

Department of Microbiology, Weber State University External Review

Review Date: March 29th

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Overview:

The review team met with Dean David Matty the morning of the 28th and discussed the intent and goals of the review. A general overview of the College of Sciences was provided at this time. The Review Team then met with the Head of Microbiology in a question/answer session about the department. The Review Team was provided tours of teaching and research laboratories and met with Microbiology faculty as a group and in small, 2 person meetings throughout the day. In addition, the Review Team met with students in the Microbiology program over lunch. Finally, the Review Team met with Dean Matty over dinner to discuss general aspects of the review. A Strengths, Weaknesses, Opportunities, and Threats (SWOT) draft analysis was prepared and provided to Dean Matty on the 29th.

Overall, the Review Team was impressed by the commitment of the faculty to the Microbiology program and its teaching mission, and the quality of the students participating in the review. Student demand for the program is outstanding and it is clear that the department is currently meeting its mission training students for careers in industry and preparing students for professional programs, such as medical or dental programs. One key factor in ensuring student success is the breadth and diversity of mentored undergraduate research opportunities provided by the department.

Societal demand for B.S.-level microbiologists is growing. This is the only state-supported Microbiology-specific department in Utah. As such, the Review Team felt support for the Microbiology department should be a high priority for targeted growth within the university.

Importantly, although there are many strengths in the program, it was the committee's perspective that it does suffer from very large SCH/faculty FTE, lack of graduate student teaching assistantship or even senior undergraduate student teaching assistantship support for lab courses, poor facilities, lack of state-of-the-art research opportunities, and poor interactions with other departments within the college. Per the latter, there seems to be considerable resistance or barriers to interdepartmental efforts in teaching and research. Indeed, in most discussions of this topic, faculty concerns about merging the biological science departments was a common topic. The Review Team understands and recognizes this concern. We also felt that interdisciplinary efforts could significantly enrich the Microbiology curriculum, not weaken it or cause it to lose its identity. The Review Team also supported the department's goal of hiring additional faculty to meet increasing student demand, but such efforts should only be pursued in the context of a well

articulated strategic plan, based on feedback from the industry, that outlines expected work-loads and identifies how the department wants to position itself for success over the coming 5-10 years. Such a plan is only useful, however, if it is consistent with the strategic plan of the college and university.

SWOT Analysis:

Strengths

- Large hardworking student population. Independent and self-motivated.
- Student success in acceptance into professional programs.
- Student demand/student interest in the program. Largest program in the college (number of graduates) and only undergraduate microbiology program in the state.
- Growth of the program in recent years.
- Strong potential for continued growth.
- Faculty dynamics and interactions within the department appear good.
- Faculty/Student dynamics appear strong.
- Inclusion of research into some of the classroom learning experiences, such as in virology, enhance student learning and development
- Efficiency of the faculty in face of minimal resources.
- Assessment criteria are well defined.

Weaknesses

- Lack of a strategic plan/vision for the department. Where does the faculty want the department to be in 5 years? Where is the field going, and how can the department best position itself to meet societal needs?
- Centralized advising and lack of structured/required advising.
- Physical facilities.
- Resources/funding for research, service, and teaching activities.

- Lack of incentives for grant writing and increasing enrollment.
- Lack of necessary human resources for laboratory preparation and course delivery.
- Silos relative to other departments and lack of departments working together.
- Insufficient institutional commitment to research.
- Workload model doesn't address increasing course size, lab sections, or research and service expectations.
- Minimal involvement of the industry, alumni, and the community as a resource.
- Internal assessment tools do not involve faculty peer-review to facilitate preparation for subsequent courses in the curriculum. A matrix should be constructed that identifies when topics and skills are mastered, as students move through the curriculum.
- Lack of state-of-the-art research opportunities, due to lack of equipment, modern laboratories, funded research (grant funded), and significant institutional support.
- Restrictive course offerings for students early in their careers (must come in as a microbiology major in order to finish in 4 years) may contribute to attrition and/or additional expense for students that choose microbiology after a semester or two.

Opportunities/Recommendations

- *Course consolidation.* Consolidation of some course offerings could add flexibility to the curriculum while still providing the background necessary for success in specific life sciences disciplines. Combined with mandatory advising involving all TT faculty, this approach would help facilitate earlier completion of degree programs.
- *New building.* A new building could encourage faculty to work together, potentially breaking down some of the silos inhibiting true cross-disciplinary collaboration. The new building should also include an equipment budget to outfit laboratories with state-of-the-art equipment.
- *New hires.* Faculty turnover and creation of new FTE leading to the hiring of new faculty could address some of the weakness in the

program. However, new hires and curriculum changes should be based on a strategic plan, which identifies future directions for Microbiology and collaborations with other departments. Now is the time, with the new building coming on-line.

- *Outreach.* Alumni/industry relations to aid in gaining resources, equipment, and input on curriculum. Use of an advisory committee.
- *Students as a resource.* Student assistantships (work study or state payroll) could be an approach to provide support in the teaching and research laboratories. Note: It was unclear to the committee how much student support was provided by the department.
- *External programs.* The federal government and the industry have a wide range of training programs that could complement department efforts. Student internship programs at other universities and national laboratories could be leveraged to allow students broader research experiences.
- *Future programs.* A master's degree in microbiology could improve research and teaching opportunities for students and faculty alike. Offering a master's program could help grow department resources while continuing to meet societal demand for highly trained microbiologists.
- *Collaborative efforts with other departments.* The committee strongly recommends working with other biology departments in development of a new common biology core and team taught introductory biology courses.
- *Incentives to encourage acquisition of new grants.* Consider teaching buyouts, summer salary, or other approaches for added compensation as additional incentives to encourage grant writing and the acquisition of funds to increase student research opportunities, and to enrich the curriculum and overall learning experience. Development of a workload model that incorporates such activities, if such a model does not exist.
- *Flexibility within the curriculum.* Consider adding some flexibility to the curriculum to facilitate completion of the degree in 4 years and to encourage/facilitate transfer of 2nd and 3rd year students from other programs.

Threats

- Very high and growing SCHs with no increased resources.

- Blatant and obvious lack of safety compliance in the teaching and research laboratories. This is a critically important area that must take priority over many another issues.
- Poor facilities and lack of state-of-the-art equipment.
- Lack of a plan to accommodate student growth.
- Restrictive course offerings for students too early in their careers (must come in as a microbiology major in order to finish in 4 years) may contribute to attrition and/or additional expense for students that choose microbiology after a semester or two.

Answers to specific questions raised by Dean Matty:

Is the curriculum appropriate compared to national trends or models?

No it is not, but the current curriculum is currently serving the students. What is needed is a vision on where the curriculum should be in 5-10 years. This vision should be consistent with the strategic plan and based on what the department sees as its mission and strengths.

Common core in the biological sciences?

Some common core courses could be considered, but not at the risk of losing the identity of microbiology. Redundancy in some courses, particularly laboratory experiences, was cited by students as a problem.

Flexibility in the curriculum?

There is little flexibility between degrees. Once students choose a degree, it is not that easy to switch out or switch in. The large number of laboratory courses that are often held at the same time makes scheduling and degree completion difficult for students. The lack of mandatory advising and the centralized nature of advising efforts does currently meet student needs.

Use of state-of-the-art teaching methods?

Some faculty are, but it doesn't appear to be across the board. Students mentioned that some faculty are only now starting to use PowerPoint.

Assessment plans?

Current assessment plans are detailed and based on individual classes and instructors. The department should consider peer-review (inclusion of faculty in addition to the instructor in the assessment process) to ensure students are being prepared for upper division courses.

Breadth and depth among faculty?

This is limited by the small number of tenure-track faculty. Future hires should be based on a strategic plan.

Workload?

Workload is a problem. A well-defined workload policy appears lacking. Current workload does not address increased effort associated with increased SCHs. There was no discussion of the policy where faculty can take on added teaching for additional compensation or how this practice impacts overall faculty workloads. Constantly teaching overloads takes time away from scholarly or service pursuits.

Facilities?

Facilities need dramatic improvement, especially with infrastructure and equipment.

Student comments

Students were laudatory and enthusiastic. This group was highly impressive and engaged in our conversation. They feel they are receiving an excellent education. Throughout our frank and honest discussion, the freely raised a number of issues that are addressed above, including: redundancy in lab courses between degrees, no flexibility in the curriculum, and minimal state-of-the-art teaching methods and technology.

Summary:

Overall, the review team feels the department is already doing great things with a small resource base. With a thoughtful strategic plan and commitment from the university to provide resources designed to grow the microbiology program, this department is poised for significant and sustained growth. Student numbers already support this claim. The opportunities afforded by a new building, greater interdisciplinary collaboration, outreach to industrial and government partners, and increased extramural grant activity will result in benefits to all life sciences students at Weber State University.