AUTHORIZATION TO PLAN (ATP) A NEW ACADEMIC PROGRAM

1. Prior to completion of the ATP, consultation has been made with the Vice Chancellor for Academic Affairs (VCAA) regarding the interest in proposing a new Engineering program.

2. **Campus/College/Department:** UHH/College of Agriculture, Forestry and Natural Resource Management (CAFNRM)

3. **Chair of Planning Committee:** Kenneth Morris

   **Planning Committee Members:** Christian Andersen, Dan Brown, Robert Chi, Jie Cheng, Tep Dobry, Bill Heacox, Randy Hirokama, Raina Ivanova, Ernest Kho, Bruce Liebert, Bill Mautz, Gerald Mello, Bruce Mathews, Jene Michaud, Ken Morris, Kenith Simmons, Marcel Tsang

4. **Degree/Certificate Proposed:** B.S. in General Engineering

5. **Describe the Need for Program:**
   a. Program Description
      
      1) **Program Learning Outcomes**
      In order to ensure the provision of adequate engineering education designed to meet the science and technology-oriented economic development opportunities and needs of Neighbor Island communities, we propose to offer an accreditable undergraduate degree at UH Hilo (UHH) in General Engineering. Initial funding for such a program was approved in HB346 in support of SR 105 which called for the comprehensive planning of undergraduate engineering program in UH Hilo.

      Learning objectives for program:

      1. Strong analytical thinking
      2. Strong quantitative skills
      3. Qualified to enter a wide variety of jobs
      4. One of the following
         a. Broad knowledge of instrument systems, including
            i. optical/photonics systems
            ii. electro-mechanical systems
            iii. computer interfaces and controls
         b. Broad knowledge of sustainable energy technology, including
            i. design principles
            ii. underlying physical, chemical, and biological science
            iii. equipment and associated technology

      2) **Program Justification**
      The Undergraduate General Engineering degree program addresses the UH Hilo Strategic Plan goal of “maintaining a well-rounded mix of liberal arts and professional programs.” This program will complement bachelor’s programs in Agricultural Science, Astronomy and Physics, Mathematics, Computer Science,
Biological Sciences and other degrees requiring engineering support of data acquisition, analysis and presentation systems, communication systems, and related components.

In order for the UH System to be better positioned to meet the State’s science and technology goals, UHH requires essential support to excel in applied and basic STEM (science, technology, engineering and mathematics) research fields that provide the hands-on experiences essential for our graduates to be competitive in the global discovery and innovation enterprise. The proposed Undergraduate General Engineering Program will serve as a complement to the existing STEM related research programs, and offer solid faculty-guided research experiences that can benefit student groups and community. The General Engineering program at UH Hilo will make an active and measurable contribution to the State's economy and provide a solid return on its investment both through the production of new knowledge and methodologies that help Hawaii's business and citizens, and through the enhanced educational experience of its students.

This degree starts by developing general engineering skills (aligned with the UHM/UHCCs pre-engineering curriculum) and provides upper division concentrations in collaboration with UHM and the Hawaii Island professional engineering community to produce graduates in areas critical to the State.

3) Program Rationale Based on Workforce Needs

The need in Hawaii is reflected in the following assessment done to identify the demand and need of engineers (Innovation and Technology in Hawaii: An Economic and Workforce Profile. October 2008; prepared for The Hawaii Science & Technology Institute):

- Engineer demand: Each year, in addition to the current workforce, the State of Hawaii needs approximately 100 electrical engineers and 35-50 engineers specializing in a wide range of other areas to fill projected existing and newly created jobs in government and companies.
- Engineer supply: Each year, the University of Hawaii Manoa graduates approximately 100 engineers from its baccalaureate and advanced degree programs in electrical, mechanical, and civil engineering. Approximately half leave Hawaii and therefore, between approximately 85-100 engineers must be imported, which represents the range of the annual in-state gap between supply and demand.

In collaboration with Big Island Engineering Association and Hawaii Society of Professional Engineers, a workforce survey has recently been completed to identify professional engineers’ needs, with focus on the Big Island.

There are currently thirteen working telescopes near the summit of Mauna Kea. Along with attracting more investments, recruiting locally has long been recognized by observatories as key development targets. A 2007 University of Hawaii'i survey
showed that only 18% of the astronomy observatories’ technical and administrative staff based on the island of Hawai‘i were born on the island. Despite significant costs, a full 40% of the observatories’ technical and administrative staff had to be recruited and relocated from overseas locations, primarily because the pool of qualified applicants on Hawai‘i Island was insufficient to fill the observatories’ needs. It would be very beneficial to both the local island community, and the observatories, if there was an adequate local pool of qualified candidates to fill these positions as they become available. Based on the requirements of the current observatories and creation of new positions planned for the Thirty Meter Telescope, together with ordinary job turnover, projections show that approximately 352 technical jobs will come open from 2010 through 2023 (Hawaii Island Astronomy Workforce Opportunities 2010-2023), for which our graduates in Instrumentation focus will be qualified.

b. Existing UH program(s)

The University of Hawaii Manoa (UHM) currently offers a bachelor’s degree in Computer Engineering, baccalaureate and graduate programs in electrical, mechanical, and civil engineering; Maui College has started an undergraduate program in engineering technology. The undergraduate degree in General Engineering that UH Hilo is planning is unique, and distinct from the existing programs at UH Manoa and Maui College. The proposed program will allow training opportunities in food technology, telescope engineering, sustainable energy, data manipulation and analysis, and engineering design, and will seek to address state needs for a workforce trained for high priority science and technology fields in the State. The program will have linkages to current and next generation observatories on Mauna Kea and other enterprises (especially in alternative energies) on the Big Island. Part of the plan is to recognize technologies that will benefit island societies, recruit students from these societies, and train them in the modern aspects of engineering science.

During the initial planning stage, consultations have been conducted with UHM College of Engineering. It is in agreement that the proposed engineering program with focuses on food technology, instrumentation and alternative energy would be valuable additions to the existing programs in UH Manoa.

To work within the constraints of resources and goals, a closer association with UHM Engineering at the upper division level and with Kapiolani Community College (KCC) at the lower division level is also in everyone’s interest. This will leverage our faculty, expand our possible areas of concentration, reconcile us with the UH Community College programs, and facilitate accreditation. The idea would be to create a “Faculty of General Engineering” composed of faculty from various campuses (largely by distance). Support for Manoa faculty participating in the program will be included in program planning.

6. Planning the New Program
   a. Planning Period
      i. The planning period will be from September 2012 through September 2013.
ii. An advisory committee of faculties selected from CAFNRM, CAS, COP and interested outside professionals from UH Mānoa and the professional engineering community will develop the degree requirements including core and elective courses. Once the degree program is developed, it will be submitted to the UHH Curriculum Review Process formal approval.

iii. The committee will create demonstration platforms and projects to engage faculty/students across involved departments and other stakeholders.

iv. The committee will coordinate with private/public community engineering stakeholders for shadowing, internship, and job opportunities.

v. The committee will set up budget analysis and manage the existing fund.

vi. Assuming that all approvals are received within schedule, the program will be implemented as following:

- Recruitment of students launched Fall 2013
- First faculty hired – Fall 2013
- Inaugural class enrolled Fall 2014

b. Description of resources required

In order to provide the above degrees, the following resources should be allocated to the UHH undergraduate General Engineering program:

i. Faculty – it is estimated that at full implementation the program would require approximately four new faculty members: two engineering faculty and two non-engineering faculty (e.g. Math). Engineering faculty is budgeted at $110,000 (associate rank) and $85,000 (assistant rank) per year per person without fringe. Non-engineering faculty at assistant professor level is budgeted at $60,000 per year per person without fringe. Additional support of lecturers for prerequisite and GE classes is required. Lecturers are budgeted at $5,000 per course.

ii. Equipment and Supplies – The costs are estimated at $125,000 for FY2013/14, $140,000 for FY2014/15, $50,000 yearly from FY2015/16 on.

iii. Library support – The program draws in partly on existing courses, but new books, archived databases and case files will need to be purchased by the library. Additional support on expanding collections at the library would require approximately $25,000/year and this number would increase to $30,000K/year when the program is in full implementation

iv. Lab support staff and Administrative staff – at full implementation, the general engineering program would require a full time lab support staff that would coordinate and manage teaching labs as well as practical labs. A full time administrative staff would be necessary for this program as his/her main job responsibility would be working with observatories and other enterprises on students’ internships, potential jobs, collaborative projects, etc.

c. Five-Year Business Plan. Attachment 1 shows the projected budget for the program.

Initial funding was approved in HB346 in support of SR 105 which called for the comprehensive planning of undergraduate engineering program in UH Hilo. HB346
provided UHH funding of $500K for planning (FY 2009/10 and FY 2010/11) and $300K a year for implementation starting from FY2011/12.

7. Impact on current courses or programs

Engineering-related education and training programs are a high priority for the State’s Innovation Initiative. UH Hilo already has a small pre-engineering program in place that, if properly restructured, could form the foundation for a full undergraduate program. The new program will give these students an option to finish their undergraduate degree in Engineering at UH Hilo rather than transfer to a mainland university or to UH Manoa. Graduates of this program will have the opportunity to apply to the UH Manoa graduate program in Engineering and specialize in biological, civil, electrical, mechanical, or ocean resources engineering. This program’s implementation will also facilitate a name change for the College of Agriculture, Forestry and Natural Resource Management to the College of Agriculture and Applied Science.

This program will complement the UH Manoa programs in engineering by providing an alternative to UH Manoa’s emphasis on traditional engineering disciplines, allowing instead a highly flexible, interdisciplinary education appropriate to the job opportunities in rural areas such as the Big Island. Additional engineering curriculum offerings would allow the University of Hawaii System to excel in applied and basic science, technology, engineering, and mathematics research fields that provide the hands-on experiences essential for its graduates to be competitive in the global discovery and innovation enterprise.

Ripple effect has been taken into consideration on the current courses and programs. Affected departments were consulted regarding availability of instructional resources for existing and planned courses for this proposed Engineering Program. A draft curriculum was sent out to affected departments. A business plan for the proposed program has taken collective input regarding additional instructional resources needed into consideration.

The ATP has completed the campus approval process prior to review by the Council of Chief Academic Officers.
Reviewed by:

*Campus Chief Academic Officer:* [Signature]  
Recommend  
Comments:

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<th>Kenith Simmons</th>
<th>SEP 06 2012</th>
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*Chancellor:* [Signature]  
Approved  
Disapproved  
Comments:

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*Council of Chief Academic Officers (Systemwide Consultation):*
Comments:

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(A copy of the signed document is provided to the Office of the Executive Vice President of Academic Affairs/Provost)
## Attachment 1. Undergraduate General Engineering Program Business Plan

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<th>Year</th>
<th>FY2013/14</th>
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Attachment 1. Undergraduate General Engineering Program Business Plan

Budget Assumptions:

1. Inaugural Class will enroll in Fall 2014 (FY2014/15)
2. Two Engineering Faculties with proposed salary of $110K and $85K w/o fringe respectively are budgeted (BOR already approved two additional engineering positions for UHH). Two non-Engineering faculties (e.g. Math) with average salary w/o fringe $60K per faculty are budgeted. First Engineering Faculty will be on board fall 2013 (FY2013/14) The rest of the faculties hiring schedule is as follows: second engineering faculty on board fall 2014 (FY2014/15), the first Non-Engineering faculty on board fall 2016 (FY2016/17), and the second Non-Engineering faculty on board fall 2017(FY2017/18). An annual increase rate of 3% has been included in the budget.
3. An annual increase rate of 3% has been included in the salary budget for lab support staff and Administrative staff.
4. Prerequisite GE costs are calculated by filling in with lecturers, and lecturer rate is budgeted as $5000 per course.
5. 20 students per freshman class, on average 5 students drop out the program after freshman, and another 5 students drop out the program after Sophomore.
6. A $400/semester professional fee charged to undergraduate engineering students of sophomore, junior, or senior standing only.