MEMORANDUM

TO:       David Lassner
          Interim Chancellor
          University of Hawai‘i at Mānoa

FROM:    Risa E. Dickson
          Vice President for Academic Planning and Policy

SUBJECT: Authorization to Plan for Bachelor of Science in Engineering Science

The subject program was discussed at the UH System Officers meeting on April 10, 2017 and was approved to move forward for purposes of planning.

cc:      UH System Officers
          Wendy L. Pearson, Program Officer
          Joanne Itano, AVP for Academic Affairs
MEMORANDUM

TO: Risa Dickson
   Vice President for Academic Affairs

VIA: David Lassner
    Interim Chancellor

FROM: Michael Bruno
    Interim Vice Chancellor for Academic Affairs
    and Vice Chancellor for Research

SUBJECT: Authorization to Plan for Bachelor of Science in Engineering Science

March 23, 2017

Attached please find an Authorization to Plan (ATP1) for a Bachelor of Science in Engineering Science from the UHM College of Engineering. I believe that you will find that this proposal is responsive to state need and addresses several strategic goals of the Mānoa Campus. Per the new review procedures:

ATP1 is submitted by the Campus Chancellor to the System Vice President for Academic Planning and Policy for review by the ATP1 committee consisting of the President, Vice President for Academic Planning and Policy, Vice President for Community Colleges, Chancellors from the four-year campuses, and a representative from the campus proposing the new program (Vice Chancellor for Academic Affairs for four-year campus or Chancellor for Community College).

Upon successful review by the ATP1 committee, we will forward the request to the Council of Chief Academic Officers (CCAO) for consultation. Should you have any questions, please let me know.

Attachment

c: Program Officer Pearson
Request for the Authorization to Plan an Academic Program at Manoa

1. **Locus**
   University of Hawai‘i at Mānoa, College of Engineering (CoE)

2. **Degree proposed and program objectives**

   **Degree proposed:**
   Bachelor of Science in Engineering Science

   **Program Objectives**
   The BS in Engineering Science will allow students to follow a more interdisciplinary degree than the current degree structures and restrictions allow. This is discussed subsequently. This program will prepare graduates to accomplish the following:

   - Graduates will be successful in entering graduate programs (MS, PhD) or professional schools, or
   - Graduates will practice in a range of engineering fields, or
   - Graduates will engage in research and development of new products, tools, and business.

3. **Alignment with the Campus and UH system mission, academic plan, or strategic direction**

   The proposed program is consistent with the University of Hawai‘i Strategic Directions, 2015–2021, i.e. Hawaii Graduation Initiative (HGI), Hawaii Innovation Initiative (HII), 21st Century Facilities (21CF), and High Performance Mission-Driven System (HPMS). The program will provide an additional and flexible opportunity for students to pursue an engineering degree. This will help increase the participation and completion of students, including students from underrepresented student populations, and prepare them for success in the workforce and communities (HGI and HPMS). In particular, the program will provide an opportunity for students to pursue a multi-disciplinary engineering education, which will lead to innovation and cutting-edge research and development (HII). The new program will stimulate development of new research and educational activities that will help generate revenue needed for facility maintenance and upgrade (21CF).

4. **Justification of need**

   New disciplines and corresponding degrees in engineering have emerged over the last several decades. ABET, the accreditation organization for engineering programs, recognizes 28 different engineering programs, each with different program criteria. UHM has 4 programs in CoE and 2 programs in other units. This new program,
which is one of the 28 ABET-recognized programs, will allow new, emerging and interdisciplinary fields to be accommodated within engineering’s accreditation structure. The intention is to seek program accreditation by ABET (the engineering accreditation organization), so that graduates will have an ABET-accredited degree.

The Engineering Science degree admits the possibility of very different “tracks”. If a track gains sufficient momentum, it can be spun off at a later date into a specialized degree. The first track will be in biomedical engineering. The employment of biomedical engineers has grown at a much faster rate than any other engineering occupation. According to Bureau of Labor statistics, from 2014 to 2024 the projected growth of biomedical engineering related jobs is 23%, much higher than the average of all occupations, 7%, and engineers, 4%.

According to Hawaii Health Information Corporation, the growth rate of the elderly population is much larger than the national average rate. The demand for biomedical devices and procedures is expected to increase, which will stimulate the growth of the local biomedical engineering industry and lead to an increasing demand of locally trained biomedical engineers. The need is also bolstered by the ever-increasing technological nature of medical practice. As such, the proposed BS in Engineering Science program will serve as an incubator for a full-fledged biomedical engineering program that will provide strong support of the future workforce development.

Figure courtesy of http://www.healthtrends.org/demo_elderly_pop.aspx
5. **Demand for the program**

There are four BS programs in the College of Engineering, i.e. Civil Engineering, Computer Engineering, Electrical Engineering, and Mechanical Engineering. Many faculty members have been historically conducting high-profile research in biomedical engineering with active collaborations with the JABSOM Medical School and Cancer Center. These research activities have high potential to create significant intellectual property and they require students with a specific interdisciplinary training. The proposed program will provide interested students the knowledge and skill sets necessary for biomedical engineering research and innovation activities.

The faculty to support the initial track in biomedical engineering are already in CoE (EE, ME, and HCAC). It is anticipated that initially most of the students will be students that would otherwise choose either ME and EE, but who are actually more interested in the biomedical field. As the program grows and becomes established, we expect it to attract new students. It is anticipated that the new program will attract 5-6% of the pre-engineering students and a similar percentage of students in mechanical engineering and a handful of electrical engineering in the first year. The current pre-engineering enrollment is about 250. The expected first year enrollment is 20. In the second year, we anticipate 8-10% of the pre-engineering students and roughly the same number of students from mechanical engineering and electrical engineering will enroll in this program, which will make a class of 30. By the 5th year, we expect a stabilized annual enrollment of 50.

6. **Non-duplication of program**

Bachelor of Science in Engineering Science is an ABET-recognized engineering degree. There are no similar degree programs offered at other UH institutions. It is noted that Biological Engineering and Biomedical Engineering are two different ABET-recognized programs with completely different program criteria for accreditation. The proposed biomedical track does not duplicate in any sense the existing ABET-accredited BS in Biological Engineering program in CTAHR in that Biological Engineering is focused on engineering biological systems, whereas biomedical engineering is focused more on engineering systems/components for use in and on humans. That is, Biomedical Engineering is envisioned to be more device-centric than is Biological Engineering. It is the intention to add more tracks to the program according to the need in the future, but no track envisioned within the Engineering Science degree duplicates any degree program offered at other UH institutions. The program criteria of Biological Engineering and Biomedical Engineering can be found from ABET at http://www.abet.org/accreditation/accreditation-criteria/criteria-for-accrediting-engineering-programs-2017-2018/#program