

July 15, 2019

PROFESSOR CATHY CONSTABLE, Chair
Department of Scripps Institution of Oceanography

PROFESSOR JANE TERANES, Director of Undergraduate Education
Department of Scripps Institution of Oceanography

SUBJECT: Undergraduate Program Review for Scripps Institution of Oceanography

Dear Professors Constable and Teranes,

The Undergraduate Council discussed the Department of Scripps Institution of Oceanography 2019 Undergraduate Program Review. The Council supports the findings and recommendations of the review subcommittee and appreciates the incredibly thoughtful and proactive response from the Department. The Department appears to be thriving academically, and the Council comments centered on the following:

Growth of the Earth Sciences major. The Council appreciates that the Department is taking thoughtful action to encourage the growth of the Earth Sciences major, including potentially restructuring the introductory course requirement and reconfiguring requirements so that bottleneck lab courses do not serve as a barrier to growth of the major. The Council is cognizant of the need for more laboratory space before the planned remodel and expansion to happen in 2020, especially as the Department attempts to grow the major, and we encourage the continued exploration of sharing space with campus partners until more permanent spaces can be allocated to the Department.

Updates to curriculum. The Council is pleased to learn of the Department's efforts to address the skills and needs of their student body, including faculty meeting to discuss methods to improve the writing skills of their students. We also echo the review committee's suggestion of looking at the computer programming skills students may need in their post-baccalaureate endeavors, and we look forward to learning about the success of the bootcamps and workshops the Department is planning.

Student recruitment and retention. The Council looks forward to receiving proposals from the Department to restructure the requirements in order to recruit transfer students and increase student diversity. We also look forward to hearing about Department's progress in developing pathway programs.

The Council will conduct its follow-up review of the Department in Spring Quarter 2020. At that time, our goal is to learn about the Department's progress in implementing the recommendations of the program review subcommittee and the Undergraduate Council. The Council extends its thanks to the Department for their engagement in this process and we look forward to the continued discussion.

Sincerely,

Anthony Burr, Chair
Undergraduate Council

Attachment

(1) Undergraduate Program Review Report and Response from Scripps Institution of Oceanography

cc: M. Corr
R. Horwitz
M. Leinen
J. Moore
R. Rodriguez
M. Sidney

Undergraduate Program Review Scripps Institute of Oceanography

March 18, 2019

Overview

The Undergraduate Council review of the program at Scripps Institute of Oceanography (SIO) took place on February 25-26, 2019.

SIO hosts a thoughtful, thriving and evolving undergraduate program. The Review Committee was impressed by the dedication and excitement brought to the undergraduate education program by SIO faculty, administrators and students. SIO now offers three major degrees, only one of which was established for evaluation at the previous program review in 2012. The historic Earth Sciences degree continues to sustain a stable enrollment; the Marine Biology degree effective since Fall 2011 is in a phase of rapid expansion; and Ocean and Atmospheric Sciences is only two years old and growing (in addition, ongoing minor opportunities include Earth Sciences and Marine Sciences). The program success is attributable to the faculty and administrative staff commitment to education and the unique niche filled by the SIO program in the UCSD curriculum. Students benefit from and appreciate access to SIO researchers and the offerings of numerous low enrollment, upper division classes, particularly field and lab courses. SIO has notably transitioned in the past decade from an almost exclusively research focused institution to placing undergraduate education at the heart of its mission. In turn, the SIO program offers a unique place in the UCSD campus curriculum and educational mission that serves a broad yet distinct section of the student body, ranging from those benefitting from popular non-major courses to those seeking competitive degrees.

Many of the challenges faced by the SIO undergraduate program relates to the rapidly growing demands being placed on space, faculty teaching time and effort, academic and career advising, and administration. Given the newness of the programs, it is expected that some growing pains should be apparent as undergraduate education has become integrated into the core operations of SIO. Although time to graduation for students in the three SIO majors is comparable to the rest of UCSD campus, current students expressed concern about lack of access to a number of over-subscribed courses, particularly desired lab courses. Many of these pressures will likely be alleviated in the medium-term by the coming availability of newly constructed instructional space in the near future. A number of improvements to the curriculum should allow students to finish in good time with strong preparation for diverse career paths.

The faculty and staff are aware of the current challenges faced by the undergraduate program and have taken appropriate steps to plan for future growth while maintaining the quality of education

and the student experience as the programs mature. Added space, new research faculty and LSOE hires will allow more course offerings, particularly lab courses in Marine Biology that are unable to effectively meet current demand. While significant opportunities for student advising are available, there is also a need to formalize advising in order to aid recruitment and preparation of incoming transfer students, as well as to insure student understanding of the program offerings, requirements and career paths available to them.

Based on the success of the program and the clear dedication of members at all levels of the SIO community to undergraduate education, we strongly recommend continued university support for the SIO undergraduate majors to insure the adequate resources needed to sustain their growth. Below we highlight identified strengths and weaknesses in the SIO program with respect to the (A) operations, (B) curriculum and (C) broader campus context and policies. Suggestions for improvements are provided within each section, with running numbers listed consecutively across sections for convenience. We acknowledge that our points largely echo those already raised and addressed in the SIO Undergraduate Program Self-Review. We hope that our feedback encourages SIO to continue with their impressive work to successfully build and improve on their undergraduate educational program.

A. Program Operations

Overall, the SIO undergraduate program is robust and growing. The staff and faculty involved in the program appear dedicated, passionate and enthusiastic. The main challenge for SIO is to accommodate the growing demand in their majors in a way that is healthy, sustainable and equitable.

Enrollments in Marine Biology have grown significantly (roughly 50 new majors per year over the past seven years) and show no sign of abatement. This is impressive, and SIO should be lauded for their efforts to build a popular, rigorous major. This growth does create capacity issues, however, as will be addressed below. The Oceanic and Atmospheric Sciences major has only recently launched. It is off to a good start (40 majors in 2018-19). The Earth Sciences major enrollments remain steady (50-60 majors per year).

The administrative and advising staff are committed to strongly supporting their undergraduate program. Their ability to do so has greatly improved since the last review as evident by the better integration of the undergraduate program staff within the SIO administration and relocation of advising offices. The changes to improve integration appear to be universally positive. The administration is providing funding for undergraduate-program related activities, such as instructional grants to faculty, travel fellowships for students presenting at scientific conferences and informational programming on research and career opportunities. While there were a small number of negative student comments regarding advising, we believe these are more related to

capacity issues in critical required courses than to the advising opportunities or advisors themselves. The recent hiring of an additional advisor and the minimal waiting times experienced by students during drop-in hours suggests that advising is sufficiently up for the task.

The faculty that teach and advise within the undergraduate program are doing so with thoughtfulness and dedication. Course offerings are expanding (mostly in Marine Biology and Oceanic and Atmospheric Sciences). Almost all courses are taught by faculty, and students appreciate that upper-division electives are typically taught by a world expert in the field. The way by which existing faculty engage with the undergraduate program appears to be mainly by self-selection – those that have an interest are welcomed, while those that do not are allowed to focus on graduate teaching.

Suggestions

1. Consider efforts to grow the number of Earth Sciences majors.

Over the years, the Earth Sciences major has maintained a steady enrollment (~50-60 students per year), and the graduates are successfully entering research and other career paths. SIO faculty noted that employment prospects for students trained in Earth Sciences are excellent, with opportunities typically outnumbering graduates. Altogether, there appears to be capacity for more untapped growth in this major. We recognize that there has been growth by way of the Earth Sciences pathway of the ESYS major, but we suggest that the Earth Sciences program faculty consider efforts to modestly expand their own major that could provide excellent training with good career options to more UCSD undergraduates.

2. Formalize faculty incentives for exceptional teaching efforts.

While we do not have an opinion on the current method for SIO faculty teaching assignments, the current practice does raise concerns about equity, especially in the context of majors experiencing significant growth. We suggest that SIO develop clear guidelines to ensure that teaching efforts beyond normal expectations are incentivized, recognized and rewarded. We recommend appropriate recognition for faculty who take on the responsibility of developing new courses or regularly teach time-intensive courses, e.g., potentially field courses, lab courses, large enrollment courses, and writing-intensive courses. Recognition could come in many forms, such as extra consideration during promotion and/or occasional teaching release to focus on research.

B. Program Curriculum

The curriculum for each of the SIO majors and minors reflects rigorous requirements in each of the disciplines. The SIO undergraduate program has been intentional in its growth to reflect both

its unique identity in the opportunities offered to students (distinct from what is already available on main campus) in balance with the needs, culture and policies of the UCSD main campus. SIO offers a number of popular Earth Sciences courses that attract new majors and can serve as general requirements for non-majors. The program has thoughtfully executed the curriculum despite the unique challenges faced by the physical distance from main campus, the implementation of many new courses, and rapid growth in enrollments (nearly doubled since last review). For example, it was noted by the program and appreciated by the students that SIO courses are strategically offered either in classrooms on the main campus or at SIO, with scheduling that accommodates travel time and minimizes course conflicts within the major.

There was positive feedback at every level on the value added by new programming, such as undergraduate seminars and themed major meetings, that provide academic and career information on research topics, opportunities, career paths and interactions with alumni. In addition, the students appreciated the graduate student leadership involved in these sessions.

The one significant issue impacting the program curriculum, and specifically the Marine Biology major, is the dire lack of instructional laboratory space. Currently, there is a single instructional lab space available to accommodate 350+ students in the major each with a requirement for three SIO laboratory classes. The program is aware of and actively working on solutions to mitigate the space constraints, including suitable but undetermined completion plans for remodeled expanded lab space in Building D. For the current undergraduates, however, there is a need for more immediate remedies. In addition to potential delays to graduation, the students expressed dissatisfaction when unable to enroll in the laboratory classes that best reflect their personal interests within the Marine Biology major.

Suggestions

3. Broadly consider solutions to meet student demand for required lab courses. (see also #8)

We appreciate that SIO is aware of and making good efforts to address concerns about lab course availability. We encourage the program to continue to consider a full range of options to help meet the current student demand for access to desired lab courses. Suggestions include, (a) an approval process to gain 199 credit for independent research in faculty labs, (b) credit for appropriate labs offered by other departments, and (c) if possible, extension of laboratory hours and FTE/staff resources in order to offer additional sections within the existing space.

4. Review and update curriculum.

It is a good time in the life of the program for the major faculty advisory committees to review and revise, as needed, the curriculum for each major. While this Committee does not have a strong opinion whether any specific changes are needed or not, aspects of the curriculum were raised for possible improvements.

a. In discussion with both the faculty and students, there was an expressed frustration with inadequate student preparation in computer programming fluency needed to meet expectations in certain SIO courses. We encourage the advisory committees to identify and define what computing standards are required for the SIO course offerings, as well as to consider the computing skills being expected of current graduating SIO majors upon entering relevant career paths. Consideration should be given to whether computer programming courses for credit might be added to the major requirements, either through in-house courses or cross-listed courses in other departments. Another student skill lamented by faculty is student writing. We commend the Marine Biology faculty for proactively undertaking a survey of what writing currently takes place in their courses, and we encourage them to follow-through on implementing intentional writing training earlier and throughout the curriculum.

b. All students who attended the program review expressed a shared view that the Marine Biology curriculum has excessive redundancy in course content that warrants review and modifications. Specifically, significant overlap in course content was noted between SIO 132 and SIO 134, and between SIO 119 and SIO 181.

c. TAs and students expressed universal dissatisfaction with team-taught classes and labs. The experience has been that multi-instructor courses resulted in confusion, unclear expectations and lack of continuity for all involved. We recommend that the program review the team-taught courses and potentially restructure with one or two instructors per course and/or revamp for better consistency across instructors.

d. On a broader view, we recommend that the program explore gaining an updated understanding of their students' post-graduation plans and career goals, and consider ways to potentially integrate this context within the curriculum. A real strength of the SIO program is the emphasis on high-quality research and preparation for graduate school, which many undergraduates successfully pursue. This research emphasis should not be diluted, and could in fact be strengthened for some students who are eager for a capstone requirement. However, a population of students in the SIO majors are passionate about alternative career paths outside of academic research. A better understanding by the program and faculty of student career goals and paths could be helpful, such as potentially offering flexible options into the major requirements and by acknowledging how the current curriculum serves to train students in ways beneficial to their alternative careers. For example, pre-med students asked whether credit toward the majors could be given for organic chemistry (perhaps selected as one of several approved options). Even without revisions to the overall curriculum, it would be helpful to promote a better student understanding of how the Learning Outcomes gained from specific course content may translate to the skills needed in their future careers.

5. Consider implementation of an SIO TA training program.

Feedback from the program self-review, the faculty and the TAs themselves all support that additional training is recommended to improve TA instruction. In addition to pedagogical approaches, many TAs are challenged by being Masters students who often have not taken the

course that they are helping to instruct. In addition, the instructors involved in team-taught SIO courses should be reminded to pay closer attention to the challenges that are faced by the TAs and students when trying to meet the multiple expectations from joint instruction. Finally, TAs requested that designated space for TA office hours be provided on the main campus (Galbraith Hall?) and an office at SIO (in Eckert) to help them consistently fulfill their roles.

6. Educate faculty to then develop Learning Outcomes.

The program has an initial document for the Learning Outcomes of SIO majors/minors. The faculty and administration expressed a need for more education and guidance from campus on best practices in writing and assessing course and major L.O.s that they will continue to develop.

C. Program in context of UCSD campus and policies

The SIO undergraduate program has grown with thoughtful and intentional programming largely aligned with UCSD culture and policies. As noted above, the program offers large Earth Sciences courses for non-major students that have steady enrollments and are easily accessible on the main campus for non-major students. The college deans of academic advising have observed that there is a lot of interest in SIO majors and courses, and they foresee continued growth in enrollments as more incoming students interested in STEM are now aware of SIO majors. It was also noted that the SIO website is easy to navigate and key to explaining to students (and parents) the academic and subsequent career opportunities of the SIO degrees.

The recent rapid growth of SIO undergraduate majors indicates that these programs fulfill an important, previously unmet demand among the UCSD student body. SIO is a uniquely attractive feature of UCSD for many prospective undergraduate students, and expansion of undergraduate majors will likely draw students across California, the U.S. and internationally. A challenge will be to meet the current and expanding student enrollment.

It was evident in the demographic data and over the course of the review that more strategic efforts could be made to boost student diversity and inclusion. This includes efforts to increase the recruitment of more transfer students and underrepresented minorities to the majors.

Suggestions

7. Efforts to increase student diversity.

a. Adequate preparation of incoming transfer students to SIO majors will help to shorten time to graduation and to recruit and retain more diverse students. Efforts toward these goals are already underway, including the planned adoption of transfer major requirements and the proposed GEOPATHS program to steer transfer students toward SIO majors and educate them about career opportunities in earth, oceanographic and atmospheric sciences.

b. Consider SIO involvement in the UCSD Summer Bridge program for incoming first-year students. This would provide early exposure to the SIO program as well as offer more STEM opportunities to this diverse student population.

c. It was noted there needs to be better alignment between SIO student interests and the UCSD Career Services. SIO could help provide career services with better tie-in information on SIO alumni and career paths in order to best and most consistently advise students.

d. The SIO program should request access to more student data from UCSD, in order to better monitor trends and best strategize on most the current and changing demands.

8. Grow instructional space and personnel resources to meet expanding enrollments.

With growth in enrollments, there is now limited availability in certain courses to satisfy laboratory requirements (most noted in upper division Marine Biology labs). This is currently an impediment to graduation for some students, and lack of access to popular, oversubscribed courses is a source of frustration. The main constraint appears to be lack of adequate marine biology lab space. Greater allocation of teaching space, particularly for lab classes, and new faculty and administrative hires are warranted to support these popular and expanding programs. Cross-listing of courses in other units also could help relieve some of this pressure. Especially given the number of cross-appointed faculty (for instance, Barton and Allen in Biological Sciences), cross listed courses are a natural way to increase availability of course offerings to satisfy requirements and shorten time to graduation.

We would like to thank everyone who provided their input and time to assist with this review. We are impressed by the dedication of the faculty, administration and staff involved in the SIO undergraduate education program.

Program Reviewers:

Professor Amy Kiger, Section of Cell & Developmental Biology, UC San Diego (chair)

Professor Jonathon Shurin, Section of Ecology & Evolution, UC San Diego

Professor Patrick Chuang, Earth & Planetary Sciences, UC Santa Cruz