University of Hawai`i-Maui College
Engineering Technology Annual Program Review 2012

Program Mission Statement

Description

The Engineering Technology program which leads to a Bachelor of Applied Science degree provides curriculum and extensive hands-on training in electronics, computers, optics, remote sensing, and other technologies required for employment in local and regional high tech companies and industries.

Mission Statement

The mission of the ENGT program is to prepare graduates to be productive technologists with a broad array of skills in a variety of areas such as telescope operations, high performance computing for scientific and engineering applications, energy production and distribution including photovoltaic and wind turbines, and system administration in a variety of industries.

Part I. Quantitative Indicators

1. PROGRAM'S STRENGTHS

a. Response to Demand Indicators

There are job opportunities in the local high tech industry for technologists (#2), and the BAS ENGT degree program fulfills this request by training an adequate number of majors (#3) leading to a healthy ratio #majors/ #county positions.

b. Response to Effectiveness Indicators

During the academic year 2011-2012, 5 seniors and 10 juniors were actively enrolled in BAS ENGT courses for a total of 17 majors. 3 seniors graduated in spring 2012. This corresponds to healthy ratios: #degrees/ #majors and #degrees /#county positions.

2. PROGRAM'S WEAKNESSES

Response to Efficiency Indicator

#11, 12, 13, and 14 are incorrect.

- #11 shows zero FTE faculty. There should be at least .5 FTE allocated to the program.
- We are not aware of how the #12 was calculated and therefore cannot confirm this number.
- We are not aware of how the #13 was calculated and therefore cannot confirm this number.

- #14 shows a budget allocation, however the approved budget for this program was denied by administration. We do not understand how this budget number was calculated and cannot confirm the validity of this amount. The program has been operating solely on extramural funding.

3. RESULTS OF PRIOR YEAR'S ACTION PLAN

- Recruitment to increase enrollment in the program: the number of majors went from 7 in fall 2010 to 17 in fall 2011.
- Increase of ECET majors' retention, persistence, and graduation in order to build up the pool of ENGT majors (see table below).

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

- The IEEE (Institute of Electrical and Electronics Engineers) Maui Student Chapter was launched in spring 2012 with 14 members (ECET and ENGT students).
- Funding through UHMC's Student Tech Fee allowed to renew software licenses (MATLAB and SolidWorks) without which students wouldn't be prepared for the workplace. The program is still dependant on tech fee funding for software licenses. We plan to continue requesting funding from the tech fee committee each semester.

4. RESPONSE TO PERKINS INDICATOR 4P1 (student placement, does not meet the goal)

All three seniors who graduated in spring 2012 with their baccalaureate degree found a job in the local high tech industry on Maui (Boeing and Pacific Defense Solutions).

5. PROGRAM ACTIONS

- Continue developing and updating a priority list of equipment, software, upgrades, and replacements through funding that becomes available.
- Purchase a Renewable Energy Systems: Solar Thermal and Photovoltaic Learning Systems. Provide students with the corresponding skills and encourage them to apply for certificates and/or licenses
- Implement the course articulation between UHMC and KauaiCC for the BAS ENGT pathway, and recruit for the BAS ENGT.
- Continue participation at all available venues, such as student fairs, student orientations, high school visits, and UH community colleges.
- Continue revising the curriculum in order to respond to the needs of the high tech industry.
- Hire full time ENGT faculty and enlarge the pool of appropriate lecturers
- Prepare actively for ABET's (Accreditation Board of Engineering and Technology) accreditation of the program: it would provide an opportunity for UHMC to demonstrate that it is committed to maintaining the engineering programs' quality and that the

Engineering Technology Program is performing at the level required by the professions we serve.

- Set up an IEEE student club on UHMC's campus.
- Continue its partnership with AWI (Akamai Workforce Initiative): the ENGT program works closely with its Akamai Internship Program component to provide excellent training and internship opportunities with local high tech companies in areas such as optics, computers, electronics, and astronomy. AWI also provides the program with a team of post graduates who run inquiry-based activities as part of selected courses.
- Get funding from diverse institutions to ensure that the program will run smoothly.

II. Outcome and Goal Achievement

A. Program Learning Outcomes

1	analyze, design, and implement electro-optic systems, control systems, instrumentation systems, communication systems, computer systems, or power systems;
2	apply project management techniques to electrical/electronic(s) and computer systems;
3	utilize integral and differential calculus, or other appropriate mathematics above the level of algebra and trigonometry to solve technical problems;
4	demonstrate critical engineering technology skills and experiences such as: making existing technology operate, creating/selecting new technology, troubleshooting, calibrating, characterizing, and optimizing;
5	demonstrate engineer's way of thinking, analyzing technology as systems;
6	demonstrate engineer professional skills such as communication and managing projects;
7	demonstrate proficiency in the general education college core requirements: creativity, critical thinking, oral and written communication, information retrieval, quantitative reasoning;
8	demonstrate a recognition of the need for, and an ability to engage in lifelong learning;
9	demonstrate an ability to understand professional, ethical and social responsibilities;
10	demonstrate a respect for diversity and a knowledge of contemporary professional, societal and global issues; and
11	commit to quality, timeliness, and continuous improvement.

B. Analysis of Student Outcome and Goal Achievement

1.

P-SLO	*3*	*4*	*7*
Course	ETRO 305	ETRO 310	ETRO 497

Courses assessed:

ETRO 305: Engineering Computing
ETRO 310: Applied Robotics
ETRO 497: Capstone Project I

PLOs assessed:

PLO 3: Utilize integral and differential calculus, or other appropriate mathematics above 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 7: Demonstrate proficiency in the general education college core requirements: creativity, critical thinking, oral and written communication, information retrieval, quantitative reasoning

Program map:

PLO	*Math 219*	*PHYS 219*	*ETRO 305*	*ETRO 310*	*ETRO 320*	*ETRO 350*	*ETRO 360*	*ETRO 370*	*ETRO 415*	*ETRO 440*	*ETRO 450*	*ETRO 460*	*ETRO 475*	*ETRO 497*	*ETRO 498*
1	I	R, E	R, E	R, E	R, E	R, E	R, E	R, E		R, E	R, E	R, E	R, E	E	E
2									I, R, E						
3	I, R, E	I, R, E	I, R, E	R, E	I, R, E	R, E	R, E	R, E		R, E	R, E	R, E	R, E		
4			R, E	R, E	R, E	R, E	R, E	R, E		R, E	R, E	R, E	R, E	E	E
5				R, E	R, E	R, E	R, E	R, E		R, E	R, E	R, E	R, E	E	E
6									I, R, E					E	E
7	R	R	R	R	R	R	R	R	R, E	R	R	R	R	E	E
8	R	R	R	R	R				R				R	R	E
9									R, E				R, E	R, E	R, E
10									R, E				R, E	R, E	R, E
11	R	R	R	R	R	R	R	R	R, E				R, E	R, E	R, E

Assessment Plan:

PLO	*Fall 11*	*Spring 12*	*Fall 12*	*Spring 13*	*Fall 13*	*Spring 14*	*Fall 14*	*Spring 15*	*Fall 15*
1						ETRO 370			ETRO 320
2			ETRO 415				ETRO 415		
3	ETRO 305				ETRO 450				
4		ETRO 310						ETRO 440	
5			ETRO 350			ETRO 475			
6				ETRO 498					ETRO 415
7	ETRO 497			ETRO 498					
8				ETRO 498			ETRO 497		
9						ETRO 475	ETRO 415		
10						ETRO 475		ETRO 498	
11					ETRO 415			ETRO 498	

2. Assessment Strategy/Instrument

Assessment tools used to assess PLO#3 in ETRO 305:

- Homework assignments (13): The problems dealt with theoretical and applicable concepts and were picked from the text book or topics covered in class. Some of the homework assignments included an additional extra credit problem.
- Classroom Activities (14): Exercise and problems asked questions about course material and some homework problems.
- Tests (3): The tests covered topics that were discussed in class.

Assessment tools used to assess PLO#4 in ETRO 310:

- Homework assignments (6): The problems dealt with theoretical and applicable concepts and were picked from the text book or from topics covered in class. Some of the homework assignments included an additional extra credit problem.
- Classroom/lab activities (4):
- Final Project: **:**The project covered topics that were discussed in class.

Assessment tools used to assess PLO#7 in ETRO 497: Oral and written Presentation Skills

- Presentation 1: Project menu
- Presentation 2: Request for proposal
- Presentation 3: Proposal
- Final oral presentation
- Final written report

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

ETRO 305

Overall the assessment shows that students are meeting the program goals. Math at the calculus level is a challenge for some of the Engineering Technology students.

ETRO 310

Students are meeting or exceeding the goals of the program.

ETRO 497

100% of the students are exceeding the expectations of the faculty in the final project demonstrations.

Course assessed	*Program Learning Outcome (PLO)*	*Exceeds*	*Meets*	*Needs Improvement*	*Insufficient Progress*
ETRO 305	**PLO 3**. Utilize integral and differential calculus, or other appropriate mathematics above the level of algebra and trigonometry to solve technical problems.				
	Assessment tool: Homework	21			
	Assessment tool: Classroom activities	24			
	Assessment tool: Test	4	1	1	2
	Overall assessment on this PLO	48	1	1	2
	Overall assessment on this PLO- Percentage	92.5%	1.9%	1.9%	3.8%

Course assessed	*Program Learning Outcome (PLO)*	*Exceeds*	*Meets*	*Needs Improvement*	*Insufficient Progress*
ETRO 310	**PLO 5**. Demonstrate engineer's way of thinking, analyzing technology as systems.				
	Assessment tool: Homework	36			
	Assessment tool: Classroom/Lab activities	24	1		
	Assessment tool: Project	5	1		
	Overall assessment on this PLO	65	2		
	Overall assessment on this PLO- Percentage	97.0%	3.0%		

Course assessed	*Program Learning Outcome (PLO)*	*Exceeds*	*Meets*	*Needs Improvement*	*Insufficient Progress*
ETRO 497	**PLO 7**. Demonstrate proficiency in the general education college core requirements: creativity, critical thinking, oral and written communication, information retrieval, quantitative reasoning.				
	Presentations	9			
	Final presentation	3			
	Final report	3			
	Overall assessment on this PLO	10			
	Overall assessment on this PLO- Percentage	100%			

C. Action Plan

There are no plans to change ENGT curriculum at this time.

The program strengths are that the curriculum was designed in collaboration with local industry and is designed specifically to meet the needs for a local trained workforce. Instruction is advanced and both didactic and hands on laboratory work are addressed. The program trains students using state of the art hardware and software. 100% of the first graduation class found employment on Maui in high technology companies. These companies now are calling to request additional interns and graduates to fill positions on Maui.

The program weakness is mainly in lack of financial support from the campus administration. This will become a major factor as current extramural funding expires

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 demos 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 ENGT program (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.

IV. Recognize and Support Best Practices

Instruction is advanced and both didactic and hands on laboratory work are addressed. The program trains students using state of the art hardware and software. 100% of the first graduation class found employment on Maui in high technology companies. These companies now are calling to request additional interns and graduates to fill positions on Maui.

V. Planning and Policy Considerations

There are no plans to change ENGT curriculum at this time.

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 part-time counseling position in the approved program proposal has not been funded by the campus general fund. This has resulted in students being referred to the program coordinator by the counseling department. The referral was necessary because the counseling department does not have the resources to support this program. Without adequate funding for counseling student progress is expected to suffer. This may be the cause of under enrollment. It has also placed additional workload in the program without additional compensation.
- 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.
- Student lab technicians are needed in order to provide up to date experiments and maintain current laboratory facilities. Student help is estimated to cost $20,000 per year. These positions will require $85,000 per year.

- 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 $25,000 per year the software licenses will become out of date and therefore effect student desirability in the workplace.

- The electro-optics laboratory will be installed in the new science building starting in January of 2013. This laboratory will require new hardware, computers, optics, and instrumentation. The estimated cost is approximately $100,000.

- 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 $10,000 per year.
