REVIEW COMMITTEE CHARGE AND APPROACH

The committee was charged with reviewing the graduate programs for the three Departments in the College of Engineering which include Civil and Environmental Engineering (CEE), Electrical Engineering (EE), and Mechanical Engineering (ME). All Departments have MS and PhD programs.

The review is based on documents provided by the University and College and interviews and discussions with various Graduate-program groups within the University.

Interviews and discussions took place with various stakeholder groups including:

- University-Level Meetings:
  - Office of the Vice Chancellor of Academic Affairs: With all team members.
  - Univ. of Hawaii Foundation: By Dr. Cheung
  - Vice Chancellor of Academics, Finance and Operations: With all team members.
  - Vice Chancellor of Research: By Dr. Nosal
  - Graduate Division: By Dr. Cheung and Dr. Lum
- College-of-Engineering-Level Meetings
  - Dean and Associate Deans: With all team members.
  - Academic and Support Staff: By Dr. Lum
  - Academic Assessment Office: By Dr. Nosal
- Department-Level Meetings with Chairs, Graduate Faculty, and Graduate Students separately:
  - CEE: By Dr. Lum
Subsequent to these meetings debriefings of preliminary findings were provided by the committee with the following groups:

- Engineering Deans and Associate Deans
- Associate Vice Chancellor of Academic Affairs (Laura Lyons) and Program Officer (April Goodwin)
- Exit Report Summary with Deans, Chairs, Faculty, Staff and Graduate Students.

This review report is structured as follows, Committee Meeting summaries segmented into University- and College-Level summaries, individual Department summaries and an overall summary of key points and recommendations.
OVERVIEW

As the only engineering school in the State of Hawaii, the College of Engineering at the University of Hawai‘i at Mānoa plays a critical role in serving the State of Hawaii and in shaping Hawaii’s future. Graduates of CoE, many of whom are Hawaii residents, supply the much of the engineering workforce for Hawaii. The College is well poised to lead Hawaii’s economic recovery by training Hawaii residents to fill the jobs that Hawaii needs, and by serving as a seeding-ground and driver for new developments in sustainable economic sectors. With proud and loyal alumni serving in all sectors and at all levels in the State, CoE’s ties with local industry and economy are strong and vibrant. Fueled by a recognition of the importance of a strong engineering school and support from administration at UH Manoa, CoE is on a strong upward trajectory, with a recent rapid growth in enrollment and an increasingly active research enterprise. Current leadership at the College is strong, forward-looking and effective.

COLLEGE-LEVEL RECOMMENDATIONS

Introduction

The on-going COVID-19 pandemic has sharpened the focus on the University of Hawaii as an institution that can play a key role in the State’s recovery effort. In pivoting toward diversifying our economy further and enhancing the quality of the tourism industry, the University is needed more now than ever to lead development of and training for new segments of industry and for the future work force. The College of Engineering is one of the key sectors poised to lead these developments.

Recommendations

We recognize, applaud, and strongly recommend the continued support and prioritization of CoE by UHM leadership.

An “Economic Diversification Committee”, possibly an extension of the Dean’s Council or External Advisor Committee, formed from a diverse set of stakeholders and sectors could be an effective and powerful mechanism to help the College plan and pivot strategically in response to new challenges and opportunities.

Post-Graduate Degrees and Certifications

The MS program was recently enhanced with the implementation of the Bachelor’s and Master’s (BAM) program. The program allows for up to three classes to be double counted between the BS and MS programs and aims to incentivize students to pursue an MS degree. Certificate programs are also being considered to supplement degree programs and address community needs.

Recommendations

Certificate programs could enhance the skill sets of graduate engineers by supplying necessary supplemental background for many disciplines. At Dr. Lum’s former company, R.M. Towill Corp. Wastewater Department, an MS Degree is encouraged but background in selected areas is a requirement. This is implemented by having personnel take selected courses from the College of Engineering MS program in Environmental Engineering. A certificate program could fill this need.
Care should be given toward the development of this program such that it does not “rob” from the MS Program. However, it could work in favor of recruitment as some may view the certificate as halfway to an MS so it may facilitate a decision to obtain the MS.

Consolidation/Restructuring of Programs

Continuing restructuring of programs is an ongoing process in university systems and the UH is no exception. The pandemic, and its impact on budgets, has added to this process in terms of the reconsideration of marginal programs and potential growth of promising programs.

Broadening the CoE programs is under consideration. Possible program restructuring includes:

- Create an Aerospace Engineering Department (or expand ME to include AE).
- Create a Biomedical Engineering Department (or expand ME to include BE).
- Introduce an Ocean Engineering undergraduate track (possibly via Engineering Science). The BAM mechanism is being considered in coordination with the ORE MS program.
- Agricultural Engineering is another area of potential development.

Recommendations

Restructuring should be conducted strategically. It should be data-driven, and involve open dialog and input from all involved levels and sectors.

Graduate Student Support - Overall

Graduate student guidance and support was identified as an area of significant need.

One issue is that nearly all of the advising and oversight tends to fall on the graduate student advisor and the graduate chair. The technical aspects of the student’s program are covered but other aspects of the students’ needs appear lacking.

The “advisor guides everything” model appears to have the following areas of concern:

- The well-being of the student relies on one or two faculty members.
- Should the advisor leave, the student is left with looking for another advisor and there have been situations where the student is left out in the cold. (Note: Dr. Lum had direct experience in this area when his advisor for the PhD program passed away suddenly from illness after the second year of his program. “It sort of felt like no one really cared about the research project.”)
- Administrative aspects of student life are also left to the advisor, which is especially magnified for foreign students. Items include, where to go for health (including mental) concerns, addressing income-tax issues, and especially VISA and travel issues for foreign students. Many of these aspects are beyond the responsibility and skill set of the advisor.

Graduate Division indicated that supplemental administrative services are available but apparently some students are not aware of these services and/or they are not sufficient to meet student needs.
Recommendations

Prioritize graduate student well-being and success beyond the typical Advisor/Student relationship. Graduate students support the research enterprise at an R1 institution; they are our future and their well-being should be a high priority. Add systems and/or programs to ensure needs are addressed and do not fall through the cracks.

One support method is to have a graduate student advocacy position to address overall student-life needs. The advocate could take the lead in the following support areas:

- Identify resources available, such as what support is available at Graduate Division and other offices across the campus (such as the International Student Services Office).
- Be the lead on improving communication between Departments and Graduate Division.
- Be a resource to go to for students who come in without a research advisor. The College would need to be involved in developing a “system”.
- The advocate should maintain procedures or direction on a variety of issues in writing. For example, graduate Student “Handbooks” could be expanded and updated to include information related to student support.
- Introduce a mechanism, preferably separate from the student academic/research advising process, to identify and assist “at risk” graduate students (e.g. those facing funding uncertainty; caught in disputes/delays/issues beyond their control; facing issues inconsistent advising etc.) of which the advocate can oversee.

Department Student Handbooks: Expand content (if needed) and awareness of the handbooks, and update them regularly. If not already included, add non-academic items related to administration and everyday living and emergency needs.

Foster Graduate Student Interaction - Graduate students can internally provide excellent support for each other. The College can promote this by supporting initiatives aimed at graduate student activities and interaction. Possibilities:

- Develop mechanisms that foster cohort-building and student interaction. Possible opportunities include: offer a common course for ME (or, more broadly, CoE) incoming graduate students; encourage club and/or society activities among students; host department mixers with effort targeted at welcoming and introducing incoming students and other personnel; broaden and re-energize the ME seminar series
- Consider centralized/consolidated graduate student office space
- Incentivize joint projects and peer-to-peer mentoring among graduate students.

Graduate Student Support – Graduate Assistant Compensation Rates

Rates vary considerably between departments and sometimes within departments. Some graduate assistants are very well supported while others report varying levels of financial stability (with some facing hardship). Compensation should be reviewed with comparable institutions nationally.

Recommendations

Review graduate assistant compensation rates. Among the items of potential concern:
● Evaluate pay rates and cost of living consistency with the costs of living in Hawaii and with sister colleges across the nation to ensure competitive compensation rates to attract and retain top students.

● Consider implementing a college-level policy regarding (minimum levels) for student pay rates. This could help protect graduate assistants and ensure fair treatment by requiring overview at the Dean’s level for cases of lower-than-CoE recommended rates. Support above minimum should be encouraged (e.g. by raising pay steps is a PI is able, or by paying overload).

Initiate a “rainy-day” fund and/or scholarship to provide support for students in need.

Pursue philanthropic fundraising for graduate student scholarship and support.

Encourage and help graduate students apply for scholarships and fellowships (federal, private, and other)

Solicit continued feedback from graduate students regarding their needs and experiences. We found that some students were (understandably) reluctant to speak openly in a public setting – allowing a mechanism for confidential and/or anonymous feedback and response could help.

Research Enterprise

The College of Engineering and its research enterprise have seen significant acceleration over the past several years with research income has increased from $3M to $8M to $17M. The Faculty has increased by 20% in the past decade. Excellence in research and innovation driven by extramural research funds research dollars which largely fuel the engine of a competitive engineering enterprise and graduate programs.

Recommendations

The Dean’s office and UH administration should continue to foster and support the research enterprise at CoE. Suggested ways to provide support include:

● The Graduate Student support programs recommended above would free faculty to spend more time on technical aspects of their work including promoting research and having more capacity to accommodate more research.

● Establish a healthy and solid administrative support structure for pre- and post-awards. Free faculty from administrative burdens involved with grant writing so they can focus on the technical parts of proposals.

● Coordinate efforts across the College to target large research funding opportunities. Develop a platform to facilitate connections and collaboration (e.g. identifying potential collaborators for specific funding opportunities).

● Department Chairs and College Deans should ensure fair access to support by Junior Faculty.

● Provide incentives and support research excellence. Examples:
  ○ Manifest the buy-back of teaching time (reducing course load) via extramural funds when appropriate
  ○ System of communicating research efforts and recognitions.
Graduate students are the gears behind the research enterprise. Evaluate financial support needs and provide competitive and life-sustaining compensation.

Consider seeding soft-money research and support positions to (continue the) kick-start of a thriving CoE research enterprise. Bring on personnel who are ultimately funded exclusively by extramural funds can develop into a self-sustaining system that feeds into faculty and student research efforts.

Program Diversification and Teaching

Some programs offer few graduate level courses (Note that this is in part because of rapid growth in undergraduate programs and a delayed response in growth in faculty – as faculty counts catch up with student enrollment, faculty increasingly have more time for research and graduate level teaching).

Recommendations

Re-visit graduate-level course needs and teaching availability.
Explore potential for cross-college course offerings
Organize and collaborate on college-wide teaching initiative
Explore potential for collaborative teaching efforts with other schools/colleges
Encourage course cross-listings

Administrative Support

CoE suffers sorely from insufficient administrative staffing and support (secretaries, fiscal officers, human resources personnel, etc). The College (faculty numbers, student numbers, research funds, programs) has grown but support has not followed (and has declined due to attrition and the hiring freeze). Admin staff may feel overstressed and undervalued, leading to pockets of low morale and efficiency. Faculty and students endure long waits (many months) for information and reimbursements which negatively impacts studies and productivity and contributes to an overall sense of frustration.

Of special note is the potential shortfall in grants review manpower which could be a roadblock to research growth.

Recommendations

Restore and expand administrative position counts as soon as is possible/practical.
Prioritize the health, efficiency and productivity of the administrative team (they are the engine behind the college).
Facilitate communication internally between administrative personnel, and also between faculty and administrative staff to curb disruptions to efficiency due to personality and expectation mismatch.
Look closely at administrative operations to make modifications (including training, reassignments, routing, etc) if and as would benefit the college. For example, consolidating/centralizing tasks assignments across units (e.g. GA hiring, travel completions, purchase orders etc) might be one way to help increase efficiency.
Exploring creative solutions may be necessary/productive in light of the current difficult budget climate (e.g. explore the potential for using “floater” support personnel, supporting administrative staff via extramural (and/or overhead) funds, sharing staff between units etc).

Recruiting

The traditional MS program includes a Plan “A” route that includes as MS thesis and is typically a 2-year program. The Plan “B” route requires an MS project and additional coursework in lieu of an MS thesis and can be completed in less than 2 years (this route is not used by all Departments). The BAM program, which allows for up to 3 courses (one 400 and two 600 level) taken for the BS be double counted toward an MS, is anticipated to encourage the pursuit of MS degrees and is showing early signs of success.

The recruiting effort in Asia is well developed and the COE has fostered many key contacts in the region. COVID-19 has however dampened these efforts in the interim. There was a loss of 7 PhD recruits due in the CEE Department due to COVID-19 and political changes (though most of the recruitments are likely deferred, not lost).

An attempt to recruit higher-skilled students by researching GRE scores was considered too expensive.

Some undergraduate students indicated that there seemed to not be an obvious effort to recruit seniors for Graduate School.

Recommendations

Ramp up graduate-student recruitment efforts (local and abroad).

Conduct college-wide, national-level marketing efforts for graduate programs.

Build branding, create a strong presence on social media for graduate programs.

Explore changes to improve national rankings.

Continue to boost the college research enterprise which will boost the national reputation of the college and attract top students.

Alumni Data

Input from and data regarding alumni (including placement) is generally unavailable for graduate programs (but there are exceptions e.g. the EE Department does have some placement data that needs updating). This information would be valuable in terms of modifying programs for success, steering the future of the college, and highlighting the impact and success of graduate programs. Regular program feedback and assessments have potential to guide changes aimed at optimizing learning, improving programs, and preparing students for future successes.

Recommendations

Improve alumni tracking efforts.

Institute a system of alumni program evaluation and feedback mechanisms.
Conduct exit interviews for CoE graduating graduate students to collect information on placement and to solicit feedback about and suggestions for the program.

Conduct employer surveys to identify areas of need and improvement.

Regularly update graduate alumni contact and placement data.

Strive to make assessment a regular and meaningful process. For example collect, process, and respond to program information in a way that feeds back into positive development for the programs.

Facilities
Faculty research laboratory space and graduate-student working space was cited as critical needs for the CoE.

Junior faculty cited the need to wait up to years for adequate space at times. This puts a roadblock on their potential success and limits the growth of the research capacity of the departments.

Space limitation ultimately feeds back to insufficient support for graduate students and programs. Student office assignment is handled on a case-by-case basis, with some students lacking access to a desk/office, and others relying on their faculty advisor to provide space in their labs. Relying on faculty to arrange space for students can be problematic for faculty without space and/or students without advisors.

Recommendations
Efforts to relieve the space constraints faced by CoE should continue with renewed energy and creativity with support from UH admin.

Assigning appropriate research lab space for faculty should be a priority. This is critical to the success and future of the faculty member (hence the department and college) and will support graduate student research and projects.

CoE can/should consider addressing graduate student office availability and assignment at the college level and/or by working directly with departments to help/support the development of space and mechanisms for consolidated student offices. Centralizing student offices could be a more efficient use of space than relying on case-by-case assignments and will provide a productive and beneficial way to foster communication between students/labs and a supportive student environment.

Entrepreneurship in engineering
This is an important and potentially transformative endeavor for the University and the State. The Dean’s Office would be the likely stakeholder to initiate this effort.

Recommendations
Foster and develop an entrepreneurial program for CoE graduate students, in collaboration with Shidler College of Business.
Recruit qualified, energetic, and entrepreneurial graduate students and faculty. Leverage BAM pathway.

Partner with supporters in industry to offer a college-wide graduate level course and programs on entrepreneurial endeavors in engineering.

Inter-departmental Communication

There seems to be an overall lack of knowledge and interest/communication between departments, and sometimes internally within departments. Some students feel isolated. There is significant potential for growth and mutual benefit through extended interaction in the College. This extends also beyond CoE to other colleges/schools on campus.

Recommendations

Aim to develop and foster college-wide interaction and collaboration. College-wide initiatives might include grant-writing sessions, joint (CoE wide) graduate-level courses, college-wide seminar series (possibly featuring CoE faculty and/or projects, or invited guest speakers).

Introduce common (cross-department) graduate course(s).

Establish and strengthen connections between faculty, cross departments, and cross colleges/schools.

Encourage faculty and student ownership of community-building, possibly by providing seed funds and/or other incentives.

Conduct a survey and/or otherwise solicit feedback and ideas regarding College climate and collaboration.

Encourage cooperating faculty membership between departments.

Incentivize and facilitate joint mentoring/advising for graduate students. Consider adopting/enhancing a system that allows for joint chairship on graduate student committees.

Create common spaces and events where graduate students and faculty can co-mingle with other units.

Encourage interaction between student professional groups / encourage grad students to join these.

DEPARTMENT-LEVEL RECOMMENDATIONS

Civil and Environmental Engineering

A positive preface was given for the CEE Department. Ranking has climbed to within top 100 in the US News ranking. Morale is considered high and the working environment is collaborative.

The enrollment in the Graduate CEE program overall is favorable and in a positive trend for both MS and PhD levels. Current enrollment included 43 MS students and 19 PhD candidates. Of the MS students 19 were in the BAM program. This well exceed the minimum program requirements of >5 MS students and
>3 PhD candidates. The only sub discipline that could use higher enrollment is the Structural group. A lack of faculty contributes to the limited enrollment. MS Degrees are considered necessary for the Environmental, Transportation, Structures and Construction sub-disciplines.

The PhD program enrollment was adequately attended and depends on the available research money. Generally, there are enough candidates to match the available research money. The limiting capacity would be the available faculty. Research money levels are currently considered high. The rapid rise could be stretching Faculty resources. COVID-19 however has resulted in the deferral of 7 PhD candidates potentially mitigating this situation. PhD candidates are predominantly from foreign countries and COVID-19s impact is being felt here. Diversity efforts were enhanced with successful initiatives to recruit and support Native Hawaiians in the PhD program in the CEE Department. Two Native Hawaiian PhDs were conferred in 2019.

The Faculty is considered overall young and active faculty. Although it is considered about right size for the current research activity, some of the undergraduate Senior classes are quite large (70 to 80 students) due to Faculty Graduate School commitments. Overall Faculty levels are considered adequate. However, for each sub-discipline a minimum of 3 is suggested to provide the necessary coverage.

Faculty access, laboratory facilities were considered adequate. Only coursework in the Structural discipline was considered limited. The BAM program was viewed positively to promote the pursuit of an MS.

In summary there appeared to be no major issues and CEE appears to be in a good spot. Some suggested improvements were mentioned as follows:

- Recruiting is one area that appeared to be able to have more focus on. The recently instituted BAM program helps with MS recruitment but the PhD recruiting program was cited as lacking. Students also noted the lack of recruitment efforts as an undergraduate. A discouragement, possibly, to recruiting is the recent Board of Licensing to disallow the MS degree 1-year experience credit if it occurred while the candidate was fully employed.

- Providing Student Collaboration Opportunities: Provide a mechanism / area where graduate students can connect, especially the PhD students.

- Providing Guest Speaker Resources:
  - Possibly 2X/semester
  - Dr. Lum suggested collaborating with private sector whom regularly bring in specialized personnel that could provide speaking services on the same travel itinerary, thereby reducing speaker costs significantly.

- Some Faculty needs were noted as nice to have:
  - Teaching Assistant for graduate classes.
  - Technical support for labs.

**Electrical Engineering**
The College of Engineering’s Electrical Engineering (EE) Department offers M.S. and Ph.D. degrees in its graduate program, with the first degrees started in 1961 and 1966 for M.S. and Ph.D. programs, respectively. The graduate program research activities focus on three main areas: Computer Engineering, Electrophysics, and Information Systems and Technology. The EE Department has approximately 18 full-time faculty, and in 2019 there were approximately 31 M.S. and 17 Ph.D. graduate students enrolled in the graduate program. The EE department is well-respected and has historically produced excellent undergraduate and graduate-level engineers who have contributed to academia and industry. A notable accomplishment of the Department is the pioneering computer networking system protocol called ALOHAnet, developed by EE faculty in 1970.

The review consisted of focused meetings with the EE chairs, the EE faculty and EE graduate students, as well as offices such as VCAFO, UH Foundation and Graduate Division. The major findings and recommendations were largely consistent with the College of Engineering as a whole; specific issues there were especially pertinent to the EE Department are discussed below, along with recommendations.

**State of the EE Department.** The EE graduate program is on a positive trajectory in recruiting high-quality faculty, increasing extramural research awards and producing qualified graduates. There is considerable support for the department from the UH president and provost, and leadership within the department (Dean’s office and chairs) is strong. However, budgetary constraints outside of the college’s control are threatening to slow or stop the department’s growth.

**Recommendations**

The department should place more emphasis on winning extramural research awards. The resources resulting from extramural funding are critical in a budget-constrained environment, and a significant portion of the funding is largely under the discretion of the department and college.

To support the faculty in attracting extramural research funding, the college and department needs to invest the proceeds of the funding, including the portion that goes into the so-called Research and Training Revolving Fund (RTRF), to provide support for the faculty in terms of staffing, attracting high-quality graduate students, and improving facilities & equipment. The reviewers recognize that there are limitations to how the funding can be used, and creative methods to use available funds may have to be developed. A review of how such resources are currently being used, and how they might be better leveraged, is recommended.

The college and department should explore ways to improve the department’s national rankings, to help recruit high-quality graduate students and improve chances of winning extramural awards. Factors that are part of the ranking methodologies should be examined for improved scoring, including but not limited to: faculty size, research activity, student/graduate/industry assessments, student-to-faculty ratios, etc.

The EE Department’s graduate program website should be reviewed, updated, and improved to enhance outreach and recruiting of faculty and graduate students.
The EE Department as an Economic Driver. The EE Department is in a favorable position to be an economic driver for the University of Hawaii and the State of Hawaii. The ability for the department to acquire extramural funding in the form of grants and contracts is the way to not only survive austere budget environments, but to thrive and drive growth in the university and the State of Hawaii. The EE Department has historically been the leader in the college in terms of winning extramural funding. Entrepreneurial faculty and graduates of the EE Department have a proud legacy of creating technologies that can become new businesses that create jobs, royalties, license fees and revenue. Examples of such success include Adtech, Terasys, Nalu Scientific, Adnoviv, and many other companies that have spawned from the EE Department. EE faculty and graduates are not only developing the future workforce for the State, but are also creating future jobs that tomorrow’s graduates will fill.

Recommendations:

The college and department should encourage and support faculty to increase grant applications to continue the growth in extramural research funding.

The college and department should foster inter-departmental and inter-college collaborations to inspire novel and innovative solutions that will lead to funding. In particular, collaborations with the Shidler School of Business will be important for entrepreneurship.

As faculty succeed in winning grants, the college and department needs to continue to support the growth by providing administrative help, increasing the number of faculty, and recruit qualified graduate students to perform the research.

Significant Need for Improved Facilities in the EE Department. There is a need for more and improved facilities and laboratories for graduate research activities. Both faculty and students expressed frustration in both the lack of adequate space for research and the state of disrepair of some existing facilities. Graduate students also find it challenging to find adequate office space, with most using research laboratories as offices. As a result, there is limited interaction amongst EE graduate students, and certainly with students of other COE departments and other colleges. In particular, EE graduate students identified the lack of access to fabrication labs, machine shops and computers.

Recommendations

The college and university administration should continue to expand and improve facilities for faculty and graduate students.

Optimize available resources through improved collaboration and sharing within the department as well as with other CoE departments. There will be an added benefit of faculty and graduate student co-mingling that may boost collaboration that will lead to more extramural funding.

Establish common spaces for graduate students to interact, both within the department and with other departments. Shared office space, common areas for lunch and leisure, and shared labs are some recommendations to consider, among others.

General Support for Graduate Students. EE graduate students expressed the need for more help and support from the department, college, and administration. A thriving graduate-student population is critical to the success of the program, and there was much frustration expressed by students on a range
of issues, including financial support, inadequate facilities and office space, access to labs and resources, struggles with student life, and availability of graduate courses. It would seem this comment would apply to graduate programs university-wide. In particular, adequate counseling and legal advice (taxes, immigration) were areas of need.

Recommendations

Most graduate students rely on their faculty advisors for help with student issues. While faculty are expected to advise their graduate students on academic and programmatic issues, they may not have enough time, experience or knowledge for many of their other issues. We recommend that the college establish a staff position that is responsible for graduate student advocacy. Advocacy would include directing students to available on-campus resources as well as advice on graduate student life and living/working in Hawaii and the U.S. This support is especially important for international graduate students, who often have additional legal issues to navigate.

Because it may not be feasible to hire additional staff, we recommend making updates and improvements to the department handbook that may help graduate students to manage commonly encountered issues. We also recommend that the department/college consider setting up a type of online information depository, like a ‘wiki’, for graduate students to document and share how they have resolved broader student-life issues that they have encountered.

Graduate student financial support levels in the form of TA-ships and GA-ships should be reviewed in relation to the cost of living in Honolulu. Several graduate students have to take on full-time jobs or seek public assistance to survive financially.

Available on-campus resources (e.g., counseling) should be reviewed for access and adequacy. Graduate students have reported that attempts at seeking on-campus assistance have been unproductive.

Additional Administrative Support. EE Department faculty and graduate students need more administrative support staff. Due to retirement and turnover, there are support vacancies that cannot be filled. The department is sorely lacking in admin support for fiscal and grant preparation, resulting in more work for faculty and missed deadlines. Reimbursements for graduate students (e.g., for travel expenses) can take months to process. Faculty in the department are spending too much time on admin and paperwork.

Recommendations

Work with the VCAFO to identify support staff who can temporarily be re-assigned to provide focused support to the department, or “float” between departments and colleges to support.

Develop creative uses of extramural funding, directly or via the RTRF, to shore up support. For example, larger multi-year grants may be able to afford a dedicated technical support staff person to handle invoicing and other project management activities.
Interdepartmental Interaction. EE graduate students are too insulated from interactions with other departments and colleges, resulting in missed opportunities to collaborate. Some graduate students rarely interact with graduate students in the same department.

Recommendations

Create shared office spaces and common areas to promote intra-departmental and inter-departmental interactions and collaborations.

Develop co-listed graduate-level courses to promote cross-departmental and cross-college interactions. This will also address the lack of available graduate courses that some students have identified as an issue.

Develop mechanisms to connect EE graduate students to the UH business school, to promote entrepreneurship, for example, participating at the Shidler Business Plan competition.

Mechanical Engineering

The Department of Mechanical Engineering MS and PhD programs were established in 1966 and 1986, respectively. Areas of concentration in research and graduate program are 1) Thermal and Fluid Sciences, 2) Materials and Manufacturing, and 3) Mechanics, Systems, and Controls. The ME Department currently has 19 full-time faculty (up from 12 in 2014). This growth was in response to a rapid growth in the undergraduate student population which was met with support from UH administration via position count increase. Over the 5 year period of the review, graduate student enrollment has steadily increased, now at 21 PhD student (an all-time high) and 21 MS students.

The ME-specific portion of the review consisted of focused meetings with the ME chairs, faculty, and graduate students. The major findings and recommendations were largely consistent with the College of Engineering as a whole; they are not repeated here except as they related to specific issues that are unique to and/or especially pertinent to the ME Department, discussed further below.

Research enterprise. A lag between growth in enrollment and growth in faculty body resulted in several difficult years with very high student-to-faculty ratios and heavy teaching loads. ME faculty are commended for their dedication to work through this difficult period of growth. One unintended outcome of this period of rapid growth is that research productivity and availability of research assistantship for students is modest.

Recommendations

With growth curves now relatively stabilized, faculty are now better positioned to re-focus on their research and on graduate programs; faculty should be fully supported as they re-energize the research enterprise. See CoE recommendations on “Research Enterprise”.

Growth in institutional support must follow growth in enrollments and faculty body but they have not kept up. See CoE recommendations on “Administrative Support”.

Capitalize on the recent increase in faculty count, which shifts ME toward the critical mass required to target large collaborative extramural funding opportunities. Facilitate collaboration and communication between ME and CoE personnel in this direction. Provide opportunities and
incentives for faculty to contribute to and participate in large research initiatives. See CoE recommendations on “Research Enterprise”.

Encourage/incentivize faculty to include student RA support in grants & awards.

Strategic program planning. Areas of specialization of faculty and graduate program cover an extremely diverse and broad scope of application and fields with only a modest number of faculty. While many schools/colleges have separate departments for areas such as materials, chemical, aerospace, or industrial engineering, these fall under one umbrella at UHM (with folks working in other units across campus). As with other units in CoE, ME holds significant potential to drive economic growth in Hawaii.

Recommendations

UHM Administration, CoE leadership, and others units across campus should work together to evaluate the potential for continued growth (and possible branching) in ME. Considerations should prioritize the wellbeing of current faculty and programs while considering topics missing/lacking at UHM and of need to the State of Hawaii. Growth and restructuring should be met with institutional support (space, administrative, faculty counts…).

Prioritize continued emphasis on relationships and collaborations, including joint research and teaching programs, with related personnel/units across campus (including CNS, CTAHR, SOEST, the School of Medicine).

Space and Facilities. Laboratory space and facilities in support of research and teaching are vital for ME but space and facilities have not kept up with growth in enrollment and faculty body. Incoming faculty report long waits for lab space (2+ years in one case; a potentially fatal delay for a junior faculty developing research and teaching programs). Student access to the facilities shop is restricted by limited availability to training and entry. Progress in research and learning in ME are consequently hampered by this bottleneck. Not all students have access to office space.

Recommendations

Revisit the training and access procedures and revise/update as needed to streamline access.

Space and facilities are a critical need for ME. See CoE recommendations for “Facilities”

Graduate Student General Support. Students not aware of a central contact point for information regarding program requirements, forms, day-to-day questions and sometimes receive mixed and differing information from different sources. ME Graduate students report that the ME Graduate Program Handbook is very helpful but that it needs refining and updating. Note however: The Graduate Chair is a central contact point for program-specific issues.

Recommendations

A graduate student advocate for the College would give students a central contact for process and general questions. See CoE recommendations for “Graduate Student Support”

The positive effects of the recent appointment of a permanent Dean has precipitated positive change and progress, and a sense of direction and continuity for the students. A regular Chair will have a
similar effect; the ME department needs a full-time regular Chair. While recognizing and acknowledging the dedication and accomplishments of the interim ME chairs, we recommend that UH Administration prioritize the (frozen) ME senior faculty member (potentially Chair) position/recruitment as soon as possible.

Update the graduate student manual and update it on a regular basis (every couple years and/or with any major program changes). Make readily accessible and available online.

**Limited Course Selection.** Availability of ME graduate classes is limited, so most of the classes taken by ME graduate students are outside of the department. There is no core ME graduate curriculum. This situation has improved in recent years as the number of faculty has caught up with the growth in the undergraduate population, but room for improvement remains.

**Recommendations**

*Offer graduate level ME courses as faculty time/availability permits.*

*Consider joint, cross-listed, or co-taught courses with other departments in CoE. This could broaden the graduate class availability and encourage cross-department and cross-college interaction, while maintaining sustainable faculty teaching loads.*

*See CoE recommendations on “Teaching”.*