Undergraduate Academic Program Review
Oregon State University
Biology Program
June 6, 2013

Summary of Findings and Recommendations

The Biology program at Oregon State University is a successful program with tremendous impact on undergraduate students through its role in the University’s general education program as well as its role as a major program for large numbers of students. The following findings and recommendations acknowledge those impacts and address issues that the review team feels will be critical as the program expands in the face of enrollment increases at Oregon State University.

1. The program relies on the energy and collaboration of multiple academic units drawn from diverse administrative units of the University. Continued success of the program will depend on the installation of scalable leadership, administrative mechanisms to sustain the commitment and collaborations of participating academic units, and an equitable plan for resource distribution.

2. University enrollment is growing rapidly and program enrollment is accelerating. To retain the current accessible nature of the program (and avoid the need to adopt a professional school filtering model), it will be vital to ensure that institutional resources are invested to cover the costs associated with increased enrollments.

3. It is commendable that the program actively promotes experiential learning opportunities and placement of students in research experiences, study abroad, and other high impact learning environments. These opportunities are a defining feature of the program and should be maintained and expanded proportionately with enrollment growth.

4. Efforts should be made to ensure that the curriculum, including entry level and upper division courses, features ample opportunities for students to engage in learning activities that demand critical thinking, problem solving and communication skills that go beyond the basic domain of memorization. Pedagogical strategies and assessments that enable rich intellectual engagement should receive increased emphasis even in the context of high enrollment courses.

5. The program features an innovative and highly worthwhile Graduate Teaching Assistant (GTA) training program, and does an excellent job of assessing and documenting the effectiveness of this program. GTA training serves as a campus model and deserves to be sustained as well as emulated elsewhere.

6. Continued success of the program will depend directly on the installation of a collaborative curricular oversight body that actively leads the program. This body must ensure diversity of perspective across the life sciences engage all contributing units to sustain in the quality of the program.
Detailed Findings

Introduction

The Biology Program at Oregon State University has a 45 year history serving undergraduate majors seeking broad training in the biological sciences. The Program houses a non-departmental major in the College of Science that has been overseen by five faculty directors since its founding; most recently (since 2002) by Professor Robert Mason of the Department of Zoology. In terms of enrollment, this major is the largest in the College of Science; second only to the General Science major (another non-departmental major). Together these two non-departmental majors comprise 72% of the undergraduate life sciences students in the College of Science based on AY 2011-2012 data.

Presented below is a review of the Biology Undergraduate Program at Oregon State University by a team including four OSU faculty (Dr. Bill Bogley, Professor of Mathematics; Dr. Mike Bailey, Professor of Computer Science; Dr. Frank Bernieri, Associate Professor of Psychological Sciences; and Dr. Roger Nielsen; Professor of Geology, CEOAS) and three external reviewers (Dr. Lee Kats, Professor of Biology, Vice Provost for Research and Strategic Initiatives and Associate Dean for Research, Pepperdine University; Dr. Bret Tobalske, Associate Professor and Director, Field Research Station at Fort Missoula, Division of Biological Sciences, University of Montana; and Dr. Kenneth Burtis, Professor of Genetics, past Dean of the College of Biological Sciences and Faculty Advisor to the Provost and Chancellor, University of California, Davis).

The team met for dinner and a pre-review session on June 5, 2013 and then all day June 6th on the OSU campus. During the day, after an introductory session with Dr. Robert Mason, Program Chair we met with Dr. Vince Remcho, Interim Dean of the College of Science; Graduate Teaching Mentors, Graduate Teaching Assistants, Biology undergraduate students, Biology advisers and faculty in the Biology Program. The group also toured the Weniger Teaching Labs. Reviewers were provided in advance with an extensive Self-Study report that addressed many of the major issues arising during the course of the day, and had an opportunity for a final executive session at the end of the day after a final meeting with Dr. Mason.

In this report, we review some of the major points raised in our interviews of the individuals and groups noted above, and share our opinions on key issues. The report considers issues relevant to undergraduate teaching and advising, faculty, graduate students, undergraduate students, facilities and administration, with a final summary including the overall impression of the Program and what the group considers to be key issues that should be addressed.

Undergraduate Teaching and Advising

Based on data presented in the Self-study Report, the Biology Program is succeeding at achieving its core mission, the delivery of a high quality curriculum to both Biology majors and
to non-majors as part of the baccalaureate core. This curriculum is characterized by strengths in lower division required courses for majors, in those baccalaureate core courses designed for non-majors, as well as upper division courses in a variety of fields. Particularly notable are the high-quality lower-division lab courses offered. These are offered at substantial expense, to both majors and non-majors; often representing one of the few laboratory science-based experiential learning opportunities that non-science majors have. It was clear that these courses are appreciated by students, and that faculty teaching the laboratory courses are proud of these cornerstones of the program. One note of concern from the undergraduate students interviewed was a perception that the student-faculty ratio (SFR) was too high, and that class sizes were too large in upper-division courses; however, general satisfaction was noted. A second issue brought up was that the diversity of student background and goals in the core courses made it hard to serve the needs of better-prepared students. Professor Mason noted later that a new course series was under development that might address this issue by creating a separate track for science students who were not majoring in biology.

No direct comments were made to the review team regarding faculty-teaching load or the distribution of the teaching duties between tenure track vs. non-tenure track instructional faculty. The distribution of the teaching responsibilities between ranks, and between faculty from the different units involved seems to be within normal bounds. It will be important to monitor the impact of rising enrollments on class size and the distribution of teaching loads so that the effort is equitably distributed and class size is kept under control, assuring that quantity does not come at the expense of quality.

One aspect of the curriculum that is changing is the development of increasing numbers of Ecampus courses. There is a strong financial incentive for the academic units to develop these courses, which lead to a direct revenue stream for the unit offering the course. Students interviewed by the review team had a generally positive view of these courses, although they had not taken many since as noted by one of the advisers they were discouraged for pre-health students. One student noted that Ecampus courses were beneficial to student athletes with conflicting schedules, but that they were perceived as “easier”. Faculty and administration should carefully monitor the development and delivery of Ecampus courses for quality and rigor. It is not in either the University’s or the student’s interest to allow convenience; or financial incentives to lessen the quality of the OSU curriculum.

A concern noted by both the Dean and the faculty was that due to student numbers, the WIC course requirement of the baccalaureate core for biology students, originally intended to be offered by faculty in the major, was being met (of necessity) largely by History of Science courses offered by faculty in the History Department. It was stated that efforts would be made to offer more such courses by faculty in the biological sciences, but there was no clear path to accomplishing that goal, and there was general satisfaction with the courses that were being offered. Significant progress toward having faculty in the major teach WIC courses will likely depend on decreasing the student-faculty ratio, which in turn depends on the resource distribution model and the priorities of the faculty.
The review team met with the professional advising staff who serve the students in their first two years before they transition to faculty advisers. The general impression is that this advising process was working well, with reasonable (for a public university) student-adviser ratios and appropriate procedures in place to ensure that students come in at least once per year. Quantitative metrics that can reflect advising such as rising retention rates and time to degree statistics supported the sense that students are well supported. However, a programmatic, “departmental” home might give these students a stronger sense of belonging. Advising service must be monitored and sustained as enrollment growth continues.

As noted in the Self-Study Report, the Program is doing quite well with respect to assessment of student learning. The Program has made a significant and useful effort by requiring students to complete the ETS Major Field Test in Biology for the last four years. It is a valid point of pride that OSU Biology students scored last year above the 90th percentile, and that their scores have risen each of the last four years. It was clear that the Program takes assessment and outcomes seriously, with evidence including: the quantitative, summative measure of student learning, and the new classroom building being designed with new pedagogical approaches and improved, higher-level learning outcomes. However, the absence of any laboratory teaching space in that new classroom building is a concern of many faculty, and may result in a bottleneck for students unless additional laboratory space is developed.

Faculty

It is not a simple matter to review the “faculty” of the biology program, given its cross-departmental nature and the participation of a large number of faculty (the team was not scheduled to meet with upper-division lecture faculty). The review team did meet with the very dedicated group faculty who deliver the majority of the lower division curriculum in biology. This group was generally positive about the courses, despite the enormous enrollments. Several of the instructors practice active learning approaches, which they acquired through participation in the National Academies Summer Institute on Undergraduate Education in Biology. Others are developing pedagogical innovations to increase interest among non-major students. Optimally, this group will have the opportunity to share their experiences with the faculty in the departments who teach upper-division courses in the major. It is commendable that senior tenured-faculty are involved in the teaching of courses. Students appreciated the knowledge, enthusiasm and expertise that these professors brought to the program. Many students also noted that exposure to these faculty gave them opportunities to get involved in research and become a member of a research laboratory; an experience that they greatly appreciated. It was noted that there was not an “active” curriculum committee to oversee the core biology courses. The perception of instructors was that there should be more frequent, better-structured meetings to evaluate the core biology curriculum; the absence of this is perhaps another unfortunate impact of the lack of departmental ownership. The chairs and faculty of the participating departments should make an effort to charge such a committee to meet regularly to ensure that the curriculum continues to serve the best interests of the students; Dr. Mason mentioned that efforts had been made in this
respect in the past and that it was a challenge to get people to come to meetings. [Note: An “active curriculum committee” has been proposed in a recently submitted School of Life Sciences Abbreviated Category I proposal.]

The participation in teaching biology core courses by faculty specializing in STEM education from the School of Education is a great addition to the program. These faculty have had a substantial impact on the training of graduate students who serve as TAs for the course, which not only improves the academic experience of the students, but also improves the teaching skills of these TAs and thus prepares them well for future careers.

The review team met with Dr. Jessica White, who serves as Director for the Graduate Teaching Certificate in College and University Teaching program and as an Instructor with the Biology Program in the College of Science. She described her very innovative approach to developing the teaching skills of graduate student teaching assistants for biology courses (see online article at http://oregonstate.edu/dept/ncs/lifeatosu/2010/oregon-state-trains-graduate-students-to-be-better-tas/). This program was described as “Cadillac” of TA training programs at OSU.

The review team also met with experienced “mentor” TAs who were veterans of the program and participate in training other TAs, some of whom were also participating in Dr. White’s program. There was uniform enthusiasm among all the participants for the TA training program. It was the consensus that both the skills of the TAs and the quality of the lab courses they taught were improving year to year. The TA training course meets ten times per term, covering a wide variety of topics related to current pedagogical techniques. Interestingly, this group noted that it was their perception that the lab component of the core courses, which were their primary focus, were evolving more rapidly, and on a different trajectory than the lectures. Concerns were noted that the lecture courses were becoming increasing less aligned with the labs, due to a lack of faculty communication with the TAs and engagement with the laboratory part of the course. Students noted the fact that most of the lectures are team-taught, which also leads to less coherence in pedagogical philosophies. It was also the perception of some undergraduate students (see below) that the course series lacked intellectual coherence; this may be related to joint ownership and the lack of an active curriculum committee as noted above. In team-taught courses, it is recommended that each instructor sit in on the other’s half so that they can work on a consistent style.

The graduate students who participate in the TA training program and in the teaching of the biology labs, represent a valuable and perhaps underutilized resource with respect to continued improvement in the quality of the core courses in biology. The review team recommends that the faculty take greater advantage of this resource by including them in a reinvigorating curriculum committee that oversees the biology major courses. This would ensuring that the graduate student mentor TAs play a significant role in helping to develop future directions. Both the committee and the TAs should be fully aware of the biology program learning outcomes and planning for the major should include reference to these outcomes. This group could also reduce and refine the overall number and content of the program learning outcomes. As they are
currently written, the outcomes are so numerous that a complete assessment of each is very difficult.

**Students**

The review team met with an outstanding, albeit non-randomly selected, group of students. Most of the students were in their third or fourth year in the honors program, and their comments were reflective of this status. Students were positive about their interactions with faculty, particularly regarding opportunities for research experiences. However, they were less complimentary about the core courses, which those who had not placed out with AP credits describing the courses as involving too much rote memorization of facts. They felt class sizes were too large, and that the diversity of academic backgrounds among students in their courses resulted in curricula that were too broadly focused. These students desire more upper-division lab courses that could serve as WIC courses. Students also noted that the program lacks an “academic home,” a topic that also emerged in discussion with the faculty and Dean.

Although the students in the group readily offered constructive criticism of the program, overall they expressed satisfaction with their experience at OSU. It would have been useful to speak with a broader cross-section of the biology student population in order to develop a more holistic sense of the student viewpoint. The students in the interview panel were not aware of the biology student advisory committee (BSAC). If this committee were more well known among students, students would be better able to provide input to shaping the program. The students were queried about whether they had raised any of their concerns about the program in course evaluations. This led to a lively discussion about the rule that anonymity was not possible if complaints were to move beyond the level of the faculty member teaching the course. The program should explore alternative pathways, remaining consistent with Oregon law and OSU policy, so that students may make confidential comments that can be used to address important issues in the classroom. One possibility could be informal, within-term assessments that are only read by the faculty member. It was clear that the students did not feel they could be candid on formal forms, or, if they were, that it would be ineffectual in helping to improve teaching.

The metrics provided in the self-study report indicate that the quality of students and their retention and graduation rates are satisfactory. Comprehensive data on post-graduate placement were not available, although statistics for medical school admission appeared to be quite good.

Two major concerns emerged with respect to students: the rapid increase in enrollment, and the challenge of dealing with increasing numbers of international students. Both the major and university are increasing enrollment at a vigorous pace, impacting the course demand both from majors (over 800 last year) as well as other students fulfilling biology requirements for all students in the Baccalaureate Core. This is a complex issue beyond the scope of this report, involving increasing enrollment of non-traditional students, increased use of Ecampus courses, changing demand for college degrees among state residents, increasing international enrollment and other issues. The review team only wishes to note that there is not robust communication
between the administration and the faculty with respect to strategic planning for enrollment, and it would be beneficial if greater transparency and clarity with respect to the administrative goals were introduced into this process. The faculty also raised the issue of the challenge of dealing with increasing enrollments of international students brought to campus by the INTO-OSU program. Language issues and academic honesty issues were noted as particular problem areas that require attention; a specific suggestion was made for developing a larger pool of tutors to assist these students, and for increasing efforts to advise the students on cultural norms related to academic behavior at OSU.

Facilities

Facilities for teaching are adequate, but are under significant pressure from rising enrollments. Due to recent investments in renovation of the teaching laboratories, it is possible to offer a quality experience to the current students; however, it was noted that consideration was already being given to extending hours during which lab courses are offered until new space becomes available. This is a very high throughput operation due to the large size of the major and the core requirements for all students.

With respect to lecture facilities, it is fortunate that the state recently approved funds for construction of a new teaching building. Beyond simply adding to capacity, this building is designed to have classrooms reflecting the latest thinking about the pedagogy of the coming century, with spaces designed for active-learning approaches. The large-lecture classrooms have been intentionally designed to reduce faculty-student distance, which may alleviate some of the concern expressed about the large class sizes that are likely to continue into the future. However, since there is no laboratory teaching space in the new building, the lab facilities are likely to become a significant bottleneck. In addition, there is likely to be a transient “squeeze” if growth continues at current rates between now and the completion of construction, but the certainty of greater capacity in the future should lessen the negative impact on faculty and student experiences.

Administration

Administration of the biology Program must be considered at several levels: the program level, its relationship to the other biology departments, and its relationships with the Dean and the Provost.

The review team met twice with Program Director Bob Mason, who has held his position for more than eleven years. Professor Mason expressed overall satisfaction with the Program, and should be congratulated for doing an outstanding job over the past decade in developing the quality of the curriculum, the training of graduate student teaching assistants and the facilities. The major concerns he expressed to the review team were focused in two related areas: the impacts of rapid growth in the major, and the challenges of administering a non-departmental program.
With respect to growth, a major concern noted was whether sufficient faculty hiring could be maintained to accommodate teaching needs associated with rising enrollments. It was noted that the financial resources available to the Program for hiring are mostly “access” funds from the Provost, requested ad hoc. Lack of significant participation in the INTO-OSU program, which is a major revenue source supporting growth in other colleges, means that this revenue stream is not directly available; thus, the only funds over which the department has some degree of control are those from Ecampus courses. Since neither enrollment growth nor revenues sources are under local control, it is not presently possible to carry out long-term strategic planning.

A related concern arises from the non-departmental nature of the Program. Tenure track faculty who teach in the Program come from a variety of participating departments on a volunteer basis, and the Director described himself as the “chief beggar” on campus in terms of seeking additional FTE to cover growth-related demand. It is not entirely clear that a departmental home for the Program would fully alleviate this problem, since faculty from many departments (other than the one that might house the Program) would still participate in teaching, but it was implied that there might nonetheless be more leverage under that scenario. Particular concern was noted that growth in other majors might lead to chairs in those departments pulling back faculty from the Program to teach in major-specific courses. Concern was also expressed that there was insufficient awareness in the Office of the Provost that past thinning of the tenure track faculty ranks resulted in new hires “filling holes” rather than adding capacity, and that this could become a particularly acute issue as recent enrollment growth reached upper division courses dependent on tenure track faculty instructors. Ultimately, much of the difficulty with respect to faculty availability can be tied to the lack of an equitable model for resource distribution – one that supports the participating program in a way that is tied to enrollment based need.

Concern about the non-departmental stature of the Program was also noted by Dean Remcho in his meeting with the review team. He reviewed the history and explained in depth the pending votes on the proposal to create a School of Life Sciences in which the Biology Program would find a home in the Zoology Department, which would be renamed “Integrative Biology.” With the additional division of the General Science major into two new majors in BioHealth Sciences (to be housed in Microbiology) and Molecular Biology (to be housed in Biochemistry and Biophysics), all majors in the biological sciences would thus find departmental homes. It was described that support for this proposal was mixed, due to differences of opinion among different parties regarding whether the move would lead to a gain or decline in faculty engagement with a major and program that was no longer under joint sponsorship. In general, the review team was supportive of the idea that a departmental home would create a more supportive environment for the Program, with stronger lines of communication to senior administration and a greater degree of accountability on the part of the ladder faculty and administration for developing the resources needed to sustain excellence. However, the review team was cognizant of the many complexities involved in this decision.
Having become aware after the visit that the vote went against the reorganization proposal, the review team strongly encourages the administration and faculty to work diligently to ensure that if the proposal is not approved in some revised form over the coming months, that mechanisms are developed to address the real problems arising from the lack of a departmental home. It is not a sustainable situation for a high quality, high enrollment major to be dependent, during a time of rapid growth, on the vagaries of the priorities of several departments for meeting its teaching needs, and it is key that the administration remedy this situation.

The review group observed that the Program Chair was significantly disadvantaged in his ability to plan for the future by a lack of clarity regarding the university’s strategic plan for his unit with respect to enrollment growth and financial support. It was not possible to determine if this lack of clarity was due to insufficient levels of communication with higher administration, or was inherent in the rapidly changing circumstances faced by the university due to economic impacts on state support and enrollment demand. If the former, there should be a concerted effort to improve the transparency of enrollment planning and budget modeling so that biology and other academic units can plan appropriately for the future.

Summary

The overall impression of the review team was very positive. Although the Biology Program faces the same challenges faced by academic programs in public universities across the country, it is continuing on a rising trajectory and doing an excellent job of preparing students from across Oregon and around the world for successful futures. The team is hopeful that the administrative uncertainty presently facing the program can be brought to a successful close in the near future, so that energies can be focused on improving the student experience. The general consensus is that the plan under consideration at the time of the review would be preferable to the status quo, but recognizes that this is a complex decision that must be made by the faculty. The review team encourages the campus administration to bring this discussion to a successful conclusion, and further advises that if the Program remains extra-departmental, that decisive measures should be taken to ensure that the Program Chair has the resources and authority available to staff and support an outstanding curriculum for a rapidly rising student population, even if this requires some changes to the traditional autonomy of deans and departmental chairs.

The review team concludes by congratulating Professor Mason, the faculty, staff and graduate students involved in this program for their dedicated efforts and consistent excellence in the education of biology students at Oregon State.

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