Department of Microbiology
Program Review

November 2007

II. DESCRIPTION OF THE REVIEW PROCESS

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Program Review Procedure

The program review procedure will be followed as outlined in the program review document. The self-study was written by the department chair, assisted by William Lorowitz (faculty member in the department) and contains input from all departmental faculty. The site visit is tentatively scheduled to be held on a day between February 15 and March 15, 2008. There is no professional accreditation review required for the Department of Microbiology.

III. PROGRAM DESCRIPTION

A. Program 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**)**

Admission Standards

Students are admitted to the microbiology program if they are students of good standing at the university.

Summary of Data (Appendix A)

Student Profiles

Approximately 60% of microbiology majors are male and 40% are female. Over one-third of the microbiology majors are preparing for either graduate or professional school. Student demographics reflect the surrounding community. Minimal effort is currently being made to recruit microbiology majors outside of the university setting due to a rather limited recruiting budget, no released time because of faculty teaching loads, and because many upper division courses are either full or exceed current laboratory capacity. Current recruitment efforts include fostering interest in general education courses, the major's fair, and periodic lectures to high school students such as the S4 program.

Enrollment Trends

Enrollment in courses for the microbiology major continues to rise while general education enrollment is slowly declining. This increase is due both to increased job market opportunities and excellent professional school placement while the decrease is due primarily to competition from the gen ed nutrition course on campus which most students view as an easy way to complete their gen ed LS requirement. The number of majors has steadily increased the past ten years due to excellent employment opportunities and because the Microbiology Department offers a diverse number of emphases in a rapidly expanding field of science. Graduates have been very successful in being accepted into professional and graduate schools with word-of-mouth advertising among undergraduates and entering freshmen students the result. Student satisfaction has been high

because the curriculum is continually updated to reflect the latest advances in the field of microbiology, thus making graduates more marketable (See Appendix F – Placement of Microbiology Graduates).

The number of graduates has remained high, and we expect to continue at this level for the foreseeable future. The number of microbiology graduates each year ranks either first or second among the departments in the College of Science. We anticipate a continued rise in both majors and graduates as regional and national emphasis on microbiology increases (especially with bioterrorism and emerging diseases constantly in the headlines and increased recruitment of graduates by professional and graduate schools). Biotechnology, molecular genetics, bioremediation, bioinformatics, proteonomics, emerging diseases, public health and other popular sub-disciplines of microbiology are providing employment opportunities and graduate schools are searching for qualified students. New industries (particularly biotechnology companies), continually opening up in Utah and in the western region, are seeking microbiology graduates instead of the more available biology graduates. The department is responding by teaching upper division courses more often, increasing some course offerings and laboratory sections, and searching for additional resources to meet the demands of rising laboratory costs, particularly in these biotechnology areas.

General education SCHs since semester conversion have dropped due to competition from courses not previously designated with gen ed credit and because several programs in the College of Health Professions now offer their own prerequisite courses instead of utilizing our gen ed courses. SCHs in service courses and upper division courses have increased for several reasons; the general perception of microbiology as a valuable and exciting field to study, high acceptance rates into professional schools, and an increase in employment opportunities in northern Utah (new biotech businesses and production facilities that require quality control personnel). The department has also attempted to teach more courses off campus and online to meet the needs of students with limited success.

The Microbiology Department has responded to these changes by attempting to increase the number of gen ed courses offered particularly off campus and online, scheduling upper division courses every year instead of every other year (resulting in a serious drain on the current expense budget), and the use of more adjunct faculty to teach summer and off campus courses. In addition, we now offer Micro 3053 and Micro 3154 twice a year and offer Micro 2054 during summer semester. The department has been teaching two new courses as experimental offerings, Geomicrobiology (inter-disciplinary with the Geosciences Department) and Tropical Diseases. The student response has been positive so these courses are in the process of being added to the curriculum.

B. Curriculum Overview

Degrees Offered:
1. Microbiology Major
2. Microbiology Minor

General Education Courses:
1. LS1113 - Introductory Microbiology

2. LS1153 - Elementary Public Health
3. LS/SI2054 - Principles of Microbiology

Service Courses:

1. LS1113	Nursing, Dental Hygiene, Respiratory Therapy, Clinical Laboratory Sciences
2. LS2054	Clinical Laboratory Sciences, Pre-medicine, Pre-dentistry, Pre-physical Therapy, Pre-veterinary, Biotechnician Certificate, Botany, Zoology, Biology Teaching Composite
3. Micro 2600	Biology Teaching Composite, Biotechnician Certificate
4. Micro 3053	Biotechnician Certificate
5. Micro 3254	Clinical Laboratory Sciences, Premedicine, Pre-dentistry, Pre-veterinary, Biotechnician Certificate
6. Micro 3305	Clinical Laboratory Sciences, Pre-medicine, Biotechnician Certificate
7. Micro 3484	Botany, Botany Teaching, Pre-agriculture, Pre-horticulture, Applied Environmental Geoscience emphasis
8. Micro 3603	Clinical Laboratory Sciences
9. Micro 4154	Biotechnician Certificate
10. Micro 4252	Pre-medicine, Biotechnician Certificate
11. Micro 4354	Biotechnician Certificate
12. Micro 4554	Pre-medicine, Biotechnician Certificate

Major/Gen Ed Comparison

Faculty generally teach an equal number of upper division and general education courses. The number of SCHs from upper division courses compared to lower division SCHs has continued to rise the past five years. Part of this rise the past is due to an increase in the number of majors in the department the past five years and, secondarily, the use of these courses as service courses by other programs. There has also been a significant increase in SCHs in the online courses offered by the department.

Course Rotation

The gatekeeper course (Micro 2054) is offered all three semesters. Three required courses are now offered twice a year with all other upper division courses offered once each year. Additional sections of laboratories for service courses have been added with the need for additional laboratory sections in other upper division required courses being examined. The main problems with offering additional laboratory sections in upper division courses are the TCH overload it places on faculty and the competition for laboratory space with other courses. All courses for majors and minors are offered on a regular basis to ensure students are able to complete graduation requirements in a timely manner (see Attachment 1).

Other Program Involvement:

Online Courses:

1. Micro 1113 - Introductory Microbiology
2. Micro 1153 – Elementary Public Health
3. Micro 3603 - Advanced Microbiology for the Health Professions

Davis Campus and Roy Campus:
1. Sections of Micro 1113 and Micro 1153 are taught by adjunct faculty.

Curriculum Evaluation

Departmental curriculum changes are the result of continual feedback and evaluation from faculty, student course evaluations, graduate surveys, and periodic discussions with potential employers. The curriculum is consistent with the departmental mission statement. A significant effort is expended to keep the upper division courses (used primarily by majors and has service courses) current so graduates will be competitive in the employment market. The overall acceptance rate for microbiology graduates into professional schools is near 80% and GRE scores average above 1000, both indicating a strong curriculum. All data, assessment, and surveys indicate students are acquiring the fundamental skills necessary to be successful in their pursuits following graduation. As a result of assessment feedback, Microbial Ecology (Micro 3154) has replaced Immunology (Micro 3254) as a required course. More lab skills competency has been included in Micro 2054 and 3053, and presentation opportunities have been increasing in the 4000 level courses.

Unique Aspects:

Weber State University has the only Microbiology Department left in the state higher education system. All other universities and colleges have either eliminated their microbiology departments or folded their microbiology courses into a biology program. Many companies and government agencies have specific positions that require a degree in microbiology yet are forced to hire biology graduates with minimal training in microbiology. Special emphases in the Microbiology Program include biotechnology, industrial microbiology, public health, and environmental microbiology. All of these areas are experiencing growth and the number of positions available is increasing.

Microbiology students have the opportunity to receive training and use pieces of sophisticated laboratory equipment, particularly in the 4000 level courses that are usually reserved for graduate level courses at other institutions. Students also can work on mentored research projects under the guidance of faculty members, providing a means to synthesize information from methodology and course content, and to further develop professional skills. This collaborative research has been presented by students at regional and national professional meetings with numerous students receiving awards in regional graduate student competitions. Undergraduate research experience is viewed very favorably when students apply for graduate or professional school. Selection committees comment on their student applicant's research experience and it has provided continued opportunities for students that otherwise would not have been made available.

Entry-level laboratory courses now utilize skills-based laboratory assessment. This has increased the competence of students in upper division courses and allowed development of more sophisticated laboratory experiments for students to perform in these classes. Upper division courses now include more independent and group research (teaching critical thinking and problem solving skills), laboratory notebooks and laboratory write-ups (requiring development of writing, computer and data analysis skills), and presentations (development of speaking, organizing and computer presentation skills) (See Attachment 2 – Upper Division Course Skills Matrix). Students also have the opportunity to work with faculty in the Center for Applied and

Environmental Microbiology, and the DNA Laboratory, both located in the Science Lab building, and the cell culture laboratory (located in the TE building).

C. Student Learning Outcomes

Department of Microbiology - Expected Student Learning Outcomes

1. Upon graduation, Microbiology majors should have a thorough knowledge and comprehension of the core concepts in the discipline of Microbiology.

These include the fact that:

a. Microorganisms are used as model systems to study basic biology, genetics, metabolism and ecology.
b. Microorganisms play an integral role in disease, and microbial and immunological methodologies are used in disease treatment and prevention.
c. Microorganisms are ubiquitous, inhabiting a multitude of habitats and occupying a wide range of ecological habitats.
d. Microorganisms and their products play a vital role in biotechnology, fermentation, medicine, and other industries important to human well being.
e. Microorganisms have an indispensable role in the environment, including elemental cycles, biodegradation, etc. ecology, and understanding evolution.

2. Upon graduation, Microbiology majors should have mastered a set of fundamental skills, which would be useful to function effectively as professionals and to their continued development and learning within the field of Microbiology.

These skills include the following:

a. Nature of Science and Scientific Inquiry: Microbiology majors should understand that science and scientific methodology is a way of knowing. They should understand the nature of science and how it is applied to every day problems.
b. Laboratory Skills: Microbiology majors should be competent observers and experimentalists. They should be able to design and execute experiments, systematically collect and analyze data, identify sources of error, and interpret the results and reach logical conclusions. They should also have a basic understanding of safety issues.
c. Critical Thinking Skills: Microbiology majors should be able to (1) differentiate between fact and opinion, (2) recognize and evaluate author bias and rhetoric, (3) develop inferential skills, (4) recognize logical fallacies and faulty reasoning, and (5) make decisions and judgments by drawing logical conclusions using sound quantitative and statistically-based reasoning.
d. Problem-Solving Skills: Microbiology majors should be competent problem-solvers. They should be able to assess the elements of a problem and develop and test a solution based on logic and the best possible information.
e. Communication Skills: Microbiology majors will be required to demonstrate competence in communication, both written and oral, in all courses where such communication is expected and evaluated.
f. Cooperation/Social Responsibility: Microbiology majors should understand and appreciate the value of cooperating and working effectively with peers and be able to

demonstrate a commitment to the process of developing such skills.

g. Computer Skills: Microbiology majors should be competent users of computer software, including word processing, spreadsheets, graphing and web-search programs.
h. Values: Microbiology majors should demonstrate an understanding of the ethical issues and responsibilities of doing science.

Assessment of these learning outcomes and skills has been occurring for almost 10 years utilizing student course evaluations, exit surveys and exit interviews (See Attachment 3 – Exit Survey and Appendix G – Assessment Reports for the past five years). Changes in curriculum, incorporation of lab skills assessment in the initial microbiology majors courses and the initiation of an upper division course skills matrix are some of the results of departmental assessments data.

D. Academic Advising

Processes Used to Advise Majors

All faculty members advise students with the department chair assuming much of the advising load particularly during their last year of study as students prepare for graduation. All students are encouraged to come in and review progress on their program of study. These reminders are given in the 2054 course. In addition, Karen Nakaoka advises the pre-physician assistant students and Glenn Harrington (being replaced by Matt Domek next year) advises the pre-dental students, both in the College of Science and across campus. Exit surveys by graduating seniors have been used to assess advising quality and results indicate excellent student satisfaction. Advising handouts have been developed to assist students in course scheduling, progress towards graduation, and selecting elective courses for particular emphases in the microbiology curriculum.

Advising changes include refinement of advising handouts and inclusion of additional faculty input for students interested in individual faculty specialties. More student advising is being attempted in the beginning of their course of study in microbiology although this has proven difficult to implement. The department goal is to assist students in developing a program of study as soon as they declare microbiology their major (See Attachment 1).

Academic Advising Evaluation

The department has done a good job of advising students but could improve in monitoring student progress toward graduation. Some students neglect to come in for advising and occasionally experience delays due to a lack of advising. All of the faculty work with students in advising capacities, although no formal student assignments are made. Departmental advising handouts and other materials are used extensively and are constantly updated to reflect any changes in course offerings or scheduling. Departmental seminars are held periodically on how to obtain employment and gain entrance into graduate programs (usually sponsored by the Microbiology Student Club or College of Science employment specialist). We have specific advisors for different areas of emphasis in the department and for each pre-professional program.

E. Faculty

Departmental Teaching Standards

Departmental teaching standards are those used by the College of Science, specifically in the teaching evaluation section of the Tenure Document and those stated in the Promotion and Tenure evaluation criteria in the University's Policy and Procedures Manual. Faculty members are made aware of teaching expectations when they are hired and during annual interviews with the department chair, the results of which are shared with the Dean.

Typical Faculty Teaching Pedagogies

All faculty (both contract and adjunct) use a variety of teaching pedagogies including lectures incorporating overheads, PowerPoint presentations, videos, slides, and other visual aids. In addition, faculty utilize demonstrations of key concepts, focus study groups, a wide variety of writing assignments, along with notes and other materials made available on the web. Upper division courses often include intensive writing assignments (generally research papers, laboratory notebooks or laboratory write-ups), presentations of research, group research projects, critical thinking exercises, and assignments requiring use of library and web resources (See Attachment 2 – Upper Division Course Skills Matrix).

Teaching Effectiveness Evaluation Measures

1. Student Evaluations for each course are reviewed by individual faculty members, along with the department chair, and dean as part of the annual faculty report and evaluation
2. Annual interview with department chair.
3. Peer Review Committee (used during tenure and promotion reviews).
4. Tenure and Promotion Review Committees.
5. Participation in Teaching and Learning Forum, Speaking across the Curriculum (SAC), Writing across the Curriculum (WAC), and other workshops on campus. Non-tenured faculty particularly are encouraged to participate in these workshops.
6. Participation in American Society of Microbiology (ASM) Teaching Symposia (held in conjunction with the annual ASM meeting). Some faculty are now presenting their teaching ideas at this symposium and are publishing in the microbiology teaching journal.

Teaching and learning processes are systematically reviewed to assess individual faculty and revised as needed to reflect new department objectives and to incorporate new technologies and laboratory methodology. Significant innovation in teaching pedagogies has been made in the past few years including team teaching in some courses, incorporation of computer technologies (presentations, testing, web-based homework, and web access to teaching materials), more critical thinking exercises, instructor assisted individual and group research projects, and skills-based laboratory assessment.

There has been a gradual decrease in emphasis on content and an increase in developing learning skills over the past five years particularly in the laboratory setting. Content is still very important in science courses but with consolidation of some courses due to semester conversion and limited resources (i.e. faculty loads and current expense budget) more emphasis has been placed on ways to acquire information and analyze its value. Upper division courses are now including more problem solving, writing, speaking, critical thinking, and computer technology. Discussions about ethical problems in all courses have increased. The rapid increase in

information and changing laboratory techniques requires a lot of effort by the faculty just to stay current in their respective specialties. The department is committed to integrating basic skills assessment and problem-solving across upper division curriculum.

Orientation of New Employees

New faculty are oriented by the department chair, attend the new faculty orientation sponsored by the University, are mentored as required by the chair, have all courses evaluated by the students, and their efforts and effectiveness is reviewed annually by the chair.

Effectiveness of Contract/Adjunct Faculty

Contract faculty and professional staff are evaluated annually by the department chair and the Dean. Each member of the department supplies an annual review of their activities in the areas of teaching, advising, scholarship, and service. All faculty and staff reviews are on file in the department. All contract and adjunct faculty have excellent credentials and have been teaching in the department for more than 10 years. Student evaluations are done in all courses taught by adjunct faculty and reviewed annually by the department chair.

Faculty and Staff Evaluation

Adjunct faculty vitae are on file in the department. All adjunct faculty are approved by the entire department and the chair reviews their student course evaluations each semester. Staff members are evaluated each year using the PREP system.

F. Support Staff, Administration, Facilities, Equipment and Library

Source and Adequacy of Funds

The vast majority of departmental funds come from the annual legislative appropriation for the university. Beginning in 2002-03, a modest amount started coming from student laboratory fees. Occasional gift-in-kind donations from local businesses and small grants for directed research projects round out the department budget. In addition, private donors have made some funds available for use as student scholarships and student research stipends although these donations are usually earmarked for the College of Science and not the Microbiology Department.

Adequacy of Facilities/Equipment

We now need four teaching labs (instead of the three traditionally used) to accommodate our growing upper division course enrollments. By utilizing the fourth laboratory room, this meant the loss of faculty research space and work areas for students to work on directed research projects. Research space is inadequate now and certain areas require some remodeling to create specialized labs, i.e. cell culture, fermentation equipment, photography of gels, etc. The addition of a faculty research area (in the ET building) in the past three years has relieved some growth constraints. Increasing laboratory space is our department's top priority. The incorporation of walk-in cold rooms and incubators would free up considerable bench top space for research and teaching use.

Some of our lab equipment is obsolete and should be replaced with computer-interfaced instruments. Newer equipment will enhance upper division student laboratories and ongoing

student/faculty projects. It is extremely difficult for the faculty to work on meaningful research projects without adequate equipment. In addition, some laboratory equipment is in need of significant repair. Without a line item for equipment repair, replacement, or service contracts, it is difficult to replace such heavily used items as vortexes, incubators and stirring plates. There is no ongoing budget available to repair larger pieces of equipment such as centrifuges and CO_2 incubators.

Library

The central Stewart Library has improved in the past five years, particularly in online journal subscription and with enhanced interlibrary loan services. Library holdings are adequate providing your research is along the lines of the journal's emphasis. Certain additional journals would be helpful, but probably not worth the expense. Searchable databases have improved significantly.

The university has been very supportive of integrating computers into the curriculum and in supplying hardware and software, but timely technical support and adequate training with new software are still problematic.

G. Liaison with the External Community

Liaison Mechanisms

Liaison with the community relies primarily on relationships cultivated between individual faculty members and local businesses, regional companies, and government facilities (county health departments, water treatment plants, etc.) (See Appendix E). In addition, the microbiology laboratory manager has cultivated relationships with other microbiology laboratories (including hospital and microbiological quality control laboratories). Many of the contacts in these companies and agencies are graduates from the Microbiology Department during the past twenty plus years.

Benefits of Community Liaison

Community associations have resulted in donated equipment, donated expendables (media, chemicals, etc.), placement of student interns, and employment of graduates. The department has received out-of-date media (still valuable for teaching laboratories), equipment (incubators, balances, etc.), reagents, and cell culture supplies from companies that recognize the department's needs. Local and regional companies now send recruiters to the WSU Job Fair and job openings to the College of Science employment specialist. Often these recruiters are WSU microbiology graduates that have encouraged their company to recruit at WSU. WSU graduates have even come back to the department from county and state government agencies to assist students in preparing for employment with these entities. Many microbiology graduates are hired by companies were previous graduates have worked. Student internships with local and state agencies have resulted in employment for the students upon graduation. Community contacts have also resulted in the establishment of several scholarships for microbiology majors. These donations have provided opportunities for faculty and students to work on timely projects with potentially significant outcomes.

Evaluation of Liaison with the External Community

Liaison between the Microbiology Department and the local community is good and expanding every year. Part of this increase is due to interaction of faculty with the community and part is due to the number of microbiology graduates who work in local companies and government agencies. Graduates are loyal to the department and often contact the department to see how they can assist the Microbiology Department and its graduates. Lisa Largent from the WSU Development Office has also been of great assistance in contacting potential donors (usually affiliated with the medical community or regional businesses) and helping the department develop relationships with this segment of the community. Faculty members have numerous ties to the local community with many resulting benefits to the department and its students.

H. Previous Reviews and Future Directions

The 2002 review team report included the following findings:

Program Strengths:

1. Faculty: The Microbiology program at Weber is a jewel in the crown of the institution. Not only is the program unique in the state system but it is also staffed with an extraordinarily talented faculty that is largely responsible for its strength and achievements. Dr. Craig Oberg leads the department with aplomb and effectiveness. He has in his possession both the breadth of knowledge and the sense of direction and vision a department chair needs to be successful. His faculty has developed a strong loyalty to him, to their program, and to each other. There exists a remarkable collegiality and sense of teamwork that sets the program apart from most others in the generally contentious and political world of academia. An aura of well-being and high morale pervades the program, despite enormous challenges.
2. Students: The program boasts the second highest number of graduates in the College of Science with one of the smallest number of faculty. Boasting nearly a 100% job-placement record in industry, Micro also serves as a basic major for medical pre-professionals and others seeking entry into graduate programs. It serves additionally as a strong contributor to the General Education program and to the College of Health Professions. Due to the exceptional abilities and dramatic popularity of the faculty and the viability of microbiology as a field of study, the program grows without recruitment in the midst of what is really a no-growth imperative.

Program Challenges:

1. Faculty: The faculty is stretched so thin that it is a wonder that it has not snapped. Due to curricular changes during semester conversion, the program went from about 70% General Education enrollments and 30% upper-division to 60-40. While manageable, this shift served to strain the expertise of the small faculty even more, to say nothing of creating a worsening situation in the laboratory. The small number of faculty in the Microbiology Department has also had a negative effect on opportunities for faculty development. The

field of microbiology is undergoing rapid advancement, so the future success of the Microbiology program in helping students get jobs or other post-graduation opportunities will be dependent upon a faculty that remains current in its areas of expertise and mentorship. Weber State University has a generous sabbatical policy which can provide an outstanding opportunity for faculty development. Unfortunately, faculty in the Department of Microbiology cannot utilize this opportunity as fully as it is intended because there are not enough "hands" to fill the void created by a members absence. Despite all this, they are over-achievers, working very hard to further the needs of their students and to make do with what they have. There is nevertheless a tragic loss of opportunity due to these constraints and, more importantly, there is considerable risk that the program will be unable to maintain its high level of achievement for much longer.

2. Facilities: Space for effective teaching and research has long since reached its limit. This not only hampers the professional development of the faculty but also hurts students who cannot perform the undergraduate research that is becoming a minimum requirement for entrance into graduate programs in medicine and science. In addition, some of the space available to the program is inadequate and unsatisfactory. For example, there are exposed pipes in the cell culture lab, where any potential contamination makes impossible effective work.
3. Funding: Budget constraints (to state the obvious) compound this problem, inasmuch as Micro faces the double whammy of not enough space for new equipment and not enough money to buy what advancing technology requires, even if they had the space for it. A consensus exists among the faculty and students in the program that the Microbiology Department receives less than its fair share of the College and University resources. There is general agreement among the faculty that teaching loads have increased since semester conversion, and the students expressed strong concerns over a deterioration in the quality of education due to growing class sizes (particularly in laboratory sections), and the relevance of practical experiences gained from outdated laboratory equipment. Students are occasionally frustrated with the lack of laboratory space and sharing of laboratory materials. For example, Micro students are required to take a Chemistry minor and report that equipment in that program is "much better" than in Microbiology. In addition, some course offerings (e.g., Immunology) are only made possible through the generous support of industry contacts, who donate laboratory reagents and supplies that the Department cannot presently afford. The expertise, creativity, and resourcefulness of the faculty and the laboratory manager, Lynn Moyes, have allowed the program to attain an exceptionally high standard of quality in undergraduate education. It would be unrealistic, however, to expect them to maintain this standard indefinitely without greater institutional support.

   As a result, Microbiology faculty once again find themselves having to do more with less.

<u>Program Recommendations:</u>

1. Resources: It seems abundantly clear that there is a need for basic reallocation of resources in the College of Science. Given the production record of the Microbiology program in relationship to some other programs in the College, at least two, and preferably three faculty positions should be reallocated as soon as possible to the program from other less

productive programs with a concomitant reallocation of space. While faculty salaries have risen steadily, the burdens on the six members of this department have likewise risen to reduce the ability of these dedicated professors to achieve their potential as educators. The administration at both the College and University levels MUST take immediate steps to rectify this deepening crisis. The Microbiology Department at WSU is like a powerful racehorse handicapped with a 300-pound jockey.

2. Recruitment: It is our conviction that a combination of additional resources and a coordinated recruitment effort would allow the Department of Microbiology to grow considerably over the next 5-10 years, and would ensure the Department's continued position as a leader in providing well-trained Microbiologists to Utah and the Intermountain region.

Institutional Response to the Review Team Report:

Because of recent national events and the increased reality and potential for bio-terrorism throughout the world, the discipline of microbiology has acquired more emphasis both nationally and at WSU. The department has recently acquired the Center for Bioremediation which had been a free-standing entity within the College of Science. To better assist their majors, the Microbiology faculty will focus on improvements in their advising and outcomes assessment processes. The next full review of the Microbiology Department is scheduled for 2007-2008.

Changes in the Department

As a result of the previous program review, an additional faculty member was hired (although replacement of that position is currently on hold due to university budget constraints), an additional research laboratory was obtained in the ET building, and modest increases were realized in the current expense budget.

APPENDICES

Appendix A

Department of Microbiology

Student and Faculty Statistical Summary

(data provided by Institutional Research)

	2002-03	2003-04	2004-05	2005-06	2006-07
Student Credit Hours Total [1]	**6,805**	**7,427**	**6,903**	**7,004**	**6,329**
Student FTE Total [2]	**151.22**	**165.04**	**153.40**	**155.64**	**140.64**
Student Majors [3]					
Microbiology	**154**	**178**	**165**	**223**	**184**
Program Graduates [4]					
Associate Degree	0	0	0	0	0
Bachelor Degree	**24**	**41**	**32**	**35**	**31**
Student Demographic Profile [5]	**154**	**178**	**165**	**223**	**159**
Female	56	53	50	70	63
Male	98	125	115	153	96
Faculty FTE Total [6]	**9.88**	**10.22**	**11.31**	**12.04**	**11.26**
Student/Faculty Ratio [7]	**22.96**	**24.22**	**20.34**	**19.39**	**18.74**

[1]**Student Credit Hours Total** represents the total department-related credit hours for all students per academic year. Includes only students reported in Banner system as registered for credit at the time of data downloads.

[2]**Student FTE Total** is the Student Credit Hours Total divided by 30. The Utah Board of Regents defines a full-time student equivalency as a student who completes 30 credit hours during the academic year.

[3]**Student Majors and Minors** is a snapshot taken from self-report data by students in their Banner profile as of the third week of the Fall term for the academic year.

[4]**Program Graduates** includes only those students who completed all graduation requirements by end of Spring semester for the academic year of interest. Students who do not meet this requirement are included in the academic year in which all requirements are met. Summer is the first term in each academic year.

[5]**Student Demographic Profile** is data retrieved from the Banner system.

[6]**Faculty FTE** is the aggregate of contract and adjunct instructors during the fiscal year. **Contract FTE** includes instructional-related services done by "salaried" employees as part of their contractual commitments. **Adjunct FTE** includes instructional-related wages that are considered temporary or part-time basis. Adjunct wages often include services provided at the Davis campus, along with on-line and Continuing Education courses.

[7]**Student/Faculty Ratio** is the Student FTE Total divided by the Faculty FTE Total.

Appendix B

Faculty Statistical Summary
(NOTE: data provided by Institutional Research)

	2002-03	2003-04	2004-05	2005-06	2006-07
Adjunct FTE	4.1	4.41	4.53	5.26	4.48
Contract FTE	1.0	1.0	1.0	1.0	1.0
Tenure Track/Tenure FTE	4.78	4.81	5.78	5.78	5.78
Total FTE	9.88	10.22	11.31	12.04	11.26

Appendix C

Microbiology Program
Contract/Adjunct Faculty Profile

Name	Gen -der	Rank	Tenure Status	Highest Degree	Years of Teaching			Areas of Expertise
					WSU	Other	Total	
Burt	M		Adjunct	Ph.D				Immunology
Call	M		Adjunct	MS				Microbiology
Cooper	M		Adjunct	MS				Public Health
Harrington	M	Prof	Term	Ph.D	7/1/93			Medical Micro
Domek	M	**Asst.** Prof	Track	Ph.D	7/1/03			Physiology Virology
Jackson	M		Adjunct	MEd				Microbiology
Lorowitz	M	Assoc Prof	Tenured	Ph.D	7/1/00			Industrial Environmental
Nakaoka	F	Prof	Tenured	Ph.D	3/1/94			Immunology Medical
Oberg	M	Prof	Tenured	Ph.D	9/1/83			Food Micro Genetics
Sondossi	M	Prof	Tenured	Ph.D	7/1/91			Ecology Environmental

Zwolinski	F	Asst Prof	Track	Ph.D	**7/1/03**			Ecology Environmental

Appendix D

Contract Staff Profile

Name	Gender	Ethnicity	Job Title	Years of Employment			Areas of Expertise
				WSU	Other	Total	
Moyes	M	C	Manager	9/1/73			Microbiology

(NOTE:data provided by Institutional Research)

Appendix E

External Community Liaisons

Name	Employer
Mark Wight	Hyclone Inc.
Elizabeth Saxton	Propac Inc.
Kristen Froerer	Nutraceutical Corp.
Sue Chao	Young Living Inc.
Diane Raccasi	ARUP
Marion Andersen	Fresenius Medical
Bethanne Beames	Lab Support
Randy Thunell	Gist-Brocades
Louis Cooper	Davis County Health Dept.
Thomas Burton	GSL Mineral
Teresa Gray	Environmental Health, SLVHD
Lee Jackson	AgriPhi Inc.
Richard Merrill	Leprino Foods
Kevin Okleberry	Environmental Health, SLVHD
Bryce Moyes	Cornerstone Inc.
Karen Mann	Weber Basin Water
Evan Call	EC Services
Steve Curtis	Nutraceutical Corp.
Jason Christensen	Nutraceutical Corp.
Jake Weston	Cephalon Inc.
Sean Shepherd	Nelson Laboratory

Appendix F

Placement of Microbiology Graduates

(Data collected primarily from Exit Surveys and Exit Interviews)

2002-2003 GRADUATES	
Neal Adams	Propac Inc., Ogden, UT
Erica Baiden	Medical School, University of Utah
Weston Barney	Optometry School Applicant
Bryan John Brezoff	Nelson Laboratory, SLC, UT
Jason Brown	Dental School Applicant; ARUP, SLC, UT
John Campbell	ARUP, SLC, UT
Keith Dooley	ARUP, SLC, UT; Propac Inc., Ogden, UT
Nissa Gough	Dental School, Marquette University
Jonathan Greenhalgh	Dental School, Virginia Commonwealth University
Brett Jackson	Dental School, Case Western University
Eli Johnson	Dental School, Creighton University
Rachel Korth	Nutraceutical Inc, Ogden, UT; Mstrs of Public Health, University of Utah
Jay Meyer	ARUP, SLC, UT; Medical School, University of Utah
Nichole Meyer (Wilde)	Medical School, UofU
Jessica Miles	Fresenius Medical, Ogden, UT; Graduate School, Princeton University
Sarvenaz Mohammadi	Weber County Human Services; Miller Laboratories, Ogden, UT
Daniel Pettingill	Law School Applicant
Lance Robins	Dental School Applicant; Teaching Certificate, Weber State University
M. Clinton Robins III	Physicians Assistant School, Loch Haven University, PA
Charissa Spendlove (Hodges)	ARUP, SLC, UT; Graduate School, University of Nebraska Myriad Genetics, SLC, UT; Medical School, University of Nebraska
Joshua Spendlove	Propac Inc., Ogden, UT
Kevin Taylor	Physicians Assistant School Applicant
Tamara Tuttle	Myriad Genetics, SLC, UT
Jann Wideman	Dental School Applicant; ARUP, SLC, UT
Ryan Wilson	Parker Chiropractic School, Dallas, TX
Clinton Youngberg	

2003-2004 GRADUATES	
Aaron Anderson	Medical School, University of Cincinnati
Carrie Bauer	Applied Bioxciences, SLC, UT
Kirk Benge	Virology Dept., State Health Dept., SLC, UT
Matt Bowen	Medical School, Virginia Commonwealth University
Jason Campbell	Podiatry School; Des Moines University
Jason Christiansen	Graduate School, Dept. Nutrition & Food Sciences, Utah State University
Carrie Craig	
Colby Frost	Podiatry School; Des Moines University
Daniel Frost	Hill Air Force Base
Craig Geddes	Nevada State Health Dept., Las Vegas, NV
Cade Harland	Medical School Applicant
Steven Jensen	MBA, WSU
Jeremy John	Dental School Applicant (UNLV)
Scott Lee	Dental School, Ohio State
Gregory Manning	Dental School, Ohio State
Michael Maxfield	Dental School Applicant
James McGavock	Dental School Applicant
Christine Meyer	Homemaker
Bennett Oberg	Touro University College of Osteopathic Medicine, Las Vegas, NV
Brenton Packer	Optometry School, University of Houston, TX
Robert Payne	Graduate School Applicant
Bryan Peck	Dental/Grad School Applicant
Phillip Pennington	Graduate School, Midwestern University
Phillip Pozzuoli	Veterinary School, St. Georges University, Grenada
Aaron Radmall	Dental School Applicant
Lyndsey Rector	Cryogenetics Laboratory, University of Utah
Matthew Roberts	Medical School, East Tennessee State, Johnson City, TN
Mike Romer	ARUP, SLC, UT; Medical School Applicant
Christina Sadler	Medical School, University of Utah
Elizabeth Saxton	Propac Laboratory, Ogden, UT
Nathan Starley	Dental School, University of Maryland
Aaron Stevens	Kirksville College of Osteopathic Medicine, Kirksville, MO
Phillip Stephenson	Kirksville College of Osteopathic Medicine, Kirksville, MO
Joseph Strasburg	ARUP, SLC, UT
Noe Vazquez	Army, Flight School
Bradley Wade	Myriad Genetics, SLC, UT
Joseph Walker	Genta Inc, SLC, UT
Jeffrey Wheeler	Kirksville College of Osteopathic Medicine, Kirksville, MO
Dustin Williams	Huntsman Cancer Institute, SLC, UT; Grad Sch, Molecular Biology, University of Utah
Luana Yuzon	ARUP, SLC, UT

2004-2005 GRADUATES	
Mark Allen	College of Osteopathic Medicine, Touro University, Las Vegas, NV
Steven Babcock	College of Osteopathic Medicine, Touro University, Las Vegas, NV
Ben Bodily	
Lori Brophy	
Shane Chase	Hospital Administration Program, WSU
Amanda Curtis	
Steven Curtis	Grad School, Dept. of Nutrition & Food Science, Utah State University
John Earl	Dental School, FL
Aaron Fausett	PA School
Eric Gabrielson	Dental School, Ohio State University
Sarah Garcia	College of Osteopathic Medicine, Touro University, Las Vegas, NV
Kelly Gerber	
James Heslop	
Allen Holdaway	
Cody Hurd	Dental School Applicant
Kevin Jensen	Nelson Laboratories, SLC
Samera Khan	
Jessica Martin	
Kael Mikesell	Midwestern Medical School, AZ
Jennifer Munden	PA School Applicant
Brady Olsen	Dental School, Ohio State University, OH
Lance Palmer	Dental School Applicant
Beau Rollins	Myriad Genetics, SLC; Nelson Laboratories, SLC
Scott Rylan Lee	Dental School, Ohio State University, OH
Audrey Skeen	Masters of Public Health, University of Utah, SLC, UT; Myriad Genetics
Brian Snow	Medical School
Jill Sonstegard	Applied Biosciences, SLC, UT
Trent Teeples	
Clayton Thompson	Biotech QA/QL
Rebecca Thompson	Graduate School, Utah State University
Michael Van Dusen	Medical School, Midwestern University, Chicago, IL

2005-2006 GRADUATES	
James Augusta	Ross Medical School, Dominica (Carribean)
Frank Balik	Graduate School applicant
Brigette Beyer	ARUP, SLC, UT
Kiley Boss	Alternate, Dental School, Creighton University, Omaha, NE
Trevor Bright	Kirksville College of Osteopathic Medicine, Kirksville, MO
Rachael Day	ARUP
Brigham Douglas	Medical School, St. Louis University, St. Louis MO
Brian Draayer	Dental School, Ohio State University, Columbus, OH
Jayde Ferguson	Graduate School, Oregon State University
Joshua Francis	looking for job
Pooja Giri	job, then grad school
Andres Gonzalez	Medical school applicant
Nathan Gracey	Physician's Assistant School, St. Francis University, Pennsylvania
Brad Green	Research Technician, University of Utah Graduate School applicant
Tye Harrison	Kirksville College of Osteopathic Medicine, Kirksville, MO
Trevor Haynes	Alternate, Louisville Dental School
Mark Hill	Medical School, Alternate, George Washington University
Brett Hurst	Research Tech, Virology, USU
James Lake	Dental School, Univ. Southern California
Steven Lockwood	LDS Hospital - CLS Laboratory, IHC-LDS
Derek Lowry	
Troy McArthur	Alternate, Dental School Boston University and Temple University
Kristine McDonald	
Stephen Merrigan	Graduate School, Utah State University
Joel Meyer	Neutraceutical Inc., Ogden
Menimabasi Ndaessien	Medical School applicant
Taylor Oberg	Graduate School, Utah State University
Mimi Oleson	Teaching - Weber School District
Jacob Rabe	Alternate, Medical School, George Washington University
Urika Rajbhandari	job - Graduate School
Rachel Reinhart	Medical School, University of Utah
Rodney Shields	Nelson Laboratory, SLC, UT
Justin Simkins	Myriad Genetics, SLC, UT
Jacob Taylor	Medical School, Michigan State University School of Osteopathic Medicine
Kimberly Thorsted	USDA Laboratory, USU, Logan, UT
Jonathan Swenson	

2006-2007 GRADUATES	
Mehri Aghaei-ghazani	
Benjamin Baird	
Scott Bankhead	Graduate school applicant
Miriam Bernardo	Graduate school applicant
Rich Beus	Pharmacy School, Hillsboro, OK
Rick Bowman	Job applicant
Jeffrey Broadbent	Dental School, University of Louisville
Ryan Brown	Dental school applicant
Todd Bullock	Job
Daniel Clark	Graduate school applicant
Aide Dedios	
Jennifer Denesha	Miller Laboratory, Ogden, UT; Graduate School, England
Jeffrey Douglas	Fresenius Inc., Ogden, UT
Bryson Dunham	Dental School, Virginia Commonwealth University
Aric Elmer	Medical school applicant
Derek Florek	Samuel Merritt Podiatry School, CA
Brandon Frankino	Nelson Laboratory, SLC, UT
Bryan Gibb	Pharmacy School, New Hampshire
John Gittins	Dental School, Marquette University
David Hansen	WSU Nursing Program
James Hillstrom	Dental School, Ohio State University
James Joseph	Dental school applicant
Keri Kinghorn	Food Analytical Laboratory, Ogden, UT
Tyson Kunz	Food Safety Net; Graduate school applicant
Eugene Larsen	Medical school applicant
Quinn Lindstrom	Podiatry School, Des Moines University
Broden Miller	Dental School, Ohio State University
Jeremy Pyper	MBA program, WSU
Ryan Reese	Dental School, Case Western University, Cleveland, OH
Jennika Scadden	P.A. School, Midwestern University, Arizona
Jeffrey Smith	Graduate School, Utah State University
Amy Starks	Job
Kyle Taylor	Dental school applicant
David Teeples	P.A. School, Quinnipiac University, CT
Kyle Tracy	Dental School, University of Louisville
Bryan Trump	Dental School, Virginia Commonwealth University
Benjamin Willis	Podiatry School, Scholl College of Podiatry, Chicago, IL

Appendix H

MAJOR ACCOMPLISHMENTS AND ACTIVITIES OF DEPARTMENT

2006-2007

1. Second highest number of graduates in the College of Science for 2006-2007 with 31 graduates.
2. Numerous undergraduate research project presentations and posters presented by students at state, regional, and national meetings.
3. Continued exit survey program for department graduates and used previous surveys to make modifications in several curriculum areas (particularly related to laboratory skills assessment) particularly in continuing integration of the two sophomore level courses with upper division courses.
4. Taught two new elective courses, Geomicrobiology and Tropical Diseases, for a second time. Utilized student and faculty feedback to determine if they should be added to the curriculum. Both are now in the process (with revisions) of being submitted to the COS curriculum committee.
5. Sponsored the National Pressure Ulcer Advisory Panel – Support Surface Standards Initiative Meeting, June 2-3, 2006.

2005-2006

1. Highest number of graduates in the College of Science for 2005-2006 with 35 graduates.
2. Numerous undergraduate research project presentations and posters at state, regional, national, and international meetings.
3. Completed development of a new Microbiology laboratory in the Tech Building for student research with a particular emphasis on cell culture equipment. This new facility was used as the main laboratory for the Cell Culture course replacing the old cell culture room in the SL building where contamination was a significant problem. Several grants have been obtained directly related to the availability of this new laboratory.
4. Continued exit survey program for department graduates and used previous surveys to continue modifications in several curriculum areas (particularly related to laboratory skills assessment and integration) particularly for the sophomore level course, 2054, and its follow up course, 3053. Added several new elective courses, Geomicrobiology and Tropical Diseases, to augment upper division offerings and cover topics that expand the department's curriculum.
4. Increased the number of SCHs for the year even with two faculty on sabbatical leave. This increase occurred in upper division courses reflective of the increased number of majors in the Department.
5. Continued remodeling and upgrading the Center for Applied and Environmental Microbiology with several research projects now underway in the new center.

2004-2005

1. Largest graduating class in College of Science for 2004-2005 with 33 graduates.
2. Scheduled Microbial Ecology (3154) for two semesters during the year in response to exit survey data.
3. Development of a new Microbiology laboratory in the Tech Building specifically focused on cell culture to replace the old cell culture room on the fourth floor where contamination was a significant problem. This project should be finished by the first part of the summer and a research project will be started in June using the new facility.
4. Repaired the ultracentrifuge, the commercial dishwasher and the autoclave so these important pieces of departmental equipment are now functional and making a contribution to the department.
5. Continued developing, remodeling and upgrading the Center for Applied and Environmental Microbiology.
6. Numerous undergraduate research project presentations and posters along with a number of student awards at state, and regional meetings.

2003-2004

1. Retirement of Diane Horne and hiring of Matthew Domek and Michelle Zwolinski as assistant

professors with a net increase of one new faculty position.

2. Continued to increase efficiency by modifying course offerings sequence and scheduling times. This resulted in a net increase of 625 SCH with only an increase in sections (both lower and upper division) offered from 58 to 62 this past year. One new course offering was an online course and Micro 2054 was also taught Summer semester for the first time. The department had a decrease in cost per SCH from $80.74 to $74.06 compared to 2002-2003.
3. Installed a computer projection system in LL 128 and upgraded the mobile projection equipment for use in the laboratories. These systems are in constant use by the faculty in their courses and have greatly enhanced classroom instruction.
4. Largest graduating class in history of Microbiology department and second largest graduating class in College of Science for 2003-2004 with 41 graduates.
5. Continued exit survey program for department graduates and used previous surveys to continue modifications of several curriculum areas including the sophomore level course, 2054, and its follow up course, 3053. Replaced Immunology (3254) with Microbial Ecology (3154) as a required course in response to course assessment measures and faculty curriculum evaluation.
6. Continued growth of Coop Work program for microbiology majors.
7. Converted the Bioremediation Center into the Center for Applied and Environmental Microbiology. Remodeling of the laboratory occurred during the academic year and will be completed this summer. Several grants were written and submitted for funding of research associated with the new center.
8. Numerous undergraduate research project presentations and posters along with a number of student awards at local, state, and regional meetings.

2002-2003

1. Increased efficiency by changing course offerings sequence and scheduling times. Also increased recruitment efforts. This resulted in a net increase of 794 SCH in spite of a decrease in sections offered from 108 to 97 this past year.
2. Installed computer projection system in LL 127 and purchased a mobile projection system for use in the other classrooms. These systems are in constant use by the faculty in their courses and have greatly enhanced classroom instruction.
3. Second largest graduating class in College of Science with 24 graduates.
4. Completed a new student/faculty laboratory research room in SL 346 to house Dr. Lorowitz's fermentation equipment.
5. Numerous faculty presentations, publications, abstracts, and workshops.
6. Converted the Bioremediation Center into the Center for Applied and Environmental Microbiology. Remodeling of the laboratory will occur this summer.

Appendix I

UNDERGRADUATE RESEARCH SUMMARY
(Listed By Faculty Member and Professional Meeting)

2006-2007

Matthew Domek
American Society of Microbiology Intermountain Branch Annual Meeting, March 10, 2007, Pocatello, ID.

1. Poster Presentation. Inhibition of Common Spoilage Fungi by Lactic Acid Bacteria. Miriam Bernardo, Karli Oberg, Kristen Froerer, Matt Domek, and Craig Oberg.

Utah Academy of Sciences, Arts, and Letters Annual Meeting, April13, 2007, Cedar City, UT.

1. Identification of Bacteriocin Producing Strains of Bacteria from the Great Salt Lake. Jason Hamblin, Bryan Leatham, James Joseph, and Matthew Domek.
2. Use of Natural Plant Extracts to Inhibit Bacteria Associated with Food-Borne Diseases, Erik Oberg, Matthew Domek, and Craig Oberg; Weber State University
3. Inhibition of Common Spoilage Fungi by Lactic Acid Bacteria, Miriam Bernardo, Karli Oberg, Kristen Froerer, Matthew Domek, and Craig Oberg.
4. The Effect of Ultraviolet Light on the Survival of Baculovirus, Bryson Dunham, John Gittins, Todd Bullock, and Matthew Domek.

William Lorowitz
Utah Academy of Sciences, Arts, and Letters Annual Meeting, April 13, 2007, Cedar City, UT.

1. Factors Affecting the Isolation of *Enterococcus*-like Organisms from the Great Salt Lake: Influence of Water Depth and Other Physical Parameters, Scott Kagie, Brandon Frankino, Daniel Clark, William Lorowitz, and Karen Nakaoka.
2. Robustness of the Disk Diffusion Assay Protocol, Badreddin Edris, Cristy Waters, Karen Nakaoka, and William Lorowitz.
3. Statistical Design of Experiments for an Undergraduate Laboratory, Jeffrey Smith and William Lorowitz.

Karen Nakaoka
American Society of Microbiology Intermountain Branch Annual Meeting, March 10, 2007, Pocatello, ID.

1. The Presence of *Marinilactibacillus*-like Organisms in the North Arm of the Great Salt Lake, Devin Lindstrom, Karen Nakaoka, and Michele Zwolinski.

WSU Undergraduate Research Conference, March 26, 2007, Ogden, UT.
1. Factors Affecting the Isolation of *Enterococcus*-like Organisms from the Great Salt Lake: Influence of Water Depth and Other Physical Parameters, Scott Kagie, Brandon Frankino, Daniel Clark, William Lorowitz, and Karen Nakaoka.

Utah Academy of Sciences, Arts, and Letters Annual Meeting, April 7, 2006, Ephraim, UT.

1. The Ability of *Enterococcus*-like Organisms to Survive in the Great Salt Lake. David Freestone, Ben Willis, Rich Beus, Nephi Redd, Ben Baird, Angie Barnes, Michele Zwolinski, and Karen Nakaoka.
2. The Presence of *Marinilactibacillus*-like Organisms in the North Arm of the Great Salt Lake, Devin Lindstrom, Karen Nakaoka, and Michele Zwolinski.
3. Association of Microorganisms with Brine Shrimp Eggs (*Artemia*) from the Great Salt Lake, Angie Barnes, Michele Zwolinski, and Karen Nakaoka.
4. Factors Affecting the Isolation of *Enterococcus*-like Organisms from the Great Salt Lake: Influence of Water Depth and Other Physical Parameters, Scott Kagie, Brandon Frankino, Daniel Clark, William Lorowitz, and Karen Nakaoka.
5. Robustness of the Disk Diffusion Assay Protocol, Badreddin Edris, Cristy Waters, Karen Nakaoka, and William Lorowitz.

Craig Oberg
Utah Conference on Undergraduate Research, Feb. 2, 2007, Salt Lake City, UT.
1. Poster presentation. Use of essential oils components to inhibit common fungi. Erik Oberg and Craig Oberg.

2. Poster presentation. Antimicrobial activity of a liquid disinfectant containing cinnamaldehyde. Jeff Douglas, Erik Oberg, and Craig Oberg.
3. Poster presentation. Phosphate use of halophilic microorganisms. Jennika Scadden, Chase Sessions, Doug Larsen, Michele Zwolinski, and Craig Oberg.

American Society of Microbiology Intermountain Branch Annual Meeting, March 10, 2007, Pocatello, ID.

1. Poster Presentation. Isolation and Characterization of Chitin-Utilizing Halophiles from the Great Salt Lake. Kevin Bowcutt Brigham Burton, Dan Cox, Michele Zwolinski, and Craig Oberg.
2. Poster Presentation. Inhibition of Common Spoilage Fungi by Lactic Acid Bacteria. Miriam Bernardo, Karli Oberg, Kristen Froerer, Matt Domek, and Craig Oberg.
3. Poster presentation. Characterization of Phosphate Use by Halophilic Microorganisms isolated from the Great Salt Lake. Chase Sessions, Jennika Scadden, Michele Zwolinski, and Craig Oberg.

WSU Undergraduate Research Conference, March 26, 2007, Ogden, UT.

1. Poster presentation. Characterization of Phosphate Use by Halophilic Microorganisms isolated from the Great Salt Lake. Chase Sessions, Jennika Scadden, Michele Zwolinski, and Craig Oberg.
2. Poster Presentation. Isolation and Characterization of Chitin-Utilizing Halophiles from the Great Salt Lake. Kevin Bowcutt Brigham Burton, Dan Cox, Michele Zwolinski, and Craig Oberg
3. Poster Presentation. Inhibition of Common Spoilage Fungi by Lactic Acid Bacteria. Miriam Bernardo, Karli Oberg, Kristen Froerer, and Craig Oberg.

Utah Academy of Sciences, Arts, and Letters Annual Meeting, April 13, 2007, Cedar City, UT.

1. Oral Presentation. Use of Natural Plant Compounds to Inhibit Bacteria Associated with Food borne Diseases. Erik Oberg, Matt Domek, and Craig Oberg
2. Oral Presentation. Isolation and Characterization of Chitin-Utilizing Halophiles from the Great Salt Lake. Kevin Bowcutt Brigham Burton, Dan Cox, Michele Zwolinski, and Craig Oberg.
3. Oral presentation. Phosphate Use of Halophilic Microorganisms. Jennika Scadden, Chase Sessions, Doug Larsen, Michele Zwolinski, and Craig Oberg.
4. Oral presentation. Inhibition of Common Spoilage Fungi by Lactic Acid Bacteria. Miriam Bernardo, Karli Oberg, Kristen Froerer, Matt Domek, and Craig Oberg

Michele Zwolinski

American Society of Microbiology Intermountain Branch Annual Meeting, March 10, 2007, Pocatello, ID.

1. Isolation and Characterization of Chitin-Utilizing Halophiles from the Great Salt Lake. Kevin Bowcutt Brigham Burton, Dan Cox, Michele Zwolinski, and Craig Oberg.
2. Characterization of Phosphate Use by Halophilic Microorganisms isolated from the Great Salt Lake. Chase Sessions, Jennika Scadden, Michele Zwolinski, and Craig Oberg.
3. The Presence of *Marinilactibacillus*-like Organisms in the North Arm of the Great Salt Lake, Devin Lindstrom, Karen Nakaoka, and Michele Zwolinski.

WSU Undergraduate Research Conference, March 26, 2007, Ogden, UT.

1. Characterization of Phosphate Use by Halophilic Microorganisms isolated from the Great Salt Lake. Chase Sessions, Jennika Scadden, Michele Zwolinski, and Craig Oberg.
2. Isolation and Characterization of Chitin-Utilizing Halophiles from the Great Salt Lake. Kevin Bowcutt Brigham Burton, Dan Cox, Michele Zwolinski, and Craig Oberg

Utah Academy of Sciences, Arts, and Letters Annual Meeting, April 13, 2007, Cedar City, UT.

1. Use of Natural Plant Compounds to Inhibit Bacteria Associated with Food borne Diseases. Erik Oberg, Matt Domek, and Craig Oberg
2. Isolation and Characterization of Chitin-Utilizing Halophiles from the Great Salt Lake. Kevin Bowcutt Brigham Burton, Dan Cox, Michele Zwolinski, and Craig Oberg.
3. Phosphate Use of Halophilic Microorganisms. Jennika Scadden, Chase Sessions, Doug Larsen, Michele Zwolinski, and Craig Oberg.
4. The Ability of *Enterococcus*-like Organisms to Survive in the Great Salt Lake. David Freestone, Ben Willis, Rich Beus, Nephi Redd, Ben Baird, Angie Barnes, Michele Zwolinski, and Karen Nakaoka.
5. The Presence of *Marinilactibacillus*-like Organisms in the North Arm of the Great Salt Lake. Devin Lindstrom, Karen Nakaoka, and Michele Zwolinski.

6. Association of Microorganisms with Brine Shrimp Eggs (*Artemia*) from the Great Salt Lake, Angie Barnes, Michele Zwolinski, and Karen Nakaoka.

Student Research Awards

1. First Place, Poster Competition. Kevin Bowcutt Brigham Burton, Dan Cox, Michele Zwolinski, and Craig Oberg. Isolation and characterization of chitin-utilizing halophiles from the Great Salt Lake. American Society of Microbiology Intermountain Branch Annual Meeting, March 10, 2007, Pocatello, ID.
2. Best Paper Award in Biological Sciences Division. Williiam Lorowitz, Examining the stringency of the CLSI disc diffusion assay protocol. Utah Academy of Sciences, Arts, and Letters 2007 Annual Conference, April 13, 2007, Southern Utah University, Cedar City, UT

2005-2006

Matthew Domek

American Society of Microbiology Intermountain Branch Annual Meeting, March 18, 2006, Provo, UT.

1. T. Oberg, M. Domek, and E. Call. Effect of heat on epithelial cell viability. Oral Presentation.

WSU Undergraduate Research Conference, March 27, 2006, Ogden, UT.

1. T. Oberg, M. Domek, and E. Call. Effect of heat on epithelial cell viability. Oral Presentation.
2. B. Barrett, T. Bright, Q. Lindstrom, D. Florek, J. Ferguson, and M. Domek. Bacteriocin production by locally isolated strains of *Flavobacterium*.

Utah Academy of Sciences, Arts, and Letters Annual Meeting, April 7, 2006, Ephraim, UT.

1. T. Oberg, M. Domek, and E. Call. Effect of heat on epithelial cell viability. Oral Presentation.

Karen Nakaoka

Utah Academy of Sciences, Arts, and Letters Annual Meeting, April 7, 2006, Ephraim, UT.

1. Poster Presentation. Stephen Merrigan, Sarah Garcia, Aaron Fausett, Jon Earl, Jake Taylor, Brett Schow, William Lorowitz and Karen Nakaoka. June 2005. Bacterial Source Tracking of *Escherichia coli* and *Enterococcus* sp. from the Great Salt Lake using antibiotic resistance analysis.

Craig Oberg

American Society of Microbiology Intermountain Branch Annual Meeting, March 18, 2006, Provo, UT.

1. Poster Presentation. Jeff Douglas and Craig Oberg. Antimicrobial Activity of a Liquid Disinfectant Containing Cinnamaldehyde.
2. Poster Presentation. Erik Oberg, Jeff Douglas, and Craig Oberg. Use of Essential Oil Components to Inhibit Fungi.
3. Oral Presentation. Brigette Beyer, Craig Oberg, and Michele Zwolinski. Phosphate Use Patterns of Hypersaline Microorganisms from the Great Salt Lake.

WSU Undergraduate Research Conference, March 27, 2006, Ogden, UT.

1. Oral Presentation. Erik Oberg, Jeff Douglas, and Craig Oberg. Use of Essential Oil Components to Inhibit Fungi.
2. Oral Presentation. Brigette Beyer, Craig Oberg, and Michele Zwolinski. Phosphate Use Patterns of Hypersaline Microorganisms from the Great Salt Lake.
3. Poster Presentation. Jeff Douglas and Craig Oberg. Antimicrobial Activity of a Liquid Disinfectant Containing Cinnamaldehyde.

Utah Academy of Sciences, Arts, and Letters Annual Meeting, April 7, 2006, Ephraim, UT.

1. Oral Presentation. Erik Oberg, Jeff Douglas, and Craig Oberg. Use of Essential Oil Components to Inhibit Fungi.
2. Oral Presentation. Jeff Douglas and Craig Oberg. Antimicrobial Activity of a Liquid Disinfectant Containing Cinnamaldehyde.

Mohammad Sondossi

WSU Undergraduate Research Conference, March 27, 2006, Ogden, UT.

1. Poster Presentation. K. Kinghorn, R. Day, K. Thorsted, J. Stone, and M. Sondossi. Rock weathering microorganisms: Exploring the role of silicate-mobilizing bacteria in the silicon cycle.

Michele Zwolinski

American Society of Microbiology Intermountain Branch Annual Meeting, March 18, 2006, Provo, UT.

1. Beyer, B., Oberg, C. Zwolinski, M. Phosphate utilization in halophilic organisms of the Great Salt Lake. WSU Undergraduate Research Conference, March 27, 2006, Ogden, UT.
1. Beyer, B., Oberg, C. Zwolinski, M. Phosphate utilization in halophilic organisms of the Great Salt Lake.

Student Research Awards

1. 2005 Best Paper Award in the Biological Sciences Division. Karli Oberg, Lane Rolling and Craig Oberg. Selection of Essential Oils Components to Inhibit *Candida* without Affecting Lactic Acid Bacteria. Utah Academy of Sciences, Arts, and Letters.

2004-2005

Matthew Domek

Utah Academy of Sciences, Arts and Letters Annual Meeting, April 15, 2005, Orem, UT

1. T. Oberg, K. Nakaoka, M. Domek and C. Oberg. Inhibition of *Staphylococcus aureus* isolated from human nares by lactic acid bacteria. Oral Presentation.

William Lorowitz

American Society of Microbiology Intermountian Branch Annual Meeting. March 12, 2005, Ogden, UT.

1. Merrigan, S., K. Gerber, and W. Lorowitz. 2005. Design and operation of an inexpensive continuous culture apparatus.
2. Lorowitz, W., K. Nakaoka, M. Sondossi, and E. Saxton. 2005. Integrating statistics with a microbiology laboratory activity.
3. Lake, J., S. Rudd, D. Hansen, and W. Lorowitz. 2005. Effect of infrared light on microbial growth.
4. Fowler, K., and W. Lorowitz. 2005. The presence of *Staphylococcus aureus* and *Escherichia coli* on the top of soda pop cans.

WSU Undergraduate Research Symposium. March 29, 2005. Ogden, UT

1. Merrigan, S., K. Gerber, and W. Lorowitz. 2005. Design and operation of an inexpensive continuous culture apparatus. Poster.
2. Lake, J., S. Rudd, D. Hansen, and W. Lorowitz. 2005. Effect of infrared light on microbial growth. Poster.
3. Steven Merrigan, Jake Taylor, Brett Schow, Shane Chase, Sarah Garcia , William Lorowitz, and Karen Nakaoka. March 2005. Bacterial Source Tracking of Escherichia coli and Enterococcus sp. from the Great Salt Lake using antibiotic resistance analysis. Poster presented at the WSU Undergraduate Research Symposium 2005.
4. Kristine M. Fowler and William Lorowitz. The Presence of *Staphylococcus auareus* and *Escherichia coli* on the top of soda pop cans. Poster.

Utah Academy of Sciences, Arts and Letters Annual Meeting. April 15, 2005, Orem, UT

1. Taylor, Jake, Stephen Merrigan, Sarah Garcia, Lori Brophy, Brett Schow, Josh Rackham, Jordan Gibb, William Lorowitz and Karen Nakaoka. 2005. Bacterial Source Tracking of Enterococcus sp. from the Great Salt Lake using Antibiotic Resistance Analysis. Utah Academy of Science, Arts, and Letters Annual Meeting, Orem, UT.
2. Merrigan, S., K. Gerber, and W. Lorowitz. 2005. Design and operation of an Inexpensive continuous culture apparatus. Utah Academy of Science, Arts, and Letters Annual Meeting, Orem, UT.
3. Lake, J., S. Rudd, D. Hansen, and W. Lorowitz. 2005. Effect of infrared light on microbial growth.
4. Fowler, K., and W. Lorowitz. 2005. The presence of *Staphylococcus aureus* and *Escherichia coli* on the top of soda pop cans.

American Society of Microbiology, 2004,New Orleans, LA.

1. Carrie Bauer, Bradley Wade, Sarah Garcia, Carri Craig, Karen Nakaoka and William Lorowitz. The Effect of Wastewater Treatment on Antibiotic Resistance in *Escherichia coli* and *Enterococcus* species.

Karen Nakaoka

American Society of Microbiology Intermountain Branch Annual Meeting, March 12, 2005, Ogden, UT.

1. W. Lorowitz, K. Nakaoka, S. Sondossi and E. Saxton. Integrating Statistics with a microbiology laboratory activity. Poster.
2. Taylor Oberg, Karen Nakaoka and Craig Oberg. March 2005. Inhibition of *Staphylococcus aureus* by Lactic Acid Bacteria. Oral presentation.

3. Stephen Lockwood, Rodney Shields, and Karen Nakaoka. March 2005. Lactic acid bacilli inhibition of *Staphylococcus aureus* in the pharynx and tonsils. Oral presentation.
4. Stephen Merrigan, Karen Nakaoka, Ken Burgener and Richard Ford. March 2005. Influence of environmental factors on numbers of *Enterococcus sp. and Escherichia coli* in the southern arm of the Great Salt Lake. Oral presentation.

WSU Undergraduate Research Symposium, March 29, 2005, Ogden, UT

1. S. Merrigan, J. Taylor, B. Schow, S. Chase, S. Garcia, K. Nakaoka and W. Lorowitz. Bacterial source tracking of *Escherichia coli* and *Enterococcus sp.* from the Great Salt Lake using antibiotic resistance analysis. Poster.
2. T. Oberg, K. Nakaoka and C. Oberg. Inhibition of *Staphylococcus aureus* by lactic acid bacteria. Oral Presentation.

Utah Academy of Sciences, Arts, and Letters Annual Meeting, April 15, 2005, Orem, UT.

1. Jake Taylor, Stephen Merrigan, Sarah Garcia, Lori Brophy, Brett Schow, Josh Rackham, Jordan Gibb, William Lorowitz and Karen Nakaoka. Bacterial Source Tracking of *Enterococcus s*p. from the Great Salt Lake using Antibiotic Resistance Analysis.
2. Taylor Oberg, Karen Nakaoka, Matt Domek and Craig Oberg. Inhibition of *Staphylococcus aureus* Isolated from Human Nares by Lactic Acid Bacteria.

American Society of Microbiology, New Orleans, LA, May, 2004.

1. Carrie Bauer, Bradley Wade, Sarah Garcia, Carri Craig, Karen Nakaoka and William Lorowitz. The Effect of Wastewater Treatment on Antibiotic Resistance in *Escherichia coli* and *Enterococcus* species.

Craig Oberg

American Society of Microbiology Intermountain Branch Annual Meeting, March 12, 2005, Ogden, UT.

1. Oral Presentation. Steve Curtis, Jeff Douglas, Lane Rolling, and Craig Oberg. Dermatophyte Inhibition by Essential Oil Components.
2. Poster Presentation. Jeff Douglas, Steve Curtis, Cedric Rolling, and Craig Oberg. Efficacy of a Lotion-based Delivery System Utilizing Natural Compounds for the Inhibition of Dermatophytes and Bacteria.
3. Poster Presentation. Karli Oberg, Lane Rolling and Craig Oberg. Selection of Essential Oils Components to Inhibit *Candida* without Affecting Lactic Acid Bacteria.
4. Poster Presentation. Jennifer Munden, Kristen Froerer, and Craig Oberg. Efficacy of Three Methods for Detection of *Staphylococcus aureus* in Food Supplements at Variable pHs.
5. Oral Presentation. Taylor Oberg, Karen Nakaoka, and Craig Oberg. Inhibition of *Staphylococcus aureus* by Lactic Acid Bacteria.

WSU Undergraduate Research Conference, March 29, 2005, Ogden, UT.

1. Oral Presentation. Jeff Douglas, Steve Curtis, Lane Rolling, and Craig Oberg. Dermatophyte Inhibition by Essential Oil Components.
2. Poster Presentation. Jeff Douglas, Steve Curtis, Cedric Rolling, and Craig Oberg. Efficacy of a Lotion-based Delivery System Utilizing Natural Compounds for the Inhibition of Dermatophytes and Bacteria.
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4. Oral Presentation. Taylor Oberg, Karen Nakaoka, and Craig Oberg. Inhibition of *Staphylococcus aureus* by Lactic Acid Bacteria.

Utah Academy of Sciences, Arts, and Letters Annual Meeting, April 15, 2005, Orem, UT.

1. Oral Presentation. Lane Rolling and Craig Oberg. Selection of Essential Oils Components to Inhibit *Candida* without Affecting Normal Microbiota.
2. Oral Presentation. Steve Curtis, Jeff Douglas, Lane Rolling, and Craig Oberg. Dermatophyte Inhibition by Essential Oil Components.
3. Oral Presentation. Jeff Douglas, Steve Curtis, Cedric Rolling, and Craig Oberg. Efficacy of a Lotion-based Delivery System Utilizing Natural Compounds for the Inhibition of Dermatophytes and Bacteria.
4. Poster Presentation. Jennifer Munden, Kristen Froerer, and Craig Oberg. Efficacy of Three Methods for Detection of *Staphylococcus aureus* in Food Supplements at Variable pHs.
5. Oral Presentation. Taylor Oberg, Karen Nakaoka, and Craig Oberg. Inhibition of *Staphylococcus aureus* by Lactic Acid Bacteria.

6. T. Oberg, E. Call, B. Oberg and C. Oberg. Wheelchair cushion aging studies utilizing fecal coliforms. Oral Presentation.

Mohammad Sondossi

American Society of Microbiology Intermountain Branch Meeting, March 12, 2005, Ogden, UT.

1. W. Lorowitz, K. Nakaoka, M. Sondossi and E. Saxton. Integrating statistics with a microbiology laboratory activity. Poster.
2. L. Brophy, K. Fowler and M. Sondossi. Alternative Method of Nasal Sampling.

WSU Undergraduate Research Symposium, March 29, 2005, Ogden, UT

1. J. Hansen, S. Carrier, M. Sondossi and H. L. Berghout. Modeling a proposed tautomerization step in the biotransformation of a dihydroxybiphenyl. Poster.
2. K. Thorsted, J. Winter, B. Wachocki and M. Sondossi. Effect of tebuthiuron on mycorrhizal assocations in high elevation plant communities. Poster.

Student Research Awards

1. Best Paper Award, 2004. S. Curtis and C. Oberg. Inhibition of Meat Spoilage Organisms by Lactic Acid Bacteria. Biological Division, Utah Academy of Sciences, Arts, and Letters.
2. First Place-Poster Competition. Karli Oberg, Lane Rolling and Craig Oberg. Selection of Essential Oils Components to Inhibit *Candida* without Affecting Lactic Acid Bacteria. American Society for Microbiology Intermountain Branch Annual Meeting. March 12, 2005, Ogden, UT.
3. Second Place-Poster Competition. Jeff Douglas, Steve Curtis, Cedric Rolling, and Craig Oberg. Efficacy of a Lotion-based Delivery System Utilizing Natural Compounds for the Inhibition of Dermatophytes and Bacteria. American Society for Microbiology Intermountain Branch Annual Meeting. March 12, 2005, Ogden, UT.

ATTACHMENTS

1. **Annual Course Schedule (Also used for student advising)**
2. **Upper Division Courses – Skills Matrix**
3. **Student Exit Survey**
4. **Faculty Vitae**