum was designed in collaboration with the local industry to specifically meet the needs for a local trained workforce.
Classes are taught by both faculty and lecturers. The lecturers are current employees in local high technology companies. They bring laboratory expertise and exercises based on the ongoing projects from the field. Students have access to the latest information and tools from the workplace.
The program trains students using state-of-the-art hardware and software.

The program weakness is mainly in lack of financial support from the campus.
Funding from UHMC's Tech Fee ($4,060 for software during the academic year 2011-2012) cannot cover all the expenses. The program requires extra funding in order to meet the needs of the high tech industry (already requested in last year's ARPD). This will become a major factor as current extramural funding expires.

A Perkins proposal has been submitted (not yet approved at the time of this report):
'We will be offering support in mathematics to students enrolling in the Electronic and Computer Engineering Technology (ECET) program before (as a summer bridge program) and during (as a tutoring program and math institute) the first year into the program. By providing the students

with the help in mathematics they need early on, we expect them to become confident and proficient in Mathematics so that they remain in the program, become successful, and achieve the academic and technical and career skills needed for entering the technical workforce or pursuing with a baccalaureate degree.'

III. Engaged Community

Engaged Community

- Each year, faculty visit local high schools to promote the ECET and ENGT programs (see table below). They are accompanied by ECET or ENGT students who perform demonstrations in electronics and optics.

High School visits, AY 2011-2012

High School	*High School attendees*
Maui High School	33
Baldwin High School	27
King Kekaulike High School	14

- Faculty also attended venues for promoting the ECET/ENGT programs (see table below).

Venues, AY 2011-2012

Venue	*Location*
Networking Mixer Event (1)	UHMC
Transfer College Fair	UHMC
Molokai Middle School Technology Career visit	UHMC
IGED (2)	UHMC
Makaukau Pa! College Readiness Day (3)	UHMC
Maui County Fair	Kahului
AMOS Conference (4)	Wailea

(1): This event gathered students enrolled or interested in a bachelor's degree at UHMC, local business leaders, and faculty.
(2): "Introduce a Girl to Engineering Day" organized by the Maui Economic Development Board's (MEDB)Women in Technology Project in collaboration with the Maui Chapter of the Hawaii Society of Professional Engineers, the County of Maui, and UHMC.
(3): The purpose of this event was to help students prepare for their successful transition from high school to college.
(4): Advanced Maui Optical and Space Surveillance Technologies Conference held in Wailea.

- ECET students participate in extra-curricular activities (see table below). They meet with high school students and have a chance to introduce them to the ECET program.

Activities	*# ECET/ENGT students*	*Task*
Baldwin High School Robotics Club [(1)]	1	Assist the instructor
King Kekaulike High School Robotics Club	2	Assist the instructor
First Lego League Tournament [(2)]	5	Referees

(1) This team won the 2012 Hawai`i Regional's on Oahu and qualified for the 2012 FIRST World Competition in St Louis, MO. (April 2012). Our ECET student accompanied his team to Missouri.
(2) FLL tournament was held at Maui High School. The ECET program worked with MEDB in order to recruit ECET students.

Advisory Board input

In September 2012 the advisory board reviewed the program goals, classes, map, and curriculum. The advisory board supported a proposal for a curriculum change that would offer the ECET AS in two years instead of three.

IV. Recognize and Support Best Practices

- Innovative teaching techniques and use of technology

  ECET students are offered all means to acquire the knowledge and technical skills that lead to entry into the technology fields. Hands-on lab activities (which are the foundation of the courses) include extensive use of equipment and software platforms that are as close as possible to what the students will encounter in the workplace.

  However, without funding to replace obsolete equipment and purchase new innovative software, it will be difficult to adequately prepare ECET graduates for the workplace.

- Recognition: ECET graduates find a job in high technology companies on Maui: It is the best recognition the program can receive for the quality of the education and training it offers to its students.

V. Planning and Policy Considerations

The ECET program is a three-year program that leads to the Associate in Science (AS) degree. AS graduates can pursue their education and enroll in the two-year Engineering Technology program which leads to the Bachelor of Applied Science (BAS) degree. Currently, it takes five years to graduate with the BAS.

In order to align with the college goal (which is to offer four-year degree programs), the ECET curriculum will undergo changes so that the program will be offered in two years instead of three. Students will be able to graduate with the baccalaureate degree within four years.

Part VI. Budgetary Consideration and Impact

The program is currently operating without any budget support from the college general fund. All required supplies, including software licenses have been purchased using extramural funding. Some funding has already expired and the remaining funding will expire in the summer of 2013.

- The student program coordinator position will become unfunded next year. This position is critical to the program. All industry, internship, job placement, high school recruiting, data collection and analysis rely on this position. The implication will impede program development and student success. This is a shared position with ENGT.

- Student lab technicians are needed in order to provide up to date experiments and maintain current laboratory facilities. Student help is shared with ENGT.

- The program requires state of the art software programs and licenses in order to meet the goals of local industry employment. The cost of upgrades increases significantly if the software maintenance agreement lapse. Without campus resources on the order of $10,000 per year the software licenses will become out of date and therefore effect student desirability in the workplace.

- Students required lab supplies and instrumentation. This has been supported with extramural funding. Students will be forced to purchase supplies without budget support from the campus administration.

- Consumables cost is $5,000 per year and instrumentation is estimated at a onetime cost of $60,000.

- Conferences, and other travel are required to keep faculty up to date on the latest technologies and teaching methodologies. Marketing materials and travel are required to recruit Hawaii and Kauai community college students.
  Travel budgets are estimated to be $2,000 per year.
