

University of Hawai`i
Maui Community College

Program Proposal

Bachelor of Applied Science

in

Applied Engineering Technology (AET)

Date of Proposal: March 5, 2009

Proposed Date of Program Implementation: Fall 2009

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1. Program Objectives

Maui Community College (Maui CC) proposes to offer an additional Bachelor of Applied Science (BAS) degree program in Applied Engineering Technology (AET). Graduates of the program will provide the highly skilled workforce that is needed to address local and regional needs as electronics engineering technicians with specialized skills in optics and remote sensing and as computer engineering technicians with specialized skills in information and communication technologies.

The major emphasis of the program will be engineering technology oriented, but coursework will require a breadth of general education courses, as are recommended by the Western Association of Schools and Colleges (WASC) Accrediting Commission for Senior Colleges and Universities (ACSCU). These general education courses are currently offered at Maui CC as part of the Maui CC Applied Business and Information Technology (ABIT) baccalaureate degree.

The proposed curriculum will follow models of baccalaureate engineering technology degree programs implemented at other colleges and universities throughout the country (Appendix A), and will include a focus on Hawai`i industries. Research indicates that this model will meet the requirements for national accreditation criteria and state and community workforce development (Appendix B).

Although not required by industry advisors, Maui CC intends to meet the requirements of the Accreditation Board for Engineering and Technology (ABET) by preparing graduates with the technical and engineering project management skills and knowledge necessary to advance in careers in the application, installation, manufacturing, operation, and/or maintenance of electrical/electronic(s) and computer systems as engineering technicians (Appendix C). These criteria in Appendix C clearly describe the mathematics requirements for engineering technology programs as different from those in engineering programs.

In addition, the National Society of Professional Engineers also describes the difference between engineering and engineering technology. *“Engineering technology programs are oriented toward application, and provide their students introductory mathematics and science courses, and only a qualitative introduction to engineering fundamentals”* (http://www.nspe.org/GovernmentRelations/TakeAction/IssueBriefs/ib_eng_tech.html)

Students who successfully complete the AET baccalaureate degree program will be able to:

- analyze, design, and implement control systems, instrumentation systems, communications systems, computer systems, or power systems;
- apply project management techniques to electrical/electronic(s) systems;
- utilize integral and differential calculus, or other appropriate mathematics above the level of algebra and trigonometry to solve technical problems;
- demonstrate proficiency in the general education college core requirements: creativity, critical thinking, oral and written communication, information retrieval, quantitative reasoning.

The AET program has been designed in close collaboration with industry advisors and University researchers to ensure that students gain skills required for employment in local companies. Industry shows strong support for the AET program and will provide curriculum development, adjunct faculty lecturers, internships, and access to laboratory equipment (Appendix D).

The AET program will provide the extensive hands-on training needed by local and regional companies to test, calibrate, and characterize electronic instrumentation, conduct tests using appropriate software applications for remote sensing and optic design, and design, implement, and administer computer networks, including Windows and high performance Linux resources. The courses, designed using inquiry and problem-based learning models, will provide high quality educational experiences to learners from diverse backgrounds.

2. Relationship of Objectives to Appropriate Functions of the College and University

The program objectives are appropriate functions of the College and University, as they are consistent with the:

- mission, vision, and Strategic Plan objectives of the University of Hawai'i System, the UH Community Colleges, and Maui CC;
- approved academic development priorities of Maui CC;
- initiatives to diversify the economic base by providing a skilled workforce for the state and county and to provide greater employment opportunities for state and county workers;
- need for a local and regional workforce with the skills that are taught by the program.

The Maui CC Mission Statement: *Maui Community College is a learning-centered institution that provides affordable, high quality credit and non-credit educational opportunities to a diverse community of lifelong learners.*

Maui CC Vision Statement: *We envision a world-class college that meets current and emerging Maui County education and training needs through innovative, high quality programs offered in stimulating environments. The College mission, goals, and actions will be guided by the Native Hawai`ian reverence for the ahupua`a, a practice of sustaining and sharing diverse but finite resources for the benefit of all.*

The AET program aligns well with the Maui Community College Strategic Plan 2003-2010 (Appendix E), and the University of Hawaii Strategic Outcomes and Performance Measures, 2008-2015.

The Maui CC Strategic Plan states in Goal 2, Objective 3, Action Strategy 3:

Develop, implement, and support new applied research programs, including electronics engineering technology, computer engineering technology, PC-cluster technology, and biotechnology.

In addition, the University of Hawai`i System Strategic Outcomes and Performance Measures, 2008-2015 (Appendix F), identifies as one of its goals:

To address critical workforce shortages and prepare students (undergraduate, graduate, and professional) for effective engagement and leadership in a global environment.

One measure of success for this goal is to increase by 3% per year the number of degrees conferred by the UH system in Science, Technology, Engineering, and Mathematics (STEM) fields from 1,540 degrees in FY 2009 to 1,847 degrees in FY 2015. The AET program will support the University of Hawai`i in its efforts to meet this goal.

The program addresses the County of Maui 2030 General Plan Update - Countywide Policy Plan: “ *Establish a four-year university and other higher education institutions to enable residents to obtain bachelors and postgraduate degrees in Maui County.*”

The AET also meets the goals set by the State of Hawai`i Legislature through Act 51. The Revised Statutes, Chapter 305 state that the purposes of the University of Hawai`i community colleges shall be to provide two- and four- year career and technical education programs (http://www.capitol.hawaii.gov/hrscurrent/Vol05_Ch0261-0319/HRS0304A/HRS_0304A-1101.htm.)

Community Needs Assessment

The proposed AET degree is designed to provide a local workforce with broad skills to meet the needs of many diverse industries. The AET degree will meet industry and community requirements for skilled engineering technicians in major areas of need:

- positions in high technology companies supporting astronomical observatories and related technology partners throughout the state;
- positions in emerging sustainable energy technology companies, wind turbines, biofuels, etc;
- technology positions in other industries such as telecom, hospitality, state and county government, education, health care, etc.

Data available from the State of Hawai'i Department of Labor and Industrial Relations shows the demand for graduates with the skills and knowledge provided by the AET program (<http://www.hiwi.org>). Examples of projected openings for 2006 – 2016 in several categories are shown:

Projected Hawai'i job opening 2006-2016:

Engineering Technicians	10 annual new openings
Electrical and Electronics Engineering Technicians	10 annual new openings
Electrical, Electronic Repair, Comm & Indust Equip	40 annual new openings
Computer Specialists	40 annual new openings
Network and Computer Systems Administrators	40 annual new openings
Electro-mechanical Engineering Technicians	10 new openings total
Industrial Engineering Technicians	10 new openings total
Environmental Engineering Technicians	10 new openings total
Aerospace Engineering Technicians	60-70 positions state-wide

Source: Department of Labor and Industrial Relations, State of Hawai'i

In accordance with executive policy E5.201, the AET also responds to the needs of industries that are based on the unique and outstanding resources of Hawai'i. The telescopes at the summits of Haleakala on Maui and Mauna Kea on Hawai'i represent over \$1 billion of investment and are some of the most advanced instruments in the world. The Maui Space Surveillance Site (MSSS), Maui Research and Technology Center (MRTC), Maui Advanced Technology Research Center, and Maui High Performance Computing Center (MHPCC), and at the Pacific Missile Range Facility (PMRF) at Barking Sands, Kauai are all more examples of world-class infrastructure in Hawai'i.

Employment statistics from The Maui Economic Development Board surveys of local companies reveal additional indicators of economic growth and job requirements and provide insights as to the workforce needs of Maui and the State.

- 50% of the tech companies on Maui are looking for Unix/Linux server and network administration skills;
- 39% are demanding GIS and Electro-Optics skills;
- 33% are demanding Linux cluster and image processing skills;
- 22% laser/photonics, telescope operator/technician skills;
- 16% fiber optics skills.

Source: Maui Economic Development Board – 2005 tech survey

Maui industry partners have been interviewed and are collaborating on curriculum development to insure AET graduates will be prepared for careers with their firms. Due to confidentiality and non-disclosure issues, exact numbers of positions for Maui are not provided. Through telephone interviews, Maui employers do confirm that should positions become available the AET degree provides students with the knowledge and skills required for employment. (Appendix D).

The October 2008 report *Innovation and Technology in Hawai`i: An Economic and Workforce Profile* (http://www.hiscitech.org/_data/n_0001/resources/live/Innovation+Tech+Hawaii+Report+Sept30.pdf) identifies the types of technology careers critical to the future economic diversification and economic growth of the state. The report identifies 4,784 technology related jobs located on the neighbor islands, with almost 1,900 of these jobs located on Maui. Average earnings in this segment were \$76,697 in 2007. An accurate up-to-date picture of market segments driving Hawai`i's technology and innovation describes astronomy on Maui and Hawai`i as the most prominent science and technology activity.

According to the Hawai`i Science and Technology Institute, the proposed Advanced Technology Solar Telescope (ATST) could result in \$300 million in new investment for Maui and result in more than 100 new jobs. The proposed Thirty Meter Telescope (TMT) on Hawai`i could result in another \$1 billion in investment and 430 more jobs. In addition to the observatories themselves, there are emerging career opportunities for engineering technicians in other expanding technology sectors as described by the Department of Business Economic Development and Tourism (DBEDT) in the brochure "Aerospace, Hawai`i - Technology in Paradise (Appendix G).

The October report also noted that important market segments for Hawai`i are aerospace, renewable energy, environmental, information and communications, and engineering services. The report notes the significant overlap between engineering technology and information and communication technology. Information technology companies accounted for an estimated 7,121 jobs in Hawai`i, while the Aerospace segment (previously Applied Optics) accounted for 15,516 jobs in Hawai`i. The AET is organized to meet the needs of both innovative markets and is positioned to meet future needs as described below:

“This market segment also included more than one-half of the state’s total technology employment as a result of its significant overlap with ICT. In the future, job creation for this segment will likely come from a nexus with the ICT market segment – custom computing, computer design, and environmental systems.”

At the National level engineering technicians held 511,000 jobs in 2006. Approximately 33% were electrical and electronics engineering technicians, as indicated by the following tabulation. Projections data for engineering technicians from the National Employment Matrix:

Projected national employment 2006-2016:

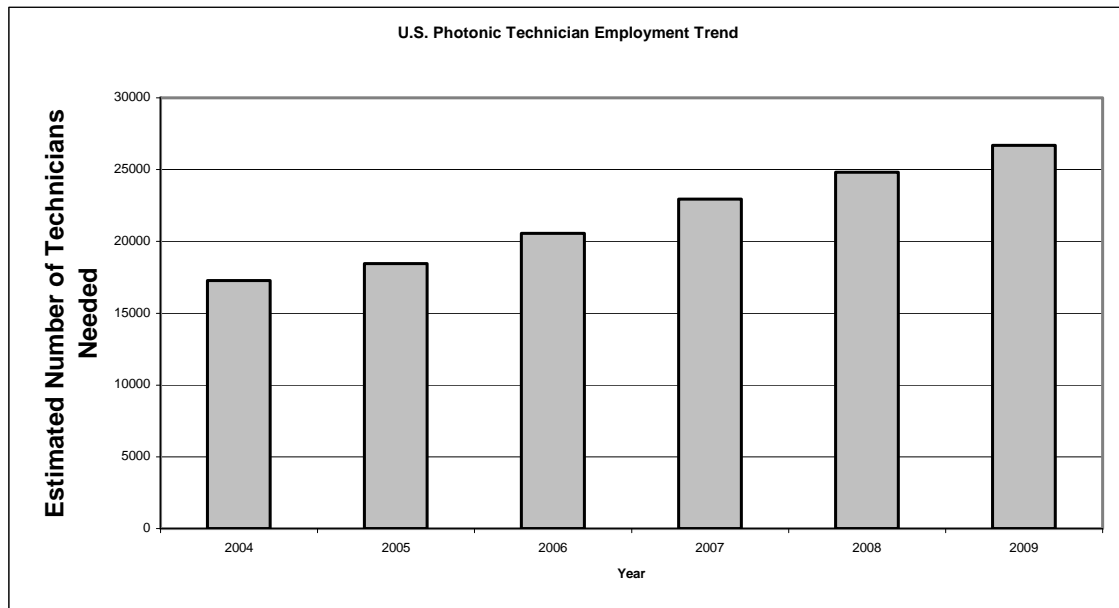
Occupational title	SOC Code	Employment, 2006	Projected	Change, 2006-16	
			employment, 2016	Number	Percent
Engineering technicians, except drafters	17-3020	511,000	545,000	34,000	7
Aerospace engineering and operations technicians	17-3021	8,500	9,400	900	10
Civil engineering technicians	17-3022	91,000	100,000	9,200	10
Electrical and electronic engineering technicians	17-3023	170,000	177,000	6,100	4
Electro-mechanical technicians	17-3024	16,000	16,000	400	3
Environmental engineering technicians	17-3025	21,000	26,000	5,200	25
Industrial engineering technicians	17-3026	75,000	82,000	7,500	10
Mechanical engineering technicians	17-3027	48,000	51,000	3,100	6
Engineering technicians, except drafters, all other	17-3029	82,000	83,000	1,600	2

Source: United States Department of Labor- Bureau of Labor Statistics

Of the jobs above, 25% are in professional, scientific, and technical service industries, mostly engineering or business services companies that do engineering work on contract for government, manufacturing firms, or other organizations.

The National Center for Optics and Photonics Education (Op-Tec) is a consortium of two-year colleges, high schools, universities, national laboratories, industry partners, and professional societies funded by the National Science Foundation's Advanced Technological Education (ATE) program. Op-Tec surveys indicate a demand for 26,698 Photonics technicians in 2009.

Projected national employment – photonics technicians:



Source: National Center for Optics and Photonics Education

There is evidence that communities and industries will respond and grow if a qualified local workforce is made available through the efforts of education. A report from the Arizona Department of Commerce business development division (<http://www.optics.arizona.edu/Inside/ArizonaOptics.pdf>) shows that the optics and photonics industry in Arizona has grown significantly in response to an effort by the University of Arizona to provide a competitive research enterprise and an accompanying skilled workforce.

Data generated by two optics industry surveys, conducted four years apart, in 1995 and 1999, show the growth of this strategic industry. Employment grew by 64.6% from 3,793 to 6,245 employees. The average company size rose from 33 to 51 employees.

3. How is the program organized to meet its objectives?

The AET program is designed and reviewed in accordance with all existing UH and Maui CC policies and procedures. The Authorization to Plan (ATP) has been approved by all required Maui CC bodies, including Maui CC's Academic Senate prior to the development of the Program Proposal, and is also supported by the UH Council of Chief Academic Officers (Appendix H). The AET program proposal was developed in accordance with UH Executive Policy E5.201: Approval of New Academic Programs and Review of Provisional Academic Programs. The program proposal has been reviewed, and is supported by, the Maui CC Science, Technology, Engineering, and Math (STEM) department, the College Curriculum Committee, and college administration.

The AET program planning process has been inclusive to ensure that stakeholders throughout the University of Hawai`i have had an opportunity to be involved. The following are among the key steps in this timeline:

Spring 2001

- AET discussion with Program Coordination Council members from the entire system. Hawai`i, Kauai, and Maui identified as participants in program development.

Spring 2002

- Maui CC Academic Senate passes a resolution to endorse Maui CC's offering of baccalaureate degrees among its degree offerings (Appendix H);
- National Science Foundation funded Center for Adaptive Optics - Akamai program starts to place interns on Maui and Hawai`i;
- Kauai defense contractors input requirements to the Program Coordination Council.

Fall 2005

- Maui, Hawai`i, and Kauai begin curriculum alignment.

Spring 2006

- UH system funding helps development of technical electives courses on Maui, Hawai`i, and Kauai that will become part of the eventual lower division of the proposed AET degree;
- The Program Coordination Council meets and reviews plans;
- Maui CC Senate Chair informs Vice President of Community Colleges of program development progress;
- Community college chancellors discuss need for engineering technicians with optics skill sets for Maui, Hawai`i, and Kauai. Program and course development continue.

Fall 2006

- Three technical electives developed for Maui, Hawai`i, and Kauai are presented to the Program Coordination Council meeting. Continuing program development plans are shared;
- Program coordinator Hoffman holds presentation for the Board of Regents on Maui outlining lower division preparation and plans for AET development.

Spring 2007

- Program coordinator Hoffman holds presentations with Maui Academic Senate Baccalaureate Committees.

Fall 2007

- Vice President of Community Colleges meets on Maui and is informed of planning progress towards the lower division and possible AET.

Spring 2008

- Discussion started regarding articulation of lower division classes and accreditation requirements with Manoa Engineering.

Fall 2008

- Authorization to Plan supported by Maui Academic Senate (Appendix H);
- Maui CC Chancellor's Advisory Council members discussion and support (Appendix H);
- Maui Community College – Business Advisory Council discussion and support (Appendix H);
- Vice Chancellors of Academic Affairs endorse the ATP.

Spring 2009

- Program Proposal supported by Maui STEM department.

The AET program will be administered by the Maui CC Vice Chancellor of Academic Affairs through the Maui CC STEM department and led by the Electronic and Computer Engineering Technology program coordinator. The program is based upon competencies identified by industry, researchers, faculty, counseling staff, advisory committee members, community partners, and ABET accrediting agency. In developing the curriculum, research on other institutions offering a similar degree was conducted to develop course selection and content that would best serve the requirements for the degree. In addition, as the process has proceeded potential mentor institutions have also been identified (Appendix A). The STEM department, college curriculum committee, academic senate, and college administration, will continuously provide assessment and feedback as the program develops.

To be admitted to the AET program in a classified status, students are required to have completed the Maui CC ECET AS degree program, or have equivalent transferable coursework from another accredited institution, with a minimum GPA of 2.5. Students will be admitted on provisional status if they have completed a minimum of 40 credits of transferable college coursework from an accredited institution with a cumulative GPA of 2.5 or higher in all courses attempted. Classified status will be assigned with completion of lower division course requirements as indicated in Appendix I.

Students must complete a solid foundation of 74 credits in the lower division courses, distributed across the liberal arts, and introductions to the major components of the program (Appendix I). The upper division consists of a total of 60 credits, and provides a common core of classes, while delivering discipline-based specific skills and knowledge, as well as broad critical thinking, communication skills, understanding of diversity, and ethical concerns that are essential to good citizenship and lifelong learning (Appendix I). Technical curriculum provides students with course work to support high technology careers in workplaces throughout Maui and the State of Hawai'i. A sample course outline of typical upper division courses can be found in Appendix J.

Graduation requirements include a minimum of 134 credits of 100 level or higher course work and a minimum GPA of 2.5 for all courses. AET majors are required to earn a letter grade in all courses required for the program and complete a capstone course in their final semester of study. Upon completion of the AET degree, graduates will be able to pursue careers in high technology companies or as engineering technicians in a variety of positions in a broad range of industries.

The AET program also provides students with dedicated counseling and academic advising to insure that they will meet admissions requirements, produce an academic plan of study, meet course requirements, and ultimately graduate. The program provides internship opportunities in high technology companies and at research faculties on Maui.

4. Who will enroll in the program?

The primary target groups for the AET program are Maui CC ECET majors and graduates of the Maui CC ECET program. Student surveys, in the spring of 2009, indicate a large demand for the AET program from current ECET majors (Appendix K). A total of 44 out of 53 current ECET majors surveyed indicate they would be interested in pursuing the AET degree.

Number of ECET majors by academic year:

Fall 01	Spring 02
33	53
Fall 02	Spring 03
52	43
Fall 03	Spring 04
47	40
Fall 04	Spring 05
54	57
Fall 05	Spring 06
56	47
Fall 06	Spring 07
58	46
Fall 07	Spring 08
62	51
Fall 08	Spring 09
54	72

Source: Banner

The growth pattern of the number of majors in the preparatory degree program and the percentage of students interested in the AET indicate that the demand is high and the projected AET cohorts will be full. The AET program has budgeted for counseling and program support positions that will insure students will receive academic and career advising so they succeed in achieving the AET degree.

Student surveys were also conducted in ICS 101, a computer science class required for many Maui CC programs. In this student population 1/3 of these non-technology majors indicated interest in pursuing the AET degree. Student surveys from Kauai CC indicate 2/3 of their technology majors are interested in the AET degree on Maui. Student surveys from Hawai'i are expected to align with Kauai. These surveys indicate a strong student demand for the AET degree program (Appendix K).

Other potential students who may enroll in the program include:

- a. New and continuing students who enroll full- or part-time to complete the entire program prior to entering the job market;
- b. New and continuing students who have already earned a two-year degree and enroll full- or part-time to complete the program in order to improve job opportunities or proceed towards an advanced degree;
- c. Employed students and other community members who enroll to learn new skills, or to improve, or to upgrade their skills in order to obtain a higher paying job.

5. What resources are required for program implementation and first five-year cycle of operation?

Over \$70 million of new and renovated classroom, lab, faculty office, student services and students support facilities have been constructed at Maui CC over the last 15 years, positioning the institution for steady growth in student populations and programs over the coming years. These state resources were leveraged to secure extramural funding exceeding \$33 million since 1992. A fiber ring circling the college is connected to an OC 6 statewide network with data, video, and television channels. These facilities and technology will support the AET program and students. This infrastructure will allow distance education opportunities between Maui, Kauai, Hawai'i, and Oahu institutions.

\$500,000 was committed in August of 2001 by the University of Hawai'i president to examine feasibility and develop procedures to establish baccalaureate degrees at community colleges. Maui CC received support for its Chancellor to be assigned to direct the project for the University of Hawai'i Community Colleges, support for an acting chancellor, acting vice chancellor of instruction, faculty and program development support, resources for baccalaureate faculty appointments, student services and library resources, travel, and other baccalaureate start-up requirements. Maui CC has successfully implemented its first BAS degree, Applied Business and Information Technology. Faculty is now in place at Maui CC for upper division Business, Information Technology, and General Education teaching requirements.

Resources required for the first five-year cycle are shown in the table on page 15. Projected tuition revenues were calculated based on an initial cohort of 20 students starting each fall semester and assuming a 50% attrition rate as students move from their junior to senior level. This results in a student count of 30 students per year beginning in year two.

Two full-time tenure track faculty positions have already been allocated by the legislature and do not represent new costs to the college. Tuition and extramural funding are projected to cover lecturer, other personnel, required library expenditures, and costs to develop and maintain an optics laboratory at Maui CC.

Extramural funding has been secured for the first three years to equip an electro-optics laboratory. Beginning in fiscal year 13 the program will only require funding for maintenance of this equipment. This explains the decrease of \$47,000 in Equipment/Supplies, as the funding shifts from start up to operational costs that will be offset by tuition revenues.

The program will utilize an existing electronics and computer engineering technology laboratory at Maui CC. Since 2002, over \$693,000 of extramural funding has been raised for program development in ECET. The electronics lab is equipped with same type of modeling, simulation, and prototyping equipment used in high technology industries throughout the state as well as information and communications equipment found at many types of companies. Facilities include a computer science lab with a Linux cluster supercomputer and Matlab software and Linux enterprise server. A new electro-optics laboratory will be equipped in summer 2008. This lab includes telescopes, fiber optics, and remote sensing hardware. In addition an adaptive optics workstation and quadrature polarization interferometer developed specifically for Maui CC programs by the University of California - Center for Adaptive Optics are installed. These are examples of the sophisticated instrumentation to which AET majors will be exposed and introduced.

In addition to the facilities on Maui CC's campus, the University of Hawai'i Institute for Astronomy – Maui Division (IfA) will provide access to additional lab facilities valued at several millions of dollars. The IfA will provide students not only with access to instrumentation, but also a forum for AET students to interact with scientific researchers and instrumentation designers at work.

A corporate community relations grant (CCRG) from IBM provides AET students with access to a super computer valued at over \$250,000. This computer is installed at the Maui High Performance Computing Center in Kihei, where students interact with very high-level programmers and system administrators of one of the world's fastest supercomputers.

The Faulkes telescope on Haleakala (Appendix L) is included in the curriculum to allow students access to the largest telescope for undergraduate research in the world. Students will gather data and install their own experiments and instruments on the Faulkes, giving them a first experience working on a fully functional research grade telescope.

The leveraging of existing infrastructure, partnerships with industry and researchers, collaboration within the UH system, and the budget shown below, insure students a high quality education in an area of technology where Hawai`i has outstanding resources, in the most economically responsible manner.

The faculty at Maui CC will continue to seek additional funding for program support. Sources of possible funding consists of:

- State General Fund Request
- Private Sector Partnerships/ Industry Donations
- County of Maui Support
- Extramural Grants
- Foundation Gifts

Department of Labor, Department of Defense, National Science Foundation, and private foundation grant proposals have been submitted.

Budget Overview:

YEAR	FY 10	FY 11	FY 12	FY 13	FY 14
PROGRAM COSTS					
Faculty w/o fringe	132,756	142,802	148,514	154,455	160,633
Other personnel costs w/o fringe	66,730	69,399	72,175	75,062	78,065
Library	10,000	10,000	10,000	10,000	10,000
Equipment/Supplies	117,200	120,200	128,200	81,200	80,200
Other					
TOTAL Expenses	326,686	342,402	358,890	320,717	328,898
REVENUES					
Projected Enrollment	20	30	30	30	30
No. of Courses	8	16	16	16	16
No. of Credits	24	48	48	48	48
SSH	480	720	720	720	720
Tuition Rate/Credit	191	213	235	235	235
Total Revenue from Tuition	91,680	153,360	169,200	169,200	169,200
Other Sources of Income*	244,008	198,964	204,098	159,447	165,011
TOTAL Revenues	335,688	352,324	373,298	328,647	334,211

- consists of: general fund allocation for faculty salaries, committed extramural funds, other private donations.

6. How efficient will the program be?

The budget summary table above outlines projects costs and revenues for the first five years of the AET program. The AET program will be based on the lower division Electronic and Computer Engineering Technology (ECET) program, the second lowest cost/SSH of any program at Maui CC (Appendix M). The program coordinator has proven to manage an efficient program and is expected to manage the AET program as efficiently. The use of Internet enabled distance education laboratories, access to the Advanced Technology Research Center labs, utilization of researchers as adjunct faculty, and guest lecture/labs from industry partners will prove to be efficient mechanisms for program management.

7. How will the effectiveness of the program be demonstrated?

The effectiveness of the AET program will be demonstrated through program review and assessment. Maui CC's program review process involves continuous and systematic evaluations of all established programs that serve to support and guide programs as they move towards continuous improvement. An annual program review will be conducted for the AET program at the end of academic year 2010, and a Comprehensive Program Review is planned at the conclusion of academic year 2013. These reviews will follow Maui CC's Self-Study Guide for Annual Assessment and Comprehensive Program Reviews.

Assessment of learning is a continuous process aimed at improving student learning at the course level by defining and measuring student learning outcomes, and by ensuring that these course learning outcomes translate to those defined for the program. More specifically, learning assessment compares student-learning objectives (what student are expected to learn) to student learning outcomes (what was actually learned) at both the course and program level as students progress through the program.

At the course level, lower division courses in the current ECET program are designed to provide the foundation for success in the upper division courses. Upper division courses have been designed to build on the lower division foundation.

At the program level, upper division courses are aligned to provide a pathway towards satisfying the program outcomes outlined on page four of this proposal. The students will be assessed in each course as they progress through the program, providing formative assessment as they progress. A summative assessment will also take place in the form of a capstone experience in each student's final semester.

In the capstone course, students will be expected to have developed knowledge, skills and attitudes that are the result of having experienced the entire AET curriculum and will demonstrate this knowledge through a capstone experience during their senior year. This capstone experience will integrate knowledge, concepts, and skills associated with an entire sequence of study in the program.

The measurement of the effectiveness of the program will include student and peer evaluations of the courses and program. Additional measures include the evaluation of completion rates, formal and informal cooperative education and internship performance evaluations, and employer evaluations of graduates.

Annually, the Vice Chancellor of Academic Affairs, the STEM department chair, and the AET program coordinator will gather data required for program review, including community assessment, to ascertain the continuing need for the program. Student evaluations, employer surveys, and the compiled analysis of yearly program health indicators will be used to determine the effectiveness of the program. The AET assessment committee, comprised of faculty, industry partners, and students, will review the program and courses. At the institutional level, the University of Hawai'i President, Vice President for Academic Affairs, and Board of Regents will provide the final review and recommendation for continuation of the AET program after the initial five-year period.

Program Health Indicators

To be used to evaluate yearly

Program Demand	Minimum	Satisfactory
Number of Student Majors	20	30
Number of Classes Taught	12	15
Number of Classes wait-listed/over enrolled	0	1
Program Efficiency		
Class Size Average	16	20
Class fit	85%	90%
Number of small classes (n<10)	0	2
Percent of sections taught by lecturers	15-20%	10-15%
Number of Advisory Committee meetings per year	1	2
Program Outcomes		
Student evaluations: percent high ranks	85%	95%
Course completion rate	80%	85%
Program completion rate	50%	70%
Percent graduates employed in the field or continuing education	85%	90%
Program judged adequate or better by:		
Employers	85%	95%
Internship/Coop Hosts	85%	95%

Appendix A

Bachelor of Applied Science

in

Applied Engineering Technology (AET)

Appendix A

Universities offering a baccalaureate – programs researched

<u>BAS or BS</u>	<u>College or University</u>
<ul style="list-style-type: none"> ● Bachelor of Science in Electrical Engineering Technology- Photonics ● Bachelor of Science in Electrical Engineering Technology- Electrical Systems ● Bachelor of Science in Electrical Engineering Technology- Computer Systems 	University of Central Florida College of Engineering and Computer Science
Bachelor of Science in Optical Sciences and Engineering	University of Arizona College of Optical Sciences
Bachelor of Science-Applied Physics/Electro- Optics track	Indiana University of Pennsylvania College of Natural Sciences and Mathematics Department of Physics
<ul style="list-style-type: none"> ● Bachelor of Science in Electronics Engineering Technology ● Bachelor of Applied Science in Electronics Engineering Technology 	Arizona State University College of Technology and Innovation Polytechnic Campus
Bachelor of Science in Engineering in Electrical Engineering (BSE)	Arizona State University Department of Electrical Engineering Ira A. Fulton School of Engineering
Bachelor of Science in Electronics Engineering Technology	Oregon Institute of Technology / Portland
Bachelor of Applied Technology	Idaho State University College of Technology
Bachelor of Science Degree in Engineering Technology (Electronics engineering technology)	Pittsburgh State University College of Technology Department of Engineering Technology
Bachelor of Applied Sciences	University of Hawaii West Oahu
Bachelor of Science, Electronic Engineering Technology	Excelsior College Albany, NY
Bachelor of Science in Applied Science and Technology in Electrical Technology Bachelor of Science in Applied Science and Technology in Electronics Engineering Technology	Thomas Edison State College School of Applied Science and Technology New Jersey
Bachelor of Science in Electronics Engineering Technology	California State University College of Engineering
Bachelor of Science in Electrical/Electronics Engineering Technology	Ferris State University College of Technology
Bachelor of Science in Electronics technology	Central Connecticut State University

Miami Dade College
Bachelor of Applied Science – Electronics Engineering Technology
C.I.P. 15.0303
134 Credit Hours

General Education - Lower Division 22 Credit Hours			
Communications – 6 Credits			
ENC 1101	English Composition 1	3	
SPC 1026	Fundamentals of Speech Communications (recommended)	3	
Social Science Elective - 6 Credits			
CLP 1006	Psychology of Personal Effectiveness (recommended)	3	
ECO 2013	Principles of Economics (Macro) (recommended)	3	
Humanities/Cultural Elective - 3 Credits			
PHI 2604	Critical Thinking/Ethics (recommended)	3	Pre-Req ENC 1102
Mathematics and Science – 7 Credits			
MAC 1105	College Algebra	3	
PHY 2048/2048L	Physics with Calculus	4	Co-req PHY2048L
	or		
PHY 2053C/2053L	Physics without Calculus	4	Co-req PHY2053L

Technology Core - Lower Division 38 Credit Hours			
CET2114C	Digital Computer Circuit Analysis 1	4	Pre/Co-req MAC1105
CET 2123C	Microprocessors	4	Pre-Req CET2114C, MAC1147
EET 1015C	Direct Current Circuits	4	Pre/Co-req MAC1105
EET 1025C	Alternating Current Circuits	4	Pre-req EET1015C; co-req
EST 1037C	Electronics Circuit Simulation	3	
EET 1141C	Electronics 1	4	Pre-Req EET1025C
EET 2101C	Electronics 2	4	Pre-Req EET1141C
EET 2305C	Electronic Communications 1 - Analog	4	Co-req EET2101C
CGS 2423	"C" for Engineers**	4	Pre-Req CGS1060
	OR		
COP 1220	Introduction to C++ Programming	4	Pre-Req CGS1060
MTB1322	Technical Mathematics 2	3	Pre-Req MAC1105
	OR		
MAC1147	Pre-Calculus Algebra and Trigonometry (recommended)	5	Pre-Req MAC1105

Technical Electives - Lower Division 8 Credit Hours			
CET 2142C	Advanced Digital Circuits (recommended)	4	CET2114C
EET 2351C	Electronic Communications 2 - Digital (recommended)	4	Pre-req EET2305C

General Education (GE)- Senior Level		14 Credit Hours	
Humanities/Cultural/Elective - 3 Credits			
PHI 2010	Introduction to Philosophy (recommended)	3	
Communications - 3 Credits			
ENC 1102	English Composition 2	3	Pre-Req ENC 1101
Mathematics/Science – 8 credits			
MAC2311	Calculus and Analytical Geometry 1	5	Pre-req MAC1147
PHY 2054	Physics w/o Calculus 2	3	Pre-req PHY1025, PHY2053 or dept approval Co-req PHY2054L
OR			
PHY 2049	Physics wi Calculus 2	4	Pre-req PHY2048; Co-req PHY2049L
[MDC General Education Electives			
PHY2054	Physics w/o Calculus	0	Pre-req PHY1025, PHY2053 or dept approval Co-req PHY2054L
OR			
PHY2049	Physics with Calculus	0	Pre-req PHY2048; Co-req PHY2049L]

Common Course Prerequisites (CCP)		4 Credit Hours	
Common course Prerequisites (CCP)-			
MAC2311	Calculus and Analytical Geometry 1	GE	Pre-req MAC1147
MAC2312	Calculus and Analytical Geometry 2	4	Pre-req MAC2311
PHY 2049	Physics wi Calculus 2	GE	Pre-req PHY2048; Co-req PHY2049L
AND			
PHY 2049L	Physics wi Calculus 2 Lab	GE	Co-req PHY2049
OR			
PHY 2054	Physics w/o Calculus 2	GE	Pre-req PHY1025, PHY2053 or dept approval
AND			
PHY 2054L	Physics w/o Calculus 2 Lab	GE	Co-req PHY2054

Engineering Technology Core - Senior Level		48 Credit Hours	
CET 3126C	Advanced Microprocessors	4	Pre-req CET2123C
CET 4190C	Applied Digital Signal Processing	4	Pre-req EET4136
EET 3158C	Linear Integrated Circuits and Devices	4	EET2101
EET 3541	Power Systems 1	3	EET1025C
EET 3716C	Advanced System Analysis	4	EET2101C
EET 4136C	Signals and Systems	4	MAC2311
EET 4732C	Feedback Control Systems	4	EET3158C
EET 4938	Senior Design 1	3	Department approval required
EET 4939	Senior Design 2	3	Department approval required
EST 3543C	Programmable Logic Controllers	4	CET2123C
ETI 3671	Technical Economic Analysis	3	MAC1105
ETI 3704	Safety Issues in Electronics Engineering Technology	3	
ETI 4480C	Applied Robotics Laboratory	4	Pre-req CET3126C
PHY2054L	Physics w/o Calculus Lab	1	Co-req PHY2054
OR			
PHY2049L	Physics w Calculus Lab	1	Co-req PHY2049

Total Lower Division/Associate in Science Credits = 68
Total Upper Division/Senior Institution Credits = 66
Total Baccalaureate degree Credits = 134

Computer Competency: By the **16th earned** college level credit (excluding EAP and college preparatory courses), a student **must take** the Computer Competency Test and pass

Or

By the **31st earned** college level credit (excluding EAP and college preparatory courses), a student **must pass** CGS 1060, an equivalent continuing education or vocational credit course or retest with a **passing score on the Computer Competency Test**.

Sample comparison of AET to Miami Dade College Curriculum

Maui CC		credits	Miami Dade		credit hours
ETRO 201	digital computer	4	CET 2114C	digital computer	4
ETRO 205	digital computer II	4	CET 2123	microprocessors	4
ETRO 101	DC	3	EET 1015	DC	4
ETRO 105	DC/AC	4	EET 1025	AC	4
ETRO 110	electronics I	4	EET 1141	electronics 1	4
ETRO 112	electronics II	4	EET 2101	electronics 2	4
ETRO 140	networking	4	EET 2305	communications	4
ICS 110/111	Intro and programming	8	CGS 2423	C for Engineers	4
MATH 107	Math for electronics	4	MTB 1322	Technical Math	5
ETRO 301	engineering mathematics	3(+2)	MAC 2311/2312	calc and analytic geometry	5
ETRO 420	physics	3	PHYS 2049	physics	3
ETRO 310	robotics	3	CET 3126	micro processors	4
ETRO 465	signal processing	3	CET 4190	digital signal processing	4
ETRO 320	optics	3	EET3158	linear IC	4
ETRO 205	power systems	3	EET3541	power	3
ETRO 360	control systems	3	EET 3716	adv. System analysis	4
ETRO 430	signals and systems	3	EET 4136	signals and systems	4
ETRO 440	Photonics	3	EET 4732	feedback controls	4
ETRO 498	capstone	6	EET 4938/39	design	6
ETRO 370	remote sensing	3	EET 3543	controllers	4
ETRO 410	project management	3	EET 3671	technical economics	3

Note Maui CC 3 credit lecture labs meet for a minimum of 4 hours per week.

Maui CC 4 credit lecture labs meet for a minimum of 6 hours per week.

Miami shows credit hours not credits.

Appendix B

Bachelor of Applied Science

in

Applied Engineering Technology (AET)

Akamai Technical Report #1

Internship Skills Inventory: Review of Akamai Internship Projects on Maui and Hawaii Island

January, 2009

Lisa Hunter,^{1,3} Mark Hoffman,² J.D. Armstrong,³ Elisabeth Reader,² Scott Seagroves,¹
Lynne Raschke,¹ Jeff Kuhn,³ others?

1. Center for Adaptive Optics, University of California, Santa Cruz; 2. Maui Community College; 3. Institute for Astronomy, University of Hawaii

The Internship Skills Inventory was undertaken by the Akamai Workforce Initiative as part of a study to gain a better understanding of the workforce skills needed for the technical workforce on Maui. In this phase of the project, we reviewed five years of internship projects completed by Akamai interns in order to create an inventory skills, understandings, and attitudes needed to be successful in a summer internship experience at an observatory or industry position. The inventory will be used to inform our long-term goal to define workforce needs, and ultimately the development of a new engineering technology program that will create a locally trained technical workforce in Hawaii.

1, Background:

The Akamai Workforce Initiative (AWI) was launched in September 2007 with funding from a new grant from the National Science Foundation (NSF# AST-0710699), and continuing funding from the NSF Center for Adaptive Optics (NSF# AST - 9876783). AWI builds on years of partnership activities on Maui including the Akamai Internship Program, curriculum development, and extensive partnering with industry, funded by the Center for Adaptive Optics (CfAO), in partnership with Maui Community College (MCC), the University of Hawaii Institute for Astronomy (IfA), Maui Economic Development Board (MEDB), the Air Force Maui Optical and Supercomputing Site (AMOS), and many industry partners. On Hawaii Island, the AWI is built on a long-term partnership with the CfAO, W.M. Keck Observatory, Hawaii Community College, University of Hawaii, Hilo, and many Mauna Kea observatories.

The Akamai Internship Program places Hawaii college and university students at observatory and industry positions for summer research experiences, or apprenticeships. Internships are available on Maui and Hawaii Island. Each island runs an internship program based on the model developed by the CfAO, but shaped to meet the unique needs and opportunities of the island. After acceptance into the program, students are matched with an organization and a mentor, and complete a seven-week project under the guidance of the mentor and others at the organization. The Akamai program asks mentors to provide a project, or in some cases several smaller projects, that will be the students own, independent project. Mentors are specifically asked to avoid “shadowing” experiences, or skills-training that does not provide the intern with a project that they have ownership of, and can present in a technical symposium.

Student internships are often representative of the types of projects and work that will be assigned to entry-level technicians, thus a valuable source of information about workforce needs. The Akamai Internship Program has been in operation since 2004, and due to the extensive program records, has a wealth of information about student internship projects. Each student prepares an abstract, and oral presentation, and a poster presentation (see: <http://cfao.ucolick.org/EO/internships/presentations.php>). In this phase of our project, we reviewed program records, and conducted interviews with our 2008 project mentors to inventory the types of projects and skills Akamai interns engaged in from 2004-2008.

2. Method:

In order to create an inventory of Akamai internship skills we utilized two sources of information from the Maui Akamai program:

- Interviews with 2008 Akamai internship project hosts
- Past Akamai intern projects (2004-2007)

2.1. Interviews with 2008 Akamai project hosts

Each year the Akamai program meets with prospective mentors to outline intern projects for the coming summer. The Akamai program staff meets with each mentor who will be working closely with an intern to learn about their ideas for projects, the skills and background needed to complete the project, as well as any additional information related to how to successfully match the intern and project. In January and February 2008 these meetings were conducted, and additionally, mentors were asked if they had new positions coming up and for information on skills that are important for their entry-level positions.

Internship hosts on Maui included:

Oceanit

Hnu- Photonics

Textron

Trex

Maui High Performance Computing Center

Northrop-Grumman

Pacific Disaster Center

Akimeka

Institute for Astronomy, Maui

2.2. Past Akamai Intern Projects

Past intern projects from 2003-07 were reviewed through project abstracts and Powerpoint presentations, and the tasks required to complete the project were identified.

2.3. Inventory of Intern Tasks

Skills and tasks identified from interviews and past intern project were divided into four categories: hardware, software, general engineering technology skills, and attitudes for success in the workplace. Tasks included in the hardware and software category were further subdivided into more detailed task areas. Engineering technologist process skills, such as “troubleshooting,” came up in interviews as important skills in and of themselves and formed a separate category. The inventory is shown below. The order doesn’t not indicate any priority nor frequency in the tasks.

HARDWARE

Telescopes:

- operate and align
- test ability of 8" telescope to track satellites
- assemble a telescope system for tracking objects in the sky
- verify that a telescope meets specifications

Optical devices and stages:

- align, coat, and change optical devices
- perform maintenance on optical stages (cleaning and oiling)
- measure figure distortion of a primary mirror
- measure mirror distortion

Lasers:

- calibrate performance of laser receiver in the lab using a calibrated source
- calibrate performance of laser receiver using standard stars

Diodes:

- use of Schottky diodes
- use of Schottky diodes for current limiting
- Position Sensing Diodes
- characterize Position Sensing Diode's temporal, spatial and power level sensitivity
- compare Position Sensing Diodes to CMOS
- create mount for photodiodes
- create mount for photodiodes to be inserted into cooling unit
- create and set up device made of laser and photodiode to detect water level

CCD's:

- install, understand
- measure plate scale of CCD using two stars
- mount CCD control hardware

Interferometers:

- set up and test FT interferometer

- characterize DM using an interferometer

Solar cells:

- solar cell module
- measure voltage output from a solar cell under varying conditions
- test the effect of tracking on solar cell efficiency
- design cooling system for solar cell

- test solar cooling device's effect on solar cell performance
- build portable solar cell module and test kit

Sensory devices:

- receiver-transmitter system
- use remote sensing
- create sensory substitution devices
- create prototype sensory substitution device
- convert from physical knob to remotely operated computer control
- HVA cards

Pupil and blind deconvolution:

- investigate how different pupil assumptions affect blind deconvolution results

study the effect of incorrect pupil information on blind deconvolution

Computers:

bring up, repair
integrate components with a computer
build resistive load box
interface
configure new hardware system
assess hardware system
design and build an inventory control database
set up wireless network on a bus and map the region where the bus can be found
upgrade power supplies for DM
proper configuration for new "hardware system"
assess what components of a "hardware system" do
write a list of requirements for a "hardware system"
compare network hardware and configurations to documented specs

Other:

compare cost and performance of piezoelectric devices and voice coil FSM
select camera appropriate to project
position, track and measure errors in pointing satellites
investigate errors in pointing determinations of modeled satellites

SOFTWARE

Create:

email form for webmaster feedback that is hidden from spambots
programs for stars
an application to visualize the positions of satellite
database and real time geospatial model of Avian Influenza outbreaks
programs to run Matlab in parallel
models of atmospheric distortion in Mathematica
visualizing code for weather model
3D topographic map of Hawai'i from a 2D array of elevations
software for tracking satellites with remote telescope
Web pages
data pipeline from weather model to 3D visualization software
program to calculate Ro based on images of stars
image scaling algorithm
create database of equipment
database of mile markers and images

Understand and Perform:

autocad
solidworks
GIS to investigate the effect of El Nino on coral bleaching
GIS to evaluate correlaton of outbreaks of Avian Influenza and migratory patterns
asp.net
ArcGis
matlab
jTrack
power point
ArcMap
mapping tools

microsoft vivio
CPLD Xilinx
ZeMax
CAD modeling for mount design
oracle database
designed database

Identify:

global web services gateway
website security
web development
XML web security, and document validation

Implement:

Web programming
java programming
C++
XML document validation
port public domain software from Linux(written in C) to Windows (also C)
CPLD Xilinx programmable logic device

Analyze:

images in blind deconvolution
images
inventory analysis
cost analysis
eliminate image flicker caused by GUI
randomly access any frame in a video file
transfer video/produce video of electronic installation for training purposes
examine South Pole data set with helioseismic analysis
compile data from learning studies
research how to store previously developed Java programs
convert blind deconvolution code from Matlab to Python
convert any video type to MP4
modify software to disregard errors in CCD camera
compare output of computer program to master file
compare network software to documented specifications
test satellite tracking software with remotely operated commercial telescope
compute residual error in tracking from images
run security scripts to verify security compliance
map mile markers into GIS system
test accuracy of GPS measurements using redundant measurements
update web pages make them more usable for portable devices

ENGINEERING TECHNICIAN PROCESS SKILLS

project planning
Analytical skills
Troubleshooting
Systems thinking
ability to follow instructions
ability to work independently
Good communication skills
mechanically inclined
Designing within requirements

Good presentation skills
Ability to clarify a problem
Use reference material and background reading
Apply theory

ATTITUDES FOR SUCCESS IN THE WORKPLACE

motivation
teachable
Interest in project/work
proactive
willingness to learn (new program, new software)
enthusiasm

Bachelor of Applied Science in Applied Engineering Technology (AET)

Competency profile

DUTY	TASK						
A. Apply Math to solve problems	A1. Solve simple algebraic equations	A2. Apply principles of geometry	A3. Perform statistical data analysis	A4. Perform proportioning and interpolation	A5. Perform basic trigonometric functions	A6. Perform vector analysis	
B. Use a computer	B1. Navigate Windows [®] Operating System	B2. Use Microsoft Word [®]	B3. Use Microsoft Excel [®]	B4. Use Microsoft PowerPoint [®]	B5. Use linux services	B6. Use project management software	
C. Build, test, and analyze electronic circuit	C1. Build, analyze, test & troubleshoot analog and digital circuits & systems	C2. Build, analyze, test & troubleshoot opto-electronic devices, circuits & systems	C3. Use an AC function generator	C4. Build, analyze, test, & troubleshoot laser power supplies	C5. Fabricate electronic and electro-optic devices		
D. Perform 2D & 3D CAD operations	D1. Create and edit basic 2D CAD drawings	D2. Create and edit 3D solid models	D3. Finite element analysis				
E. Build, test & operate optical systems	E1. Select, clean, install & align optical components for a specific application	E2. Test & measure devices, stages, mirrors...	E3. Calibrate and verify laser sources	E4. Install and characterize devices, lasers, LED, PSD, CMOS sensors, photodiodes, and photovoltaics	E5. Install and characterize CCD, interferometers, receivers, transmitters, piezoelectronic devices and voice coils	E6. Compare and verify to specifications	E7. Assemble & test tracking
F. Build, test & configure computer/network systems	F1. Ensure appropriate safety procedures	F2. Test to specifications	F3. Configure, install, repair, and troubleshoot PC, interface	F4. Specify components, requirements and assess performance	F5. Determine physical and electrical requirements for a power supply	F6. Perform networks, wireless	
G. Program, test & analyze using software engineering tools	G1. Secure Web pages, XML, asp. Organize video and CCD files. Produce technical video	G2. Inventory and scaling of images, databases, oracle	G3. GIS, GPS, mapping tools	G4. Use: ZeMax, C, C++, Java	G5. Run MatLab, Matematica, Lab View	G6. Test with scripts (analyze outputs)	
H. Build, analyze & test laser systems	H1. Select, clean, install, and align optical components	H2. Identify, install and test laser electrical and cooling system	H3. Measure and adjust laser output parameters	H4. Assemble and wire laser systems			

Competency profile subtask outline
(*: required by representatives of Maui companies)

A. Apply Math to Solve Problems

A1. Solve Simple Algebraic Equations

1. Identify equations with one unknown.
2. Solve algebraic equations by isolation of the unknown.
3. Identify equations with fractions.
4. Solve equations by cross-multiplying.
5. Identify and solve linear equations.
6. Calculate the slope of a line.

A2. Apply Principles of Geometry

1. Apply the laws of exponents
2. Calculate exponentials and roots
3. Analyze right triangles
4. Use Pythagorean theorem
5. Calculate the area and circumference of a circle
6. Determine angular measurements (degrees and radians)
7. Establish a tangent to a circle
8. Analyze parallel lines, transverse lines, and angles
9. Perform bisection of an angle
10. Calculate the sum of the interior angles of a polygon
11. Calculate the area of a triangle and irregular shapes
12. Analyze trapezoids

A3. Perform Statistical Data Analysis

1. Collect, screen, analyze and plot data
2. Create graphs (line, bar, and pie)
3. Calculate mean, median, and standard deviation.

A4. Perform Proportioning and Interpolation

1. Calculate ratios and proportions.
2. Calculate direct, inverse, and combined variations
3. Calculate constants of proportionality
4. Perform tabular interpolation

A5. Perform Basic Trigonometric Functions

1. Calculate the trigonometric functions of sine, cosine, and tangent
2. Calculate the inverse trigonometric functions of arcsine, arccosine, and arctangent
3. Solve a right triangle

A6. Perform Vector Analysis

1. Analyze components of vectors
2. Perform vector addition
3. Perform vector combination
4. Plot data in the X-Y coordinate system

5. Plot data in the X -Y-Z coordinate system
6. Calculate the slope of a line in the Cartesian coordinate system

B. Use a Computer

B1. Navigate Windows[®] Operating System

1. Create a file
2. Create a directory or folder
3. Manage file folders
4. Open and save files
5. Use Windows Explorer
6. Use Internet explorer
7. Create and/or open a Zip file

B2. Use Microsoft Word[®]

1. Create, format and edit a document
2. Cut and paste text, data and graphics
3. Save a document
4. Create and format a table
5. Format bullets and numbering
6. Format borders and shading
7. Create and format letters and envelopes
8. Print a document
9. Insert drawings and/or pictures into a document
10. Convert a Word document into an Adobe.pdf file
11. Use drawing features to enhance documents
12. Apply footers and headers
13. Set page margins and print parameters
14. Change fonts and symbols
15. Use spell-check
16. Create and use macros
17. Track, highlight, and accept/reject comments and changes

B3. Use Microsoft Excel[®]

1. Create a spreadsheet file
2. Save a spreadsheet file
3. Create, format and edit cell data
4. Create data tables
5. Sort data
6. Cut and paste text, data and graphics
7. Apply mathematical functions
8. Perform statistical data analysis
9. Create pivot tables
10. Create plots and graphs

B4. Use Microsoft PowerPoint[®] *

1. Organize and create a PPT presentation
2. Edit and save a PPT presentation
3. Create, format and edit bullet list presentation

4. Create, format and edit 2D & 3D graphics
5. Insert and format Excel chart and/or table
6. Format slide and object transitions
7. Create and/or apply presentation templates
8. Insert and format clip art and other digital images
9. Insert and format hyperlinks
10. Apply shading to drawing elements

B5. Use Microsoft Vivio *

B6. Use Linux services

1. Apache
2. Web server
3. Databases
4. Mail

B7. Use project management software

1. Create Web pages *
2. Update web pages: make them more usable for portable devices *
3. email form for webmaster feedback that is hidden from spambots *
4. Design and build an inventory control database *

C. Build, Test, and Analyze Electronic Circuits

C1. Build, analyze, test and troubleshoot analog and digital circuits & systems

1. Calculate AC, DC and RMS voltage, current, resistance and power
2. Measure DC and RMS voltage, current, resistance and power using a digital multimeter
3. Use a digital storage oscilloscope
4. Use programmable function generator
5. Use an RF spectrum analyzer
6. Use a digital logic probe
7. Use a digital logic analyzer
8. Use circuit simulation software (e.g., MultiSim[®], Pspice[®], Electronics Workbench[®], etc)
9. Identify short circuits and open circuits
10. Build, analyze, and test electronic motion control systems (i.e., x-y-z micro positioning system, DC and stepper motor control circuits)
11. Solder according to comply with IPC standards
12. Read component specifications
13. Read wiring schematics
14. Perform basic wiring according to wiring schematics
15. Identify ground loops and RF shielding requirements
16. Comply with OSHA Electrical Safety standards

C2. Build, analyze, test and troubleshoot optoelectronic devices, circuits & systems

1. Use opto-isolators for electrical isolation
2. Build and troubleshoot optical detector circuits:
 - Select appropriate detectors in accordance with system speed, response, rise time, wavelength, distance bandwidth product and sensitivity specifications-including PIN or APD detectors

- Measure signal amplitude at the transmitter and detector (receiver)
3. Build and troubleshoot LED and laser diode driver circuits:
 - Install appropriate laser diode, VCSEL diode array, or a non-laser light source for system assembly
 - Interface diode laser with current drive and TE cooler
 4. Use an optical power meter:
 - Measure power and compare with power budget to assess performance of given fiber-optic systems
 - Measure power and determine system signal gain and loss
 - Calculate acceptance values for power loss; correlate transmitter/receiver requirements to customer requirements
 5. Use a fiber break indicator
 6. Strip, cleave and inspect fiber optic cable:
 - Fabricate fiber optic cable according to specifications
 - Monitor fiber draw process
 - Polish fibers at connector insertion
 7. Terminate and test fiber optic cable assemblies:
 - Terminate fiber with appropriate fiber-optic connector using manufacturing specifications
 - Align and terminate polarization maintaining (PM) fiber
 8. Determine and measure fiber optic cable characteristics (i.e., tensile strength, circularity, index profile, dispersion characteristics, etc)
 9. Install bare fiber connectors:
 - Select appropriate connectors, couplers, and splicers for a given system
 - Join fibers at connectors
 10. Use a fiber optic loss test set
 11. Measure insertion loss:
 - Interface laser to fiber with minimal insertion loss
 - Calculate insertion loss in fiber-optic systems
 12. Use an Optical Time-Domain Reflectometer (OTDR)
 13. Install and test mechanical splices
 - Use mechanical splices to join fibers
 14. Use a fiber optic fusion splicer
 - Use fusion splicer to join fibers
 15. Use an optical spectrum analyzer
 - Characterize fiber-optic source using optical spectrum analyzer
 16. Install and operate a thermo-electric (TE) cooler
 17. Install and test coherent and incoherent fiber optic bundles
 18. Build, operate and test Erbium Doped Fiber Amplifiers (EDFA):
 - Use EDFA for signal regeneration
 - Measure EDFA output spectral characteristics
 19. Install and test fiber optic couplers and splitters:
 - Measure and calculate coupler split ratio
 20. Install and test fiber Bragg gratings
 21. Select, build, operate and test integrated optical modulators
 - Measure optical modulator output parameters
 22. Properly dispose of fiber optic waste
 23. Clean and handle optic fiber according to industry specifications
 24. Ensure adherence to ANSI Z136.1 laser safety standards
 25. Comply with OSHA Electrical Safety standards
 26. Measure power and compare with power budget to assess performance of given fiber- optic system
 27. Calculate bandwidth of a fiber-optic system
 28. Test and verify initial source output and launch angles at source/fiber interface

C3 Use an AC function generator

C4. Build, analyze, test and troubleshoot laser power supplies

1. Build, analyze, test and troubleshoot high voltage neutral gas laser power supplies
2. Build, analyze, test and troubleshoot high voltage ion laser power supplies
3. Build, analyze, test and troubleshoot solid-state diode-pumped laser power supplies
4. Build, analyze, test and troubleshoot laser diode driver circuits
5. Build, analyze, test and troubleshoot solid-state flash lamp-pumped driver circuits
6. Build, analyze, test and troubleshoot high voltage RF power supplies
7. Build, analyze, test and troubleshoot pulsed laser power supplies
8. Build, analyze, test and troubleshoot fiber laser power supplies
9. Comply with OSHA Electrical Safety standards

C5. Fabricate electronic and optoelectronic devices

Check optical system alignment

D. Perform 2D and 3D CAD Operations

D1. Create and edit basic 2D CAD drawings

1. Perform basic 2D CAD file management
2. Apply drawing settings
3. Use basic and advanced editing commands
4. Create drawings with stated accuracy
5. Organize drawing information
6. Control the display of drawings
7. Create multi-view drawings
8. Create orthogonal views.
9. Create sectioned drawings
10. Create and edit electrical wiring and assembly drawings
11. Create drawing annotations including geometric tolerance.
12. Understand and use centerlines.
13. Apply the standards from ASME Y14.5-1994 to dimensions for both English and Metric drawings.
14. Place notes on drawings
15. Use and manipulate blocks
16. Software application for 2D and 3D design and drafting *
17. CAD modeling for mount design *

D2. Create and edit 3D solid models

1. Understand how to sketch, refine, and add parametric dimensions and constraints to profiles using a 3D solid modeling system.
2. Create part features for a 3D solid model.
3. Manipulate the view of the part.
4. Create 3D work planes.
5. Edit part features.
6. Data pipeline from weather model to 3D visualization software *
7. Understand and use Solidworks *

D3. Finite element analysis

E. Build, test & operate optical systems

E1. Select, clean, install & align optical components for a specific application

1. Comply with industry standards for handling, cleaning and inspecting optical components
2. Select, clean, install, and align focusing optics
3. Select, install, align and test an etalon
4. Use appropriate alignment techniques
5. Focus beam on target surface
6. Use optical alignment scope
7. Align an optical system using a triangulation technique
8. Align an optical system using an auto collimation technique
9. Align laser and optical components in system
10. Set up and align a telemetry system employing beam modulation
11. Read a basic wiring and optical layout schematic
12. Read a mechanical/optical drawing for dimensions and tolerance and data reference
13. Verify wavefront correction using an adaptive optical system
14. Operate and align telescopes *
15. Perform maintenance on optical stages (cleaning and oiling) *

E2. Test & measure devices, stages, mirrors

1. Measure wavefront aberrations
2. Perform radiometric and photometric measurements
3. Set up and calibrate focal plane arrays
4. Perform digital image processing
5. Perform set up and calibration of imaging systems
6. Measure figure distortion of a primary mirror *
7. Measure mirror distortion *
8. Select camera appropriate to project *

E3. Calibrate and verify laser sources

1. Measure output power of laser or other light
2. Conduct appropriate laser safety checks per ANSI standards
3. Ensure correct laser safety practice in working area per OSHA and ANSI standards
4. Calibrate performance of laser receiver in the lab using a calibrated source *
5. Calibrate performance of laser receiver using standard stars *

E4. Install and characterize devices, lasers, LED, PSD, CMOS sensors, photodiodes, photovoltaics

1. Design and test photodetector circuits
2. Characterize Position Sensing Diode's temporal, spatial and power level sensitivity *
3. Compare Position Sensing Diodes to CMOS *
4. Create mount for photodiodes *
5. Create mount for photodiodes to be inserted into cooling unit *
6. Create and set up device made of laser and photodiode to detect water level *
7. Characterize and use Schottky diodes *
8. Use of Schottky diodes for current limiting *

E5. Install and characterize CCD, interferometers, receivers, transmitters, piezoelectronic devices and voice coils

1. Set up and align common path (Fizeau) interferometers
2. Set up and align Michelson interferometers
3. Set up and align a holographic interferometric system

4. Set up and calibrate infrared detectors
5. Design and test photodetector circuits
6. Analyze and evaluate interferometric fringe patterns
7. Perform interferogram evaluation and wave front fitting using the software provided Install and characterize CCD *
8. Measure plate scale of CCD using two stars *
9. Mount CCD control hardware *
10. Set up and test FT interferometer *
11. Characterize DM using an interferometer *
12. Receiver-transmitters *
13. Create sensory substitution devices *
14. Create prototype sensory substitution device *
15. Convert from physical knob to remotely operated computer control *
16. HVA cards *
17. Compare cost and performance of piezoelectric devices and voice coil FSM *

E6. Compare and verify to specifications

Verify that a telescope meets specifications

E7. Assemble & test tracking

1. Perform set up and calibration of LIDAR systems
2. Perform set up and calibration of FLIR systems
3. Test ability of 8" telescope to track satellites *
4. Assemble a telescope system for tracking objects in the sky *
5. Position, track and measure errors in pointing satellites *
6. Investigate errors in pointing determinations of modeled satellites *

F. Build, test & configure computer/network systems

F1. Ensure appropriate safety procedures

F2. Test to specifications

1. Identify technical functions for customer requirements
2. Analyze and convert customer requirements into technical specifications
3. Convert supervisors statements into a statement of work
4. Identify measurable parameters to match statement of work specifications
5. Recommend development, fabrication, or purchase of components necessary for the system
6. Generate schematics for the system
7. Compare network hardware and configurations to documented specs *

F3. Configure, install, repair, and troubleshoot PC, interface

1. Install windows
2. Install Office
3. Install Linux
4. Install Linux services
5. Meet Comp TIA A+ technician requirements
6. Configure and assess new hardware system *

F4. Specify components, requirements and assess performance

1. Identify and interpret customer requirements

2. Specify appropriate component.
3. Integrate components with a computer *
4. Build resistive load box *
5. Write a list of requirements for a "hardware system" *
6. Assess what components of a "hardware system" do *

F5. Determine physical and electrical requirements for a power supply

1. Upgrade power supplies for DM *

F6. Perform networks, wireless

1. Meet Cisco CCNA requirements
2. Set up wireless network on a bus and map the region where the bus can be found *

G. Program, test & analyze using software engineering tools

G1. Secure, organize, and produce

1. Web pages *
2. Websites *
3. Asp.net *
4. XML Web secure and document validation *
5. Randomly access any frame in a video file *
6. Transfer video/produce video of electronic installation for training purposes *
7. Convert any video type to MP4 *
8. Modify software to disregard errors in CCD camera *

G2. Inventory and scaling of images, databases, oracle

1. Create database of equipment *
2. Database of Avian Influenza outbreaks *
3. Image scaling algorithm *
4. Database of mile markers and images *
5. Design databases *
6. Images in blind deconvolution *
7. Perform inventory analysis *
8. Eliminate image flicker caused by GUI (Graphical User Interface) *
9. Examine South Pole data set with helioseismic analysis *
10. Compile data from learning studies *
11. Compute residual error in tracking from images *

G3. GIS, GPS, mapping tools

1. Real time geospatial model of Avian Influenza outbreaks *
2. Visualizing code for weather model *
3. 3D topographic map of Hawai'i from a 2D array of elevations *
4. GIS to investigate the effect of El Nino on coral bleaching (geographic information system) *
5. GIS to evaluate correlation of outbreaks of Avian Influenza and migratory patterns *
6. Understand and perform ArcGis *
7. Understand and perform ArcMap *
8. Understand and perform jTrack *10. Map mile markers into GIS system *
9. Test accuracy of GPS measurements using redundant measurements *

G4. Use programs: ZeMax, C, C++, Java

1. Create program to calculate Ro based on images of stars *2. Use java *
3. Use CPLD Xilinx *
4. Port public domain software from Linux(written in C) to Windows (also C) *
5. Reasearch how to store previously developed Java programs *

G5. Software to track satellites

1. Software for tracking satellites with remote telescope *
2. Test satellite tracking software with remotely operated commercial telescope *
3. An application to visualize the positions of satellite *

G6. Run MatLab, Mathematica, Lab View

1. Create programs to run Matlab in parallel *
2. Create models of atmospheric distortion in Mathematica *
3. convert blind deconvolution code from Matlab to Python *

G7. Test with scripts (analyze outputs)

1. Compare output of computer program to master file *
2. Run security scripts to verify security compliance *

H. Build, Analyze & Test Laser Systems

H1. Select, clean, and install optical components

1. Comply with industry standards for handling, cleaning and inspecting optical components
2. Select, clean, install and align laser HR mirror and output coupler
3. Select, clean, install, and align focusing optics
4. Select, clean, install, and align solid-state laser rod
5. Select, install, align and test a flash lamp
6. Select, install, align and test a diode laser pump
7. Select, install, align and test a laser Q-switch
8. Select, install, align and test an etalon
9. Select, install, align and test polarizers, quarter-wave & half-wave plates
10. Use and autocollimator to align optical cavity
11. Terminate, splice and test fiber optic beam delivery cable.
12. Identify, install and test laser beam tracer
13. Construct, align and use an interferometer
14. Ensure adherence to ANSI Z136.1 laser safety standards
15. Comply with OSHA Electrical Safety standards

H2. Identify, install and test laser electrical and cooling systems

1. Identify, install and test laser electrical system according to specifications
2. Identify, install and test laser cooling system according to specification
3. Identify, install and test laser gas flow system according to specifications
4. Identify, install and test laser shutter & beam dump system
5. Identify, install and test laser safety interlock system
6. Identify, install and test laser gas assist nozzle
7. Comply with OSHA Electrical Safety standards

H3. Measure and adjust laser output parameters

1. Measure and adjust laser output power (CW and pulsed)
2. Measure laser output beam divergence
3. Measure and adjust laser output mode profile
4. Measure and adjust laser beam diameter
5. Measure and adjust laser output wavelength spectrum
6. Measure and adjust laser beam polarization
7. Determine laser beam quality factor (M^2 & K)
8. Measure and adjust RF generator output
9. Measure laser beam propagation factor
10. Measure laser coherence length
11. Select, install, and adjust laser beam focusing optics
12. Ensure adherence to ANSI Z136.1 laser safety standards
13. Comply with OSHA Electrical Safety standards

H4. Assemble and wire laser systems

1. Read and understand wiring schematics
2. Operate hand tools (hand drill, screwdrivers etc)
3. Read and understand Assemble Drawings
4. Wire panels per NEC and NFPA guidelines
5. Assemble sheet metal and machined parts
6. Integrate laser system with appropriate enclosure (i.e., Class I)
7. Document assembly and wiring changes.
8. Comply with OSHA Electrical Safety standards

Employability skills

For the two specialty areas:

- Ability to follow instructions
- Work responsibly with minimal supervision
- Follow security procedures
- Present oneself accordingly
- Be willing to learn
- Keep motivated
- Show enthusiasm
- Be able to clarify a problem
- Manage project planning
- Apply theory with real parts
- Exhibit creativity
- Identify oneself with the profession and at the same time maintain cultural awareness and a sense of community
- Show interest in astronomy
- Be mechanically inclined
- Create training programs (for Marine Mobile Modular Command Center)
- Be interested in reading Math books

Appendix B – Hawai`i Job Description

Job Descriptions

Source: Department of Labor and Industrial Relations -Hawaii Labor Informer:

Electrical and Electronics Engineering Technicians

Apply electrical and electronic theory and related knowledge, usually under the direction of engineering staff, to design, build, repair, calibrate, and modify electrical components, circuitry, controls, and machinery for subsequent evaluation and use by engineering staff in making engineering design decisions

Electrical, Electronic Repair, Comm & Indust Equip

Repair, test, adjust, or install electronic equipment, such as industrial controls, transmitters, and antennas

Engineering Technicians

All engineering technicians, except drafters, not listed separately

Electro-mechanical Engineering Technicians

Operate, test, and maintain unmanned, automated, servo-mechanical, or electromechanical equipment. May operate unmanned submarines, aircraft, or other equipment at worksites, such as oil rigs, deep ocean exploration, or hazardous waste removal. May assist engineers in testing and designing robotics equipment

Industrial Engineering Technicians

Apply engineering theory and principles to problems of industrial layout or manufacturing production, usually under the direction of engineering staff. May study and record time, motion, method, and speed involved in performance of production, maintenance, clerical, and other worker operations for such purposes as establishing standard production rates or improving efficiency

Environmental Engineering Technicians

Apply theory and principles of environmental engineering to modify, test, and operate equipment and devices used in the prevention, control, and remediation of environmental pollution, including waste treatment and site remediation. May assist in the development of environmental pollution remediation devices under direction of engineer

Aerospace Engineering Technicians

Operate, install, calibrate, and maintain integrated computer/communications systems consoles, simulators, and other data acquisition, test, and measurement instruments and equipment to launch, track, position, and evaluate air and space vehicles. May record and interpret test data

Computer Specialists

All computer specialists not listed separately.

Network and Computer Systems Administrators

Install, configure, and support an organization's local area network (LAN), wide area network (WAN), and Internet system or a segment of a network system. Maintain network hardware and software. Monitor network to ensure network availability to all system users and perform necessary maintenance to support network availability. May supervise other network support and client server specialists and plan, coordinate, and implement network security measures. Exclude "Computer Support Specialists"

Appendix B – Potential Employers on Maui

Telescopes on Maui

Air Force Maui Optical Station (AMOS)
Air Force Maui Space Surveillance System (MSSS)
Faulkes Telescope
Lunar Ranging Experiment (LURE) Observatory
Mees Solar Observatory
Remote Maui Experiment (RME)
Solar-C Scatter-Free Observatory

Telescopes on Big Island

Caltech Submillimeter Observatory, Caltech/NSF
Canada-France-Hawaii Telescope (CFHT)
Gemini Northern Telescope, USA/UK/Canada/Argentina/
Australia/Brazil/Chile
James Clerk Maxwell Telescope, UK/Canada/Netherlands
NASA Infrared Telescope Facility (IRTF)
Subaru Telescope, Japan
Submillimeter Array, Smithsonian Astrophysical Observatory/Taiwan
UH Institute for Astronomy
United Kingdom Infrared Telescope (UKIRT)
University of Hawaii at Hilo
Very Long Baseline Array, NRAO/AUI/NSF
W. M. Keck Observatory, Caltech/University of California

Hi- Tech

Akimeka LLC
Analytic Graphics, Inc.
Boeing
First Wind - Kaheawa Wind
Haleakala Solar
Harmer Communications
H-nu Photonics
Lockheed Martin
Maui Economic Development Board, Women in Technology
Maui High Performance Computing Center (MHPCC)
Maui Innovative Peripherals
Maui Ops, Photon Research Associates
Micro Gaia Inc.
Monsanto
Northrup Grumman

Appendix B – Potential Employers on Maui

Oceanit
Pacific Defense Solutions, LLC.
Pacific Disaster Center
Peletex
Schafer Corporation
Science Applications International Corporation
Textron Systems Corporation
Trex Hawaii

Energy

Blue Earth
First Wind - Kaheawa Wind
Haleakala Solar
HR Biopetroleum Corporate Office
Lava Net
Maui Electric Company, Ltd.
Maui Energy Company (Leo Caires)
Maui Koa Solar
Maui Solar Energy Software Corporation
Oceanlinx Ltd.
Provision
PV Software
Rising Sun Solar
Solar king Inc.
Stan's Electrica Service LLC
Takahashi & Shadow
UPC wind management

Network and IT consulting

Lava Net
Nemo Networks LLC

Telecom

Island Telecom
Maui Telecom & Computer
T-Mobile
Verizon Wireless

Electronics

Low Voltage Wiring & Service

Appendix B – Potential Employers on Maui

Sun Industries Inc

Yap's Electric

PC services

AZ PC services

Computer Geek of Maui

Computer Services Hawaii

CyberDefender PC Support - Computer Service

Inacom Information Systems

Inter Island Software and Computers

Maui Computer Care

Maui Gateway

Maui Net

Maui Techguy

Protek

Q & As Clear Image

Heavy Industry

Hawaiian Commercial & Sugar Company (HC&S)

Maui Land & Pineapple Company (ML&P)

Hotels

Four Seasons

Grand Wailea Resort

Hyatt Regency Maui Resort & Spa

Maui Prince Hotel Makena Resort

Outrigger Palms At Wailea

Royal Lahaina Resort

The Fairmont Kea Lani Maui

The Ritz-Carlton, Kapalua

The Westin Maui Resort & Spa

Wailea Marriott Resort

Westin Kaanapali Ocean Resort Villas

Appendix C

Bachelor of Applied Science

in

Applied Engineering Technology (AET)

Criteria for Accrediting Engineering Technology Programs Effective for Evaluations during the 2008-2009 Accreditation Cycle

Definitions

(From Section II.D.1. of the ABET *Accreditation Policy and Procedure Manual*)

While ABET recognizes and supports the prerogative of institutions to use and adopt the terminology of their choice, it is necessary for ABET volunteers and staff to have a consistent understanding of terminology. With that purpose in mind, the Commissions will use the following basic definitions:

Program Educational Objectives – Program educational objectives are broad statements that describe the career and professional accomplishments that the program is preparing graduates to achieve.

Program Outcomes – Program outcomes are narrower statements that describe what students are expected to know and be able to do by the time of graduation. These relate to the skills, knowledge, and behaviors that students acquire in their matriculation through the program.

Assessment – Assessment is one or more processes that identify, collect, and prepare data to evaluate the achievement of program outcomes and program educational objectives.

Evaluation – Evaluation is one or more processes for interpreting the data and evidence accumulated through assessment practices. Evaluation determines the extent to which program outcomes or program educational objectives are being achieved, and results in decisions and actions to improve the program.

It is the responsibility of the program seeking accreditation to demonstrate clearly that the program meets the following criteria.

GENERAL CRITERIA

Criterion 1. Students

The program must evaluate student performance, advise students regarding curricular and career matters, and monitor student's progress to foster their success in achieving program outcomes, thereby enabling them as graduates to attain program objectives.

The program must have and enforce policies for the acceptance of transfer students and for the validation of courses taken for credit elsewhere. The program must also have and enforce procedures to assure that all students meet all program requirements.

Criterion 2. Program Educational Objectives

Each program must have in place:

- a. published program educational objectives that are consistent with the mission of the institution and applicable ABET criteria,
- b. a documented process by which the program educational objectives are determined and periodically evaluated based on the needs of constituencies served by the program, and
- c. an educational program, including a curriculum, that enables graduates to achieve the program educational objectives.

Criterion 3. Program Outcomes

Each program must demonstrate that graduates have:

- a. an appropriate mastery of the knowledge, techniques, skills, and modern tools of their disciplines
- b. an ability to apply current knowledge and adapt to emerging applications of mathematics, science, engineering, and technology
- c. an ability to conduct, analyze and interpret experiments, and apply experimental results to improve processes
- d. an ability to apply creativity in the design of systems, components, or processes appropriate to program educational objectives
- e. an ability to function effectively on teams
- f. an ability to identify, analyze and solve technical problems
- g. an ability to communicate effectively
- h. a recognition of the need for, and an ability to engage in lifelong learning
- i. an ability to understand professional, ethical and social responsibilities
- j. a respect for diversity and a knowledge of contemporary professional, societal and global issues
- k. a commitment to quality, timeliness, and continuous improvement

Criterion 4. Continuous Improvement

The program must use a documented process incorporating relevant data to regularly assess its program educational objectives and program outcome, and to evaluate the extent to which they are being met. The results of these evaluations of program educational objectives and program outcomes must be used to effect continuous improvement of the program through a documented plan.

Criterion 5. Curriculum

The program must provide an integrated educational experience that develops the ability of graduates to apply pertinent knowledge to solving problems in the engineering technology specialty. The orientation of the technical specialization must manifest itself through program educational objectives, faculty qualifications, program content, and business and industry guidance.

These criteria specify subject areas and minimum total credit hours essential to all engineering technology programs. The curriculum must appropriately and effectively develop these subject areas in support of program educational and institutional objectives.

Total Credits Baccalaureate programs must consist of a minimum of 124 semester hours or 186 quarter hours of credit. Associate degree programs must consist of a minimum of 64 semester hours or 96 quarter hours of credit.

Communications The communications content must develop the ability of graduates to:

- a. plan, organize, prepare, and deliver effective technical reports in written, oral, and other formats appropriate to the discipline and goals of the program
- b. incorporate communications skills throughout the technical content of the program
- c. utilize the appropriate technical literature and use it as a principal means of staying current in their chosen technology
- d. utilize the interpersonal skills required to work effectively in teams

Mathematics The level and focus of the mathematics content must provide students with the skills to solve technical problems appropriate to the discipline and the program educational objectives. Algebra, trigonometry, and an introduction to mathematics above the level of algebra and trigonometry constitute the foundation mathematics for an associate degree program. Integral and differential calculus, or other appropriate mathematics above the level of algebra and trigonometry, constitutes the foundation mathematics for baccalaureate programs.

Physical and Natural Science The basic science content can include physics, chemistry, or life and earth sciences that support program educational objectives. This component must include laboratory experiences which develop expertise in experimentation, observation, measurement, and documentation.

Social Sciences and Humanities The social sciences and humanities content must support technical education by broadening student perspective and imparting an understanding of diversity and the global and societal impacts of technology.

Technical Content The technical content of a program must focus on the applied aspects of science and engineering in that portion of the technological spectrum closest to product improvement, manufacturing, construction, and engineering operational functions. The technical content must develop the skills, knowledge, methods, procedures, and techniques associated with the technical discipline and appropriate to the goals of the program.

The technical content develops the depth of technical specialty and must represent at least 1/3 of the total credit hours for the program. In order to accommodate the essential mathematics, sciences, communications, and humanities components, the technical content is limited to no more than 2/3 the total credit hours for the program.

- a. The technical content of the curriculum consists of a technical core and the increasingly complex technical specialties found later in the curriculum. The technical core must provide the prerequisite foundation of knowledge necessary for the technical specialties.
- b. Laboratory activities must develop student competence in the use of analytical and measurement equipment common to the discipline and appropriate to the goals of the program.
- c. Technical courses must develop student knowledge and competence in the use of standard design practices, tools, techniques, and computer hardware and software appropriate to the discipline and goals of the program.
- d. Capstone or other integrating experiences must draw together diverse elements of the curriculum and develop student competence in focusing both technical and non-technical skills in solving problems.

Cooperative Education Cooperative education credit used to satisfy prescribed elements of these criteria must include an appropriate academic component evaluated by the program faculty.

Criterion 6. Faculty

Overall competence of the faculty will be evaluated through such factors as formal education, balance of academic experience and professional practice, industrial experience, professional certification, teaching experience, teaching effectiveness, technical currency, scholarly activity, professional society participation, communication skills, extracurricular support for student activities, and similar attributes appropriate to the program educational objectives.

Individual faculty members must have educational backgrounds, industrial experience, professional practice, communication skills, and technologically current knowledge that support the field of instruction and program educational objectives. Collectively, the faculty must be capable of providing students an appropriate breadth of perspective and effective instruction in the use of modern technical and non-technical methodologies in careers appropriate to the program educational objectives.

The program must have an effective professional development plan for its faculty.

The number of faculty members must be sufficient to provide program continuity, proper frequency of course offerings, appropriate levels of student-faculty interaction, and effective student advising and counseling.

Each program must have effective leadership through a full-time faculty member with defined leadership responsibilities for the program.

The program faculty must have sufficient responsibility and authority to define, revise, implement, and achieve program educational objectives.

Criterion 7. Facilities

Adequate facilities and financial support must be provided for each program in the form of:

- a. suitable classrooms, laboratories, and associated equipment necessary to accomplish the program educational objectives in an atmosphere conducive to learning
- b. laboratory equipment characteristic of that encountered in the industry and practice served by the program
- c. modern computing equipment and software, characteristic of that encountered in the industry and professional practice served by the program
- d. Internet and information infrastructures, including electronic information repositories, equipment catalogs, professional technical publications, and manuals of industrial processes and practices adequate to support the educational objectives of the program and related scholarly activities of students and faculty

Criterion 8. Support

A. ADMINISTRATION

The administration must be effective in the:

- a. selection, supervision, and support of the faculty
- b. selection and supervision of the students
- c. operation of support facilities for faculty and students
- d. interpretation of the college to members of engineering and technical professions and the public

B. INSTITUTIONAL SUPPORT

Institutional support must include:

- a. adequate financial resources and constructive leadership to assure the quality and continuity of the program
- b. resources sufficient to attract, retain, and provide for the continued professional development of a well-qualified faculty

- c. sufficient financial and human resources to acquire, maintain, update, and operate facilities and equipment appropriate for the program
- d.. services to assist students in finding employment upon graduation.

C. PROGRAM ADVISEMENT

An advisory committee representing the organizations that employ graduates must be utilized to advise the program in establishing, achieving, and assessing its goals. The committee must periodically review program curricula and provide advisement on current and future needs of the technical fields in which graduates are employed.

Criterion 9. Program Criteria

Where applicable, each program must satisfy program criteria that amplify these general criteria and provide the specifics needed for a given discipline. A program must satisfy all program criteria applicable to the technical specialties implied in the program title.

Appendix D

Bachelor of Applied Science

in

Applied Engineering Technology (AET)

NORTHROP GRUMMAN



Northrop Grumman Corporation
Technical Services
P.O. Box 398
Makawao, HI 96768-0398
Tel: (808) 249-1432
Fax: (808) 249-1429

Date: 25 February 2009

To: Mark Hoffman

From: Albert Esquibel

Subject: Letter of Support

As the Site Manager for the Maui "Ground-based Electro Optical Deep Space Surveillance" (GEODSS) contract, I have worked for many years with the local college in curriculum development. It is gratifying to see that some of our inputs have been taken seriously, and have been implemented. The current ECET program provides the minimum requirements for new employee's desired by our company.

Northrop Grumman appreciates the hard work put into curriculum development that is relevant to our industry here on Maui. Expanding the offerings in Electro-Optics and Photo Voltaics is very desirable to our industry. It would be a tremendous benefit for both individuals desiring to enter the High Technology market place, as well as current employers.

Finding and keeping qualified employees in the State of Hawaii is a challenge. By working with the college we have been able to find local candidates that are highly motivated to stay on the job. This reduces our overall costs, provides us with better qualified employees, and improves the employees' chances for advancement.

Northrop Grumman fully supports the college's proposed expansion to a four year degree program. The sooner the program can be implemented, the better our local economy is served.



Mark Hoffman
Maui Community College
310 Ka'ahumanu Avenue
Kahului, HI 96732

February 9, 2009

Dear Mr. Hoffman:

Oceanit continues to enjoy and value its association with Maui Community College and our collaborative efforts to strengthen the workforce pipeline to meet the needs of Hawaii's growing technology sector. We applaud MCC's commitment to better meet the needs of the high tech industry (especially optics related technology requirements of local high tech companies) and are excited that MCC is actively pursuing the institution of a Baccalaureate degree in Applied Engineering Technology (AET).

Over the past 5 years Oceanit has employed a number of Engineering Computer Electronics Technology (ECET) graduates including Michael Ecsedy, Sharon Sharp, Vicky Sensano, Kawai Kuluhiwa, Arthur Agdeppa and Darcy Bibb. The quality of these graduates has been outstanding! We believe the AET program will provide even higher level graduates which we anticipate will be a key component in meeting Oceanit's future staffing requirements.

Sincerely,

Curt Leonard
Manager
Oceanit
590 Lipoa Parkway, Suite 259
Kihei, HI 96753

192/16 1-29-09



MAUI HIGH PERFORMANCE COMPUTING CENTER



An Air Force Research Laboratory Center Managed by the University of Hawai'i

550 Lipoa Parkway, Kihei, Maui, Hawai'i 96753 • Phone (808) 879-5077 • Fax (808) 879-5018 • info@mhpcc.hpc.mil

January 27, 2009
MHPCC-GB-2009-001

Maui Community College
Attn: Mark Hoffman
310 Ka'ahumanu Avenue
Kahului, HI 96732

Mark,

As a Maui high technology employer, the Maui High Performance Computing Center (MHPCC) is dependent on the Maui Community College as a source of trained workforce personnel. We participated in the collaborative development of the College's first four year curriculum, the Applied Business and Information Technology (ABIT) syllabus, and we have directly benefited from that initiative in hiring one of your first ABIT graduates.

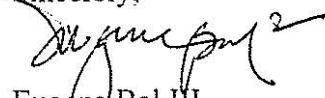
Having participated in several program advisory meetings in the development of the College's second four year curriculum, we are pleased to see the progress being made to institute the Baccalaureate degree in Applied Engineering Technology. We fully support the program's goals and objectives to build capacity and strengthen the workforce pipeline to prepare local students for the emerging positions in Hawaii's growing science and technology sector.

In addition to curriculum development, MHPCC is committed to add to your portfolio of offerings to the new students in the Applied Engineering Technology curriculum with:

- internships,
- job shadowing and mentoring opportunities,
- providing tours and demonstrations, and
- continuation of advisory board participation.

As an engine for economic diversity and development, the Baccalaureate degree in Applied Engineering Technology holds promise to continue the evolution of workforce development for Maui and Hawaii. We most strongly endorse your proposed addition of this second four year degree to the College's offerings. As an active member of the National Defense, research and development, and High Performance Computing communities, we applaud your initiative and stand ready to assist you.

Sincerely,



Eugene Bal III
Executive Director



"Fostering Disaster-Resilient Communities through Information, Science, and Technology"

Mr. Mark Hoffman
Assistant Professor
Electronics and Computer Engineering Technology Program
Maui Community College
310 Kaahumanu Ave
Kahului, HI 96732

February 3, 2009

Dear Mr. Hoffman:

The Pacific Disaster Center (PDC) is pleased to submit this letter of endorsement regarding the Maui Community College (MCC) proposal to develop a new Bachelor of Applied Science degree program in Applied Engineering Technology.

The PDC supports MCC's commitment to provide new talent for Maui's high technology work force, and its ongoing effort to develop and enhance its current programs. MCC's latest endeavor to expand its curriculum to include a new Bachelor of Applied Science degree in Applied Engineering Technology clearly demonstrates continued commitment to understanding Hawaii's current workforce needs, and anticipating future industry needs. This new curriculum will better prepare local students for the emerging positions within Hawaii's growing science and technology sector.

With its headquarters on Maui, PDC employs approximately 35 staff with diverse backgrounds in fields such as physical and social sciences, Geographic Information Systems, Information and Communication Technologies, Software Engineering, modeling applications, as well as hazards and disaster management.

Through its long-standing partnership with MCC, the PDC has offered Maui college students unique and enriching internship opportunities that link classroom learning with real-world application of skills since 1999. Through their participation, interns gain exposure to a variety of technologies and their application, furthering the mission of the PDC to provide applied information research and analysis support for the development of more effective policies, institutions, programs and information products for the disaster management and humanitarian assistance communities in the Asia Pacific region and beyond. PDC is pleased that the majority of its MCC interns have managed to fill a vacant position at the PDC and/or other local high-technology firms at the end of their internships. We believe that the new degree program would strengthen high-tech workforce development on the island and would help businesses in need of new talent.


PDC is committed to helping students make the transition between college and the workforce, and will continue to offer internships to Maui students in direct support of this new program. PDC will also continue to actively participate in curriculum development meetings, program advisory panels, and exchanges between institutions of higher learning and the high-tech industry, as appropriate. In addition, PDC would be pleased to offer guest lectures on topics relevant to the Applied Engineering Technology program.

In summary, PDC is one of many high-technology businesses on Maui that benefits directly from the educational programs offered at the Maui Community College, and would further benefit from the development of a new Bachelor of Applied Science degree program in Applied Engineering Technology. We look forward to being an active participant in this important initiative.

Sincerely,

A handwritten signature in black ink, appearing to read "Ray Shirkhodai", with a long horizontal flourish extending to the right.

Ray Shirkhodai
Executive Director
Pacific Disaster Center

TREX  **HAWAII, LLC**

Daron L. Nishimoto
Trex Hawaii, LLC
427 Ala Makani St
Kahului, HI 96732
(808) 442-7007

February 25, 2009

Re: Letter of Support for Applied Engineering Technology Bachelor of Applied Science degree for Maui Community College

To Whom It May Concern:

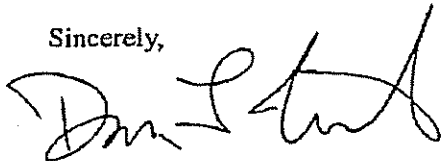
Trex Hawaii, LLC has been actively involved in designing the curriculum for the proposed Applied Engineering Technology Bachelor of Applied Science degree for Maui Community College. We believe that the graduates of this degree will have the skills and knowledge required to advance their careers at Trex Hawaii, LLC Maui Division. We *strongly* support this effort to provide our local high technology industry with the highly skilled workers it requires. In the past, Trex Hawaii, LLC found most of the qualified and skilled workers came from Oahu or the mainland. This comes at a very high cost and employee retention is always an issue. Quality graduates with a technical degree is critical for our company's growth on Maui.

Technical members from Trex Hawaii, LLC have attended many advisory board meetings and curriculum design discussions both at Maui Community College and at the Technology Park in Kihei. Professor Hoffman is very familiar with our state-of-the-art optical and electronics laboratory in Kahului and understands the skill level and experience needed to execute the technical programs we undertake at Trex. Our industry provides unique opportunities for residents to participate in many facets of a high technology career.

Trex Hawaii, LLC is a participant in the Akamai internship program and hosts interns each summer for eight-week projects. The student projects have helped Professor Hoffman determine skill requirements for an applicant to become a valued employee at Trex. This process has now helped to produce requirements for the Baccalaureate degree that will insure graduates will have the right skills for employment at Trex.

We would definitely give graduates of this technical curriculum a high hiring priority based on their experience and existing partnership with the Maui Community College.

Sincerely,



Daron L. Nishimoto
R&D Program Manager



UNIVERSITY
of HAWAII[®]
MĀNOA

College of Engineering

PETER E. CROUCH
DEAN

January 30, 2009

Professor Mark Hoffman
Electrical & Computer Engineering Technology,
Science, Technology, Electronics and Math
Ka'a'ike 211
Maui Community College
310 Ka'ahumanu Ave.
Kahului, HI 96732

Re: BAS Degree in Applied Engineering Technology at Maui Community College

Dear Professor Hoffman:

The College of Engineering at the University of Hawai'i at Mānoa is pleased to support the development of enhanced capabilities in technology and engineering technology education at Maui Community College (MCC).

Programs in engineering technology at the Bachelor's degree level are recognized by ABET (the recognized US accrediting organization for college and university programs in applied science, engineering and technology), as separate from engineering programs and are accredited by a different body under ABET. As such, it is not appropriate for the College of Engineering at UH Mānoa, which only offers courses in engineering and not engineering technology, to play a role in the decision of whether or not to support the specific program being considered here. However, it is appropriate for the College to demonstrate its support for enhanced capability in technology and engineering technology programs in all UH community colleges and, specifically MCC, which is critical to the development of an optics industry in Maui and hence to an enhanced role for the College of Engineering at UH Mānoa.

The College of Engineering at UH Mānoa has, and will continue to provide guidance regarding articulation, curriculum and ABET accreditation standards and process implementation for technology and engineering technology programs, and in particular for the proposed AET degree. If the AET degree is approved, the College and its faculty will collaborate with MCC on articulation and programming and will help develop and teach online classes where feasible and appropriate.

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Honolulu, Hawai'i 96822
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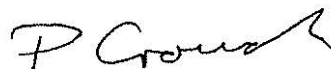
Professor Mark Hoffman
January 30, 2009
Page 2

At a meeting in fall 2008 organized by the College of Engineering at UH Mānoa and held at the East-West Center, representatives from the UH Community Colleges, UH Hilo, UH West Oahu, and UH Mānoa agreed that it made sense to focus on developing engineering, engineering technology, and technology programs across the UH system to ensure that needed resources and knowledge can be shared across programs as far as possible. The College of Engineering at UH Mānoa hopes to play an increasing role in helping pursue system wide coordination and development of these programs.

As engineering and technology play an increasing role in the economic development of Hawai'i, it is clear that there will be an increasing role for graduates from programs in all three fields of technology, engineering technology, and engineering in the Hawai'i workforce. The AET, as described in the MCC proposal, would produce individuals for the growing workforce on Maui and other parts of Hawai'i. In addition, the added resources made available in MCC to run the AET program would strengthen introductory engineering and technology course availability, for all STEM students in Hawai'i, especially through online courses that can be shared with all students in Hawai'i and hence help develop STEM programs in engineering and technology system wide. This is especially important as it will help increase the number of STEM students graduating with AA degrees from Hawai'i community colleges, who can then make easier transitions to the engineering program at UH Mānoa, as well as other science degrees at UH Mānoa.

New faculty hired for the proposed AET program with skills in optics and related fields should develop good relationships with UH Institute for Astronomy faculty and engineers working on Maui in and around the developing optics industry. This should, in turn, help provide enhanced opportunities for engineering faculty at UH Mānoa to develop research relationships with UH faculty on Maui and engineers working in the Maui high tech industry that will, in turn strengthen, UH's role in economic development in Maui.

Sincerely,



Peter E. Crouch
Dean



Center for Adaptive Optics
UC Santa Cruz
1156 High Street
Santa Cruz CA 95064

Mark Hoffman
Electrical and Computer Engineering Technology
Ka'a'ike 221
Maui Community College
310 Ka'ahumanu Ave.
Kahului, HI 96732

February 28, 2009

Dear Mark,

I am pleased to write this letter in support of the enhancement of the engineering technology program at Maui Community College. The state of Hawai'i is in need of a pathway for local students to pursue technical careers, and Maui Community College is uniquely positioned to expand upon the existing Electrical and Computer Engineering Technology (ECET) program. In particular, I am very supportive of your plans to build a program that prepares students for technical careers on Maui, Hawai'i Island, and Kaua'i, where there are common needs due to the astronomical and remote sensing facilities, but communities too small to each have their own program. Like Maui, Hawai'i Island, is under consideration for new astronomical observatories, and if plans are approved will need a local technical workforce. Your proposed new program has the potential to create a steady flow of locally trained technicians for both islands, as well as more broadly in the state of Hawai'i and beyond.

As a long-time partner and collaborator I look forward to continuing to work on the expansion of the ECET program to go beyond an Associate's level degree. Through the Akamai Workforce Initiative (AWI), we will continue to offer internships on both Maui and the Big Island, placing students in industry and observatories, subject to continued funding. In addition, we plan to continue the Professional Development Program (PDP), which trains and prepares graduate students for teaching college level science, technology and engineering. We have also had an increasing number of faculty members participating. As you know, the PDP includes a series of workshops, followed by a practical teaching experience. The PDP focuses on inquiry-based teaching strategies, and diversity and equity issues in the classroom. Maui CC faculty members have been participating and contributing for many years, and we hope very much that this continues and directly supports the development of new curriculum for the engineering technology program. Our scientific community values the opportunities that have come from collaborating with you and other faculty members at Maui CC. The partnership that we have had with Maui CC for all these years has produced some of our most innovative curriculum, and has become a model that can be used by others.

The Maui CC – Institute for Astronomy (IfA) partnership to develop and teach courses for the proposed BAS program is an important part of your implementation plan. Through my position at the IfA, I will continue to help facilitate and shape this process, and hope to develop mechanisms for assisting IfA scientists to learn about and use effective and inclusive

teaching methods. Our pending AWI proposal would provide substantial resources specifically for this, and we are continuing to pursue a range of funding options. I look forward to working with you on the details for the Maui CC- IfA partnership agreement as we move toward implementation.

In summary, I continue to support, and commit to participating in, the enhancement and expansion of the Maui CC engineering technology program.

Sincerely,

A handwritten signature in black ink, appearing to read 'Lisa Hunter', with a large, stylized flourish extending to the left.

Lisa Hunter
Associate Director, Education and Workforce Development
Center for Adaptive Optics

Director, Akamai Workforce Initiative
University of Hawaii Institute for Astronomy

Report of the Akamai Advisory Council

February, 2008

Introduction:

The Akamai Advisory Council provides input and advice to the Akamai Workforce Initiative (AWI) Director, as well as the entire Akamai team. The Council gives overall input to the AWI effort, and in 2008 was charged with giving feedback on specific aspects of the project such as workforce needs, course plans, and integrating cultural and community values and interests into curriculum. The Akamai Advisory Council met on October 22, 2008 at the Institute for Astronomy in Pukalani, Maui. The Council met with the Akamai team, listened to presentations, gave feedback, and discussed the overall progress of the Akamai Workforce Initiative.

Name	Title/Affiliation
Suzette Robinson (chair)	Vice Chancellor, Academic Affairs, MCC
Sol Kaho'ohalahala	Community Liaison
Herb Lee	Executive Director, Pacific American Foundation
Doug Dykstra	Vice Chancellor, Academic Affairs, Hawaii CC
Dan O'Connell	CEO, Hnu Photonics
Daron Nishimoto	R&D Program Manager, Trex Enterprises
Curt Leonard	Oceanit
Don Ruffato	Textron
Renate Kupke	Laboratory for Adaptive Optics, UC Santa Cruz
Priscilla Mikel	Kamehameha Schools
Andy Sheinis	Asst. Professor, University of Wisconsin
Peter Crouch (not present)	Dean College of Engineering, UH Manoa
Mike Isaacson	Interim Dean, School of Engineering, UC Santa Cruz

The members of the 2008 Akamai Advisory Council are:

The charge to the Council at the October 22, 2008 meeting was to provide feedback and perspectives on how Akamai is doing in general, and specifically on AWI objectives for 2007-08, which included:

- Maintain strong Akamai internship program on Maui and Big Island
- Support development of electro-optics program at MCC
- Pilot Teaching & Curriculum Collaborative (TeCC)
- Complete a workforce skills study that will help guide electro-optics curriculum development
- Begin preliminary work in integrating culture and community into Akamai and electro-optics curriculum
- Build capacity and infrastructure to sustain Akamai in future

Akamai team members present at meeting: Lisa Hunter, Jeff Kuhn, Mark Hoffman, Scott Seagroves, Lynne Raschke, Joseph Janni, and Jenilynne Salvado (representing Leslie Wilkins). Presentations were given by Lisa Hunter, Jeff Kuhn, Mark Hoffman, Scott Seagroves, and Lynne Raschke.

Summary:

The Akamai Workforce Initiative has worked together to create a pipeline of well-prepared students who will succeed in the work force. Developing industry-based curriculum, infusing cultural values into the lessons, and providing internships have been key components to the program that build capacity and ensure the on-going sustainability of the program.

The Council has provided feedback on each of the 2007-08 AWI specific objectives:

1. Maintain strong Akamai internship program on Maui and Big Island

Recruitment of students for a one-week short course followed by a five-week internship at a cooperating observatory has emphasized outreach to women, Native Hawaiians and other under-represented groups. The roster of former interns includes more than one-fourth Native Hawaiian, one-third females, and one-third community college students. More than 60% are born in Hawai`i.

The successful placement of well over 100 interns on the islands of Maui and Hawai`i has built partnerships between the high tech industries and local communities and opened career opportunities on both islands.

More than 90% of the Akamai Program's former interns continue to respond to surveys. More than half of these report that they have enrolled in Science and Engineering degree programs, while almost one-third are in the Science, Technology, and Engineering workforce. Placed in context, this represents a set of outcomes that is twice the national norm for similar programs. Additionally, the wide range of industry-expected, entry level training opportunities offered in the Akamai internship projects is a model for aspirants to the high tech workforce, wherever they are located.

2. Support development of electro-optics program at MCC:

The parameters of the program curriculum were developed using information from the International Technology Education Association, Applied Business Engineering & Technology accreditation standards, and the National Photonics Skills Standards. Local industry partners were asked to identify the entry skills students would need in order to begin careers in electro-optics and related fields. Professionals agreed that students should be engaged in learning skills that would give them the ability to adapt to a future of continuously emerging new technologies and associated challenges. Therefore, the curriculum was designed to emphasize inquiry-based problem-solving skills. In addition, it was also considered important that students would be able to incorporate Native Hawaiian cultural values within the context of engineering process skills. With a curriculum that embraces both of these components, the program prepares the students to work in a highly technical field and at the same time understand the impact of their work on the community's social framework.

3. Pilot Teaching & Curriculum Collaborative (TeCC):

The Akamai Workforce Initiative (AWI) has developed a Teaching and Curriculum Collaborative (TeCC) that was incorporated into curriculum at Maui Community College in 2008. TeCC blends Hawaii culture and community workforce needs while emphasizing innovation and engineering processing skills. Skills are taught by graduate students from a variety of institutions (Hawaii Community College, University of California Berkley, University of California Los Angeles, University of California Santa Cruz Center for Adaptive Optics, University of Hawaii Institute for Astronomy and University of Hawaii Manoa) trained to teach using this innovative approach. Instructions are administered to students in a laboratory setting, emphasizing inquiry based learning while combining engineering process skills with industry relevant content. By emphasizing engineering process skills, interns and graduating students enter the workforce equipped with skills to immediately begin contributing to problem solving using sound engineering techniques.

4. Complete a workforce skills study that will help guide electro-optics curriculum development

The Maui Community College (MCC) Electro-Optics Program, under the direction of Mr. Mark Hoffman and utilizing the Akamai Workforce Initiative (AWI) two strand model, continues to expand its electro-optical education and training on Maui with the objective of: a) expanding opportunities for Hawaii students of all backgrounds; and, b) addressing the technical workforce needs on Maui. Currently, MCC offers a two-year Electronics Engineering Technology Associate in Science curriculum which provides a foundation for a soon to be implemented four-year Applied Engineering Technology curriculum leading to a Bachelor of Applied Science degree. The majority of the institutional processes/approvals required for authorization to plan for and implement the four-year Applied Engineering Technology curriculum have been completed. A full program proposal to obtain a five year provisional status will be submitted for Campus and Board of Regents approval in the Spring of 2009. It is anticipated that upper division classes could start as early as the Fall of 2009. Graduates of these two and four year programs will be well prepared to enter into the high paying local high-tech job market. Local high-tech companies will benefit significantly from the local source of talent that companies must now obtain from the mainland at significant cost and risk of employee permanence.

5. Begin preliminary work in integrating culture and community into Akamai and electro-optics curriculum

The incorporation of significant community and cultural elements into the building of curriculum, designing instructional strategies and implementing creative internship programs leading to successful workforce outcomes is an important goal of the AWI. The success of this strategic integration is directly related to meeting the rigor, relevance and relationship factors that are key to student achievement and positioning oneself for realizing career goals.

First and foremost are the relationships that have been started in proactively reaching out to local students in both the secondary (i.e. Po'okela) and post secondary student pool. In 2007-2008, a total of 30 students from both Maui and the Big Island were recruited as part of the Akamai internship program. This internship was based on a developing relationships with both older students (peer mentors) as well as industry personnel in which the acquisition and application of knowledge was related to specific local industry needs and metrics. A long term evaluation/tracking system was also developed to help monitor progress over time. The participation and high interest in the local industry (Maui & Big Island) in training students with specific skills suited to their needs has been a powerful motivator for both students and prospective employers. This directly relates to the relevance factor.

The development of cultural relevance incorporated into both the curriculum and the work-study experience is another element that is being carefully developed with both formal and informal connections to the Host Hawaiian culture. While there might be unique engineering and technical skills associated with electro-optic technology, incorporating core values based on a cultural view and application are equally important in motivating students and assessing achievement.

AWI believes that the integration of rigorous academic standards, built upon firm caring relationships among both students and faculty, in a learning environment that embraces applications to build strong communities is the model for long-term sustainable success. It is committed to strengthening these factors as the program evolves and develops broader partnerships in the future.

6. Build capacity and infrastructure to sustain Akamai in future:

The collaboration between the Air Force Research Laboratory, Maui Community College, the Institute for Astronomy, Center for Adaptive Optics, and other industry partners resulted in a leveraging of resources that has provided the Akamai program with a solid infrastructure and foundation. Students have access to state-of-the-art laboratory and test equipment, well-qualified teachers, and industry internships. This display of unity among government, academia, and industry has not only resulted in attracting quality students, but has also yielded financial support from various revenue streams, including a UH Office of Research grant of \$160,000 per year.

With its well-developed curriculum, internship opportunities for students, and strong government, education, and industry partners, the Akamai Program successfully prepares students for the ever-evolving world of work in high technology fields, meets vital state workforce needs, and ensures that local students will be able to continue to live and work in their Hawai'i communities. Continuation of this program is critical.

Appendix E

Bachelor of Applied Science

in

Applied Engineering Technology (AET)

Response to Maui Community College Strategic Plan Action Strategies

Action Strategy 2.

Expand training and workforce development programs, e.g. Dental Assisting, in coordination with county, state, and industry economic initiatives.

Response:

The ATE BAS degree program will expand training and workforce development programs in coordination with the county, state, and industry economic initiatives. The degree builds upon the significant Federal, State, and County infrastructure investment already in place in Maui county at the summit of Haleakala and the Research and Technology Center in Kihei, at the summits of Mauna Kea and Mauna Loa and at Waimea on the island of Hawai'i, and at the Pacific Missile Range Facility at Barking Sand, Kauai.

The program proposal and curriculum has been developed in close collaboration with industry advisors. The Chancellor's advisory board, The Maui CC business advisory Council, and the Maui CC Engineering Technology Advisory Board have all made input to the program learner outcomes, course content, and skill requirements. The Akamai Workforce Initiative (AWI), which includes Maui CC, received funding in 2007-08 to assist in planning the BAS degree. The AWI Teaching and Curriculum Collaborative completed an Internship Skills Inventory, a review of similar programs across the country, and research on engineering technology skills from national reports and standards (see: <http://www.ifa.hawaii.edu/haleakalanew/akamai/akamaiEO.shtml>).

County and state officials have been consulted in regards to the economic initiatives for development of technology industries on Maui and related industries throughout the state. Industry advisory boards on Kauai and Hawai'i have been consulted with regards to skill and knowledge requirements. Observatories management on Hawai'i will be interviewed to ascertain skill requirements. The proposed BAS degree is directly aligned with county and state initiatives, such as the Department of Business, Economic Development and Tourism's Aerospace initiative and Focus Maui Nui's economic recommendations. The degree also promotes national initiatives for Maui and the state. The \$250M Advanced Technology Solar Telescope planned for construction on Haleakala, the \$100M Advanced Laser Facility planned for the Pacific Missile Range Facility, and the \$1B+ Thirty Meter Telescope under consideration for the big island of Hawai'i are examples of national scientific and engineering projects that would have a long lasting economic impact on the state and would be served by the development of this AET BAS degree.

Action Strategy 3.

Include liberal arts education as the foundation for an educated community and a competent workforce.

Response:

The proposed BAS degree has a liberal arts educational component as well as a targeted technology component. Maui CC and the Western Association of Schools and Colleges have approved the liberal arts coursework requirements for the Applied Business and Information Technology (ABIT) baccalaureate degree currently offered at Maui CC. The

proposed AET BAS would require the same liberal arts coursework as the ABIT degree. The proposed liberal arts component has been evaluated for prerequisites and other coordination issues.

Action Strategy 5.

Maximize opportunities for students to enroll and transfer among campuses in order to achieve their educational objectives in a timely manner.

Response:

The Community Colleges Program Coordination Council (PCC) has met several times where the AET BAS program proposal has been discussed. Maui, Hawai'i, and Kauai community colleges are aligning electronics, optics, and electro-optics classes such that Associate degree graduates may transfer from Hawai'i and Kauai to Maui. Courses have been identified that are appropriate for articulation with Manoa Engineering. Articulation agreements will be put in place such that students from the proposed AET BAS may transfer some of the technical classes from Maui to Manoa. However the AET BAS is an engineering technician program and is very different in scope from the Electrical Engineering program at Manoa. The Accreditation Board for Engineering and Technology (ABET) describes the difference between engineering and engineering technology as: "Engineering and technology are separate but intimately related professions. Here are some of the ways they differ:

- Engineering undergraduate programs include more mathematics work and higher-level mathematics than technology programs.
- Engineering undergraduate programs often focus on theory, while technology programs usually focus on application.
- Once they enter the workforce, engineering graduate typically spend their time planning, while engineering technology graduate spend their time making plans work.
- At ABET, engineering and engineering technology programs are evaluated and accredited by two separate accreditation commissions using two separate sets of accreditation criteria.
- Graduates from engineering programs are called engineers, while graduates of technology programs are often called technologists.
- Some U.S. state boards of professional engineering licensure will allow only graduates of engineering programs – not engineering technology programs – to become licensed engineers.

The National Society of Professions Engineers described the difference between engineering and engineering technology:

- "The distinction between engineering and engineering technology emanates primarily from differences in their educational programs. Engineering programs are geared toward development of conceptual skills, and consist of a sequence of engineering fundamentals and design courses, built on a foundation of complex mathematics and science courses. Engineering technology programs are oriented toward application, and provide their students introductory mathematics and science courses, and only a qualitative introduction to engineering fundamentals. Thus, engineering programs provide their graduates a breadth and depth of knowledge that allows them to function as designers. Engineering technology programs prepare their graduates to apply others' designs."

Students that are perusing Electrical Engineering at UH Manoa will be advised to complete liberal arts education at Maui CC and then transfer to UH Manoa

Action Strategy 7.

Cooperate, as appropriate, with other higher education institutions to provide high quality educational services to the county and to the state through such programs as the University of Hawai'i Center, Maui.

Response:

The AET BAS has been designed in very close collaboration with the University of Hawai'i – Institute for Astronomy (UH-IfA), Maui Division and the University of California, Santa Cruz – Center for Adaptive Optics (CfAO). These higher education intuitions formed a consortium with Maui CC, the Akamai Workforce Initiative, and have provided research and funding to establish the required skill standards for engineering technicians throughout the state, particularly on Maui, Hawai'i, and Kauai. They have provided laboratory activity designs based on inquiry methods and teaching teams of graduate students to facilitate these designs. This process has proven to be effective at the Associate degree level during over 7 years of collaborative educational design and facilitation. The AET BAS will have adjunct faculty participants from both institutions to continue curriculum design and laboratory activity facilitation. These researchers are providing input to curriculum design at the program, course, and activity levels. Inquiry based laboratory exercises will be an integral part of the course delivery methods in the AET BAS. The program and courses will also be designed to include specific components to serve underrepresented groups, including students that have little mathematics foundation. Maui CC has been extensively involved in collaborations with the CfAO to design and pilot innovative curriculum, and has been a demonstration site implementing inquiry-based instructional material. The CfAO, and the newly established Institute for Scientist and Engineer Educators (ISEE) will continue to provide curriculum design and intellectual input that specifically addresses diversity in engineering to insure that women are successful participants in the AET BAS program. Manoa Engineering is a participant in curriculum and program evaluation to insure that the program will provide high quality educational services and meet national accreditation standards. Formal distance education components from theses collaborating institutions will be coordinated with the University of Hawai'i Center, Maui.

Action Strategy 10.

Facilitate dialogue and discussion with business and community partners to better serve workforce needs.

Response:

The AET BAS has been designed with input from business and community partners to insure the program will serve current and future workforce needs. Several community meetings have been held over the past year to review proposed courses and program learner outcomes. Working with AWI, five years of internship project have been reviewed with the industry hosts to define the content and process skill requirements to insure the successful participation in the workforce for these 4-year graduates. The Chancellor's business advisory committee convened to review their independent analysis of workforce requirements for Maui. Theirs findings for Maui echo the key findings of a

separate independent report commissioned by the State of Hawai'i legislature and a survey done by the Maui Economic Development Board (MEDB). This research indicates the type of education and training required for the economic diversification and economic growth for the state is the proposed AET BAS.

Action Strategy 11.

Determine the need for emerging specializations in the workplace; create partnerships between college and community representatives to address new program initiatives.

Response:

Maui CC has been a partner in the Akamai program since this program was conceived in 2001. The Akamai Internship, which started with a program on Maui and expanded to the Big Island, has placed 116 local students in industry and observatory internships, and has a retention rate of more than 80%, with approximately 40 students working in high tech positions now.

Expanding on the internship, the Akamai Workforce Initiative was launched in September 2007, with funding from the National Science Foundation and the Air Force Office of Scientific Research. AWI is continuing, and building partners and funding, with the current core partnership including UH/IfA, Maui CC, the CfAO and AMOS. AWI is continuing research into the detailed workforce requirements for the emerging remote sensing high technology industries on Maui, Hawai'i, and Kauai. AWI is carried out under the leadership of Lisa Hunter, who began Akamai with CfAO funding and has transitioned the effort to Hawaii, with headquarters at the UH/IfA, where she now holds the position of the Director of the AWI. A grant is currently under review at the NSF which would significantly increase resources to the AWI, and continue the involvement of UH Manoa graduate students in the development of curriculum for the proposed BAS degree. The AET BAS will continue to benefit from this fully developed partnership between college and community representatives.

Action Strategy 12.

Reevaluate existing college programs to ascertain relevancy and effectiveness.

Response:

The existing Electronic and Computer Engineering Technology (ECET) Associate in Science degree program has been evaluated for relevancy and effectiveness. Annual program reviews are conducted to insure the relevance and rigor of the program and curriculum. Several lower division courses have been modified or added to insure the lower division of the proposed BAS will adequately prepare students for the courses that follow in the upper division.

Action Strategy 13.

Seek external funding sources, e.g. National Science Foundation, to develop programs that promote economic diversification and high-end technology.

Maui CC is a partner in a 5-yr proposal is currently under evaluation at the National Science Foundation that will provide additional funding for program improvement, internships, and course development, through the Akamai Workforce Initiative. This

funding will be used to enhance the AET BAS curriculum with inquiry based activities developed and facilitated by UH graduate students in Engineering and Astronomy. The Directed Energy Professional Society (DEPS) has and will continue to provide funding for curriculum development in the content areas specific to the AET BAS. Private funding is currently available for the program development. Only secured funding is shown in the budget template. Proposals under evaluation are not included as revenue sources.

Action Strategy 14.

Partner with the community to identify educational and training needs and to determine how the College can best meet those needs.

The AET BAS proposal identifies educational requirements from the community, and is an appropriate response to these workforce needs. This Applied Engineering Technology BAS degree will provide workforce development for Maui and improved access to lifetime education for all. The program is driven by the needs of local employers to hire a trained local workforce and the needs of local residents to participate in sustainable high wage careers. The program will support federal, state, and county government initiatives to diversify the economy of the state by building upon the unmatched viewing conditions, geographic isolation, and mid-Pacific location that makes Hawai`i ideal for astronomical research, space surveillance, and missile defense testing.

Action Strategy 15.

Develop appropriate sustainable baccalaureate degrees.

The program will be based on the technology assets on Maui that are truly world-class. The U.S. Air Force telescope at the summit of Haleakala is the largest and most advanced telescope in the Department of Defense. The Maui High Performance Computing Center has one of the top 100 fastest computers on the planet, according to *top500.org*, a website that ranks high performance computers based on standardized test metrics. The BAS program will have the use of one of the most advanced telescopes in the world for undergraduate education, the Faulkes.

The program will create an alliance among researchers, industry, local educators, and national leaders to join with the local community to provide advanced technical education in an area of strategic importance to Hawai`i. A pipeline of local students will be developed that will benefit island communities and residents as well as local high technology companies.

The University of Hawai`i Institute for Astronomy (IfA) will provide resources to help develop curriculum, teach courses, and provide laboratory experiences at the Advanced Technology Resource Center on Maui. PhD faculty from the IfA-Maui will help to develop 300 and 400 level courses. Faculty members will also develop lab exercises that utilize the IfA -Maui Advanced Technology Research Center laboratories and equipment. These exercises will provide graduates with experience using state-of-the-art instrumentation that relates directly to job opportunities on Maui and throughout the State of Hawai`i.

The University of Hawai`i Manoa College of Engineering will provide PhD faculty as teachers for distance education options and will be consulted for guidance on curriculum and courses, delivery options, and articulation where appropriate.

The Akamai Workforce Initiative (AWI) is a collaboration between the Center for Adaptive Optics (CfAO) at University of California, Santa Cruz, the University of Hawai`i Institute for Astronomy (IfA) – Maui Division, the Maui Economic Development Board, and Maui Community College. Funded by the National Science Foundation and the Air Force Office of Scientific Research, and the Center for Adaptive Optics (also funded by the NSF), this initiative expands upon many years of partnership activities. AWI offers internships on Maui and Hawaii Island, and has been actively involved in the planning process for this degree program. The AWI steering committee and curriculum working group has provided research into engineering technology curriculum throughout the nation and accreditation standards. The AWI curriculum-working group will continue to define program and student learner outcomes and assist in curriculum development, contingent upon pending funding.

Maui Community College has been collaborating for many years with the CfAO on inquiry base teaching and other learner-centered teaching approaches, through the CfAO Professional Development Program (PDP). The PDP emphasizes strategies for addressing diversity and equity in the classroom, with inquiry learning as a core strategy. MCC has piloted several innovative model courses, and has integrated inquiry learning into multiple courses. Building on this long-term collaboration, the new BAS program will integrate inquiry- and problem-based learning into new courses.

These partnerships with educators, researchers, industry, and the community will insure the degree is sustainable, rigorous, and relevant.

Appendix F

Bachelor of Applied Science

in

Applied Engineering Technology (AET)

SERVING THE STATE OF HAWAII

**University of Hawai'i System
Strategic Outcomes and
Performance Measures, 2008–2015**

Office of the Vice President for
Academic Planning & Policy

May 2008

Introduction

In June 2002, the Board of Regents adopted the *University of Hawai'i System Strategic Plan: Entering the University's Second Century, 2002–2010*. The vision set forth in our plan was predicated on the Native Hawaiian practice of sharing diverse, but finite, resources for the benefit of all and grounded in a unifying mission, an overarching commitment to a culture of excellence and performance, and a set of principles intended to guide the evolution and transformation of the system. Our plan was developed with wide participation of constituencies throughout the University.

During the 2007–08 academic year, the University community and its public revisited the strategic plan. Participants broadly affirmed our strategic goals and the values underlying our goals. They recommended we better differentiate system and campus roles, and establish clear and measurable outcomes to assess performance and progress. Participants agreed that articulating our plan in terms of the higher education needs of the state adds a valued dimension and reaffirms our University's commitment to serving the state. Based on these recommendations, the University developed this companion piece to our plan which assigns strategic outcomes and performance measures to be accomplished by 2015. This update will guide the future priorities of the University and inform our budget planning process for the next three biennia.

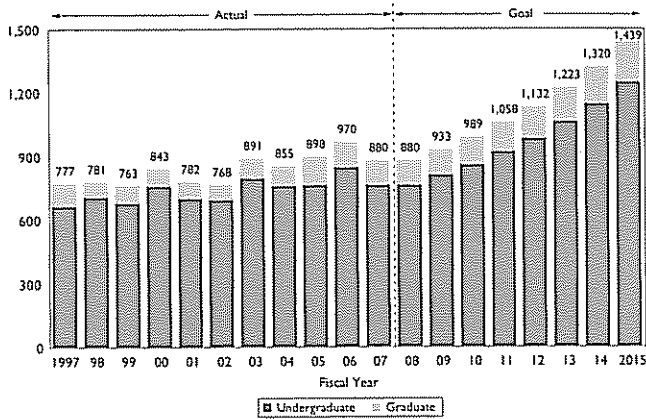
Performance measures assigned to each strategic outcome demonstrate our willingness to be held accountable and enable us to effectively assess our progress. The goals we have set for 2015 are stretch goals, and challenge us to reinvent ourselves. We use quantitative measures to provide evidence of our efforts, but acknowledge that many of our core values—academic rigor and excellence, integrity and service, aloha and respect—while not addressed here, are central to our mission.

Our commitment to increasing the educational capital of Hawai'i aligns with the Hawai'i P-20 Council goal of 55 percent of Hawai'i's working age population possessing a college degree by the year 2025 and reflects a coordinated vision of our state's future. The P-20 Council, comprised of leaders in education, business, government, labor, and community, share our belief that all of Hawai'i's residents deserve a high quality education. As the state's sole public institution of postsecondary education in Hawai'i, we will strive to do our part to reach the 55 percent goal. The University of Hawai'i is committed to improving the social, economic, and environmental well-being of current and future Hawai'i generations.

Native Hawaiian Educational Attainment

To position the University of Hawai'i as one of the world's foremost indigenous-serving universities by supporting the access and success of Native Hawaiians.

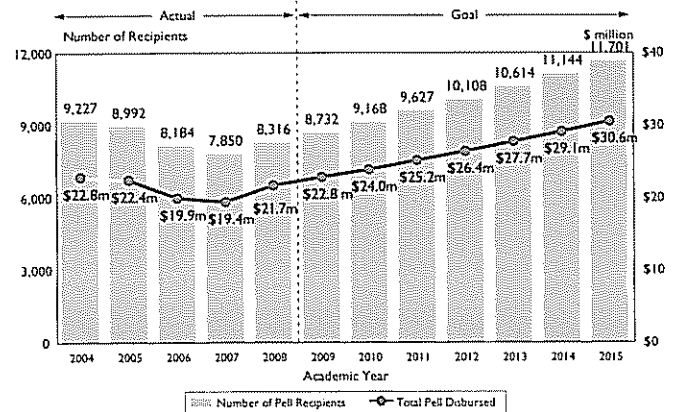
Degree Attainment of Native Hawaiians at UH
GOAL: INCREASE 6-9% PER YEAR



Note: Goals based on percentage increases every two years (FY09-FY10 = 6%; FY11-FY12 = 7%; FY13-FY14 = 8%; FY15 = 9%).
Source: UH Institutional Research Office for historical data

Hawai'i's Educational Capital (continued)

UH Disbursement of Pell Grants
GOAL: INCREASE 5% PER YEAR

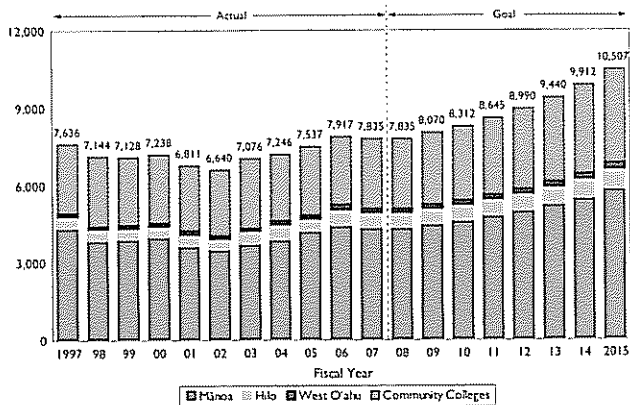


Notes: The Federal Pell Grant program provides need-based grants to low-income, first-time undergraduate students or students enrolled in certain post-baccalaureate programs that lead to teacher certification or licensure. The maximum award for the 2008-09 award year (July 1, 2008 to June 30, 2009) is \$4,731. AY08 figures are estimated. Average amount awarded: AY04, \$2,471; AY05, \$2,488; AY06, \$2,437; AY07, \$2,477; AY08, \$2,613.
Source: UH Office of Student Affairs for historical data

Hawai'i's Educational Capital

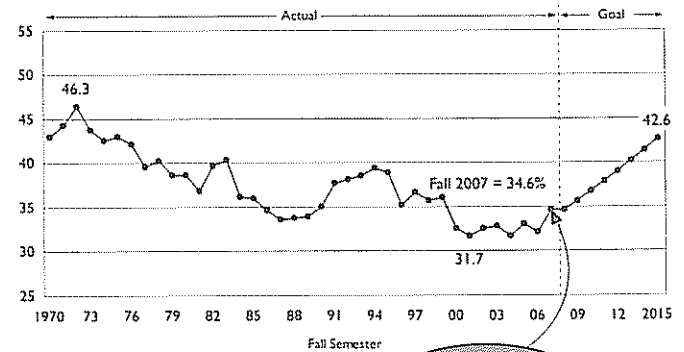
To increase the educational capital of the state by increasing the participation and completion of students, particularly Native Hawaiians, low-income students, and those from underserved regions.

UH Degrees & Certificates of Achievement Earned
GOAL: INCREASE 3-6% PER YEAR

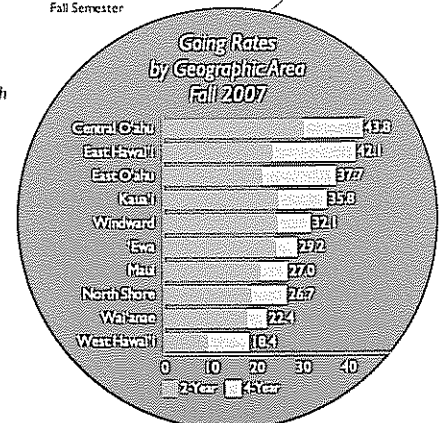


Note: Goals based on percentage increases every two years (FY09-FY10 = 3%; FY11-FY12 = 4%; FY13-FY14 = 5%; FY15 = 6%).
Source: UH Institutional Research Office for historical data

Going Rates of Public and Private High Schools to UH System Campuses
GOAL: INCREASE 3% PER YEAR



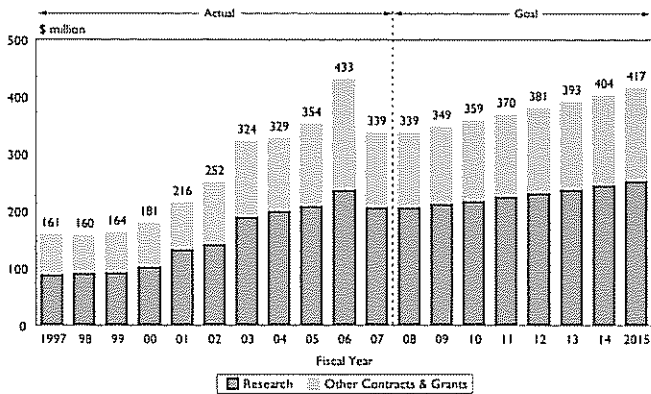
Note: The going rate is the percentage of Hawai'i high school graduates entering the University of Hawai'i without delay upon graduation from high school.
Source: UH Institutional Research Office for historical data



Economic Contribution

To contribute to the state's economy and provide a solid return on its investment in higher education through research and training.

UH Extramural Fund Support
GOAL: INCREASE 3% PER YEAR



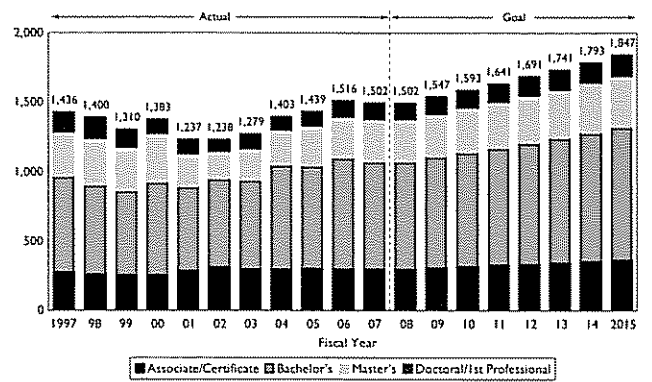
Note: Other contracts and grants include training, instrumentation, building improvements, conferences, centers, boat operations, art and dance performances, etc.

Source: UH Office of Research Services for historical data

Globally Competitive Workforce

To address critical workforce shortages and prepare students (undergraduate, graduate, and professional) for effective engagement and leadership in a global environment.

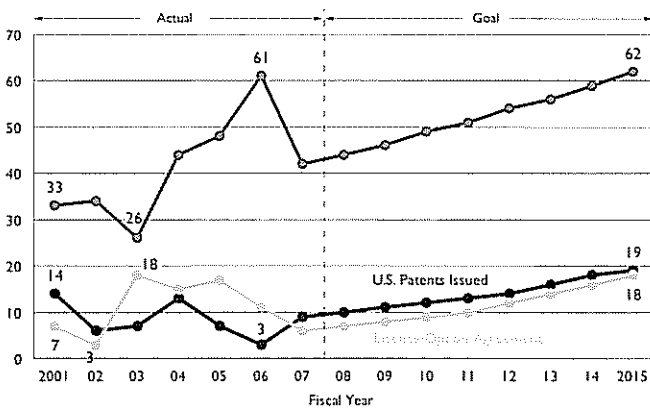
UH Degrees in STEM Fields
GOAL: INCREASE 3% PER YEAR



Note: STEM (Science, Technology, Engineering, and Math) fields defined by Classification Codes and Occupations, 2002-03 (Table 19), GAO-06-114 Federal STEM Education Programs, October 2005.

Source: UH Institutional Research Office for historical data

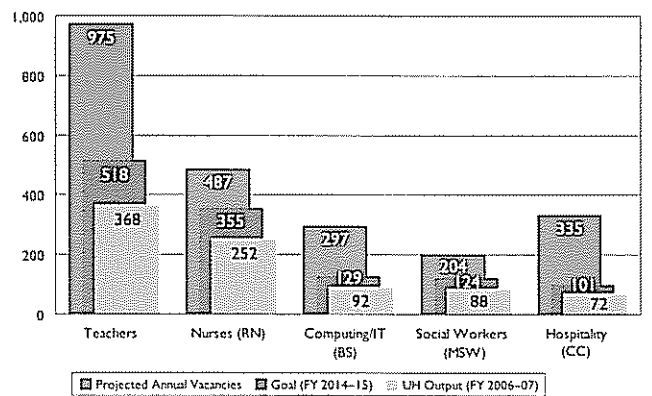
UH Invention Disclosures, Patents, and Licenses
GOAL: INCREASE 5-15% PER YEAR



Note: Goals: Invention disclosures received = increase 5% per year, U.S. patents issued = increase 10% per year, license/option agreements executed = increase 15% per year.

Source: UH Office of Technology Transfer and Economic Development for historical data

Projected Annual Vacancies in Shortage Areas Statewide, 2006-17 and Total UH Output, 2006-07
GOAL: INCREASE 5% PER YEAR

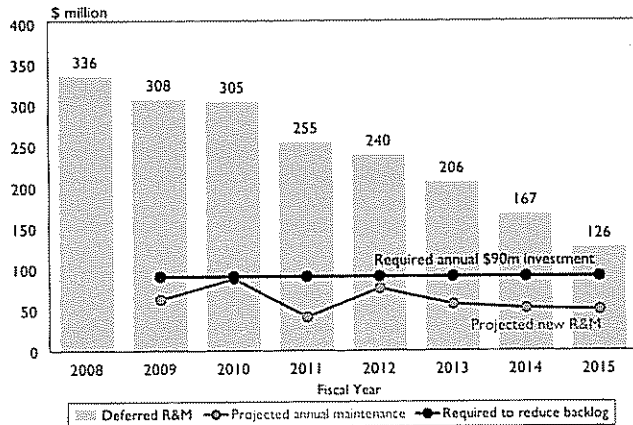


Source: Economic Modeling Specialist Inc (EMSI), April 2007 for projected vacancies UH Institutional Research Office for UH Output (FY 2006-07)

Resources and Stewardship

To acquire, allocate, and manage public and private revenue streams and exercise exemplary stewardship over all of the University's resources for a sustainable future.

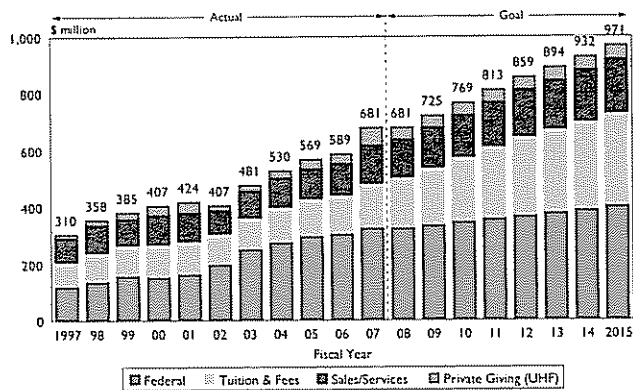
Annual Investment Required to Decrease Deferred Maintenance Backlog to \$126 Million by 2015



Note: Figures represent 2008 dollars.
 Source: The Facilities Renewal Reinvestment Project by the Pacific Partners Consulting Group, March 27, 2008.

UH Funding Sources

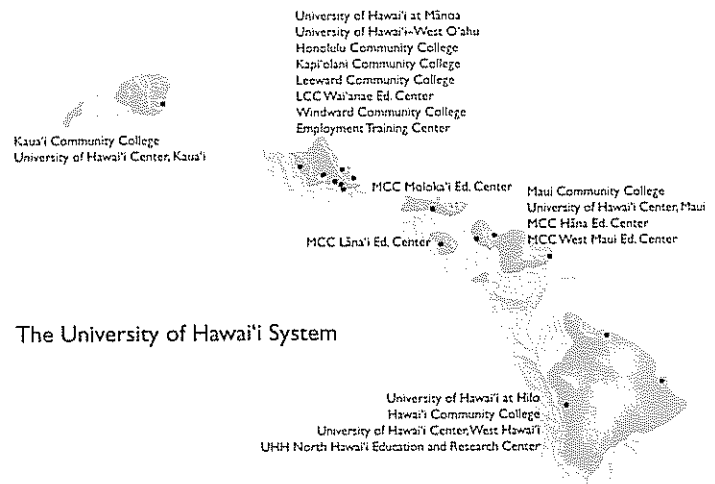
GOAL: INCREASE NON-STATE REVENUE STREAMS 3-15% PER YEAR



Notes: Revenue goals: Federal increase 3% per year; Tuition & Fees 5-15% per year; Sales/Services 5% per year; Private Giving (UHF) increase to \$50m by 2015. Sales/Services = Sales and services of educational activities and auxiliary enterprises; and all items of revenue not covered elsewhere.
 Source: UH General Accounting and Loan Collection Office for historical data

For more information:

University of Hawai'i System Strategic Plan 2002-2010:
www.hawaii.edu/ovppp/stratplansys.html
 Strategic Plan Update main page:
www.hawaii.edu/ovppp/uhplan/



The University of Hawai'i System

Office of the Vice President for
 Academic Planning & Policy
 University of Hawai'i System
 (808) 956-7075
app@hawaii.edu



UNIVERSITY OF HAWAII

An equal opportunity/affirmative action institution

www.hawaii.edu

Appendix G

Bachelor of Applied Science

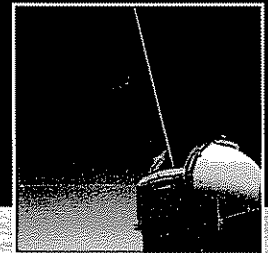
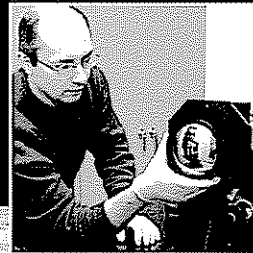
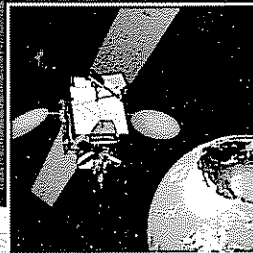
in

Applied Engineering Technology (AET)

Aerospace

Hawaii

Technology in Paradise



Look beyond Hawaii's pristine beaches and you'll discover expanding technology sectors, supported by innovative business initiatives and competitive advantages unique to the Islands.

1 ASTRONOMY & ASTROPHYSICS

- Pioneering studies of galaxy/star formation, interstellar matter, and cosmology.
- Adaptive optics for planetary and stellar observations.
- Ultra-high frequency neutrino research supporting cosmic evolution studies.
- Photonic chip development for visible and infrared space observations.
- Advanced wide-field imaging to detect earth-approaching objects.

2 PLANETARY GEOSCIENCES

- Airborne and spaceborne hyperspectral imaging of volcanic plumes.
- Spectroscopic studies of the Moon, Mars, moons of Jupiter, and asteroids.
- Space-based marine remote sensing and seafloor mapping.
- Terrestrial remote sensing and satellite data retrieval.
- Meteoritics and Cosmochemistry research and analysis.

3 HIGH PERFORMANCE COMPUTING AND COMMUNICATIONS

- Supercomputer modeling and simulation.
- High-performance image reconstruction and 3-D space imaging/visualization.
- Atmospheric/oceanic modeling and forecasting.
- Hawaii broadband satellite networks, teleports and Internet 2 links.

4 SPACE LAUNCH

- Pacific Missile Range Facility supporting surface/subsurface/air/space operations.
- Development of commercial space launch capabilities.

5 SPACE RECONNAISSANCE

- Electro-optical systems for satellite tracking and space object identification.
- High accuracy orbital positioning technology for space situational awareness.
- Space-based surveillance for disaster monitoring, management and mitigation.
- Ultra-high speed sensors for airborne surveillance and reconnaissance.

6 AEROSPACE EDUCATION & TRAINING

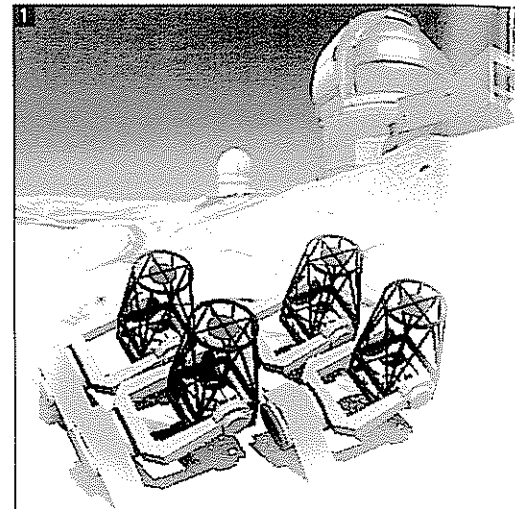
- Interdisciplinary education, research, and public service programs in space and earth science, remote sensing, space exploration, and aerospace technology.
- K-12/university programs integrating STEM disciplines through tech applications.
- The Pacific Aerospace Training Center providing commercial aviation and aeronautics maintenance technology programs.

7 SPACE-BASED REMOTE SENSING & IMAGING

- Satellite imaging systems to support search & rescue, disaster assessment, port & border security, environmental monitoring, and resource management.
- Hyperspectral imaging systems to detect IEDs and mines, airborne chem-bio agents and plumes, narcotic production and trafficking.
- Robotics systems research, development, testing and evaluation.
- Lidar/Ladar systems supporting planetary, atmospheric & terrestrial research.

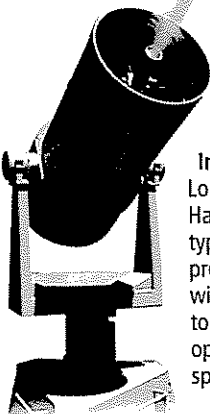
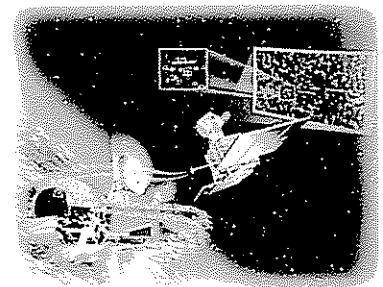
8 SPACE EXPLORATION PARTNERSHIPS

- The Japan-U.S. Science, Technology & Space Applications Program (JUSTSAP)
- The Pacific International Space Center for Exploration Systems (PISCES)
- Ongoing collaborative partnerships with NASA research centers.



The clear skies and stable air above Hawaii's volcanic peaks make the state a premier location for astronomy and astrophysics. Ongoing research supported by 22 international world-class observatories atop Mauna Kea, Mauna Loa, and Haleakala is addressing key questions concerning the nature, origin and fate of the universe through studies of galaxies, stars, interstellar matter, and our solar system.

5 Oceanit is one of Hawaii's largest and most diversified science and engineering companies, with capabilities in marine-based biotechnology, space situational awareness, missile defense, remote environmental monitoring, biophotonics, and transparent medical monitoring. Oceanit recently spun out the Maui Optical System and Imaging Center (MOSAIC). Located in Kihei, Maui, it is Hawaii's optical design, prototyping and fabrication center, providing Hawaii companies with the infrastructure required to develop next-generation optical technologies for space surveillance.

A large, black telescope mounted on a white base. The telescope is pointed upwards and to the right. The base is a complex mechanical structure with various adjustment knobs and supports.

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- Pioneering studies of galaxy/star formation, interstellar matter, and cosmology.
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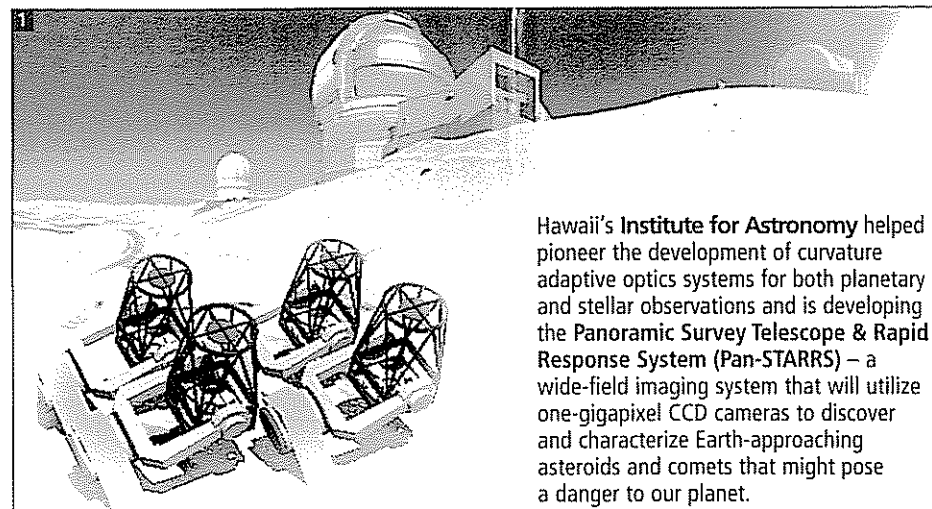
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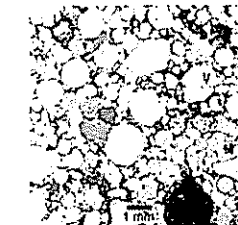
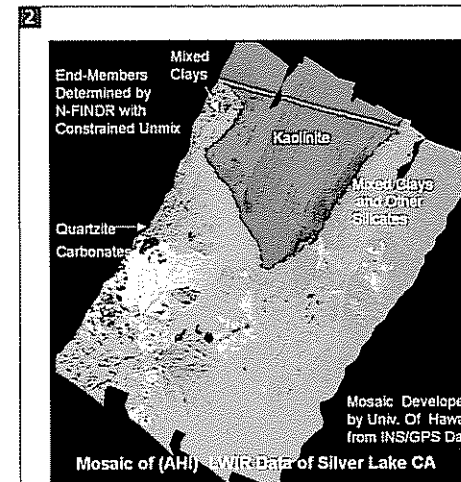
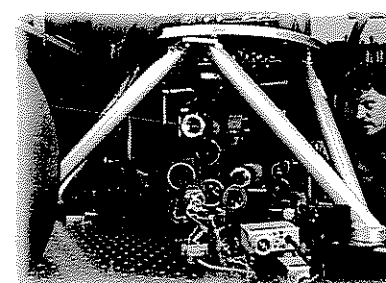
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Hawaii's Institute for Astronomy helped pioneer the development of curvature adaptive optics systems for both planetary and stellar observations and is developing the Panoramic Survey Telescope & Rapid Response System (Pan-STARRS) – a wide-field imaging system that will utilize one-gigapixel CCD cameras to discover and characterize Earth-approaching asteroids and comets that might pose a danger to our planet.

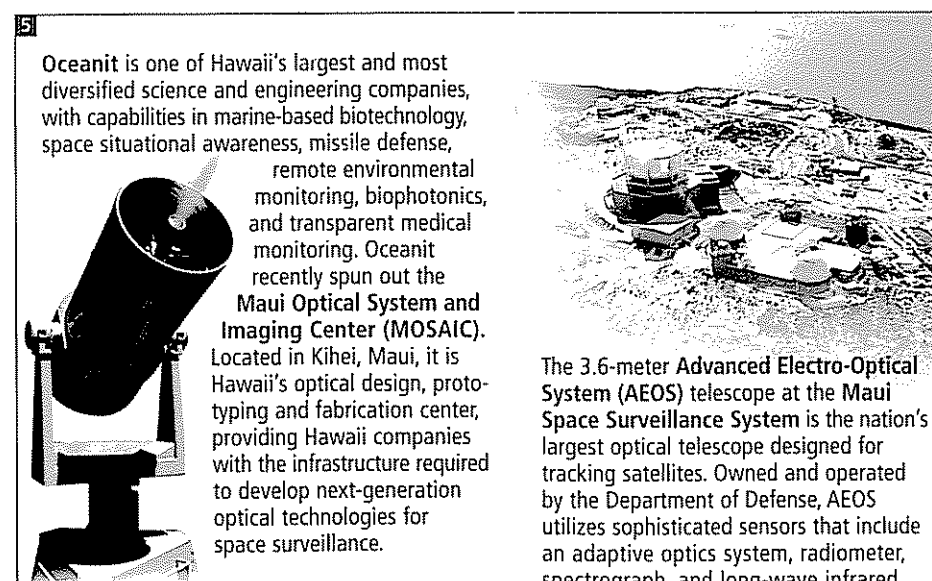
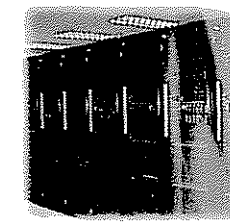
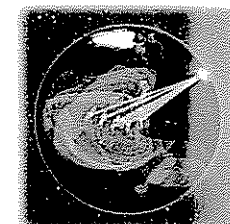
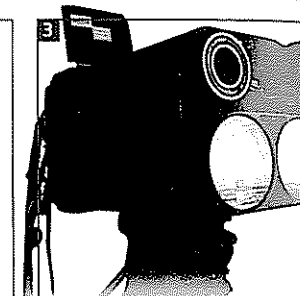
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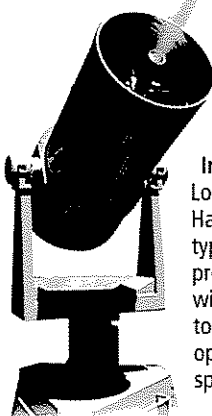
This picture illustrates a thin section of a chondrite containing millimeter-sized chondrules

The Airborne Hyperspectral Imager (AHI) is a long wave infrared hyperspectral sensor developed for the Defense Advanced Research Projects Agency (DARPA) by the Hawaii Institute of Geophysics and Planetology (HIGP) at the University of Hawaii. Capable of operating from ground or airborne platforms, the AHI system has been deployed for airborne detection of land mines, geological mapping, gas detection, coastal water temperature mapping, concealed target detection and phenomenology, and missile defense intercept test support.

HIGP research on meteorites and Apollo lunar samples focuses on understanding the vast array of stellar and geological processes that formed and modified planets and asteroids. The Institute makes detailed mineralogical and petrologic studies using optical and scanning electron microscopy, electron probe analysis, and ion microprobe measurements of isotopic and trace element abundances. HIGP samples of over 20 different chondritic asteroids are extraordinarily diverse and new kinds are recovered every year from Antarctica and deserts around the world.

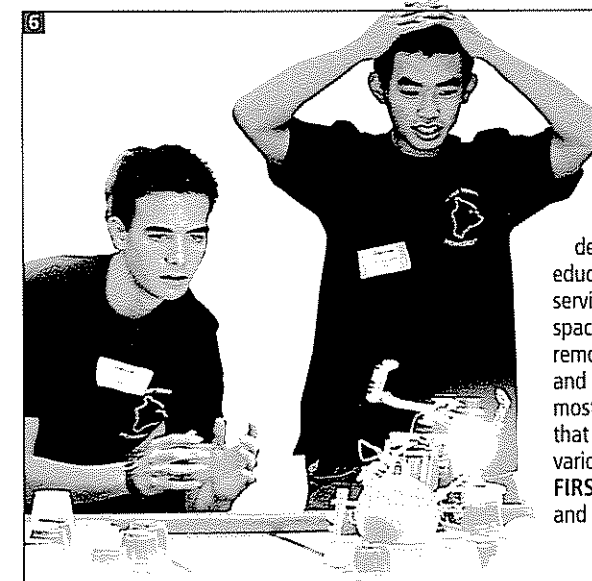
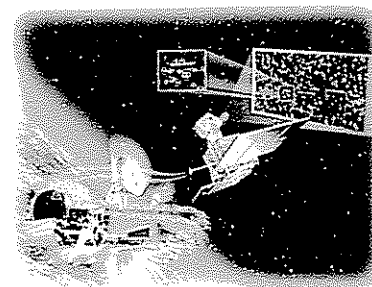


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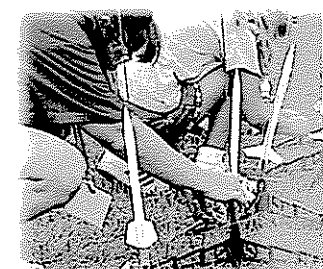


The 3.6-meter Advanced Electro-Optical System (AEOS) telescope at the Maui Space Surveillance System is the nation's largest optical telescope designed for tracking satellites. Owned and operated by the Department of Defense, AEOS utilizes sophisticated sensors that include an adaptive optics system, radiometer, spectrograph, and long-wave infrared imager to track and identify man-made objects in deep space.

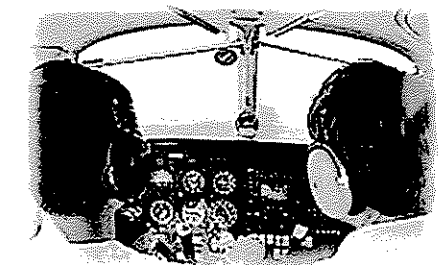
Boeing, Lockheed Martin, BAE Systems, Northrop Grumman, and other leading aerospace companies maintain space reconnaissance operations in Hawaii, and have been expanding their operations in the islands as a bridge to Asia-Pacific markets.



Chartered under the National Space Grant College and Fellowship Program, the Hawaii Space Grant Consortium is developing interdisciplinary education, research, and public service programs related to space science, earth science, remote sensing, human exploration and development of space, and aerospace technology. Future Flight, one of the Consortium's most popular activities, features various "exploration" programs that encourage students and their families to design, build, and test various technologies. Hawaii also supports statewide Botball and FIRST Robotics programs, and periodically hosts both regional and national team competitions.



The Honolulu Community College's Pacific Aerospace Training Center (PATC) is home to two aviation programs in Hawaii – the Aeronautics Maintenance Technology Program and the Commercial Aviation Program. In cooperation with state and federal agencies, foreign governments and commercial air carriers, PATC provides essential aviation training to foster safe aviation practices throughout the Pacific. The program has trained over 5,000 aviation technicians with students coming from Hawaii and the mainland as well as Japan, Korea and China.



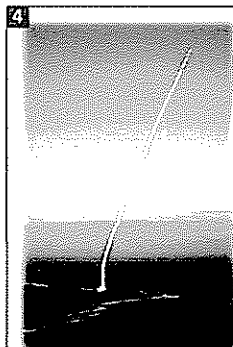
NOVASOL, one of Hawaii's fastest growing and largest private high-tech defense contractors, is a technology leader in Free Space Optical Communications (FSOC). FSOC transmits data using infrared lasers, which circumvents many of the problems associated with RF communications, such as channel contention and susceptibility to detection, interception, and jamming. NOVASOL systems operate in the 1550 nm wavelength region, which is invisible to standard silicon-based imaging devices such as night-vision equipment and image intensifiers.

As part of the University of Hawaii Electrical Engineering Department, the Optical Communications Laboratory (OCL) is pursuing advanced research in optics and lasers for communications and sensing. Through innovations in electro-optic system design and signal processing, the OCL explores new possibilities in the areas of free-space communications, optical fiber technologies, and optical sensor applications, including remote sensing.



The Hawaii Pacific Teleport leverages the combination of Hawaii's strategic mid-Pacific location and low-cost, high-capacity access to trans-Pacific submarine fiber optics to operate a leading international telecommunications facility for telephony, VOIP, videoconferencing, VPN, DVB-IP multicasting, IP connectivity and television broadcasting services. HPT's infrastructure links markets from Pakistan to Mongolia to Australia/New Zealand to Micronesia and Hawaii, providing unique opportunities to facilitate international commerce during a single business day.

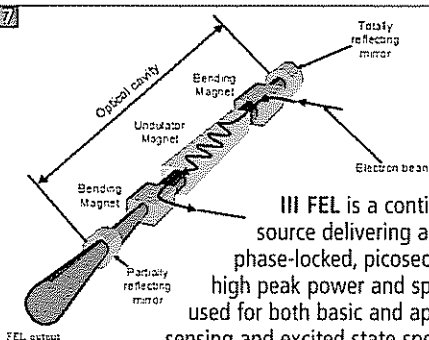
The Terascale High Performance Computing Platform at the Maui High Performance Computing Center (MHPCC) supports over 60 TeraFLOPS (60 x 10¹² floating point operations per second), 5.2TB (5200GB) of memory, and 250TB of storage space. Known as "JAWS," the supercomputer compliments other systems at MHPCC that collectively provide more than ten million hours of computing time to the defense, science, and aerospace communities.



Located on the island of Kauai, the Pacific Missile Range Facility (PMRF) is the world's largest instrumented multi-environment test range capable of supporting surface, subsurface, air, and space operations simultaneously. PMRF supports over 1,100 square miles of instrumented underwater range and over 42,000 square miles of controlled airspace. PMRF transmits real-time test and exercise data

and video anywhere in the nation. Interconnectivity is achieved with microwave, fiber-optic, and satellite network resources.

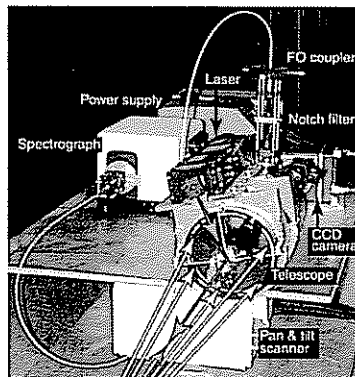
The University of Hawaii (UH) is currently working with PMRF to establish a Small Satellite Program, making UH the only university in the world with this capability. Targeted space missions include remote sensing of volcanoes and post-disaster recovery following hurricanes, earthquakes and tsunamis. The ultimate goal will be to fly a UH spacecraft to the moon.



The Department of Physics at the University of Hawaii is installing an infrared, rf-linac-based free-electron laser (FEL). Originally developed at Stanford University, the MOPA

III FEL is a continuously tunable, mid-IR laser source delivering a diffraction-limited beam of phase-locked, picosecond optical pulses of extremely high peak power and spectral brightness. The FEL will be used for both basic and applied research including remote sensing and excited state spectroscopy, cavity electro-dynamics, coherent multicolor spectroscopy, the design of optical resonators for the production of coherent optical pulse trains and tunable x-rays, and novel techniques for linear and nonlinear optical spectroscopy.

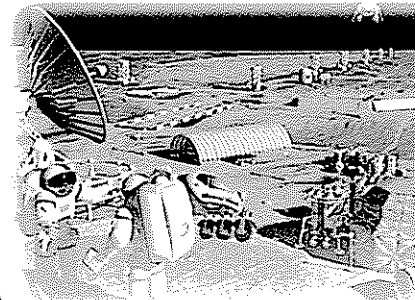
The Hawaii Institute of Geophysics and Planetology, University of Hawaii, is currently developing a combined remote Raman and Laser-Induced Breakdown Spectroscopy (LIBS) for investigating mineralogy and elemental composition of rocks on planetary surfaces. Combined Raman and LIBS spectroscopy is being developed for detecting mineralogy and trace transition metal ions and rare-earth ions geochemistry. The remote LIBS spectroscopy is also being used to discriminate between the fluorescence from biological pigments and inorganic mineral fluorescence based on the fast lifetime (nano-sec) of biogenic materials.



Hawaii serves as the U.S. Secretariat for the Japan-U.S. Science, Technology & Space Applications Program (JUSTSAP) – a unique forum of distinguished scientists, educators, government officials, and business professionals dedicated to identifying and exploring innovative opportunities for international collaboration in space exploration. JUSTSAP activities are coordinated through project teams that focus on the design, development and implementation of advanced communications, remote sensing, renewable energy, resource utilization, and other space-based systems.

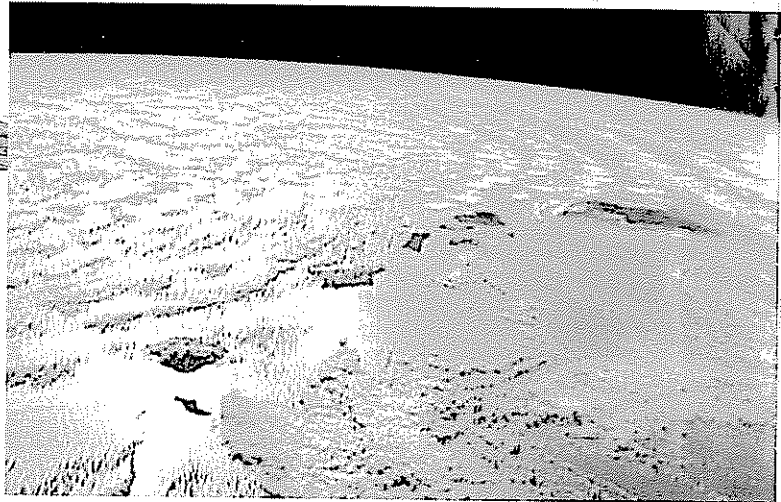
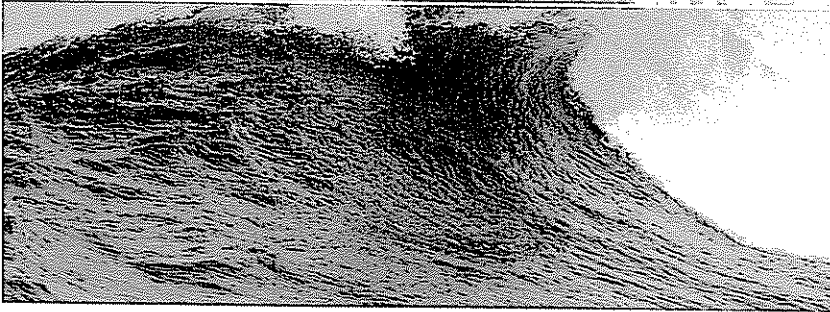
The State of Hawaii is working with JUSTSAP, the National Aeronautics and Space Administration (NASA), and other aerospace institutions and organizations worldwide to establish a Pacific International Space Center for Exploration Systems (PISCES) in the islands. PISCES would

utilize Hawaii's volcanic soils and lunar-like terrain and substantial scientific and technical expertise to design, test and evaluate innovative technologies to support future robotic and manned exploration of the Moon and Mars, as well as to train scientists, engineers and future astronauts for future space missions.



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Business Support



Department of Business, Economic Development & Tourism

The core mission of the Department of Business, Economic Development & Tourism (DBEDT) is to strengthen and diversify Hawaii's economy, lead business development efforts, attract new businesses and investment, and document Hawaii's economic development.

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Other business resources include:

High Technology Development Corporation

Offers business assistance to companies interested in investing, expanding or relocating in Hawaii. Operates three incubation facilities, a technical assistance program for small businesses participating in federal research and development funding programs, a high technology web portal, and a statewide incubation services program. (808) 539-3806, www.htdc.org

National Defense Center of Excellence for Research in Ocean Sciences

Supports the Department of Defense technology requirements; encourages leading edge research and development (R&D) in ocean sciences and technology in Hawaii; and fosters the use of ocean R&D facilities in Hawaii. (808) 327-4310, www.ceros.org

Economic Development Organizations

Dedicated to attracting, retaining and growing business in Hawaii. Collaborate with government agencies and other business associates.

- Enterprise Honolulu
(808) 521-3611, www.enterprisehonolulu.com
- Maui Economic Development Board
(808) 875-2300, www.medb.org
- Kauai Economic Development Board
(808) 245-6692, www.kedb.com
- Hawaii Island Economic Development Board
(808) 935-2180, www.hiedb.org

Hawaii Strategic Development Corporation

Promotes economic development and diversification, in conjunction with private enterprise. Dedicated to developing a sustainable venture capital industry in Hawaii. (808) 587-3830, www.htdc.org/hscd

Hawaii Technology Trade Association

Statewide private sector membership organization dedicated to supporting Hawaii's growing technology industry. (808) 550-4882, www.htta.org

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Fosters entrepreneurial development through networking, education and access to venture capital. (808) 262-7329, www.hvca.org

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Provides resources and facilities for energy and ocean-related research, educational, and commercial activities. (808) 329-7341, www.nelha.org

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A University of Hawaii program designed to connect entrepreneurs with University of Hawaii resources. (808) 956-6985, www.connections.hawaii.edu

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Markets and licenses technologies developed at the University of Hawaii; seeks to encourage broad utilization of the results of University research; and supports the transfer of new technology and ideas from the University to the community-at-large. (808) 539-3819, www.mic.hawaii.edu



Hawaii Department of Business, Economic Development & Tourism

Strategic Industries Division

P.O. Box 2359, Honolulu, Hawaii 96804

Telephone: (808) 586-2388

Fax: (808) 586-2536

www.hawaii.gov/dbedt

Appendix H

Bachelor of Applied Science

in

Applied Engineering Technology (AET)

Council of Chief Academic Officers Meeting Summary

October 22, 2008
Bachman 113
10:00-1:30 p.m.

Present: Erika Lacro (Honolulu CC), Richard Fulton (Windward CC), Jim Goodman for Mike Pescok (Leeward CC), Phillip Castille (UHH), Suzette Robinson (Maui CC), Noreen Yamane for Doug Dykstra (Hawaii CC), Louise Pagotto (Kapiolani CC), Ramona Kincaid for Charles Ramsey (Kauai CC), Peter Quigley (UHM), Linda Randall (UHWO) Linda Johnsrud and Joanne Itano (UH System)

Guests: Mark Hoffman (Maui CC), Wesley Yuu (P20), Joanne Taira and David Mongold (UH System)

Future Agenda Items

- Proposed change to UH mission by Pukoa Council
- Implications of changes to WASC standards
- Fees for subchange requests for ACCJC (*per Mike Rota, effective Jan 2009, there is a \$500 fee for each subchange request; ACCJC has added a staff person to provide support for subchange requests as part of his/her responsibility; 6-7 request per month are reviewed and requests are due a month before the committee meetings. All CC Chancellors have been notified of the fee by ACCJC.*)

Maui CC ATP BAS Applied Engineering

Mark Hoffman provided an update. There has been more discussion on campus about the proposed degree and the implications of a second bachelor's degree. Curriculum Committee approved the ATP and the Faculty Senate approved continued planning on 10/10/08. A likely timeline is the program proposal to be reviewed by the department in Jan 2009, to Curriculum Committee on Feb 2009 and to the Faculty Senate Apr 2009 if all goes smoothly. Hoffman intends to seek ABET accreditation. IFA will open their 15,000 square foot lab for use by this program. There is alignment in the lower division among Haw CC, Kaua'i CC and Maui CC; some upper division courses could be offered via distance methods. This program prepares a technician who supports design engineers. Hands on labs are a major component of the curriculum. The proposed curriculum has 3 courses that are comparable to 3 electrical engineering courses at UHM. An articulation agreement will be worked on.

Suzette Robinson reported that there was a campus wide meeting on 10/3/08 and the Chancellor presented a transition plan which included 3-5 years of duo accreditation with ACCJC and WASC Senior. About 60 faculty/staff were present and 73% voted in support of the transition plan.

CCAO endorses the ATP.

Nonresident Enrollment Policy

Linda Johnsrud shared the briefing that will be presented at the BOR meeting on 10/23/08 with feedback provided by the CAOs. The presentation will also be made at UHM and UHH who are most impacted by this policy.

Math Summit

Wesley Yuu provided an update on Math Summit #1 (see attached). The power point presentation is available at www.hawaii.edu/mathsummit. There was a very positive response among the participants. The actions identified included:

- Improve the math pipeline to career and college ready math (get people into math and keep them there)
- Improve vertical and horizontal alignment of courses so that students transition smoothly between institutions and courses.
- Prepare more qualified and effective mathematics teachers/instructors.

Five Year Faculty Review

Different campuses implement this review differently. OVAPP has added a Director of Academic Personnel Administration (Dr. Jim Nishimoto) to address from a systemwide perspective academic personnel issues, level 2 grievances and collective bargaining. It is clear that there is a blurry line between human resources and academic affairs. CAOs are interested in a discussion with Jim regarding the above issues at a future CCAO meeting.

Budget Update

The CIP budget was approved by the BOR at its September 2008 meeting. The operating budget will be discussed at the October BOR meeting. The operating budget for 2010 and 2011 is a reduction in the G funds budget base of \$13.5 million (10%) and will be financed by G funds reductions and transfer of program expenditures to funding by special, revolving or Federal funds (cost savings in utilities and not filling of vacant positions) Also the BOR will be requested to approve, on a contingency basis, additional G budget base reductions of \$22.0 million (15%) and \$30.6 million (20%). Discussion included likelihood of additional budget cuts, should future cuts be across the board among the 10 campuses or differentially, and retrenchment. Actions to meet identified strategic outcomes and Native Hawaiian initiatives are at this time to remain in the budget.

The task force on Act 188 is looking at base + funding; possibly incentive funding and formula funding met. A consultant has been hired and Chancellors serve on this task force.

Distance Delivery Discussion

Is there a role for the UH System to better coordinate distance delivery? Should the market drive decisions related to distance delivery of courses/programs? Consensus is that the UH system might focus on selected areas to ensure coordination and collaboration. For example, teacher education programs within the UH system will be meeting soon to discuss coordination

and collaboration.

It was suggested that possibly a more comprehensive directory of distance delivered courses be made available if the information could be pulled from Banner, since there are common codes being used to code distance delivered courses. A follow up from Catherine Kawada, ITS, who manages the current list of distance delivered courses:

We have received this question numerous times and it has been discussed at different groups (MSG, CDC, campus committees).

The information we request on our forms differ from that which Banner requests. We ask for Textbook lists, Course Descriptions, Instructor Contact, etc. Majority of the time because of our deadline, info on our list precedes Banner scheduling, especially for cable and ITV classes. So students tend to look at our list since it isn't yet available on Banner or the Class Availability website. Some dept. wait till we approve the ITV and Cable courses before they input into Banner.

If there was a way to pull up online course offerings from Banner, the only information we would get would be 1) Instructor, 2) Subject, 3) Course, 4) CRN but wouldn't be able to extract info for other types of information such as course description, textbooks, technical requirements etc.

And truthfully though the standard codes are in place, I still find discrepancies on whether or not folks are actually filling in the IM field in Banner for their dl classes.

Next Meeting

November 19, 2008

SENATE MEETING AGENDA for May 10, 2002 In KaLama 103.

Call to order 2 pm KaLama 103

Minutes - Thanks Denise Cohen

Old Business

1) Resolutions from last meeting:

A. The faculty senate should debate whether MCC should offer among its degrees baccalaureate degrees. Kate Acks seconded the resolution

B. MCC should fast track an Applied Business and Technology Information (ABIT) as our own degree and Education as a collaborative degree. Developmental track degrees to be considered our own education degree, Applied Arts, Construction Management, Digital Media Arts, Information Technology and Social Work. Mark Slattery seconded this resolution.

2) Process for Reassigned Time: Suzette needs to make decision shortly. Does Academic Senate want to be included in the decision making process?

3) Shared Governance: Looking at half day during first week back in fall to continue process. Will have all material gathered this year compiled so we can begin looking at priorities and organizing the process.

4) Executive Committee election results: APT: Jill Fitzpatrick (2nd term), Business: David Grooms (2nd term), Non-Inst Faculty: Lisa Sepa (1st term), SS/Hum: Dorothy Pyle (2nd term)

New Business

1) Curriculum

Reports

APTs: Jill Fitzpatrick -

Assessment: Lynn Yankowski - The committee continues to work on assessment and is working towards a presentation to the Senate

Budget: Kate Acks -

Baccalaureate Curriculum Development Team: BK Griesemer -

Curriculum: Curriculum Committee Report - BK - The Curriculum Website is up-to-date as of May 9. After the Senate meeting, I will correct it to reflect the happenings at the meeting. I will continue to update throughout the summer. The committee has meet for the last time until August. Ann (Frannie) Coopersmith will be assuming the full role as Chair on June 1. If there are any questions about curriculum that was passed by the Senate this Academic Year (or for the previous three) please direct those questions to me. If it was tabled or was not passed by the Senate then please talk with Frannie. Frannie will also take over chairing the Curriculum Coordinating Group, which is the informational group made up of committee chairs and team leaders of any group having anything to do with curriculum - assessment, AA revision, articulation, BCDTeam, accreditation, curriculum.

Thanks to all of you who have served on the Curriculum Committee over the last four years. I appreciate all the hard work and time you put in as do all of us at the college.

And thanks to all my colleagues for an educational and, I think productive, four years in the area of curriculum. The best to Frannie and next year's committee. BK.

Distance Ed: Cynthia Foreman & Ron St. John -

Procedures: Kathryn Fletcher - The Procedures and Policy Committee is happy to announce the completion of the evaluation of Maui Community College administrators. A little over 300 packets were distributed to all employees of MCC. Ninety-four evaluations were returned. All information and documentation will be given to a sub-committee of the Executive Committee of the Academic Senate, who will then meet with the various administrators and share with them the feed-back you have provided. My thanks to the members of the Procedures and Policy Committee, Rosemary Perreira, Ku'uipo Lum and Dennis Tanga, who all did an outstanding job.

Senate Chair: Marge Kelm - 1) Thanks to everyone who participated in the Shared Governance Retreat April 20. I did not get out evaluations, but would welcome any feedback via e-mail. I especially appreciated the committee: Patricia Adams, Herb Coyle, Jill Fitzpatrick, Nancy Johnson, Diane Meyer, Walette Pellegrino, Suzette Robinson, Lee Stein, flo wiger, (I hope I didn't forget anyone!) 2) The System-wide Strategic Plan will be presented to the Board of Regents next week. It is available on the WEB. 3) I forwarded The Community College Strategic Plan to the campus from Mike Rota. 4) I would like to thank everyone for the great participation and wonderful support I have received from you this year.

Service Learning: Molli Fleming -

Social: Sean Calder -

Smoking Policy: Michele Driscoll - Deanna's now co-chair. Working from the idea that MCC is going to be basically a non-smoking campus with certain areas where smoking is permitted, Deanna (co-chair) and I have been soliciting wish-lists from both smokers and non-smokers, both in and out of meetings. We came up with a tentative plan for a few areas to set aside for smoking facilities. Today flo and I walked the campus to discuss those areas, made several revisions and are now ready to set up our next meeting (for after finals week!!!), with David, Marvin, Deanna, some student govt' rep(s), flo and myself. At this meeting we hope to firm up plans a bit more and discuss the how-to part of building a few structures of whatever kinds. Since locations have been a bit fluid, we will probably need to wait till after that meeting to get a description/map circulating on campus. What all this looks like is that some members of our campus community are going to go away for the summer and return to an already in-place plan, or at least the start of it.

Student Government: Matthew Caldones

TIC: Bud Clark -

UHPA: Herb Coyle -

Writing Intensive: Catherine Thompson -

Minutes of the Academic Senate May 10, 2002
Submitted by Alfred Wolf June 18, 2002

In Attendance: Lynn Yankowski, Bruce Butler, Pat Adams, Shermane Chu, Vinnie Linares, Alfred Wolf, Marge, Kelm, Dorothy Pyle, Mike Albert, Malia Johnson, Cynthia Foreman, Hiroko Deleon, David Grooms, Ron St. John, Catherine Thompson, Lisa Sepa, Lillian Mangum, Sally Irwin, Michael Takemoto, Dan Kruse, Frannie Coopersmith, Lee Stein, BK Griesmer, Kate Acks, flo wiger, Kathryne Fletcher, Kiope Raymond, San Albers, Herb Coyle, Milton Cha, Molli Fleming, Jill Fitapatrik, Michele Driscoll, Renee Riley, Eric Engh, C Pascual, Lorelle SoanzoPeros, Sean Calder

Curriculum:

- a) PSY 213, PSY 214 seconded by Kathy Fletcher and passed unanimously.
- b) Math 20, Math 22, MATH 23, MATH 24, MATH25 seconded by Dorothy Pyle and passed unanimously.
- c) ENG 19, ENG 21, ENG 22 seconded by Magi Bruck and passed unanimously.
ENG 100, ENG 104, ENG 55 seconded by Catherine Thompson. and passed unanimously.
- d) PHIL 110 seconded by Kate Acks and passed unanimously.

Writing Intensive - all are encouraged to offer a writing intensive class. See Catherine Thompson.

Addition by M. Kelm:

Minutes: April 12 Senate meeting minutes were accepted.

Process for Reassigned Time was discussed and it was decided that a faculty group would meet with Suzette, DOI, to make recommendations on the proposals. Suzette would then make the final decision based on all information that was pertinent. Kate Acks, Pat Adams, Marge Kelm, Dorothy Pyle and Karen Tanaka formed the faculty group.

Resolutions moved, seconded and passed:

- 1) The Academic Senate endorses MCC's offering of baccalaureate degrees among its degree offerings.
- 2) The Academic Senate endorses development of Applied Business and Information Technology (ABIT) as its first baccalaureate degree and that the college will pursue other baccalaureate degrees as appropriate.

However, we relocated the meetings to Oahu and had our usual dinner meeting with CC Chairs only to discuss concerns on Thursday, a three hour meeting of the ACCFSC (All Campus Council of Faculty Chairs) and a 2 1/2 hour meeting of the CC Chairs, Mike Rota, and Joyce Tsunoda Discussion on the CC level was around the upcoming change with the Chancellor leaving. However, there has been very little specific information about what is going to happen other than Joyce retiring at the end of the year. Other topics included the change in Manoa Gen Ed Core and articulation issues. The ACCFSC is continuing to refine working procedures and trying to get increased participation on the council by UH Manoa faculty. The ACCFSC has voted to meet monthly in conjunction with the Board of Regents. Minutes of our 09/13/02 meeting will be available shortly. The last CC Strategic Planning meeting of the Senate Chairs and Provosts will be in Honolulu

Service Learning: Frannie Coopersmith - On Friday, 27 September from 11 am to noon there will be a Service Learning Workshop in the Skybridge studio. It will cover a general introduction to Service Learning, suggestions for agency placements, and a discussion of assessment techniques for reflective journals. If you have any questions, please contact Ann Coopersmith at extension 329 or reply to this e-mail. For those faculty who have already included Service Learning in their courses, please leave a copy of your syllabus in mailbox 26.
Mahalo

Social: Sean Calder - **Smoking Policy:** Michele Driscoll/Deanna Kamakeeaina Reece.

Student Government: Katie Barry - **TIC:** Bud Clark -

UHPA: Herb Coyle - **Writing Intensive:** Catherine Thompson -

Announcements:

The MCC Student Art Exhibit will open in the lobby of the Library, with a reception for the artists, on Wed. Sept. 25, from 4:00-5:30 pm. Refreshments will be served.

MCC's Safe Zone Committee, in cooperation with the Maui AIDS Foundation, is sponsoring a potluck and video showing on National Coming Out Day, October 11th, in Ka Lama 103. The potluck will start at 5 PM, with the video showing at 7 PM. The video "Ke Kulana He Mahu: Remembering a Sense of Place" will be shown. In order to create a safe space for students to attend this video, it would be helpful if students could be offered extra credit for attendance. If you have any questions, please contact David Brass at extension 572 or Kate Sample at extension 330.

Faculty/Staff Development Meeting Thursday, September 26 at 3 pm in the Nursing Conference Room. Open to anyone who would like to participate. E-mail Marge at kelm@hawaii.edu if you cannot attend because of the meeting time and give a schedule of when you could meet. Please submit requests for Faculty/Staff Development funding to Marge Kelm prior to the activity. So far we have been able to fund all requests. You can access \$500 within a 2 year period.

Academic Senate Meeting Minutes

October 10, 2008

Ka'a'ike 105

1:30 p.m.-3:30 p.m.

Present: Donna Haytko-Paoa, Kyle Takushi, Aris A Banaag, Elaine Yamashita, Nancy Johnson, Steven Farmer, Marge Kelm, Renée Riley, Sean Calder, Lisa Deneen, Colleen Shishido, Thomas Hussey, Crystal Alberto, Laura Lees, Lillian Mangum, Daniel Kruse, Alf Wolf, Kulamanu Ishihara, Dorothy Pyle, Mark Slattery, Jung Park, Elisabeth Reader, John Pye, Lee Stein, Elisabeth Armstrong, Julie Powers Mollie Fleming, Maggie Bruck, David Grooms, Joyce Yamada, Cyrilla Pascual, Tim Marmack, Rosie Vierra, Shane Payba, Richard Hill, Kathleen Hagan, Kris Shibano, Arthur Agdeppa, Kathy Fletcher, Bert Kikuchi, Peter Fisher, Leinani Sakamoto, Lorelle Peros, Diane Meyer, Kani'au Kai'anui, Melody Bohn, Kalei Kaeo, Kahele Dukelow, Gayle Early, Ryan Daniels, Dorothy Tolliver, Margaret Christensen, Michael Takemoto, Bradley Duran, Debbie Winkler, Ben Guerrero, Vinnie Linares, Mark Hoffman, BK. Griesemer, Cynthia Foreman, Catherine Thompson, Ron St John, Sally Irwin, Jill Fitzpatrick, and Michele Katsutani

I. Called to order 1:38pm

II. Minutes from 9/12 and 10/1 were approved.

III. Introductions: The new MCC Counselor, Aris Banaag, was introduced.

IX. Announcements

- Senate information will be distributed over the senate, APT, and faculty listservs.

VI. Standing Committee Reports and Updates

- Planning and Budget Committee

Cindy Foreman reported there have been emergency budget meetings that presented new and continually changing guidelines from the state, the latest including budget cuts of about \$91,000. Enrollment growth money will continue to enable hiring of lecturers for the spring semester. Although \$1.6 million was budgeted for electricity, about \$2.3 million will go to MECO. We're looking at creative ways to use energy on campus. Alternative forms of energy are good ideas, but mean payback further down the road. We have been through budget cuts before.

V. Unfinished Business

- Student Academic Grievance Procedure

Diane Meyer reported she emailed out the Student Academic Grievance Procedure with cosmetic changes.

Maggie Bruck moved to accept the Student Academic Grievance Procedure with the proposed cosmetic changes. Mollie Fleming seconded the motion. The motion passed.

- Update by Mark Hoffman

Mark Hoffman, program coordinator for electronics and computer technology, shared a PowerPoint presentation (See Mark's PowerPoint which will be linked to this document once it is online) with information of the proposed ATP for a BAS in Applied Engineering Technology that included the following:

- Explanation of why a BAS on Maui and the \$3 billion industry if fits into.

- Report about Innovation and Technology in Hawaii: An Economic and Workforce Profile.
- A detailed timeline of work on these programs and the process it has followed since March 2001.
- Detailed background of the ATP process through curriculum and senate in the past few months.
- Partners providing information on existing engineering tech bachelor's programs, completed workforce skills studies and the AKAMAI Program.
- The Course Development flow chart he has been following.
- Industry advisors from Kauai, Maui, and Hawaii that he has been in discussion with and the statewide evaluators
- A diagram of long range strategy of implementation;

Mark Hoffman has come to senate today to ask for a vote of support on continued planning. Not to have a degree, but to explore the options of possible degrees in electrical engineering.

Discussion:

- If we were to collaborate with other institutions, is this to be a shared degree? Up until today, we were only dealing with other institutions. I'd like to see alternative options be looked into.
- We could explore doing it with other institutions. Our Chancellor has a different view of what would be the optimal model for our degree.
- We have not been privy to these discussions because the discussions were not open.
- To create 300-level courses and curriculum would require additional WASC program proposals. By authorizing planning, proposals can be produced to be voted on; this is only to continue planning.

Mark Hoffman added if we are authorized to continue planning, we'd like to be able to explore all options as part of the planning process.

V. Standing Committees continued

- Curriculum

BK. Griesemer presented the University of Hawaii Executive Policy—Administration April 1989. In particular she read sections C.2 (which indicates at the CCs the chancellors establish the processes for ATPs and have final approval); C.3 (which states “each Unit prepares a report to the President’s Office on the ATP activity. . . The President informs the BOR of approved ATPs as information items.”); and D.2 (which describes the process for new Academic Programs).

She added the following:

- Because the Curriculum Committee is aware that the process for review of ATPs and Program Proposals has not be clear to all, the committee will write down the process that has been used since 1985, bring it to the senate for approval, and pass it forward to the chancellor as a resolution on the process to sign.
- The MCC curriculum process is one of the strongest in our system. Our curriculum process allows anyone to initiate an idea. Departments should be vetting issues thoroughly. Curriculum (including ATPS and program proposals) should not be handed through as if they are automatic. There are still other ATPs that the committee is considering; this is the one we have moved forward. For example, when the Gerontology ATP came to curriculum, we recommended it go to related departments such as the Social Science Department for further review.

Discussion:

- This information has not been part of the process.
- This is the third time BK. Griesemer has presented this ATP and Program Proposal process to the senate.
- Even if this is the third time, the process has not been followed. Proposals have shown up out of order and out of sequence. Your ATP is permission. The next step is that you produce research that will come back to the STEM department.
- According to the recent presentations, the ATP Mark Hoffman is presenting has followed the campus process all along and, therefore, the resolution from this past week is not correct.

- The motion was not about Mark's work, it was that the body of the senate did not believe we had enough information about resources, faculty, and so on to make a sensible decision before even planning.
- We are very supportive of Mark's work, but another perspective is the Moloka'i perspective: fifteen years ago, it was stated that the ECET program was to move to outer islands and serve rural communities. This has never happened. In moving forward in planning another bachelor's degree, we need to note the part about this degree to the outer islands. Our concern is that before other ATPs sit with the curriculum committee, someone has to address the questions of resources and outreach.
- Supposedly we have 4-5 different ATPs at different level. Is there a limit on how much can be put forward at one time? Does one affect the process of the others? There seems to be a disconnect with the community and what the community wants pushed forward. The intent of the ATPs did not come from our department, so we do not have the developmental input in the process.

BK. Griesemer stated that technically there is no limit as to the number of ATPs permitted at one time. The ATP is permission to plan so that thorough research can be completed. There have been other ATPs that have never become programs. This is a campus decision and should not be left to the curriculum committee to force the question.

It was decided to come back to this issue in the curriculum report after resolutions have been voted on.

V. Unfinished Business continued

- Retention, Persistence & Comp. Resolution

Michele Katsutani reported there has been reluctance on part of administration to sign off on the Retention and Persistence resolution in order to be aligned with other campuses and because faculty should be able to stand up to this.

- Resolution Development by special Committee

Michele Katsutani thanked the special committee and the Academic Executive Committee for working on this resolution this past week. The following resolution is a result of the special Senate Meeting last week:

“Whereas, the College is facing the prospect of profound institutional transformation as it considers the adoption of additional four-year degrees,
 Whereas, this change has far-reaching implications and requires careful analysis of complex factors to inform effective decision making,
 Whereas, MCC has been committed to shared governance, which ideally results in a process that “fosters a sense of empowerment, equal partnership and a vested interest in successful outcomes of institutional policy and implementation decisions. The purpose of such a system is to direct all available physical and financial resources toward meaningful improvement and progress” (Lau, 1996). “Ideally, shared governance can create game plans that bridge lines of authority, share resources to take advantage of unforeseen opportunities, and facilitate programs to even out the workload while maximizing system efficiency” (Howell, 1997; Acebo, 1995). (*Shared Governance in Community Colleges, ERIC Digest, 1999*),
 Whereas, the Academic Senate of MCC is the “policy recommending body of MCC’s academic community,”
 Whereas, the Academic Senate and administration agree on the need for substantive dialogue, healthy debate, transparent decision making, and shared governance,
 Whereas, this ideal process has not been practiced at MCC in the recent decisions around sustainable science positions and a visible push to add a second bachelor’s degree fast-tracked to MCC (ATP supposedly on BOR agenda for October/November), resulting in a significant number of faculty and staff feeling uninformed,

Whereas, academic support services are not adequately staffed nor equipped for additional four year degrees, particularly with our unstable economy,
Be it resolved that the Chancellor, the Academic Senate Executive Committee, the Academic Senate and the campus stakeholders will work cooperatively to devise a strategy for regular, systematic sharing of information in forums that foster lively debate, provide opportunities for the expression of diverse viewpoints, and ensure timely answers to questions, and most importantly, create a campus environment wherein decisions reflect the process of building and then arriving at consensus.”

Discussion:

- The vote of this resolution should be done in secret ballot.
- The resolution will be posted for five days after this meeting and then we can conduct monkey survey.

Eric Engh moved to vote right now, not by secret ballot. The motion was seconded by Rosie Vierra.

Discussion: To clarify, if we vote on this today, we as a body make the decision, but others will have five days to voice their opinions. To truly be secret, let's use Monkey Survey.

Twenty member votes for the motion; the majority voted against the motion. The motion did not pass: It was decided to vote by secret ballot.

Marge Kelm agreed to set up the vote by Survey Monkey.

VI.Standing Committee Reports continued

- Curriculum Committee report continued

BK. Griesemer presented the Curriculum Committee's motion for the senate to reconsider supporting continued planning for curriculum proposal Item 2008.01: ATP for BAS in Applied Engineering Technology. The motion was seconded by Daniel Kruse. The motion passed.

BK. Griesemer added the deadline for Fall 2009 curriculum has passed. The deadline for Spring will be later in Spring 2009.

- Assessment

BK. Griesemer shared an extraction from the Accrediting Commission for Community and Junior Colleges (WASC) rubric for evaluating institutional effectiveness program review, planning, and student learning outcomes. She also shared a letter that states 2012 is our deadline for reaching the Proficiency level of the rubric for accrediting process—if we don't meet these requirements, we could be put on warning. Some well known colleges in California are currently on warning for not following this. The Senior Commission is probably moving in this direction as well. She will share the letter and rubric by email.

- Procedures & Policy

Vinnie Linares reported the committee is working on the following issues. Look for emails and more information to come.

- 1) Guidelines for Applied Research
- 2) Academic Renewal Policy
- 3) The Dean's list
- 4) Credit By Exam Policy

Discussion:

- Do we have examples of this research from other campuses? Can we see these examples of top-heavy research issues?
- As the committee looks at the Credit By Exam policies, the committee should look at CLEP and Advanced Placement exams. Can we become a CLEP center to make the exam available to students?

To clarify the intention of the motion, BK. Griesemer requested to restate and revote on the previous motion. The Curriculum committee has moved for the senate to support the planning for curriculum proposal Item 2008.01: ATP for BAS in Applied Engineering Technology. The motion was approved.

- IT-Committee

Renée Riley reported the following:

- At this morning's ITC meeting, BK. Griesemer gave a workshop on assignment alignment. It is available in streaming video on the ITC Laulima site.
- Next week's ITC meeting will focus on the challenging student: bring a challenging student scenario and we'll work together to problem solve.
- Right after the November faculty senate meeting, we'll have Dr. Wehrman talk about his sabbatical. There will also be food.
- In December, we will be linking with the Social Committee for another event.

VI. Ad Hoc Committee Reports and Updates

- Safety Plan & Procedure

Elaine Yamashita reported the next Safety Committee meeting will be Friday October 24, 10 a.m. in Hale 218. There's a new feature on MyUH Portal to sign up for emergency alert text messaging that would be in addition to the voicemails. What exactly is defined, as an emergency is still unclear.

Discussion: Please have the Safety Committee look into the blue lights on emergency phones around campus. Some lights appear to have burned out. This makes finding the phones in an emergency difficult. If lights are out, do phones work? Are they tested? Do they work?

- Service Learning and Civic Engagement

Molli Fleming presented Madilyn Witt, VISTA, who is working on several civic engagement projects around campus. Looking for creative ideas for incorporating civic engagement in courses, we're coming up with a list of discipline-specific service opportunities that faculty could use as extra credit. If you have additional ideas, please contact Madilyn Witt.

VII. New Business

- Feedback on Campus Wide Meeting

Discussion: We will need another campus wide meeting with the chancellor. There are obviously many holes in the way we make decisions around here. How can we proceed in the future to avoid taking all this time in processes? It takes time, and we need to work together.

IX. Announcements continued

- Vice President Morton will be here 10/17. Please let Michele Katsutani know if you think we should hold a meeting with him.

A recommendation was made that the Academic Senate Executive Committee meet with VP Morton on 10/17 since he will already be on campus. Michele Katsutani will inquire.

- The next Academic Senate meeting will be November 14.

Meeting adjourned.

Chancellor's Advisory Council Minutes
September 8, 2008

Present: Del Adlawan, Susan Bendon, Dave Gleason, Gwen Hiraga, Steve Holaday, Richard Kipper, John Kreag, Dorvin Leis, Martin Luna, Alec McBarnet, Boyd Mossman, Howard Nakamura, Mitchell Nishimoto, Curtis Tom, Leona Wilson.

MCC: Clyde Sakamoto, Herman Andaya, Marilyn Fornwall, Cordy MacLaughlin, Suzette Robinson, Alvin Tagomori, David Tamanaha

Call to Order: Richard Kipper called the meeting to order at 3:00 p.m.

Approval of Minutes: The minutes of the May 12, 2008 meeting were approved.

Institute of Music Proposal: Bob Wehrman discussed plans for the proposed Hawaiian Music Institute. The program would offer instruction in music technology, drama, music business and performance. The capstone would be a release of an album and Mountain Apple has indicated an interest in supporting the program. Completing the program would open up job opportunities such as recording engineers, music teachers and performers. A discussion centered on what degree or certificate the students would receive.

Fall 2008 Enrollment: The current enrollment reported by Alvin Tagomori, Vice Chancellor for Student Affairs, is 3265. This is a 9.5% increase over the Fall 2007 figure of 2981. Many of the MCC students are unclassified and do not qualify for financial aid. The counselors are working with these students early in the year to define educational plans. A mandatory orientation was held before the beginning of the fall semester. The college is creating educational opportunities to aid in job relocation for those who are laid off and for inmates about to be released from MCCC.

College Budget Overview: David Tamanaha, Vice Chancellor for Administrative Affairs, gave a budget overview reporting a \$643,000 budget challenge this year due to an electricity shortfall. Also a proposed 4% legislative reduction and Governor's restriction would cause an additional \$150,000 budget cut. Discussions have taken place to determine where some reductions could take place. Solutions to reduce the electric expenses as well as generating our own power include a windmill and Photo Voltaic Panels. Clyde asked the Council for thoughts as to when they projected the economy might recover. The general response was that it would take a year or two. MCC tuition revenues are up this year which will help alleviate some of the budget constraints.

Program and Faculty Developments: Suzette Robinson, Vice Chancellor for Academic Affairs, discussed the proposal for the new Dental Hygiene program which will begin with 10 new students this January upon approval by the Commission on Dental Accreditation. She continued to present the Authorization to Plan updates for the following programs.

- Applied Engineering
- Information Technology
- Sustainable Sciences
- Gerontology

- Applied Ocean Sciences

Suzette shared backgrounds of the new faculty the college has hired. She then discussed the “Achieving the Dream” program for Hawaiian students. Resources from OHA and Kamehameha Schools are helping students who have difficulty with successfully completing initial “gatekeeper” classes. The college seeks to promote higher levels of student success through financial aid, faculty advising, curricular and teaching changes, and with strengthening student study skills and habits. .

WASC Accreditation Activities: The college is pursuing the additional four-year degrees with a November 13th WASC Jr meeting to discuss a possible transition to WASC Sr. as well as a proposed name change.

CIP Activities:

- A new organization, Campus Apartments, is managing the student housing project with about 100 students in Kulana’ā’o at the beginning of fall semester.
- The Student Life Center is open and the MCC bookstore is the latest in the system. Plans are to open an evening café.
- The Science Building has been redesigned as a one story building with our focus on labs. Some of the items that need to be cut may be added at a later date.
- The Lanai Ed Center is moving around the corner to a new site. It is a larger space that the Lanai Company is looking to renovate. .
- Solar panels may be placed on rooftops to help with the electricity challenge.

Report on Gifts:

- A supercomputer valued at \$450k has been donated by IBM
- The golf tournament was a successful event even in a distressed economic state. The college has many strong supporters that came through in tough financial times. Mahalo to chair Marty Quill and his golf committee.

Various Reports:

- MCC has been asked to host the Post Secondary International Network Conference in 2010. This is an opportunity to learn from international partners and network with the institutions to identify global measures for student and institutional performance.
- Project Ohana helped distribute 100 computers to Hawaii students in Hana, Lanai and Molokai.
- The Maui Isle Expo was attended by 400 participants.
- The Noble Grape, an annual fundraiser for the MCC Culinary Academy will be held on October 25, 2008.
- Clyde will travel to New York to present the basis for MCC’s Bellwether Award to the Association of Community College Trustees.
- December 3, 2008 the college will host the National Science Foundation day.

Next Meeting: November 10th, 2008, 3pm-4:30pm, Class Act.

Respectfully submitted,
Marilyn Fornwall

Chancellor's Advisory Council Minutes
November 10, 2008

Present: Susan Bendon, Dave Gleason, Jeff Halpin, Richard Kipper, Roger MacArthur, Alec McBarnet, Boyd Mossman, Howard Nakamura, Ken Ota, Martin Quill, Curtis Tom

MCC: Clyde Sakamoto, Herman Andaya, Marilyn Fornwall, Cordy MacLaughlin, Alvin Tagomori, David Tamanaha

Call to Order: Richard Kipper called the meeting to order at 3:00 p.m.

Approval of Minutes: The minutes of the September 8, 2008 meeting were approved.

Update on College Budget and Impact of State Restriction and Reduction: David Tamanaha discussed the state challenge and the 10% reduction the UH system was required to make. The reduction may increase to 20% to compensate for the \$900 million shortfall by 2011. Hiring restrictions, contract reductions and spending reductions will be implemented. There will be a \$13,487,444 reduction for the UH system in fiscal Year 2010. This includes a \$2.3 million reduction for the community colleges with a \$258,912 reduction for the Maui Community College budget.

Guidelines used to reduce the budget include:

- Reduce the utility cost by 10%
- Have no reductions in strategic outcomes
- Have no reductions in equipment
- All funded positions must be budgeted

A 10% reduction in the electricity usage would generate a savings of \$167,583. A reduction in campus security would save the college \$59,070. Eliminating dorm security would save \$10,000 and another \$22,259 could be saved by a reduction in student assistants.

Meeting our tuition targets will be important to address instructional and other needs within our budget. Some additional strategies include increasing retention rates and revenue generation. David is traveling to Honolulu to attend a presentation on vendors that may offer solutions to energy savings. The college has been in discussion with several potential vendors. Green Power is offering to put up a windmill as part of the power campus source at no cost to the college but with a commitment to buy power back at 20 percent reduction from the MECO rate. .

Consolidating Student Housing: A plan is being developed and examined to move Hale Haumana students into the new student housing, freeing the old facility to be used for short-term college needs for visiting lecturers, grant-funded project staff, and other student projects, etc.

Revenue Generation: A management services contract is out for bid to keep our Pa`ina building open additional hours as well as possible nights and weekends using an external contractor. Our sustainable construction and technology students will work with faculty to help with energy savings, Wind power or green power could be working in 6-9 months. Photo-voltaic panels in the parking lot could take

longer. Alec McBarnet suggested bringing in a consultant that could evaluate the college energy uses and help with increased savings.

Swap Meet: The swap meet will start the end of November on Sundays, moving to Saturday mornings after the beginning of the New Year. The college will make at least \$40K per year through lease rent and possible gate receipts and perhaps more if higher numbers of attendees appear.

College Transition: Clyde will be meeting with the UH President and others to work on the possible transition to add additional 4-year programs while maintaining an open admissions 2 year institution. As MCC is the only higher education institution on Maui, even with the University Center, needs and opportunities in the community including careers that require four year degrees are not being adequately addressed. Sustainable living wage career opportunities in areas such as a bachelor of applied science in Applied Engineering Technology would be one the next new proposed 4-year degree program.

Noble Grape: This year's event received a great deal of support from the Chancellor's Advisory Council, and Clyde thanked everyone for their continuing support.

Next Meeting: January 12, 2009, 3pm-4:30pm, Class Act.

Respectfully submitted,
Marilyn Fornwall

Appendix I

Bachelor of Applied Science

in

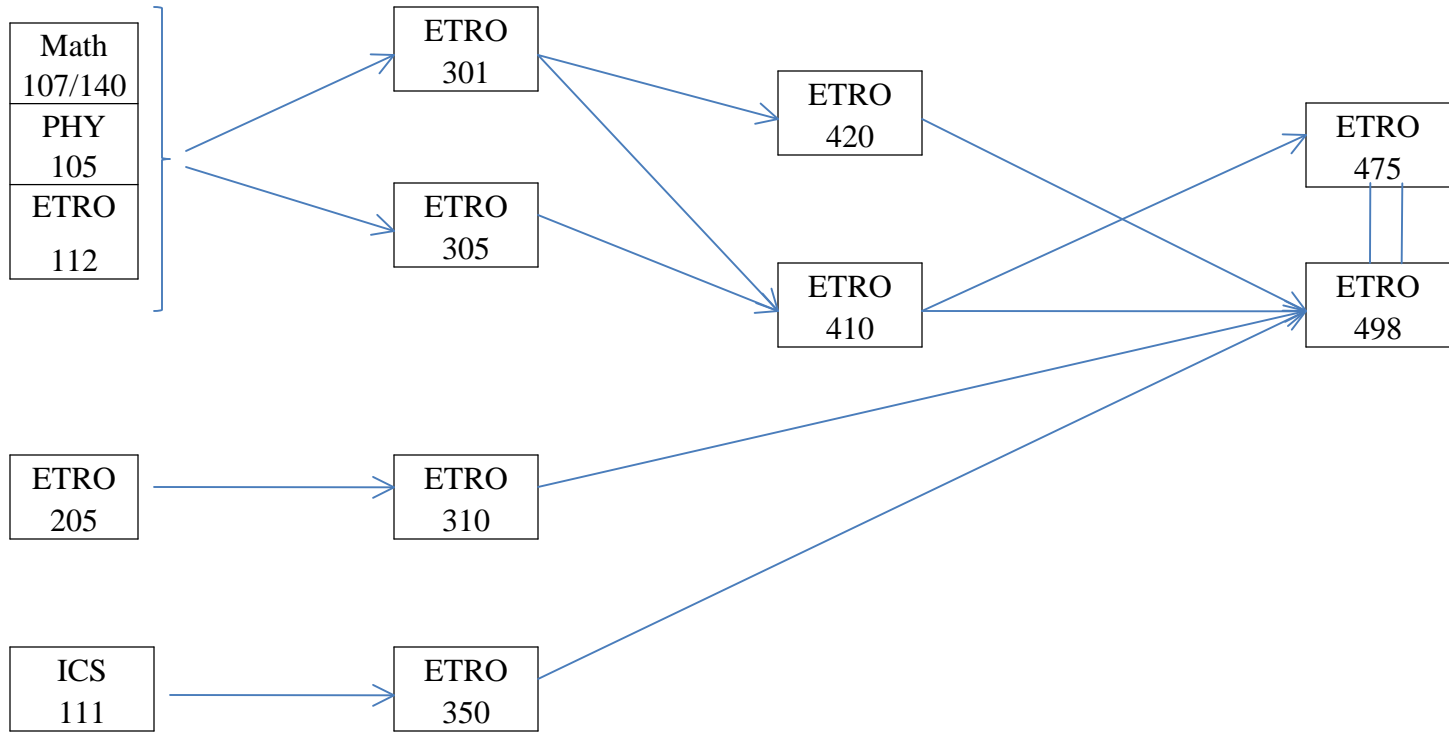
Applied Engineering Technology (AET)

Lower Division Requirements

ECET Associate in Science Degree Planning Worksheet		
ECET Certificate of Completion		Credits
Introduction to Electronics Technology	ETRO 101	3
Instrumentation for Engineering Technicians	ETRO 102	4
Digitals Tools for the Information World	ICS 101	3
ECET Certificate of Completion	Credits Required	10
ECET Certificate of Achievement		Credits
ECET Certificate of Completion	All Classes	10
GEN ED English/Communication	ENG 100	3
Information and Computer Science	ICS 110	3
GEN ED Natural Science	PHYS 105 or Higher	4
Gen ED Quantitative Reasoning	MATH 107, or MATH 140, or Higher	4
ECET Certificate of Achievement	Credits Required	24
ECET Associate of Science Degree		Credits
ECET Certificate of Achievement	All Classes	24
GEN ED English/Communication	ENG 210	3
GEN ED Communication	COM 130 or 145	3
GEN ED Humanities Elective	100 LEVEL OR ABOVE	3
GEN ED Social Science	SOC 100 or PSY 100	3
ECET Engineering Technology Core Lower Division		Credits
Electronic Circuit Analysis I	ETRO 105	4
Computer Networking I	ETRO 140	4
Digital Computer Technology I	ETRO 201	4
Digital Computer Technology II	ETRO 205	4
Introduction to Computer Science	ICS 111	4
Special Topics Project in Elect. Tech.	ETRO 298	4
Cooperative Education	ETRO 193v	1
Internship II	ETRO 293v	2
ECET Engineering Technology Core Lower Division	Credits Required	63
ECET BAS Track	All Classes	63
Electronics Technology I	ETRO 110	4
Electronics Technology II	ETRO 112	4
Introduction to Optics and Photonics	ETRO 161	3
ECET Associate in Science	Total Credits Required	74

Upper Division Requirements

AET Bachelor of Applied Science Planning Worksheet		
General Education Requirements		Credits
Advanced Research and Writing	ENG 316	3
Ethical Theory	PHIL 301	3
Conflict Management and Resolution	PSY/COM 353	3
Intercultural Communication	COM 459	3
Changes and Choices	HUM 400	3
General Education Requirements	Credits Required	15
Engineering Technology Core Upper Division		Credits
Engineering Mathematics	ETRO 301	3
Power Systems and Sustainable Energy	ETRO 305	3
Applied Robotics	ETRO 310	3
Engineering Computing	ETRO 350	3
Project Management	ETRO 410	3
Electro-Magnetism	ETRO 420	3
Advanced Instrumentation	ETRO 475	3
Engineering Technology Capstone	ETRO 498	6
Engineering Technology Core Upper Division	Credits Required	27
General Education and Core Requirements	Credits Required	42
Engineering Technology Technical Electives		
18 credits required	Credits Required	18
Intermediate Optics	ETRO 320	3
Electro-Mechanical Control Systems	ETRO 360	3
Remote Sensing and Geographic Information Systems	ETRO 370	3
Signals and Systems	ETRO 430	3
Opto-Electronics and Photonic Devices	ETRO 440	3
Signal Processing	ETRO 465	3
Database Application Design	ICS 360	3
Advanced System Administration	ETRO 335	3
Advanced Networking	ETRO 340	3
Engineering Database Applications	ETRO 450	3
Data Visualization	ETRO 480	3
AET BAS upper division	Total Credits Required	60
ECET lower division	Total Credits Required	74
AET BAS Degree Requirements	Total Credits Required	134



Upper Division Course Descriptions

ETRO 301 Engineering Mathematics – 3 Credits

Prereq MATH 107, or MATH 140 or Higher; PHYS 105 or Higher; ETRO 112; or consent

Introduces mathematical concepts useful in the study of Engineering Technology. Utilizes the capabilities of MATLAB and its applications to visualize solutions to technical and engineering problems. Includes a hands-on engineering laboratory to demonstrate programming examples and apply programming skills.

ETRO 305 Power Systems and Sustainable Energy – 3 Credits

Prereq MATH 107, or MATH 140 or Higher; PHYS 105 or Higher; ETRO 112; or consent

Introduces power systems, Photovoltaic devices, wind and water turbines, and fuel cell technologies. Demonstrates energy management systems and efficiency concepts. Studies photovoltaic device concepts and applications. Introduces power generation and transmission system.

ETRO 310 Applied Robotics – 3 Credits

Prereq ETRO 205, or consent

Studies robotic electro-mechanical devices. Introduces system requirements and solutions. Computer programming of applications to robotic solution.

ETRO 320 Intermediate Optics– 3 Credits

Prereq ETRO 161, or consent

Introduces intermediate optical concepts. Exposes students to phenomena related to the field of optics. Uses the wave approach to describe and demonstrate the mechanisms and properties involved in optical systems. Offers examples of modern optical engineering.

ETRO 335 Advanced Windows System Administration.

Prereq ETRO 285, or consent

Introduces advanced windows system administration concepts. Studies the installation and maintenance of Windows Servers and products under Windows server architectures. Install and configure web servers, email clients, LDAP and other services associated with Windows Server solutions

ETRO 340 Advanced Networking – 3 Credits

Prereq ETRO 240, or consent

Introduces advanced networking concepts in system analysis, network security, and system administration.

ETRO 350 Engineering Computing – 3 Credits

Prereq ICS 111, or consent

Studies computer programming to solve electronics and optical system problems. Uses Software programming applications, technical databases, image processing, and other scientific and engineering software tools.

Upper division courses

ETRO 360 Electro-Mechanical Control Systems – 3 Credits

Prereq ETRO 310, or consent

Introduces electronic control system applications and theory. Active and adaptive optical systems. Mount controls, tracking algorithms.

ETRO 370 Remote Sensing and Geographic Information Systems– 3 Credits

Prereq ETRO 320, or consent

Re-enforces radiometric and photometric principles. Introduces satellite sensing concepts. Analyzes data. Uses GIS applications and data.

ETRO 410 Engineering Project Management – 3 Credits

Prereq ETRO 301, 305; or consent

Introduces Engineering project management theory and applications. Uses current project management software tools. Covers project management, risk mitigation, project planning, and project implementation. Introduces project guidelines for federally funded projects

ETRO 420 Electro-Magnetism – 3 Credits

Prereq ETRO 301, or consent

Studies the application of electromagnetism, differential calculus of vector fields, gradient operators, vector integrals, flux of vector fields, curl of vector fields, electrostatics and divergence, application of Gauss' Law, electric fields, electrostatic energy, dielectrics and polarization, vector potential and Maxwell's equations

ETRO 430 Signals and Systems – 3 Credits

Prereq ETRO 360, or consent

Introduces advanced system concepts. Uses design simulations and robotic applications.

ETRO 440 Opto-Electronic and Photonic Devices – 3 Credits

Prereq ETRO 370, or consent

Studies lasers, LED, and broad spectrum light sources. Characterization of light sources. Design and troubleshoot photo-electronic devices; photo-diodes, photo-transistors, photo-resistors, Avalanche photo-diodes, quad cells, linear displacement devices, etc. Radiometric and photometric measurement concepts; irradiance, radiance, radiant intensity, luminance, radiant exitance.

ETRO 450 Engineering Database Applications – 3 Credits

Prereq ICS 360

Introduces database applications for scientific and engineering solutions. Covers the practical implementation of engineering solutions, including programming examples. Introduces multi-platform and disparate system integration.

ETRO 465 Signal Processing – 3 Credits

Prereq ETRO 430, or consent

Studies signal processing using a variety of hardware and software tools. Produces experimental data for analysis. Includes image processing and de-convolution techniques, under and oversampling.

ETRO 475 Advanced Instrumentation – 3 Credits

Prereq ETRO 410, or consent

Upper division courses

Case studies on advanced instruments in Hawai`i and throughout the world. Introduces students to the instrumentation packages installed on various systems. Discussion on system integration and testing. Measure point spread functions and Strehl ratios.

ETRO 480 Data Visualization – 3 credits

Prereq ICS 360

Introduces data visualizations for scientific and engineering data sets. Uses software tools for data retrieval and data viewing. Studies current data visualization techniques for cross-platform and web applications.

ETRO 498 Applied Engineering Technology Capstone – 6 Credits

Prereq ETRO 310, 350, 410, 420, and 475(or concurrent); or consent

Provides an opportunity to utilize and demonstrate the tools and understanding developed during the Applied Engineering Technology program. Includes strategy formation and implementation, project management and risk analysis, troubleshooting and prototyping of a typical electronic or computer engineering technology project. Project documentation, testing, delivery, and presentation are required.

ICS 360 Database Application Design – 3 Credits

Prereq ICS 115 and 214

Introduces database management systems (DBMS). Covers both the theoretical and practical aspects of DBMS, such as database design, use, and implementation. Includes a final programming project to develop a practical database system for library access, electronic commerce, information retrieval or a similar application. Involves the use of the database language SQL, and, possibly other languages.

Lower Division Course Descriptions

ETRO 101 – 3 Credits

Introduction to Electronics Technology

Introduces applications of arithmetic and mathematics to electronic and computer technology, engineering notation, electrical units, schematic diagrams, fundamentals of electronic and computer technology, and electrical components. Demonstrates theory and application of electronic measuring instruments and the construction of circuits

ETRO 102 – 4 Credits

Instrumentation for Engineering Technicians

Introduces fundamental principles and applications of optics, electronics, engineering, and computer software integral to the operation of instrumentation used in a variety of disciplines and research areas. Emphasis will be on systems used for data collection, imaging, and image processing, including examples drawn from local high-tech industries.

ETRO 105 – 4 Credits

Electronic Circuit Analysis I

Introduces topics including resistance, Ohm's Law, Kirchhoff's Laws, Networks with DC voltage sources, circuit analysis, Thevenin's Theorem and Maximum Power Theorems, and uses of meters.

ETRO 110 – 4 Credits

Electronic Technology I

Introduces topics including basic theory and operations of solid-state devices including diodes, bipolar transistors, field effect transistors, SCRs, and zener diodes. Covers electronic circuits performing limiting, rectifying, and amplification.

ETRO 112 – 4 Credits

Electronic Technology II

Continues the study of electronic devices and circuits including design of amplifiers, cascade amplifiers, power amps, FET amps, operational amplifiers, IC oscillators, timing circuits and introduction to communication circuits.

ETRO 140 – 4 Credits

Computer Networking I

Introduces network terminology, protocols, and standards. Covers the OSI model, basic concepts of routers and routing, and IP addressing including subnet masks. Defines and describes different network topologies. Develops configuration and router skills.

ETRO 161 – 3 Credits

Introduction to Optics & Photonics

Studies the physics of light, geometric optics, lenses, mirrors, polarizing lenses, interference/diffraction waves, laser physics, optical imaging, and bio-photonics. Provides lab experiments and projects to reinforce the theory.

ETRO 193v – 1-3 Credits

Internship I

Lower division course descriptions

Introduces the student to the work place, the student's major interest area, and the availability of job stations. Upgrades opportunities for specific skills dependent upon the job station. Provides work practicum credits based on one credit for each 75 hours of supervised work. Requires a work-related project during which the student will demonstrate competency in acquired employability skills. Student, instructor, and employment supervisor jointly develop learning outcomes. Instructor and employment supervisor jointly evaluate student. (May be repeated for a maximum of 3 credits.)

ETRO 201 – 4 Credits

Digital Computer Technology I

Introduces digital computer technology including number systems and codes, Boolean algebra, logic circuits, multivibrator circuits, data control circuits, and troubleshooting of digital circuits.

ETRO 205 – 4 Credits

Digital Computer Technology II

Introduces digital computer and microprocessor technology including memory circuits, microprocessor architecture, addressing modes, programming, stack operations, subroutines, input and output operations, microcomputer subsystems and interfacing, troubleshooting of computer circuits.

ETRO 293v – 1-3 Credits

Internship II

Introduces the student to the work place, the student's major interest area, and the availability of job stations. Upgrades opportunities for specific skills dependent upon the job station. Requires a workplace-based project for which the student evaluates and prepares a written proposal as a solution to specific job-related problems. Provides work practicum that emphasizes the employability skills objectives adopted as standards by the Electronic Industry Association (EIA). Student, instructor, and employment supervisor jointly develop learning outcomes. Instructor and employment supervisor jointly evaluate student. (May be repeated for a maximum of 6 credits.)

ETRO 298 – 4 Credits

Special Projects in Electronics Technology

Introduces special topics in electronic and digital computer technology. Creates, designs, and builds an electronic capstone student project under guidance of the instructor. Provides students the opportunity to gather the required schematics, components, and devices for the project. Allows option to repair or restore an existing electronic device.

ICS 101 – 3 Credits

Digital Tools for the Information World

Emphasizes production of professional level documents, spreadsheets, presentations, databases, and web pages for problem solving. Includes concepts, terminology, and a contemporary operating system.

ICS 110 – 3 Credits

Prereq ICS 101

Introduction to Computer Programming

Teaches fundamental programming concepts including sequential, selection, and repetition flow; variables and types; syntax; error types; compilation; linking; loading;

Lower division course descriptions
and debugging. Introduces algorithms, flow charts, UML, and other analytic tools.
Explains and practices problem solving and critical thinking methods.

ICS 111 – 4 Credits

Prereq ICS 110

Introduction to Computer Science I

Provides a background for students entering computer science, engineering, or other fields that require a background in computer programming. Teaches the basics of the computer hardware/software interfaces. Includes programs, applications, and compilers. Introduces programming concepts, algorithms, and problem solving techniques using high-level object-oriented programming languages.

Full-time students would take courses in this sequence:

Note: Each student's plan may be different from this sequence.

First Semester (Fall)	Credits	Second Semester (Spring)	Credits
ETRO 301 Engineering Mathematics	3	ETRO 350 Engineering Computing	3
ETRO 305 Power Systems and Sustainable Energy	3	Technical elective	3
ETRO 310 Applied Robotics	3	Technical elective	3
Technical elective	3	General Education elective	3
General Education elective	3	General Education elective	3
	15		15
Third Semester (Fall)	Credits	Fourth Semester (Spring)	Credits
ETRO 410 Project Management	3	ETRO 475 Advanced Instrumentation	3
ETRO 420 Electro-Magnetism	3	ETRO 498 AET Capstone	6
Technical elective	3	Technical elective	3
Technical elective	3	General Education elective	3
General Education elective	3		15
	15		

Appendix J

Bachelor of Applied Science

in

Applied Engineering Technology (AET)

See Curriculum Action Request (CAR) form for the college-wide general education and/or program SLOS this course supports.

5. Student Learning Outcomes (SLOs): List one to four inclusive SLOs.

For assessment, link these to #7. Recommended Course Content, and #9. Recommended Course Requirements & Evaluation. Use roman numerals (I., II. III.) to designate SLOs

On successful completion of this course, students will be able to:

- I. demonstrate knowledge of the concepts and fundamentals of wave optics.
- II. apply mathematical and engineering models and templates in problem solving related to optics.
- III. demonstrate and conduct basic experiments, as well as analyze and interpret data in the context of optical engineering applications
- IV. use the techniques, skills, and modern engineering tools for designing and optimizing optical components or systems relevant to real world situations (optical testing, optical fabrication).

6. Competencies/Concept/Issues/Skills

For assessment, link these to #7. Recommended Course Content, and #9. Recommended Course Requirements & Evaluation. Use lower case letters (a., b., c...n.) to designate competencies/skills/issues

On successful completion of this course, students will be able to:

- a. Understand concepts linked to light waves, wave optics and the interaction light-matter.
- b. Become familiar with the basics of reflection, refraction, diffraction, interference, and aberrations.
- c. Use optical devices and the applications of their properties to optical systems.
- d. Understand Fourier optics.
- e. Choose proper mathematical models and templates and apply to adaptive optics.
- f. Use engineering strategies to understand and design specific cases: aberrations, wavefront distortion.

7. Suggested Course Content and Approximate Time Spent on Each Topic

Link to #5. Student Learning Outcomes and # 6 Competencies/Skills/Issues

- Geometric optics applied to ray tracing, mirrors, lenses, and prisms. (2-3 weeks), (a, b)
- Wave optics in propagation of light, diffraction, interference. (2-3 weeks), (a, b, c, d)
- Wavefront distortions: introduction to Kolmogorov turbulence models. (2-3 weeks), (b, c, d)
- Diffraction and interferences: application to holography. (2-3 weeks), (b, c, d)
- Minimizing aberrations in mirrors and lenses: introduction to Zernike polynomials. (2-3 weeks), (c, e)
- Interferometry: application to surface measurement, tomography. (2-3 weeks), (c, e)
- Elementary Optical Systems: Telescopes, Illumination Systems, LIDAR. (2-3 weeks), (c, e, f)

8. Text and Materials, Reference Materials, and Auxiliary Materials

Appropriate text(s) and materials will be chosen at the time the course is offered from those currently available in the field. Examples include:

1. Eugene Hecht, "Optics", 4th, Pearson, Education, 2002, ISBN, 0-8053-8566-5.
2. Robert K. Tyson, "Introduction to adaptive optics", SPIE Press, ISBN 081943511-2

Appropriate reference materials will be chosen at the time the course is offered from those currently available in the field. Examples include:

- Accompanying practice exercises if available
- Articles, handouts and/or exercise prepared by the instructor
- On-line materials

Appropriate auxiliary materials will be chosen at the time the course is offered from those currently available in the field. Examples include:

- Scientific Calculator such as TI 30

9. Suggested Course Requirements and Evaluation

Link to #5. Student Learning Outcomes (SLOs) and #6 Competencies/Skills/Issues

Specific course requirements are at the discretion of the instructor at the time the course is being offered.

Suggested requirements might include, but are not limited to:

- Examinations (written and/or oral) 40-60%
- In-class exercises 0-10%
- Homework 10-20%
- Quizzes 0-10%
- Projects/research 0-10%
- Attendance and/or class participation 0-10%

10. Methods of Instruction

Instructional methods will vary considerably by instructor. Specific methods are at the discretion of the instructor teaching the course and might include, but are not limited to:

- Lecture, problem solving, and class exercises or reading
- Lab experiments and reports
- In-class exercises, homework assignments, quizzes, written examinations
- Projects or research (written reports and/or oral class presentations)
- Attendance and/or class participation,
- Audio-visual or internet presentations
- Visual step-by-step instruction with students
- Group or individual projects
- Service-Learning

11. Assessment of Intended Student Learning Outcomes Standards Grid attached

Appendix K

Bachelor of Applied Science

in

Applied Engineering Technology (AET)

Student Survey Results:

IN Spring 2009 students were surveyed in Maui CC ECET classes and ICS 101 classes in order to get data from both majors and non-majors. Students were also surveyed in Kauai CC electronics classes.

Students were asked to answer Yes or No to the following question:

I am interested in pursuing a Bachelor of Applied Science in Engineering Technology degree at Maui Community College.

Maui CC ECET majors:

83% yes

44 – yes

9 – no

Maui CC ICS 101 class A:

36% yes

11- yes

19 – no

Maui CC ICS 101 class B:

22% yes

2 – yes

7- no

Kauai CC Electronics majors:

66% yes

6- yes

3 - no

Appendix L

Bachelor of Applied Science

in

Applied Engineering Technology (AET)

LAS CUMBRES OBSERVATORY

Global Telescope Network, Inc.



February 25, 2009

To whom it may concern:

LCOGT and the Faulkes telescope project support the effort at Maui Community College to develop a Bachelor of Applied Science degree in Applied Engineering Technology. We are strong supporters of education efforts and believe the development of this degree will help diversify and strengthen the economy of Maui. LCOGT will provide access to the Faulkes telescope for students enrolled in this engineering technology program. Students will be able to gather data and thereby gain an understanding of the role of the technician in telescope operations. The LCOGT education effort on Maui will provide guided tours of the Faulkes Telescope North facility on Haleakala, allowing students to examine a world-class system in action.

LCOGT will assist with curriculum development such that the Faulkes telescope becomes an integral part of the training program on Maui. Students may design experiments and instruments for the Faulkes and gain real world experience with the challenges faced by the engineering technicians in design, implementation, and test in a functional telescope.

We hope that by providing Faulkes access and education the community on Maui will gain a better understanding of the opportunities and benefits LCOGT offers. We support the Applied Engineering Technology program development and hope for success.

Sincerely,

A handwritten signature in black ink, appearing to read 'Wayne Rosing', is written over the printed name and title.

Wayne Rosing
President

Las Cumbres Observatory Global Telescope Network, Inc.
6740 Cortona Drive, Suite 102
Goleta, Ca 93117

Appendix M

Bachelor of Applied Science

in

Applied Engineering Technology (AET)

Applied Engineering Technology – Budget Details

	2009-2010	2010-2011	2011-2012	2012-2013	2013-2014	2014-15
Students & SSH						
A. Headcount enrollment (Fall)	20	30	30	30	30	30
B. Annual SSH	480	720	720	720	720	720
Direct and Incremental Program Costs Without Fringe						
C. Instructional Cost without Fringe	132,756	142,802	148,514	154,455	160,633	167,059
C1. Number (FTE) of FT Faculty/Lecturers	2	2	2	2	2	2
C2. Number (FTE) of PT Lecturers	0.25	0.38	0.38	0.38	0.38	0.38
D. Other Personnel Costs	66,730	69,399	72,175	75,062	78,065	81,187
E. Unique Program Costs	127,200	130,200	138,200	91,200	90,200	83,200
F. Total Direct and Incremental Costs	326,686	342,402	358,890	320,717	328,898	331,446
Revenue						
G. Tuition	91,680	153,360	169,200	169,200	169,200	169,200
Tuition rate per credit	191	213	235	235	235	235
H. Other	244,008	198,964	204,098	159,447	165,011	170,797
I. Total Revenue	335,688	352,324	373,298	328,647	334,211	339,997
J. Net Cost (Revenue)	-9,002	-9,922	-14,408	-7,930	-5,313	-8,551
Program Cost per SSH With Fringe						
K. Instructional Cost with Fringe/SSH	368	262	272	283	295	306
K1. Total Salary FT Faculty/Lecturers	123,648	128,594	133,738	139,087	144,651	150,437
K2. Cost Including Fringe of K1	166,925	173,602	180,546	187,768	195,278	203,090
K3. Total Salary PT Lecturers	9,108	14,208	14,777	15,368	15,983	16,622
K4. Cost Including fringe of K3	9,563	14,919	15,516	16,136	16,782	17,453
L. Support Cost/SSH	214	214	214	214	214	214
Non-Instructional Exp/SSH	175	175	175	175	175	175
System-wide Support/SSH	39	39	39	39	39	39
Organized Research/SSH						
M. Total Program Cost/SSH	582	476	486	497	509	520
N. Total Campus Expenditure/SSH	385	385	385	385	385	385

Budget Justification

A.

Annual Headcount is calculated using a cohort of 20 students entering the upper division each year.

B.

Students take 24 credits per year in the major.

C.

Instructional cost w/o Fringe is based on 2 FTE FT Rank 3 Step 5 Faculty at \$61,824 annual salary for a total of \$123,648. This annual salary cost is increased by 4% per year. These positions have already been allocated to the Maui CC general fund and do not represent new funding requests.

C2.

Part-time lecturers(level B) and adjunct faculty. Six credits in year one. Nine credits per year after year one.

D.

¼ FTE clerical, 1.25 FTE student lab assistant, and a ½ FTE counselor. Current salary baselines are used and 4% per year are projected.

E.

Unique Program costs are calculated using projections for program development. The program will use extensive laboratory exercises and hands-on projects based on the technology used in local high technology companies. Computers and specialized software licenses, optics and electro-optics supplies, optics and electro-optics workstations and other costs have been estimated.

F.

Total costs are the summation of the direct and incremental program costs without fringe.

G.

Tuition is calculated using resident tuition fees as outlined in the Academic Cost and Revenue Template.

H.

Revenue is identified from a variety of extramural sources. There are several proposals that are currently funded and are expected to continue. Funding agencies have been contacted and have indicated that these year-long proposals will be continued. Revenue for the two faculty positions already allocated is shown. Revenues for these salaries will increase with the 4% of the salary cost increase projections. Additional funding from extramural sources has been identified and will pay for start up costs for year one through three.

I.

Total revenue is the summation of the individual revenue line items.

J.

Net cost is projected to show income to the campus.

K.-N.

Program cost per SSH with fringe is determined to be higher than the campus average of \$385 per SSH. This higher cost is due to the focus on applied hands-on laboratory exercises.

Comparative Costs per SSH

(Selected upper division classes beginning in Fall 2004)

<i>PROGRAM</i>	<i>Cost*</i>	<i>SSH**</i>	<i>Cost/SSH</i>
Business Careers	\$35,127	1566	22
Etron-Computer Eng Tech	86,599	1390	62
Hotel Operations	29,262	449	65
Accounting	73,479	726	101
Auto Body	22,788	142	101
Welding	4,215	41	103
Fashion Technology	25,632	226	113
Human Services	52,633	437	120
Office Admin & Tech	105,135	850	124
Administration Justice	27,648	201	138
Automotive Technology	49,209	353	139
Food Service	173,864	1184	147
Carpentry/Drafting	24,992	159	157
Building Maintenance	37,467	154	243
Nursing	385,836	1232	313
Agriculture	76,724	232	331
<i>Totals/Average</i>	<i>1,210,610</i>	<i>9342</i>	<i>130</i>

Notes:

* Source: Program Operating Resources Summary, Office of Dean of Instruction, Fall 2000 - except ABIT

** Source: Course Enrollment Report, UH IRO, Fall 2000 - except ABIT

**2006-07
COMMUNITY COLLEGES
EXPENDITURES PER SSH**

	EXPENDITURE (1)	SSH (2)	EXPENDITURE PER SSH	% OF INSTRUCTION	% OF TOTAL
GENERAL ACADEMIC INSTRUCTION	\$40,838,190	299,614	\$136	52.9%	24.7%
Humanities	\$22,771,000	157,562	\$145	29.5%	13.8%
Natural Sciences	\$11,412,639	90,446	\$126	14.8%	6.9%
Social Sciences	\$6,241,338	48,665	\$128	8.1%	3.8%
Other General Academic	\$413,213	2,941	\$141	0.5%	0.3%
OCCUP & VOC INSTRUCTION	\$36,355,315	115,635	\$314	47.1%	22.0%
Business	\$7,733,242	38,811	\$199	10.0%	4.7%
Food Service and Hospitality Ed	\$4,164,262	10,455	\$398	5.4%	2.5%
Health Services	\$9,698,489	19,422	\$499	12.6%	5.9%
Public Services	\$3,224,471	15,840	\$204	4.2%	2.0%
Technology	\$10,398,426	29,627	\$351	13.5%	6.3%
Other Vocational	\$1,136,425	1,480	\$768	1.5%	0.7%
INSTRUCTION	\$77,193,505	415,249	\$186	100.0%	46.7%

	GENERAL FUNDS	TFSF	EXPENDITURE (1)	EXPENDITURE PER SSH (3)	% OF NON- INSTRUCTI ON	% OF TOTAL
INSTRUCTION	\$69,282,133	\$7,911,372	\$77,193,505	\$186		46.7%
PUBLIC SERVICE	\$6,661,978	\$399,327	\$7,061,306	\$17	9.8%	4.3%
ACADEMIC SUPPORT	\$15,812,763	\$2,563,442	\$18,376,205	\$44	25.6%	11.1%
STUDENT SERVICES	\$11,161,475	\$1,116,677	\$12,278,152	\$30	17.1%	7.4%
INSTITUTIONAL SUPPORT	\$11,721,319	\$3,981,356	\$15,702,675	\$38	21.9%	9.5%
OPER/MAINT PLANT	\$12,217,963	\$4,352,512	\$16,570,475	\$40	23.1%	10.0%
SCHOLARSHIPS/FELLOWSHIP	\$51,108	\$0	\$51,108	\$0	0.1%	0.0%
AUXILIARY ENTERPRISES	\$1,757,361	\$0	\$1,757,361	\$4	2.4%	1.1%
NON-INSTRUCTION	\$59,383,969	\$12,413,314	\$71,797,283	\$173	100.0%	43.5%
CAMPUS SUBTOTAL	\$128,666,102	\$20,324,686	\$148,990,787	\$359		90.2%
SYSTEM SUPPORT			\$16,222,225	\$39		9.8%
UH			\$11,951,802	\$29		7.2%
CC			\$4,270,422	\$10		2.6%
TOTAL CAMPUS			\$165,213,012	\$398		100.0%

(1) Expenditures = General Funds plus Fringe Benefits and net Tuition & Fee Special Funds for regular Fall/Spring semesters

(2) Fall plus Spring for credit Student Semester Hours (SSH)

(3) Divided by total SSH for the campus for Non-Instruction and System Support expenditures

COURSE FTE (CFTE)*	13,842
INSTRUCTION PER CFTE	\$5,577
NON-INSTRUCT PER CFTE (SWS incl)	\$6,359
TOTAL PER CFTE	\$11,936

* Total SSH divided by 30