

## School of Ocean & Earth Science & Technology

Context: There appear to be opportunities to increase enrollment in both Atmospheric Sciences and Ocean & Resources Engineering, areas in which we have both State need and strength. We should discuss the progress in having more of our top researchers in the classroom.

It should be noted here that many of the recommendations of the 2019 program review team have been implemented, as indicated in the 1-year follow-up report.

### Department of Atmospheric Sciences

#### *Summary Recommendations*

- Consider broadening the program to Atmospheric and Ocean Sciences (in collaboration with Oceanography), with a concentration in Meteorology.

#### *Details*

- The Department offers the BS, MS, and PhD in Atmospheric Sciences. There are 14 students enrolled in the BS, 17 in the MS, and 20 in the PhD program.
- Tenure-track faculty FTE is 10.92, down from 13 in 2014.
- The Department changed the name of the unit and degree programs from Meteorology to Atmospheric Sciences in 2015, which may have adversely affected undergraduate enrollment. There were 31 students enrolled in the BS program prior to the name change. (Enrollment in the graduate programs remained steady at about 30.) Recommend that the faculty consider whether “Atmospheric Sciences” adequately conveys to undergraduates a focus on meteorology, given the drop in enrollment following the name change.
- The program review team noted that course-scheduling issues could be affecting the time-to-degree for undergraduates, which seem at least partly due to the small size of the program.

*The students had trouble getting reliable advice about course scheduling. This is a serious issue because many important ATMO courses are offered only every other year due to the small size of the program. Central SOEST advising was not always aware of the specific years when particular courses are offered. – 2019 SOEST External Review Report, page 8*

Scheduling issues can easily lead to retention issues if not addressed. Recommend that the faculty review this carefully.

- A broadening of the program to Atmospheric and Ocean Sciences could attract more students while still allowing for a specialized concentration or track in meteorology. This would perhaps require coordination with the Department of Oceanography. It's possible that such a program would be as popular as the current BS in Global Environmental Sciences, which is highly successful.

## School of Ocean & Earth Science & Technology

### Department of Earth Sciences

#### *Summary Recommendations*

- Continue to monitor undergraduate enrollment, particularly in the BS program.
- Consider developing general education foundations courses to attract majors and increase SSH.

#### *Details*

- The Department offers the BA in Environmental Earth Sciences, the BS in Earth Sciences, and the MS and PhD in Earth and Planetary Sciences.
- There are 18 enrolled in the BA (up from 8 in 2012), 20 enrolled in the BS (down from 37 in 2012), 22 enrolled in the MS, and 33 enrolled in the PhD (up from 24 in 2012).
- The Department underwent a name change of the unit (from Geology & Geophysics) and degree programs in 2019. It is too early to determine whether the name change will have a positive effect on recruitment and enrollment.
- Tenure-track faculty FTE is 20.14, down from 22.69 in 2014.
- The undergraduate programs, particularly the BA, have been on the “small programs list” for a number of years. Faculty have been responsive to making curricular changes to attract students, and collaborate with the College of Education on an Earth Science Education track to prepare middle and high school earth science teachers. It appears that these efforts have been successful for the BA. Recommend that the faculty monitor enrollment and review its recruitment strategies for the BS program.
- The program review team noted that undergraduates were not satisfied with the general education requirements (which is not unusual). However, upon review, it appears that Earth Sciences offers limited courses that fulfill general education requirements. For example, in Fall 2020 there is just one writing intensive course (4 in Spring 2020), and the remainder fulfill DP and DY requirements only. As a result, students must look outside the major to fulfill other requirements (writing intensive, written communication, quantitative reasoning). Recommend that the faculty review undergraduate courses to determine whether there are opportunities to add general education designations, particularly foundations courses (written communication and quantitative reasoning) and writing intensive courses. General education foundations courses provide excellent opportunities to attract students to the major.
- Recommend that the Department collaborate with the Department of Geography and the Environment (Social Sciences) on research, and potentially, joint or cross-listed courses. The Undergraduate Certificate in Geospatial Information Science (in Geography) may also be of interest to Earth Science majors. Per the Social Sciences review team (2016):

## School of Ocean & Earth Science & Technology

*Connections between the Department [of Geography] and Geology do not seem to be very prominent, while connections to biology and marine biology seem to be stronger. Closer ties to geology may be to the advantage of both departments, including in terms of research collaborations and in attracting majors and double majors. – 2016 Social Sciences External Review Report, page 47*

### Department of Ocean and Resources Engineering

#### Summary Recommendations

- Collaborate with Engineering on an Ocean Engineering track within the recently approved BS in Engineering Science. Consider a combined BS/MS pathway with Engineering Science to recruit promising students into the master's program.
- Recruit ocean industry professionals into the Plan-B Master's program.

#### Details

- The Department offers the MS and PhD in Ocean and Resources Engineering. There are 9 enrolled in the MS (down from 18 in 2012), and 4 enrolled in the PhD (down from 13 in 2012). The MS is the only ABET-accredited Ocean Engineering master's degree in the country.
- Tenure-track FTE is 5.92.
- The external review team identified a few possible causes for the decline in enrollment.

*The reason for this decline in enrollment is not entirely clear since the department has two (2) Teaching Assistant (TA) positions and based on their substantial research grants, there should regularly be some new GRA positions available in the department. One may attribute part of this decline to several factors: (i) time to graduation appears longer than typical in similar engineering programs (see discussion later), which yields low graduation rates (3/3/4 MS awarded and no PhD in past 3 years); (ii) since 2012, the number of student's applications has gradually decreased, with the yield (enrolled versus accepted students) staying at about 50%; and (iii) some faculty have been employing postdocs on their research projects (numbers not provided), who under the stipend-based SOEST model, which incurs a reduced overhead rate, are quite financially attractive to PIs. – SOEST External Review Report, pages 22-23.*

- Per the external review team, faculty are exploring the possibility of an undergraduate degree or an Ocean Engineering track within the recently approved BS in Engineering Science (housed in Mechanical Engineering). The track would also provide the opportunity to develop a combined BS/MS pathway to attract students. The review team agreed with the approach, as well as plans to recruit working professionals in the ocean industry as part-time students in the MS program.

## School of Ocean & Earth Science & Technology

- Recommend that the department consider the viability of the PhD program. Per the review team, applications are down, and issues with the facilities may also be affecting the Department's ability to attract and retain students. It may be worth it to consider stopping out admission to the PhD until these issues can be resolved.

### Department of Oceanography

#### *Summary Recommendations*

- Pursue ABET accreditation for the BS in Global Environmental Science.
- Develop a recruitment plan for the MS and PhD in Oceanography.

#### *Details*

- The Department offers the BS in Global Environmental Science, and the MS and PhD in Oceanography. The Department collaborates with the School of Life Sciences on the MS and PhD in Marine Biology.
- There are 90 enrolled in the BS in GES, 19 in the MS in Oceanography, and 29 in the PhD in Oceanography. The MS and PhD in Marine Biology are jointly administered with SOEST, however through an arrangement with IRO, students are allocated to Natural Sciences or SOEST. For SOEST, there are 16 enrolled in the MS in Marine Biology and 33 in the PhD (enrollment is 9 and the CNS MS and 11 in the CNS PhD).
- Tenure-track faculty FTE is 29.04, down from 31.15, distributed across Biological Oceanography, Marine Geology and Geochemistry, and Physical Oceanography.
- The BS in GES is a successful major, with ample opportunities for undergraduates to engage in research. Enrollment has grown steadily from 60 in 2012 to 90 in 2019. The program chair has developed combined degree pathways with Urban & Regional Planning, Education, and Public Health. Notably, there is not yet a pathway in Oceanography.
- There are plans to secure ABET accreditation for the GES program, also recommended by the SOEST external review team (2019), which may lead to an increase in enrollment.

*Given its strength and health, the review team supports and recommends that GES explore securing ABET Environmental Science Accreditation for a track in the degree program: a GES-ABET Environmental Science accreditation... Such accreditation would allow students interested in receiving an accredited degree to do so within the GES Program within its current curriculum structure. This would make the SOEST GES Program one of the first undergraduate science degrees with an engineering accreditation, increasing the program's reputation and the job potentials of graduates of the program. – Page 20*

## School of Ocean & Earth Science & Technology

- Enrollment in the PhD has decreased from a high of 48 in 2012 down to 29 in 2019. It's unclear if the decrease was intentional. Enrollment in the MS has remained stable. The review team recommended that the Department step up recruitment efforts.

*Recruitment of graduate students from the GES program is working well and is resulting in a more diverse graduate student body, but there is no formalized recruiting into the Department of Oceanography outside of Hawai'i (unless there is a SOEST booth at AGU or Ocean Sciences). Efforts to recruit using social media, web sites, and faculty contacts at other universities and colleges could be implemented to increase applicant pools. Numbers of offers and yield should be tracked in upcoming years to ensure continued rebound from the low enrollment of 2017-2018.*

- Several climate issues in the graduate program that were identified by the review team deserve attention. Discussion of these may be found on pages 19-20 of the external review report.

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