EXECUTIVE SUMMARY
WSU Department of Microbiology
Self-Study Document, Fall 2012

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The following is a summary of the self-study document, highlighting important points. For complete information, please refer to the full, self-study document itself.

**Mission Statement:**
The department of Microbiology seeks to provide a quality undergraduate education to students of Weber State University in both general education and discipline-specific courses. We strive to provide our graduates with a solid academic foundation for further educational opportunities, and the knowledge and skills for career opportunities upon graduation. We seek to integrate into student's program of study the development of skills including critical thinking, problem solving, written and oral communication, and laboratory research techniques. The department provides opportunities for research and other scholarly activities for both faculty and students, and serves as a resource for the campus and the state of Utah in the area of microbiology. We attempt to inspire life-long learning and teach students the broad range of disciplines in microbiology. We also believe that a more knowledgeable public will be able to make more informed decisions with regard to scientific issues that impact their lives.

Revised, November 1999

**Curriculum:**

The Department of Microbiology offers coursework in general microbiology as well as a wide variety of microbiology sub-disciplines. The curriculum, for microbiology majors, has been developed to ensure that students are exposed to the scope of microbiology, and are well prepared for professional (e.g. medical or dental) school, graduate school, or employment in the field of microbiology. All microbiology majors take five required courses that cover the basics of microbial cell biology, ecology, physiology, and genetics. In these courses, students also learn and practice fundamental laboratory and scientific skills. Beyond this core content, students can take a range of elective courses that best meet their educational goals and interests. We offer courses in diseases, immunology, environmental, and applied microbiology. Many students also participate in undergraduate research where they can further develop their laboratory and critical thinking skills. Many students present or publish their research regionally or nationally.

The department offers three Life Science General Education courses: LS/MICR 1113 Introduction to Microbiology, LS/MICR 1153 Elementary Public Health, and LS/MICR2054 Principles of Microbiology. These courses introduce students to the nature of science and the fundamental principles of biology through the study of microorganisms. The general education courses were renewed in 2009, and meet the Natural Science and Life Science Learning Objectives. Enrollment in these courses remains high despite competition from LS courses outside of the college. Online, evening, and distance-learning sections of these courses allow them to be highly accessible to non-traditional and off-campus students. We also offer upper-division courses for students in health professions, non-microbiology science majors, and off-campus professionals.

**Student Learning Outcomes and Assessment:**

The department has established five core concepts and seven fundamental skills that students should master by the time they graduate with a degree in microbiology. These concepts and skills are taught and assessed in the required and elective courses. There is significant overlap between courses, to ensure all outcomes are met, regardless of which electives a student takes (Table 4). Assessment of these outcomes is done in each course and each instructor uses assessment tools that are most appropriate for their curriculum and teaching pedagogy. The department is developing a comprehensive assessment plan for each of the learning outcomes. We are also developing a curriculum map of the laboratory skills taught in each course so that skills are introduced, practiced, and assessed as students progress through the program.

Over the past five years the department has seen an increase in the number of majors and graduates. The department continues to lead the College in the number of graduates each year. On exit interviews, students rank the overall program effectiveness as excellent (4.7 out of 5 point scale). Graduates of our department are highly successful at obtaining employment and acceptance to professional or graduate school (Table 8).

Involvement of students in mentored research projects has increased significantly over the past five years with students presenting at state regional and national meetings, publishing papers, and even winning graduate student competitions. Research experience is now expected for admission to many medical and dental schools. Participation in research has increased the rate of graduate and professional school acceptance among our graduates.

Placement of microbiology graduates in jobs has been a strength of the department. Our students are recruited by local and regional industries. The need for qualified microbiologists in a wide variety of industries has been increasing and most graduates find employment immediately upon graduation. Graduates have also been very successful in obtaining acceptance to professional and graduate school programs. More students are choosing this career path and several courses have been tailored to assist them in preparing for professional or graduate studies. The high numbers of students majoring in microbiology over the past ten years illustrates the popularity of our program.

In our general education courses, the assessments are designed to evaluate the Natural Sciences and Life Sciences learning outcomes that are achieved through mastery of the course content. We do not, at this time, use department-wide standardized questions that assess each of the learning objectives. However, we are working with the Office of Institutional Effectiveness and the General Education Life Science Assessment committee to design assessments in ChiTester, or otherwise, that can be easily evaluated department-wide.

**Academic Advising:**

Advising occurs throughout the department. All faculty work with students by helping them choose courses, discussing careers, graduate and professional school opportunities, and providing general assistance. Official advising activities, including outlining course schedules, approving prerequisites, course exceptions, and graduation clearances are the responsibilities of the department chairperson. The advising process has changed somewhat with the introduction of CatTracks. Students have greater accesses to their course requirements and can easily view their progress toward degree. However students still often visit several advisors and are sometimes confused about which courses they need to take.

The pre-Professional advisors for Physicians Assistants (Dr. Nakaoka) and Dental schools (Dr. Domek) are within the Department of Microbiology. They serve students in our department, college, and across campus. Dr. Culumber also advises the Biology Composite Teaching majors.

**Faculty:**
The Department of Microbiology has seven tenured or tenure-track faculty members: four full professors, two associate professors, and one assistant professor. Two members of the faculty are women. The Department currently has four adjunct faculty teaching general education courses.

All faculty are encouraged to attend, and preferably present at, a professional meeting or workshop each year. Faculty have also been involved with on-campus professional development activities offered by the Teaching and Learning Forum. All faculty are involved with service to the Department, College, University, and community. All tenured and tenure-track faculty are evaluated according to the PPM. Faculty also complete annual reviews and meet with the department chairperson to discuss their progress and goals for the next year.

**Program Support:**

The needs in the department are primarily related to continued growth of upper-division courses and increased mentored student research projects. Increases in personnel, space, and budget are needed for continued growth.

Laboratory space is in short supply with none available for increasing laboratory enrollments or faculty research. It is becoming increasingly difficult to find classrooms to teach upper-division courses that will accommodate the higher enrollments. Infrastructural deficiencies, such as the availability of laboratory space, continue to cause trouble for the department, and these issues will likely only be resolved upon the completion of a new science lab building.

Current expense budgets have barely kept pace with enrollment increases, particularly in upper-division, laboratory intensive, courses. Inadequate funding limits the number and types of experiments that can be done in these courses. Some of the department's equipment is outdated and needs to be replaced while critical pieces are in need of significant repairs. Even when we can afford to purchase new equipment, there is no place to house it or current expense money to maintain it. Inadequate funding also means very little support can be provided to faculty, for travel, research, or curriculum development.

Student research is expensive and labor intensive for faculty, but is now necessary for students to be competitive for graduate and professional school positions. Funding through Office of Undergraduate Research for student research in the summer has brought some relief. Unfortunately, there have been no funds available for faculty overload salaries as they mentor research students during summer semester.

The department is fortunate to have excellent laboratory and office support. However, both of these positions are currently part-time hourly positions. This threatens these positions in the event that the office administrator or laboratory manager needs to be replaced. Further, we typically hire several student workers to support our laboratory classes. As enrollment in our upper division courses increase, we will need to increase the amount of laboratory support for these classes. Continued support of our laboratory manager and hourly student lab aids is vital for our upper-division labs.

**Relations with External Community:**

The Microbiology Department has developed a number of relationships with local industries. These relationships have led to student internships, the donation of supplies to the department, faculty

consulting for industries, and the employment of graduates. The department needs to continue efforts to develop partnerships with industry. Traditionally this has been a weakness and has only started to improve in the last five years, particularly with the assignment of a specific development person to the College of Science.

**Results of Previous Program Reviews**:

The previous program review recognized that the Department of Microbiology is a unique and valuable asset to the state. The department has a large number of majors and graduates that are very successful after graduation. The faculty are talented, are engaged in the field of microbiology, and are dedicated to student success. Students and faculty participate in a significant amount of undergraduate research, leading to publications and presentations.

The review also identified some major issues for the department. At the time of the review the department was struggling with inadequate budgetary support for teaching and scholarship and with aging equipment and infrastructure. Budgetary support has not increased with the increases in upper-division SCHs offered by the department. The department has been able to update or purchase some equipment, which has improved the laboratory experiences for students. Further, one of our research rooms is currently (2012) being remodeled to improve functionality and safety. There is still no plan for replacing or repairing major pieces of equipment that could fail.

Another challenge identified was the high teaching load. At the time of the review, a faculty member had recently retired. Due to the recession, that position was frozen until 2012. Between 2008 and 2012, the department functioned and enrollments grew with only six faculty members. As faculty taught larger and larger courses, this put a tremendous strain on the department. We had little flexibility for scheduling, sabbatical leave, reassigned time, or developing new courses. In July 2012, we were able to fill a frozen position. However, as the major continues to grow, the department will continue to experience this stress. Adding another faculty member (bringing our total to eight) would allow more flexibility for scheduling, and allow the department to offer more courses in cutting edge microbiology. The college should also review how it counts laboratories and undergraduate research TCHs to better reflect the time and commitment of these responsibilities.

**Current Challenges:**

Current challenges for the department have not changed substantially. Growth of the department is limited by availability of personnel, space, and finances. Currently, due to high TCHs, the department has very little flexibility for offering new courses, offering sabbatical leave, research, or professional development opportunities. Laboratory space is in short supply with none available for increasing laboratory enrollments or faculty research. Class sizes often range between 35-50 students. Each lab room can accommodate 24 students, requiring the extra students to work in an adjacent laboratory space. We can sometimes staff the additional room with a faculty member or adjunct, but large laboratory sections of upper-division courses often go understaffed. This limits the ability of the instructor to teach and assess laboratory skills and to assure that students are using proper and safe techniques.

Current expense budgets have barely kept pace with enrollment increases, particularly in upper-division, laboratory intensive, courses. Inadequate funding limits the number and types of experiments that can be done in these courses. With the current budget situation, students work in larger laboratory groups and faculty can only provide demonstrations of some procedures and test kits. Continued support of our laboratory manager and hourly student lab aids is also vital for our upper-division labs. Some of the department's equipment is outdated and needs to be replaced while critical pieces are in need of significant repairs. Even when we can afford to purchase new equipment, there is no place to house it or

current expense money to maintain it. Inadequate funding also means very little support can be provided to faculty, for travel, research, curriculum development, and teaching improvement.

The department has the opportunity for further growth through increasing the number of majors, increasing course offerings, collaborative and interdisciplinary research and teaching, and adding new faculty to expand the expertise within the department. As the field of microbiology continues to advance, the demand for well-trained microbiologists will increase. The Microbiology Department at Weber State has a strong record of teaching excellence, placement of graduates, research, and service that will continue through the next decade.