External Review **May 2017**

Sonoma State University Department of Biology

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Overview

The Biology Department at Sonoma State University has an active faculty engaged in both research and teaching as well as service, which includes student advising. Faculty members have been successful in obtaining funding and involving students their research. The department has made significant changes in recent years to their curriculum in order to promote student success. Their physical resources in terms of research and teaching laboratories limit the size of the faculty and the number of courses that can be offered. Support staff are also limiting. Biology majors are required to carry out a capstone research project. This is based on sound pedagogical reasons, but puts an additional strain on department faculty workload. The department now limits the number of students admitted and has revised their curriculum to accommodate students who enroll. Overall, the department is doing an excellent job with the available resources.

Below I first discuss the changes that have been made in response to the previous review. Included are issues that have arisen following the changes and recommendations to address them. I then discuss observations made during the current external review, along with recommendations for changes that may be helpful. Finally, a suggested plan for going forward is presented.

A. Responses to previous review

The department has made a number of significant changes to address suggestions made in their last external review. The department should be commended for both the way in which changes were made, a good example of shared governance, and with the way in which the changes specifically addressed criticisms. As with most changes in academic programs, the results need to be assessed and unexpected consequences addressed. Some of the major changes are discussed below.

1. Impaction

This was a necessary move, as the ability of the department to serve majors is limited by both human and physical resources.

Area of concern

The effectiveness of the secondary admissions criteria chosen has not been assessed. The Biology department should track the retention and graduation rates of students based on their test scores and High School GPA, as well as other factors that may help assess the effectiveness of the secondary admission requirements. How has the changed admission practices affected the demographics of admitted students? Can predictors of student success be identified?

2. Restructuring the curriculum:

The lower division curriculum for majors was restructured so that there are two tiers of broad introductory courses. The lower division tier consists of one semester of Cell Biology and Genetics and one semester of Diversity and Ecology. The second year builds on that with one semester of more advanced Ecology and Evolution and one semester of more advanced Molecular Biology, Cell Biology

and Physiology. This provides an overall reduction in required courses and consistency in course offerings from year to year.

Areas of concern

Despite the department's efforts in reorganizing the curriculum, there are still some areas where student progress can become stalled.

a. The tiered two year introductory sequence of four courses, each of which is offered only once/year

The first two courses are required for the second two courses. Multiple students indicated that if a single course was missed it resulted in a delay of a complete year in progress towards their degree. BIOL 130 and especially BIOL 321 are still low completion rate courses. Students indicate this balloons enrollment, making it difficult to enroll in these courses.

Recommendations

- Change the prerequisites so that BIOL 131 is the only prerequisite for only Biol 320 and BIOL 130 is the only prerequisite for only BIOL 321.
- Student instructor (SI) resources should be focused on BIOL 130 and 321. Peer mentor tutoring sessions could be initiated for these courses.

b. Small enrollment upper division courses

Students indicated that some desired courses were limited to 15 students. This has its origin in the design of the instructional space; one of the teaching laboratories was built with a capacity of 15 students. The larger teaching laboratories are used for higher enrollment lower division courses.

Recommendations

- If larger teaching laboratory space is available for courses with large waitlists they should be utilized. I realize this is unlikely to be the case, but if this hasn't been explored, it should be.
- Upper division courses in high demand with laboratories limited by the teaching space can be run with a single lecture and two laboratory sections.

3. Reduction of unit requirements and reorganizing degree options:

These changes bring the unit requirements in line with the directives of the Chancellor's Office and provide more flexibility for students in upper division electives. The available options are distinct and justified. There is currently an adjustment period for students interested in the now discontinued microbiology degree and pursuing a Clinical Laboratory Scientist certificate, but as those changes reach the catalogue future students will know that option is not available. It is difficult to let such an option go, but given the limits in human resources for the department it was justified.

Area of concern

The department still offers a large number of options, which requires a large number of different courses to be offered on a regular basis. The number of faculty available limits the number of courses that can be offered. If assessment of the curriculum indicates students are still having trouble getting courses, a further constriction of degree options should be considered. I was not provided with the number of students enrolling in the different options, so it not possible to determine the relative pressure on each.

4. Course fees

This was an excellent solution to the problem of funding laboratory teaching. The department, university and students should be commended for approving this.

5. Capstone Research Courses

The department has developed different course options to try and meet the student demand for capstone research, including a group course option.

Area of concern

The small number of available faculty still limits the ability to accommodate students. The research capstone is an example of high quality, personal instruction and should be maintained. Getting students involved earlier may help relieve the backlog.

Recommendations

- Allow off-campus research to fulfill the research capstone requirement. This could include REU programs available at many institutions across the country, Bodega Marine Laboratory or local research institutes. A requirement for advisor approval prior to these experiences could allow for some control over where it is carried out as well as reporting requirements. An existing independent research course could be utilized to require a written report on research experience carried out off campus.
- The requirement for the research capstone is not emphasized on the department website and should be made much more visible. If options are expanded, those should be prominent on the website.
- Discussion of research capstones should be included in courses in the second and third year.
- Advising workshops should be held discussing capstone research opportunities.

6. Learning objectives

The Biology department systematically reviewed and revised their student and program learning outcomes in an inclusive and collegial manner. The results are excellent and really define the knowledge and skills that we hope students will learn when obtaining a biology degree. Faculty members use these outcomes to examine their courses and identify where the SLOs were taught and measured in their courses.

Area of concern

The embedded assessment of learning outcomes individually by faculty in their courses is problematic. The assessment material and grading is not standardized. Each faculty member decides what criteria to use and how stringent the assessment is. Grading course material is not the same as assessment.

Recommendation

- The university should provide resources for assessing student and program learning outcomes. Faculty in general are not trained in how to do this; workshops by faculty or other professionals who are trained in assessment would be helpful.
- Faculty members should consider using pre and post-tests to specifically examine SLO's.
- The department should explore where it could incorporate a standardized assessment of program learning outcomes. An exit exam could be required in a required senior level course or courses.

B. Current External Review

The Biology Department at Sonoma State University has made a number of changes in response to the previous review. They are currently in the process of assessing the results of those changes. Comments that may be helpful in refining what has been done so far are included in the previous section (A.1-6). Going forward, efforts should focus on assessment of the program as currently configured as well as on planning to meet the goals set forth in the graduation 2025 targets. Some areas of concern identified and recommendations for each are listed below.

1. Data analysis; enrollment management, assessment

The Biology Department is currently operating at its maximum capacity. They have used their impacted status to limit the number of majors to a number they can accommodate with their existing faculty and staff. The restructured curriculum was an effort to reduce unit requirements and to increase flexibility in course requirements such that students could progress toward graduation in a timely fashion. Examination of the CSU Institutional Research Dashboard indicates that the four year graduation has increased and the total number of units completed at graduation has decreased since the changes were made. However, the distribution of students in their program is senior heavy, indicating some difficulty in progressing in the upper division. The university data indicate that there is a clear achievement gap. Data on student performance relative to admission scores, race, gender and ethnicity was in general not available. Roadblocks and bottlenecks to student progress, indicators of student success, risk assessment of students and progress reports were also not available. Improvements in retention and graduation rates will be greatly facilitated if such information is monitored. This requires the university to provide support through predictive analytic software/advising such as EAB (SSC) or Tableau as well as human resources at the college and department level.

Recommendations

- Installation by the university of predictive analytic software that allows analysis of enrollment, student success and coordination of advising efforts. The CSU system may have or be developing licensing of software that could be of assistance.
- Move the Chair position to 12 months to allow time for analysis and planning.
- Increase staffing at the department level. There is currently an office coordinator and a vacant half-time office assistant. A full time office assistant could free time for the coordinator to assist with collection of data.

2. Advising

Advising is a critical component of meeting the targets that have been given for retention and time to graduation. The goals won't be met without advising and tracking students from the moment they arrive on campus.

<u>Area of concern</u>

Advising is currently carried out by faculty as part of their service requirement, or by the chair of the department. As a result, it is uneven, uncoordinated and relies on student initiative to seek out advice. The Chair's time is shifted to advising and away from other duties. Students voiced concern about advising, particularly transfer students who felt lost in their first semester. The department self-study correctly identifies advising as an important component of meeting the Graduation 2025 targets, but there is no coherent plan on how to improve it.

Recommendations

- Provide faculty with assigned time for advising. This could be for one or two individuals or across the board.
- Mandatory transfer advising in the fall semester. This is critical to make students aware of the BIOL 320/321 and capstone research requirements.
- Mandatory freshman advising in the spring semester (as well as the fall, which already occurs).
- Early advising on career options. One of the largest reasons for the low retention in biology majors is the "med school drop off". Students need to be aware that there are many career options provided by a degree in biology.
- An effective strategy may be to advise groups of students in workshop settings. This would better utilize faculty time and allow preparation prior to the workshops to optimize the message. This can be very effective for groups of students who often have the same questions. Enrollment blocks can be used to ensure attendance.
- According to the CSU dashboard, 20% of Biology graduates at Sonoma started out as undeclared. Student input indicated that undeclared majors had low priority for enrollment in Biology courses and were not advised as majors. Either a pathway for entry into the major should be developed, or the students should be required to enter as a biology major.
- Hire additional staff at the college or department level to carry out advising of first and second year students. These positions could also aid in gathering data and in assessment using student surveys. They could also help with early alert and timely advising efforts.
- An advising software system that allows advisors comments would help coordinate and track advising efforts. In the absence of that a shared folder or department website, as well as an occasional meeting where student performance and advising could be discussed would be helpful.

3. Human Resources

<u>Faculty</u>

There are currently twelve faculty in the department. There is laboratory space for thirteen, and with some renovation, possibly room for a fourteenth. The faculty currently have difficulty offering the courses needed. A reduction in time to graduation and any increase in the number of majors will be difficult with the current number of faculty. There is also going to be a turnover of faculty next year, with retirements and faculty taking positions at other institutions.

Recommendations

- Develop a strategic plan for faculty hiring with a goal of fourteen faculty. Factor in curricular needs, student interests, available space and equipment and projected faculty losses. Target research systems that can operate with the available start-up funds. Include lecturers in the plan and where expansion in full time lecturers could relieve the load on TT faculty.
- Consider hiring a computational biologist (to get to fourteen). This would relieve the need for a wet lab and provide opportunities for a number of student capstone research projects. Programming skills and experience with big data are increasingly important for graduates to be successful in the sciences.

<u>Staff</u>

The Biology Department has one full time office coordinator and one half-time office assistant. The department also has two instructional support technicians (IST). One of these not only prepares the laboratories for a large number of different courses but also does all of the ordering and accounting for

both the department and for individual faculty members external grants. Apparently this IST has the only purchasing card (P-card) allowed for the department. This is a particularly low level of support, even for a small department.

Recommendations

- Look into getting work-study students to work in the department office. They can be valuable as front-line support and in carrying out simple office tasks. This can free up office staff for other work.
- Hire graduate assistants (GA) to help ISTs prepare teaching laboratories. These positions are common at other institutions, are low cost and help support graduate programs. They also allow for night laboratories to be offered. The GA positions can be combined with a Teaching Assistant (TA) position in the same course, or can be stand-alone positions.
- Provide a P-card to the office coordinator and to any faculty member with an external grant that provides indirect costs. The faculty member's indirect return account serves a collateral if purchases exceed grant funds. This is common practice at many CSUs. Explore shifting or sharing purchasing and bookkeeping responsibility between the IST and office staff. A 12-month chair can provide oversight, particularly if advising duties are lessened.
- Consider increasing office staff from 1.5 to 2 positions. The justification is based on an increased role in purchasing, advising and program assessment duties by office staff.

Summary

The Biology Department at Sonoma State has a highly qualified and engaged faculty and a dedicated staff. The faculty have active research programs that involve students. They are working at maximum capacity to satisfy student needs. They have made carefully considered changes to their program to facilitate student progress. These changes seem to have improved graduation rates and reduced the number of units students have at graduation. Going forward, the department should address the achievement gap between URM and non-URM students and continue to assess their curriculum to identify roadblocks to student progress. The department has developed excellent student learning outcomes and should work with the college and university to assess whether these outcomes are being met. In order to meet the goals outlined by the Chancellors Office for the CSU, the department will need to work with the college and university to ensure it has the human resources required. This will require a strategic plan for faculty hiring. An examination of the numbers, workloads and position description of support staff may also allow optimization of department operations.

Recommendations

1. The university should build infrastructure for assessment of programs and student success.
    a. Increase data available from Institutional research.
    b. Install predictive analytics software available to chairs and advisors.
    c. Provide resources to departments for program and course assessment.
2. Student Advising should be restructured and coordinated. Having faculty advise students as part of their service load will not be sufficient to provide the level of advising needed to meet retention and graduation goals.
    a. An advising center run by staff should be established at the college and/or department level to handle first year, GE and undeclared majors.
    b. Assigned time should be provided to faculty with significant advising duties.
    c. The university should provide and support centralized advising software.

3. The number of faculty in the Biology Department should be increased to the maximum physical resources allow. This will allow increased research activity, course offerings, numbers of majors and opportunity for student research.
    a. The department should develop a long term hiring plan to reach a maximum of fourteen tenure track faculty.
    b. An increase in full time lecturers should be considered, justified by enrollment numbers and an analysis of student need, both majors and non-majors.
4. Relatively modest changes to support personnel could improve department operations. This in turn would increase faculty and student success. These changes include use of work study students, graduate students to help set up laboratories, increased office staff and staff advisors. Shifting of purchasing duties among staff, allowing faculty with grants to have P-cards, a reorganization of how advising is carried out and a twelve month chair should also be considered.
5. The department should continue to analyze data on the effectiveness of admissions criteria, retention rates, course completion rates, student progress and attainment of student learning outcomes. The curriculum should be adjusted based on data obtained.