WEBER STATE UNIVERSITY

2007-2008 PROGRAM REVIEW

DEPARTMENT OF BOTANY

NOVEMBER 15, 2007

II. DESCRIPTION OF THE REVIEW PROCESS

A. PROGRAM REVIEW TEAM

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B. BRIEF DESCRIPTION OF PROGRAM REVIEW PROCEDURE

The self-study report was completed on November 15, 2007.
The program review team's on-site visit was on February 29, 2008.
Dr. Jim Farrar, Chair, Department of Plant Science, California State University-Fresno, was the team leader and the party responsible for writing the final review report of recommendations to the Department of Botany, Weber State University.

EXECUTIVE SUMMARY

1. MISSION

In providing a quality undergraduate education to students of Weber State University, the Department of Botany seeks to maximize opportunities for effective education and communication about the value and intellectual appeal of plants, and to offer students experience in laboratory and field-based research in preparation for government and industry careers or advanced academic pursuits in plant biology. We attempt to inspire students to pursue the study of plants as an intellectual endeavor in understanding life's major component - the plants, with their under appreciated physically and functionally dominant place in the world. Plants as organisms are defined during the program by their ecology, structure, evolution, physiology, diversity, and their profound influence on human society, world history, and the global economy. In addition, botanists offer expertise about plants to policy-makers involved in agriculture, conservation, and protection of the environment. We also believe that a more knowledgeable public will be able to make more informed decisions with regard to plant derived products and environmental issues. This understanding should also lead to a paradigm shift that garners greater support for botany as a vitally important profession. The study of Botany is not only challenging but fun while preparing students for a wide variety of careers as well as developing skills that enhance the pursuit of leisure interests.

In addition to playing a primary role in delivering a liberal arts experience through relevant general education courses to non-majors, the Botany program aims to train major and minor students who are prepared for the challenges of employment in botanically related sub-disciplines or for the rigors of Graduate Studies.

The Botany program at Weber State University is the only such program remaining in the state of Utah. We believe that such a unique program develops an important plant biology presence in the mindset of the students, which is often lost in Biology programs where Botany is de-emphasized in favor of a pro-animal priority. While our program is small when compared to many others at WSU, it is relatively large when compared to other such programs nationally. In size, we remain one of the top ten Botany programs nationally and have enjoyed this status for several decades.

2. CURRICULUM

The department offers a BS degree for majors (with three emphases) and a BS degree for Biology Composite Teaching majors (in conjunction with the Zoology Department). Honors designation can be obtained upon completion of certain criteria as part of the department and the Honors program. Along with a minor, a Pre-Agriculture & Pre-Horticulture, Pre-Forestry & Pre-Range Management, BIS emphasis, Urban and Regional Planning emphasis, and a Biotechnician Training Program are also offered. General Education is provided through four special courses which often make up the bulk of a faculty member's teaching load.

The curriculum contains forty-two courses covering the traditional spectrum of sub-disciplines in the Plant Sciences. The arrangement of core courses followed by three emphases paths is unique. A major strength of the curriculum is two courses designed for majors that develop their student portfolios by their senior year and have the portfolio become a central component of the capstone experiences. An additional unique aspect of the

curriculum is the balance between laboratory and field experiences it provides. Augmentation of the curriculum is accomplished through numerous internship opportunities accorded student majors where *Cooperative Work Experience* credit may be earned.

3. STUDENT LEARNING OUTCOMES AND ASSESSMENT

During the 2000-2001 academic year the Department of Botany developed its first comprehensive Assessment Plan. This plan involved: (a) Rewriting a **mission** statement, (b) Identifying **student learning outcomes,** (c) Developing a **curriculum grid** wherein we address each course with respect to the outcomes emphasized in *(b)***,** (d) Developing an **assessment plan** wherein we identify how each learning outcome in *(b)* is to be assessed, when, and by whom, and (e) Beginning to **gather data** on assessment of these learning outcomes. On the basis of this exercise, not only did the department develop a comprehensive program for assessing student learning outcomes, but the curriculum was revised after reflection on what we wished our students to know, what skills they ought to have developed, and what values in the affective domain of development they ought to have developed upon graduation. This assessment plan continues to guide curriculum development in the department as we assess student learning outcomes on a regular basis. The major tool used to monitor progress in and to make an evaluation of the degree to which learning outcomes have been achieved is the **Student Portfolio**.

4. ACADEMIC ADVISING

In Autumn 2001, the Botany Department started a new, one credit course, Botany 2121, *Career Planning for Botanists*. One objective of this course was to improve advising. It made little sense to advise Botany students on an individual basis when we could advise a small group with more efficacy and efficiency. After initial advising about degree requirements by the department chair, students are encouraged to take the *Career Planning for Botanists* course (offered every semester and taught by the department chair) to learn more about required course work, the Botany student portfolio, suitable electives for particular areas of Botany, extracurricular activities, etc. During this course, students are encouraged to seek more specific advice from faculty whose research interests match that of the student. This process involves all faculty and is becoming more important as students choose to do undergraduate research and write up a thesis using a faculty as a mentor. Another way advising is accomplished is through an informal networking that takes place amongst the majors who work closely in the room set aside for majors, minors, BIS students, and pre-professional students. Most of these students also belong to the Botany Club and most of the faculty are available each week when students have their club meetings. Advising is often carried out in these two settings. Senior students become a valuable advising asset to underclassmen. The department is fortunate to have senior students that form an excellently functioning learning community outside of the class room. Continual interaction with faculty serves as quality control so that this advising is yet another tool for communication of requirements, course sequencing, and pre- and post-graduate opportunities for students. Data on advising are primarily collected during graduating senior Exit Interviews. Consensus seems to be that Botany is regarded as a small and caring department with faculty and staff having the student's best interests in mind at all times. Their doors are always open and students who need advice get it when they need it. As Weber State University develops more undergraduate research opportunities, faculty mentoring becomes one of the most important components of advising.

5. FACULTY

The Department of Botany is made up of tenured/tenure-track faculty who are well-trained in diverse areas of expertise. They all hold PhDs from a variety of institutions both in the US and Canada. Faculty conduct research and remain current in their areas of expertise. Of the six full-time faculty, two have extensive post-doctoral experience. Two of the six are female which represents a net loss of one since our last hire, five years ago, replaced a female with a male. Also, of the six, two are Canadians and one is part Native American. Every effort is made to hire new faculty from diverse backgrounds and that the pool of applicants itself is as diverse as possible. The full-time faculty is augmented by two adjunct faculty, both of whom are women who hold MS degrees. One holds a Botany Teaching Masters degree and teaches one course each semester (*Environment Appreciation*) in our evening program as well as one concurrent enrollment course at the high school where she is an award-winning contracted teacher. The other adjunct holds a Masters degree in Biological Anthropology and teaches our *Plants in Human Affairs* course, in the evening program.

Our department has sufficient breadth to provide a quality education in basic botany, environmental awareness and responsibility as well as specialty areas including plant anatomy, ecology, evolution, geography, plant tissue culture, physiology, morphology, propagation, taxonomy, algology, marine biology, genetics, ethnobotany, mycology, and soils. Faculty are also proficient in field and laboratory skills and techniques, plant specimen collection, preservation and preparation which are taught to students through laboratory courses, field trips and directed research. We seek to provide mentors and role models for all of our students and have succeeded in achieving a faculty composition that meshes with the needs of our student body. There has been considerable stability in the departmental faculty. In the past 40 years only two members have left for reasons other than retirement. The Botany faculty are actively involved in professional development activities including research, field work (in the U.S. and abroad), grant writing, teaching improvements, conferences/workshops, professional presentations, consulting, etc., which are supported through departmental, institutional, and external funding sources.

The main tool we use to determine the quality of teaching is the student course evaluations, peer evaluations of faculty during their tenure/promotion reviews, and through annual faculty evaluations at the Department Chair and Dean level. While tenured faculty are required by the university to be evaluated in 2 courses per year, most have students evaluate them in every course they teach, which is the requirement for non-tenured, tenure-track and adjunct faculty. The department chair and the individual faculty member review the evaluations, and discuss them in the annual review of the faculty. We also get some information about the quality of our teaching from our graduating seniors during their exit interviews. Each faculty member is evaluated during the tenure and promotion process, and a teaching portfolio documenting the quality of instruction is part of the peer review process.

6. PROGRAM SUPPORT

The department currently is supported by the services of one Professional Staff (Laboratory Manager) and one half-time Classified Staff (Secretary). Both, because of their competence, training, and experience, are indispensable to the operation of our program. Since the duties of the Secretary have changed radically over time, the obsolete title of Secretary should be replaced by Office Specialist or Administrative Assistant and pay increased commensurate with the changed responsibilities. The Secretary holds a BS degree in English while the Laboratory Manager holds a MS degree in Forest Ecology. Both have

exceptional knowledge of their duties and have personalities that allow them to serve as excellent and important liaisons between students, faculty, administrators, and the public.

The principal source of budgetary support is legislative appropriations and its E & G budget allocation. These are generally deemed marginally adequate since occasional special funding through either student laboratory fees, grants, special legislative appropriations for technology enhancement, or private donations have been made available for equipment purchases outside the capability of the current expense budget. The support of the College of Science has been tremendous even in very difficult times. In short, resourcefulness is a hallmark of our department's operation.

As we embark on an expansion of undergraduate research with faculty mentors, current inadequate space needs will become even more critical. Classroom space is adequate but laboratory research space is not. Likewise, greenhouse space and equipment needs will also expand as students engage in more research. Our Herbarium will require additional space as the collection of vascular plants increases and as it becomes the repository of collections of fungi, algae, and mosses as well. While some expansion of laboratory space in the Tech. Ed. Building helped tremendously, serious expansion needs for space will need to be addressed.

Significant gains have been made in our science library holdings and information access during the period since our last self-study. Through special one-time legislative appropriations, careful resource management to maximize the acquisition of learning resources at minimal cost, especially major databases and expanded use of electronic media and interlibrary loans, faculty and students both are served very well. Courses and less formal workshops and seminars lead by library personnel have made our students more aware of all electronic information available. Significant progress is being made in this most critical area of resource needs. Since one of the skill sets identified in our Portfolio involves "Information Seeking", the information resources of the library have played a more meaningful role in student preparation.

7. RELATIONSHIP WITH EXTERNAL COMMUNITY

During the forty-five years that Weber State University has been a four year institution, the Department of Botany has been interested and active in creating and maintaining a program of instruction that best serves the needs of its students. Our faculty have always been engaged in maintaining contact with employers and graduate schools to get a sense of their needs. This continual contact has allowed our faculty to create a meaningful curriculum and modify it when necessary. Using an external advisory council was deemed unsuccessful for a variety of reasons and abandoned. We remain committed to gathering information from outside our university that is helpful in allowing us to create the best possible opportunities for our students. We do it individually as faculty within the confines of our particular areas of specialization. We visit, telephone, work with, advise, and conduct research with professionals outside our department. Our department chairman attended many meetings designed to address the needs of botany departments in the United States. These meetings of the National Council of Botany/Plant Biology Department Chairs/Heads were especially helpful during the decades of the 80s and 90s. While this group no longer meets formally, contact remains helpful in sharing data of mutual benefit.

Today we maintain close contact with our alumni, obtaining feedback regarding their successes and failures. We engage in activities with groups like the Sierra Club, the

Audubon Society, the Nature Conservancy and the Ogden Nature Center. We visit other campuses, work with and discuss issues with other faculty. Several of our faculty have traveled through five continents, taking students on field trips, meeting other scientists and/or working with indigenous people. We attend professional meetings and present papers. We serve as advisors to high school science programs. We ask questions, offer suggestions and bring back to our department the information we have gathered. We consider issues and collectively make decisions based on the information we have assembled.

8. STATISTICAL SUMMARIES

Student, Faculty, Contract/Adjunct Faculty, and Staff statistical summaries appear in Appendices A-D. Appendix A shows the number of program majors (both Botany and Biology Composite Teaching majors), their demographic profiles, number of graduates, FTE faculty, and student credit hours (SCHs) generated. Data show fairly steady numbers of program majors, however, these represent a drop from the high of 83 in 1997. This decline correlates with a national trend.

Of note in these data is a decline in SCHs generated with the lowest taking place in 2006-2007. This decline is correlated with an increase in section offerings of Nutrition LS1020 *"Foundations of Nutrition"* offered as a Life Science General Education course through the College of Education, Department of Health Promotion & Human Performance. Currently they offer twenty-four sections.

A. MISSION STATEMENT

Program Mission Statement - Revised 2007:

In providing a quality undergraduate education to students of Weber State University, the Department of Botany seeks to maximize opportunities for effective education and communication about the value and intellectual appeal of plants, and to offer students experience in laboratory and field-based research in preparation for government and industry careers or advanced academic pursuits in plant biology. We attempt to inspire students to pursue the study of plants as an intellectual endeavor in understanding life's major component - the plants, with their under appreciated physically and functionally dominant place in the world. Plants as organisms are defined during the program by their ecology, structure, evolution, physiology, diversity, and their profound influence on human society, world history, and the global economy. In addition, botanists offer expertise about plants to policy-makers involved in agriculture, conservation, and protection of the environment. We also believe that a more knowledgeable public will be able to make more informed decisions with regard to plant derived products and environmental issues. This understanding should also lead to a paradigm shift that garners greater support for botany as a vitally important profession. The study of Botany is not only challenging but fun while preparing students for a wide variety of careers as well as developing skills that enhance the pursuit of leisure interests.

Evaluation of the Mission Statement According to the Standards Provided:

The Department of Botany fulfills the central institutional mission of providing a liberal education to students of many backgrounds. Our program aims primarily to educate rather than train students. We emphasize knowledge and understanding both *basic* and *applied,* however, the applied is not overemphasized as is the current trend towards science in general. Too often the applied becomes the overriding motivation for science and its success is measured by political parameters. If society had demanded the same degree of applied science then as now, when polio first appeared, we would have created a better iron lung rather than a vaccine. We are very concerned that our students understand science as a way of knowing based on testable methodologies and that they have a balanced background from which to gain new knowledge and understanding.

The Botany program at Weber State University is the only such program remaining in the state of Utah. We believe that such a unique program develops an important plant biology presence in the mindset of the students, which is often lost in Biology programs where Botany is de-emphasized in favor of a pro-animal priority.

In addition to playing a primary role in delivering a liberal arts experience through relevant general education courses to non-majors, the Botany program aims to train major and minor students who are prepared for the challenges of employment in botanically related sub-disciplines or for the rigors of Graduate Studies. The students whom we serve as majors and minors are generally those who discover within themselves a longstanding interest in Plant Biology after being exposed to a Botany general education course in college. Recruiting of freshmen right out of high school is rare given that such students, if exposed to biology at all, have a pro-animal/anti-plant bias. This, coupled with the realization that our culture is a "*zoochauvinistic"* one, drives us to follow the philosophy embodied in the

mission statement with enthusiasm. Included is an attempt to provide the best possible Botany experience and training in preparation for life beyond W.S.U

The entire program is unique. Nationally, many Botany programs have been incorporated into larger Biology programs where Plant Biology is eventually diminished or eliminated. While our program is small when compared to many others at WSU, it is relatively large when compared to other such programs nationally. In an October, 2007 survey (conducted by Dr. Phil Cantino, Department of Environmental and Plant Biology, Ohio University, Athens, OH) of 44 departments of Botany or Plant Biology or who responded with undergraduate Botany programs in departments with a broader title such as Biological Sciences, Plant Cell and Molecular Biology, Botany and Plant Pathology, etc., Weber State University was listed as ***sixth*** in the nation in size. We have enjoyed top ten status for the several decades these data have been collected, usually by programs undergoing review and who were responding to claims that their programs are simply too small.

We anticipate that by maintaining this unique program we will be in a position to deliver the needed education to our various publics when this need is more fully recognized. It is slowly becoming so. In addition, the department offers the only course in the College of Science that meets the Diversity requirement of the University (Ethnobotany), which highlights the importance of plants to various cultures.

B. CURRICULUM OVERVIEW

B 1 *Types of Degrees Offered, General Education/Service Courses Offered, Comparison of Program Effort for Major/Minor Versus General Education/Service Courses:*

BOTANY DEPARTMENT DEGREE PROGRAMS

Botany Major - B.S. degree

Track A - enriched with quantitative science and intense laboratory hands- on experiences, designed to prepare students for graduate school and careers in laboratory research.

Track B - enriched with field-oriented course opportunities, is designed to best prepare students for field-related careers such as ecology, environmental science, and natural resource management.

Track C - with a slightly reduced number of required courses but with more elective courses is designed to meet the needs of students who simply wish to obtain a General Botany degree without a particular focus or emphasis as met by tracks A or B and to add flexibility for transfer students to minimize the time required for graduation.

Biology Composite Teaching Major - the Botany and Zoology departments cooperate in offering a Biology Composite Teaching Major

Botany Departmental Honors program

Departmental Honors - students must be enrolled in the General Honors program and complete 9 hours of General Honors courses, fulfill requirements for the Botany departmental or teaching major, of which at least 12 hours must be completed on an Honors basis and maintain a GPA of 3.5.

Pre-professional programs - Two year (no degree)

Pre-Agriculture and Pre-Horticulture - these programs are designed to give students an opportunity to complete University general education requirements and general Botany requirements prior to transferring to a institution that offers degree programs in Agriculture and Horticulture.

Pre-Forestry and Pre-Range Management - these programs are designed to give students an opportunity to complete University general education requirements and general Botany requirements prior to transferring to an institution that offers degree programs in Forestry and Range Management.

Botany Minor/Emphasis Programs

Minor/BIS Emphasis - students must complete a minimum of 19 credit hours in Botany courses.

Urban and Regional Planning Emphasis - This is a interdisciplinary Program, which provides a special emphasis in Urban and Regional Planning for majors in Botany, Economics, Engineering, Geography, Geology, Microbiology, Political Science, Sociology, Zoology, and related fields.

Biotechnician Training Program (Associate of Science Degree & Certificate)

The Department of Botany participates with the Departments of Microbiology and Zoology in the Associate of Science Degree and 3rd - year Certificate in Biotechnician training for the biotechnology industry.

General Education and Service Courses provided by the Program

The Botany Department offers four General Education courses, Botany LS1203 *Plant Biology*, Botany LS1303 *Plants in Human Affairs*, Botany LS1403 *Environment Appreciation*, and Botany LS1370 *Principles of Life Science*. Additional service courses include Botany SI2104 *Plant Form and Function*, Botany SI2114 *Evolutionary Survey of Plants*, and Botany DV2303 *Ethnobotany*.

Botany LS1203, Botany SI2104, and Botany SI2114 serve as a pool from which Microbiology, Zoology, Geosciences, and Biology Composite Teaching majors select one or more as required courses. In addition, Geosciences recommends the Botany 3214 (Soils) course for their Applied Environmental Geosciences major and Botany 3214 (Soils), Botany 3303 (Plant Genetics), or Botany 3473 (Plant Geography) for their Earth Science Teaching major. Botany DV2303 is used as a course to meet the University diversity requirement and represents the only such course offered within the College of Science. The Botany LS1403

(*Environment Appreciation*) course is required of all majors in the John B. Goddard School of Business and Economics and the Automotive Technology program in the College of Applied Science and Technology. Botany LS1370 (*Principles of Life Science*) serves the students in the Elementary Teaching program. The Botany Department also provides the primary instruction for the cross-listed course 2600 (Laboratory Safety). This course is cross-listed in five departments within the College of Science and is proposed as a required course in the program in Forensic Science housed in the Department of Criminal Justice, College of Social and Behavioral Sciences. Discussions are ongoing with the Forensic Science program to develop a service course in Forensic Botany. Additionally, conversations are also taking place with the College of Health Professions with respect to a service course in Medicinal Botany for use in their proposed BS and MS programs.

Comparison of the Program Effort for Major/Minor versus General Education/Service Courses

Inasmuch as SCHs play the major role in measuring productivity, and General Education & Service courses provide the majority of our SCH production, considerable time and effort is expended in these courses. Since the College of Business and Economics and a program in the College of Applied Science and Technology require Botany LS1403 *(Environment Appreciation)* for their majors, this has become our largest enrollment course and as many as seven sections have been offered in a single semester yielding 500-600 students. (It must be noted, however, that since the addition of the NUTR(HLTH) LS1020 "Foundations in Nutrition" course from the College of Education as a course which also fulfills the Life Science General Education requirement, the numbers in each section of the Botany LS 1403 (Environment Appreciation) course have been dropping steadily.) For the faculty who teach Botany General Education courses these may involve 30 - 100% of their teaching load in any given semester. Other faculty, however, have the majority of their loads made up of 2000-level and upper division (3000 and above) courses serving the major and minor. Though we are a small department we represent a great diversity of sub-disciplines and interests. This diversity is one of our strengths as noted by previous program evaluation teams.

B 2 ***Course Rotation by Year for the Past Three Years (2005-2008):***

Three Year Course Rotation Schedule

2005-2006 Academic Year	
Fall Semester - 2005	**Spring Semester - 2006**
Botany LS1203	Botany LS1203
Botany LS1303	Botany LS1303
Botany LS1403	Botany LS1370
Botany SI2104	Botany LS1403
Botany SI2114	Botany SI2104
Botany 2121	Botany SI2114
Botany DV2303	Botany 2121
Botany 2413	Botany 2203
Botany 2600	Botany DV2303
Botany 2830	Botany 2600
Botany 3105	Botany 2830
Botany 3214	Botany 2950
Botany 3403	Botany 3204
Botany 3454	Botany 3403
Botany 3504	Botany 3523
Botany 3641A	Botany 3624
Botany 4252	Botany 3641B
Botany 4750	Botany 4750
Botany 4800	Botany 4800
Botany 4830	Botany 4830
Botany 4840	Botany 4840
Botany 4850	Botany 4850
Botany 4890	Botany 4890
Botany 4970	Botany 4950
Botany 4990	Botany 4970
	Botany 4990

Three Year Course Rotation Schedule con't.

Fall Semester - 2006	Spring Semester - 2007
Botany LS1203	Botany LS1203
Botany LS1303	Botany LS1303
Botany LS1403	Botany LS1370
Botany SI2104	Botany LS1403
Botany SI2114	Botany SI2104
Botany 2121	Botany SI2114
Botany DV2303	Botany 2121
Botany 2600	Botany 2203
Botany 2830	Botany DV2303
Botany 3105	Botany 2600
Botany 3214	Botany 2950
Botany 3403	Botany 3303
Botany 3454	Botany 3403
Botany 3514	Botany 3473
Botany 3641C	Botany 3523
Botany 4252	Botany 3624
Botany 4750	Botany 3641D
Botany 4800	Botany 4800
Botany 4830	Botany 4830
Botany 4840	Botany 4840
Botany 4850	Botany 4850
Botany 4890	Botany 4890
Botany 4970	Botany 4950
Botany 4990	Botany 4970
	Botany 4990

Three Year Course Rotation Schedule con't.

2007-2008 Academic Year	
Fall Semester - 2007	**Spring Semester - 2008**
Botany LS1203 Botany LS1303 Botany LS1403 Botany SI2104 Botany SI2114 Botany 2121 Botany DV2303 Botany 2413 Botany 2600 Botany 2830 Botany 3105 Botany 3214 Botany 3303 Botany 3403 Botany 3454 Botany 3504 Botany 3570 Botany 3641A Botany 4113 Botany 4252 Botany 4570 Botany 4800 Botany 4830 Botany 4840 Botany 4850 Botany 4890 Botany 4970 Botany 4980 Botany 4990	Botany LS1203 Botany LS1303 Botany LS1370 Botany LS1403 Botany SI2104 Botany SI2114 Botany 2121 Botany 2203 Botany DV2303 Botany 2600 Botany 2950 Botany 3204 Botany 3403 Botany 3523 Botany 3624 Botany 3641B Botany 4750 Botany 4800 Botany 4830 Botany 4840 Botany 4850 Botany 4890 Botany 4954 Botany 4970 Botany 4980 Botany 4990

Course titles for Academic Years 2005-2006 and 2006-2007.

Botany LS1203	Plant Biology (3)
Botany LS1303	Plants in Human Affairs (3)
Botany LS1370	Principles of Life Science (3)
Botany LS1403	Environment Appreciation (3)
Botany SI2104	Plant Form and Function (4)
Botany SI2114	Evolutionary Survey of Plants (4)
Botany 2203	Home and Garden Plants (3)
Botany DV2303	Ethnobotany (3)
Botany 2413	Introduction to Natural Resource Management (3)
Botany 2503	Biology of the Plant Cell (3)
Botany 2600	Laboratory Safety (1)
Botany 2830	Readings in Botany (1)
Botany 2950	Elementary Field Botany (1-2)
Botany 3105	Anatomy and Morphology of Vascular Plants (5)
Botany 3204	Plant Physiology (4)
Botany 3214	Soils (4)
Botany 3303	Plant Genetics (3)
Botany 3403	Environment Appreciation (3)
Botany 3454	Plant Ecology (4)
Botany 3473	Plant Geography (3)
Botany 3504	Mycology (4)
Botany 3514	Algology (4)
Botany 3523	Marine Biology (3)
Botany 3624	Taxonomy of Vascular Plants (4)
Botany 3641A	Intermountain Flora – Woody Plants (1)
Botany 3641B	Intermountain Flora – Montane Forbs (1)
Botany 3641C	Intermountain Flora – Wetland Plants (1)
Botany 3641D	Intermountain Flora – Grasses (1)
Botany 4113	Evolution of the Plant Kingdom (3)
Botany 4252	Cell Culture (2)
Botany 4750	Topics in Botany (1-5)
Botany 4800	Individual Research (2)
Botany 4830	Readings in Botany (2)
Botany 4840	Thesis Readings (2)
Botany 4850	Thesis Research (2)
Botany 4890	Cooperative Work Experience (1-6)
Botany 4950	Advanced Field Botany (1-5)
Botany 4970	Botany Thesis (2)
Botany 4990	Seminar in Botany (1)

Course titles for Academic Year 2007-2008.

Botany LS1203	Plant Biology (3)
Botany LS1303	Plants in Human Affairs (3)
Botany LS1370	Principles of Life Science (3)
Botany LS1403	Environment Appreciation (3)
Botany SI2104	Plant Form and Function (4)
Botany SI2114	Evolutionary Survey of Plants (4)
Botany 2203	Home and Garden Plants (3)
Botany DV2303	Ethnobotany (3)
Botany 2413	Introduction to Natural Resource Management (3)
Botany 2503	Biology of the Plant Cell (3)
Botany 2600	Laboratory Safety (1)
Botany 2830	Readings in Botany (1)
Botany 2950	Elementary Field Botany (1-2)
Botany 3105	Anatomy and Morphology of Vascular Plants (5)
Botany 3204	Plant Physiology (4)
Botany 3214	Soils (4)
Botany 3303	Plant Genetics (3)
Botany 3403	Environment Appreciation (3)
Botany 3454	Plant Ecology (4)
Botany 3473	Plant Geography (3)
Botany 3504	Mycology (4)
Botany 3514	Algology (4)
Botany 3523	Marine Biology (3)
Botany 3470	Foundations of Science Education (3)
Botany 3624	Taxonomy of Vascular Plants (4)
Botany 3641A	Intermountain Flora – Woody Plants (1)
Botany 3641B	Intermountain Flora – Montane Forbs (1)
Botany 3641C	Intermountain Flora – Wetland Plants (1)
Botany 3641D	Intermountain Flora – Grasses (1)
Botany 4113	Evolution of the Plant Kingdom (3)
Botany 4252	Cell Culture (2)
Botany 4570	Secondary School Science Teaching Methods (3)
Botany 4750	Topics in Botany (1-5)
Botany 4800	Individual Research (2)
Botany 4830	Readings in Botany (2)
Botany 4840	Thesis Readings (2)
Botany 4850	Thesis Research (2)
Botany 4890	Cooperative Work Experience (1-6)
Botany 4950	Advanced Field Botany (1-5)
Botany 4970	Botany Thesis (2)
Botany 4980	Portfolio Summative Assessment
Botany 4990	Seminar in Botany (1)

B 3 ***Program Involvement with WSU Online, Davis Campus, Correspondence, Distance Delivery, etc.:***

Currently the Department of Botany offers one course, Botany LS1303 *Plants in Human Affairs* (3), through both correspondence and on-line as distance delivery. The on-line version is so popular that we believe it has had an impact on on-campus enrollments. Over the last few years the department has participated in delivering both day and evening classes at the Davis Campus as well as at various other satellite sites of W.S.U. The Botany LS1403 (*Environment Appreciation*) course is also offered through the Concurrent Enrollment program of W.S.U. at selected area high schools. Since we are a small department we have probably reached the limit of our involvement at off-campus sites.

B 4 ***Unique Aspects of Curriculum Not Adequately Described Elsewhere:***

The arrangement of a core of courses followed by three emphases paths towards a major bears repeating as unique. Two notable strengths within this curriculum are: (1) the implementation of the Botany 2121 *Career Planning for Botanists* course, and (2) a new course, Botany 4980 *Portfolio Summative Assessment*. The *Career Planning for Botanists* course is arguably the most important single credit hour course the students will take inasmuch as it lays out the entire program of requirements, gets the students started on their portfolio where they deal with the comprehensive list of expected student learning outcomes, surveys employment and graduate school opportunities for students, arranges for their advisement and mentoring, introduces students to a path of life-long learning, teaches students how to market their skills, and equips them with answers to a most perplexing question they constantly hear from peers and family, *"What are you going to do with a Botany degree*?" The Portfolio Summative Assessment course is a new course added during the last year, in response to feedback from students and faculty assessment of student learning outcomes, which provides a vehicle for senior students to assemble the portfolio during their final semester of their senior year with guidance and assistance from faculty. The establishment of this Portfolio Summative Assessment course indicates a maturation of the entire curriculum in support of the portfolio requirement of the program.

An additional unique aspect of the curriculum is the balance between laboratory and field experiences it provides. Most of our courses have a strong laboratory component and for others, field-work provides for a hands-on experience. Significant effort has been expended in providing majors with extensive field experiences in a variety of vegetation types and locales. The department has built a reputation of not only providing such field experiences for its majors but for all students availing themselves of the opportunity, especially from General Education courses. The latter is accomplished through a collective department field trip to the Uinta Mountains (for 42 years continuously) during the fall semester and a spring semester field trip to Antelope Island in the Great Salt Lake, which has been conducted since 2003.

The curriculum is augmented by internships accorded students for work in industry or government on summer work/study-related projects. They have an opportunity to obtain credit for these experiences through a course entitled “Cooperative Work Experience”. While this is not a required course, students add significantly to their capstone requirements and experiences by including summaries of such research in their portfolios in addition to

obtaining elective credit through this Co-op course. Such internship opportunities are plentiful and during the last three years, more opportunities were available than the number of students available. This portends well for the future of Plant Biology.

B 5 ***Evaluation of Curriculum and Process Used to Modify and Update:***

The curriculum for both the degree programs and the general education/service courses were completely overhauled nine years ago during planning for conversion to a semester from a quarter system and through the development of a thorough review of student learning outcomes assessment. Each semester, graduating majors offer feedback through exit interviews and additional faculty reviews are carried out on an as-needed basis. This level of review has resulted in a curriculum that is balanced, comprehensive, diverse, and relevant. The program mission statement has been revised and the curriculum is not only consistent with this mission but with the mission of the institution. As we continue to progress through the assessment process we will no doubt make further revisions; however, we feel that the curriculum presently in place is the strongest it has ever been and students have every opportunity to assist us in implementing it successfully. We believe that courses are offered often enough to permit students to meet the requirements in a timely manner. If students enter our program as freshmen and receive careful advisement and mentoring, they can graduate in fewer than four years. The typical student majoring in botany, however, is one that transfers from another program and this inevitably results in a delay in meeting the graduation requirements. Every effort is made to minimize the amount of time required for such studies. As an example of our commitment to the latter, we offer as evidence the following: (1) we offered a section of Plant Genetics during a semester normally unscheduled simply to permit several students the opportunity to graduate in December rather than in spring, (2) implemented the course Botany 4750 *(Topics in Botany*) which allows us to respond immediately to special interest and/or "hot" topics in response to student requests for relevant Plant Biology issues, and (3) developed a Track C emphasis to provide flexibility for transfer students who in the past experienced long delays in meeting graduation requirements.

C. STUDENT LEARNING OUTCOMES AND ASSESSMENT

During the 2000-2001 academic year the Department of Botany developed its first comprehensive Assessment Plan. This plan involved:

(a) Rewriting a **mission** statement
(b) Identifying **student learning outcomes**
(c) Developing a **curriculum grid** wherein we address each course with respect to the outcomes emphasized in (b)
(d) Developing an **assessment plan** wherein we identify how each learning outcome in (b) is to be assessed, when, and by whom
(e) Beginning to **gather data** on assessment of these learning outcomes

On the basis of this exercise, not only did the department develop a comprehensive program for assessing student learning outcomes, but the curriculum was revised after reflection on what we wished our students to know, what skills they ought to have developed, and what values in the affective domain of development they ought to have developed upon

graduation. This assessment plan continues to guide curriculum development in the department as we assess student learning outcomes on a regular basis. Annual reports of these assessments can be found on our web site at:
http://programs.weber.edu/assessment/participants/botany.htm

It must be said that during the first few years of implementation of the assessment plan, through the portfolio requirement especially, students had difficulty buying into the program. It was perceived as considerable added work without obvious payoff. This was true in part because the faculty were not as effective as possible in making obvious the payoff to students, or having students well into their studies perceiving the new portfolio requirement as not applying to them so the attitude was not the best. Even some faculty had difficulty buying into the new program with the anticipated additional workload to implement the plan fully. Seven years later, based upon exit interviews of all graduates and follow-up discussion by faculty and staff, it is safe to say that students and faculty both have developed a very healthy attitude towards the portfolio, have worked hard at finding ways to improve its development, and are excited about the success it has had for many students seeking employment. The Botany portfolio has been used as a model in other programs across the campus, especially the Honors Program.

C 1 ***Cognitive/psychomotor/affective/performance behaviors of graduating major/minor students.***

(1) Upon graduation, Botany majors should have a thorough **knowledge and comprehension** of the core concepts in the discipline of Plant Biology. These include:

(a) Plants are *like* other organisms in regard to: basic metabolism, sexual reproduction, clonal reproduction, hormonally regulated development,ability to respond to the environment, diversity and evolution.

(b) Plants are *unique* organisms in: their varied life histories - especially a sporic one with alternation of generations; their role as primary producers in food webs, serving as the interface organisms between the organic and inorganic worlds *via* mineral assimilation and photosynthesis; and the oxygenation of the atmosphere.

(c) Plants serve as an important source of products: food, fiber, flavorings, feed, fuel, pharmaceuticals, etc.

(2) Upon graduation, Botany 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 Plant Biology. These skills include:

(a) *Field and Laboratory Research Skills:* Botany majors should be competent observers and experimentalists, whether such research takes place in the field or in the laboratory. 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 laboratory and field safety issues.

(b) *Critical Thinking Skills:* Botany majors should be able to engage in the following aspects of critical thinking: (i) differentiate between fact and opinion, (ii) recognize and evaluate author bias and rhetoric, (iii) develop inferential skills, (iv) recognize logical fallacies and faulty reasoning, and (v) make decisions and judgments by drawing logical conclusions using sound quantitative or statistically-based reasoning. Critical thinking does not exclude imaginative and speculative thinking as it applies to science in general and botany specifically. To the extent that critical thinking skills are discipline-specific, students should understand that science and its methodology is a way of knowing.

(c) *Problem-Solving Skills:* Botany 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.

(d) *Communications Skills:* Botany graduates are required to demonstrate competence in communication, both written and oral, and present the results of their research in senior theses, senior capstone courses, and in all upper-division courses where such communication is expected and evaluated by both their peers and the instructor.

(e) *Computer Skills:* Botany graduates should be competent users of computer software including, but not limited to, wordprocessing, spreadsheet, graphing, and web-search programs. Such skills are also imperative for organizing their required portfolios.

(f) *Information Seeking Skills:* For success in college and for lifelong learning, graduates must be able to: recognize when information is needed; identify appropriate types of information; and locate, evaluate, and use information effectively, ethically, and legally.

(g) *Cooperation/Social Responsibility Skills:* Graduates ought to 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. Included here also is valuing: democracy, equal opportunity, work ethic and ongoing personal growth and renewal.

(h) *Self-Assessment Skills:* Graduates should be able to demonstrate progress in the development of their ability to make a realistic appraisal of growth in all three domains of learning (cognitive, conative, and affective). They should be able to identify, evaluate and explain major, if not pivotal, influences in their development as a botanist.

(3) Upon graduation, Botany majors should demonstrate significant value-added progress in developing the following **values**:

(a) *Appreciation* of the *diversity* of cultures and intellectual points of view.

(b) *Understanding* of *ethical issues* and responsibilities such as the environmental costs of excessive consumerism, impacts of technology upon society, etc.

(c) *Commitment* to the development of cultural perspectives that do not disparage others solely on the basis of an individual's or group's ethnicity, gender, religion, sexual orientation, marital status, age or disability.

(d) *Appreciation* that Botany follows the *Liberal Arts* tradition which is based upon the notion that, in a world of ideas, a person is not free or liberated from the bonds of ignorance if s/he makes decisions based upon closed-minded habits, prejudices, or unconscious emotions that preclude critical thinking. Additionally, graduates will need to demonstrate growth in their social obligation to communicate with the public on scientific and technical issues.

(e) *Appreciation* of the *aesthetic* attributes of nature, whether their studies are primarily in the field where entire ecosystems or biomes are investigated or in the laboratory where the microscope and biochemical techniques are used as tools for observing nature.

(4) ***All students who are exposed to Botany courses*** (majors, minors, support, and General Education students) should **understand and appreciate**, in addition to the core knowledge of Plant Biology, the nature of science, how science is applied to everyday problems, and significant botanical achievements. Biology Composite teaching majors should become aware of teaching strategies that accommodate multiple learning styles of their prospective students.

C 2 ***Data collected on student learning outcomes including how and when data was collected:***

Inasmuch as the primary source of data on learning outcomes is obtained through the Portfolio, much of the departmental efforts center around this requirement. Considerable effort to evaluate, however, is also expended in individual courses by individual faculty as well as through an Exit Interview process participated in by all faculty (see Assessment Plan and Assessment Grid below.)

Enough time has passed for all Botany majors to be under a catalog that requires BTNY 2121. Beginning with the 2007-2008 catalog, BTNY 4980 will replace Senior Seminar (BTNY 4990) or Thesis (BTNY 4970) as the course is which the portfolio receives its final assessment. This change represents the maturation of the Botany Student Portfolio requirement. At the time we started the Portfolio, all majors had to assemble and present a formal, oral presentation in Senior Seminar (BTNY 4990). For most of them, this was the first and only time they ever did this kind of activity, and it constituted their capstone experience. We added Botany Thesis (BTNY 4970) to the curriculum as an alternate capstone experience. A few years after that, we started requiring Botany students to develop a Portfolio to document their progress and accomplishments. We also began to revise our upper division courses to include project work, class presentations, more problem based learning, etc. so that students were better prepared coming into Senior Seminar/Botany Thesis. We added Career Planning for Botanists (BTNY 2121) to the curriculum to provide the starting point for the development of the Portfolio. The Portfolio is checked whenever a student takes an upper division Botany course. The final assessment of the portfolio was included with the student's capstone (BTYN 4970 or 4990). What we have noticed in last

couple of years is that because of the revisions to the upper division courses, the seminar/thesis presentation is no longer needed as a requirement to ensure that our graduates do an independent project and give a formal presentation. Also, we have a need to accommodate more possibilities for a capstone experience. So, in response to a need for a distinct Portfolio assessment course which allows more flexibility in capstone experiences, we developed a 3 credit hour course, BTNY 4980 Portfolio Summative Assessment. The amount of credit recognizes the time students spend assembling, documenting, and writing materials for the Portfolio during their time in the Botany Major Program. The writing component includes a content knowledge essay which, if properly done, easily exceeds 50 pages. The Portfolio includes a requirement for a capstone experience; a student might or might not have capstone related course credits among his or her elective coursework.

The Botany Department has conducted formal exit interviews of graduates since Spring 2000. This usually involved two sets of graduates each year since we have both a spring and a fall graduation at W.S.U. Good inputs have been offered by graduating seniors and curricular changes have been made in response. The information gathered came from answers to the following questions:

(a) How ***long*** did your degree studies take?
(b) What ***motivated*** you to choose Botany and how do you feel about having made that choice?
(c) What did you find ***most useful*** and ***least useful*** in your program of study?
(d) What recommendations do you have that would make the Botany ***curriculum*** more useful to students whose specific interests in Botany match yours? To students with other specific interests within Botany?
(e) How would you assess the ***advisement*** you received from all levels, from the laboratory manager, to the professors, secretary, and advisement centers?
(f) How well could you ***assess yourself*** with regard to the three areas of ***expected learning outcomes*** identified by the Department of Botany? Did the keeping of a ***portfolio*** assist your self-assessment? If so, in what way?
(g) What are your ***future*** short-term and long-range plans?
(h) Are there any ***additional comments*** you wish to make?

C 3 ***Program Changes made as a result of outcomes data:***

Program changes were made as a result of developing the assessment plan even before outcomes data were collected. Each course was revisited and entire faculty input was given with respect to syllabus content, appropriateness of objectives, activities, etc. The process of identifying measurable outcomes and developing an assessment plan in addition to reflection on the mistakes made during conversion from quarters to semesters caused the department to revise its program and curriculum requirements during the 2000-2001 academic year. These changes centered around five issues. In summary, these were:

(1) Need to correct mistakes made during quarter to semester conversion.
(2) Following the development of an outcomes assessment plan, the need for a Career Planning course emerged.
(3) Need for options to accommodate career goals.

(4) Adapting Ethnobotany courses to meet the needs of a new University Diversity requirement.
(5) Identifying core knowledge and comprehension of Plant Biology that every Botanist should know and making this a key component of the Portfolio requirement.

Since the major revision of both the program and the curriculum, the department has created a plan to obtain regular feedback from students through graduate exit interviews which take place twice each year. Input from this exercise as well as periodic self-assessment by the faculty has had a healthy impact on the fine-tuning of the program and curriculum. While the curriculum and program have remained reasonably steady since this major review, two changes of significance have been made. These involved the addition of a Track C to the initial two tracks and the addition of a Portfolio Summative Assessment course.

C 4 ***Evaluation of the outcomes and assessment procedures according to the standards provided:***

As described above, the outcomes assessment process was undertaken in the 2000-2001 academic year and involved the rewriting of a departmental program Mission Statement. As with the Institutional Mission we attempt to provide a quality undergraduate education to students of Weber State University. Our program deals with the value and intellectual appeal of plants and we develop majors that meet a variety of criteria for being educated in Plant Biology. The learning outcomes are assessed according to the process identified above. We also attempt, through our General Education courses, to develop a more plant-knowledgeable public so that they may function as better citizens in our democracy.

All learning outcomes are expressed as measurable, challenging, yet achievable and precise outcomes rather than various processes. A conscious effort was made to address these criteria for outcomes as they were drafted. Each outcome is not equally easy to measure, however. The **cognitive** area (knowledge and comprehension) and the **conative** (skills) area are fairly straight forward with respect to measurement and evaluation. The **affective** domain remains much more elusive. We strongly believe, however, that this is one area of growth and development that our students strongly need to have assessed. While impossible to assess in quantitative terms, bringing the student's self assessment skills to bear is imperative. If we do not challenge the student to think about this area and attempt to assess their strengths and weaknesses relative to it, little real growth and development will take place. Further, inasmuch as the institution places ever increasing importance on this domain of learning, especially with regard to *"diversity"* or *"inclusivity"*, we feel that all units, especially departments, should demonstrate a commitment to this area of student growth.

It must be pointed out that even before data on assessment of various outcomes were gathered, the department responded to emerging needs for curricular change. The program was changed giving students more choice in emphases and identifying a set of core courses required of all students. Several new courses were developed to meet the challenges that the assessment process indicated, and syllabi were changed to not only reflect the newly identified learning outcomes but also to incorporate objectives to provide the plan for

meeting each outcome. It has been a gratifying experience and, as more data are collected, will become even more so.

Inasmuch as the Student Portfolio has become the major assessment tool used by the Department of Botany, what follows is a description of the portfolio requirements along with the evaluation rubric as it appears in the Student Handbook on the department's website. The three learning domains and the expected outcomes are repeated, however.

Botany Student Portfolio

What is a Student Portfolio?

A portfolio is a multidimensional collection of both student and faculty selected educational works. This collection contains both developmental as well as representational materials and is well-organized and readily revisable. The material represents knowledge literacy, skills mastery, and affective development. This collecting exercise empowers students while giving new dimensions to the purpose of their education. Portfolios are used for assessment purposes in addition to serving as an incentive to the student for developing good habits in assembling and organizing materials of relevance to themselves and others, such as personnel managers or graduate school selection committees. "Folder" topics of the Botany Portfolio are listed below but be mindful of the fact that some materials will be used in more than one folder, therefore, cross-reference such material rather than duplicate it.

(1) Knowledge and Comprehension

Upon graduation, Botany majors should have a thorough **knowledge and comprehension** of the **core concepts** in the discipline of Plant Biology. These include the fact that:

(a) Plants are *like* other organisms in regard to: basic metabolism, sexual reproduction, clonal reproduction, hormonally regulated development, ability to respond to the environment, diversity and evolution.

(b) Plants are *unique* organisms in: their varied life histories - especially a sporic one with alternation of generations; their role as primary producers in food webs, serving as the interface organisms between the organic and inorganic worlds *via* mineral assimilation and photosynthesis; and the oxygenation of the atmosphere.

(c) Plants serve as an important source of products: food, fiber, flavorings, feed, fuel, pharmaceuticals, etc.

The following should be included in this *"folder"* of the Portfolio:

- Pre-test and Post-test scores and reviewer comments. The Pre- & Post-test question appears below. Throughout your studies in Botany you should compose and revise a response to the following:
  "In a well-organized English essay, with detailed illustrative supporting materials such as graphs, lists, tables, and/or drawings, demonstrate that you have a thorough knowledge and comprehension of the above core concepts of Plant Biology."

- Course syllabi for all Botany and Support courses.
- Completed *"Advising Summary"* Sheet.
- Copy of the most recent *TRANSCRIPT*.
- Exit interview summary.
- Optional: If a GRE (or similar) exam is taken, a copy of the record received should be included in the portfolio.

(2) Skills Development

Upon graduation, Botany 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 Plant Biology. Evidence of mastery of each skill must be presented.

These skills include the following:

a. **Communication Skills:** Botany graduates will be required to demonstrate competence in communication, both written and oral, and present the results of their research in senior theses, senior capstone courses, and in all upper-division courses where such communication is expected and evaluated by both their peers and the instructor.

(i) ***Writing Skills*** - any graded written assignments, in Botany courses or other, such as poems or short stories in an English class. Included shall be date, course number and title, instructor, purpose of the assignment (if known), etc. Included here shall be an annotated reading list, with abstracts of papers, articles, or books that were both read and had a significant impact upon the student. We believe that such reflections causes us to identify with the *pivotal* impacts in our lives that changed our paradigm. This component shall also demonstrate ***critical thinking, reasoning, and effective argument skills***. CRITICAL THINKING as used here contains the following elements:

- Determining cause-and-effect relationships
- Differentiating between fact and opinion
- Recognizing and evaluating author bias and rhetoric
- Determining the accuracy and completeness of information presented
- Recognizing logical fallacies and faulty reasoning
- Comparing and contrasting information and points of view
- Developing inferential skills
- Making decisions and sound judgments by drawing logical conclusions using quantitative or statistically-based reasoning

Critical thinking does not exclude imaginative and speculative thinking as it applies to science in general and botany specifically. To the extent that critical thinking skills are discipline-specific, students should understand that science and its methodology is a way of knowing.

(ii) ***Speaking Skills*** - any oral presentation(s) given in courses or extracurricular events. Include title of talk, abstract, date, location of talk, & type of audience. Sample of evaluations using the *Oral Presentation Evaluation Form* as used by the Department of Botany should be included.

b. ***Computer Skills***- Botany graduates should be competent users of computer software including, but not limited to, wordprocessing, spreadsheet, graphing, and web-search programs. Such skills are also imperative for organizing their required portfolios. Evidence may include any courses taken or training (certificate) received. List of programs student can use, including version (WP 9.0 vs. 8.0, Mac vs. PC, etc.) Include hard copy of work.

c. ***Field and Laboratory Research Skills:*** Majors should be competent observers and experimentalists, whether such research takes place in the field or in the laboratory. They should be able to design & execute experiments, collect and analyze data, and interpret the results using logic.

d. ***Problem-Solving Skills:*** Botany 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. Evidence of problem-solving skills development should appear in the capstone experience portion of the portfolio, however, draw specific attention to the evidence at this point in the portfolio.

e. ***Self-Assessment Skills:*** Graduates should be able to demonstrate progress in the development of their ability to make a realistic appraisal of growth in all three domains of learning (cognitive, conative, and affective). They should be able to identify, evaluate and explain major, if not pivotal, influences in their development as a botanist. Evidence of such skill development might be a statement of personal and professional goals, assessment of progress toward these goals, assessment of major accomplishments, individual strengths and weaknesses, etc. What experiences have you had that demonstrates strengths and weaknesses. Written evaluation of experiences should be made, for example: was a particular course or relevant experience useful, enjoyable, and why (include support courses as well as Botany courses.) What was science fair judging like and what did you learn from that experience? If you attended a conference and presented a paper, how did you do? How did the audience react and why? Giving this area considerable thought will pay enormous dividends.

f. ***Cooperation/Social Responsibility Skills:*** Graduates ought to 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. Included here also is valuing: democracy, equal opportunity, work ethic and ongoing personal growth and renewal. Students might consider as evidence such things as written recommendations from those with knowledge of such skills, assessments by supervisors on cooperative work experiences, employers who have placed students in a position to gain such skills on the job, etc.

g. ***Information Seeking Skills:*** For success in college and for lifelong learning, graduates must be able: to recognize when information is needed; to identify appropriate types of information; and to locate, evaluate, and use information effectively, ethically, and legally.

(3) Special Achievements

a. Letters/Certificates of commendation, recognition, special achievements, awards, etc.
b. Newspaper clippings of articles featuring the student.
c. Anything by the student that was published - newspaper article, book review, research paper, etc.
d. Letters of recommendations which are not confidential
e. Presentation at a conference. We encourage students to participate at regional conferences like the National Undergraduate Research Conference; the National Honors Conference; Utah Academy of Arts, Letters, and Sciences; Western Regional Honors Conference; Weber State Chapter of Tri-Beta Honor Society; Weber State Chapter of Sigma Xi; West Coast Biological Sciences Undergraduate Research Conference; etc.
f. Membership in professional societies (Most student rates for membership are so low there is no reason for an interested student not to belong. Examples include Sigma Xi and Tri-Beta). Botany students have an opportunity to hold office in the local chapter of Tri-Beta or other organizations on campus.

(4) Capstone Experiences

a. **Senior Project/Thesis:** To be written according to the guidelines in the *"Botany Senior Thesis"* section of the *"Botany Student Handbook"***.** This shall include an annotated list or summary of pertinent papers, books, notes, diaries, letters, etc., read in conjunction with the project. Laboratory notebook(s), field notebook(s), with objectives, plans, procedures adopted, observations, measurements, graphs, tables, conclusions, etc. connected with the project should be included. Include title and abstract of oral presentation of senior project or thesis given at the senior seminar or formal presentation before your thesis advisory committee.

b. **Other Field and Laboratory Research:** As records of field and/or laboratory research as part of senior courses are kept, select ones should be used as evidence of research skills gained. Botany majors should be competent observers and experimentalists, whether such research takes place in the field or in the laboratory. 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 laboratory and field safety issues and demonstrate that such understanding has been achieved.

(5) Creativity

This folder provides the student with an opportunity to demonstrate their creative talents and individuality using whatever medium the student selects. This could be related or

unrelated to Botany. Considerable overlap with other folders could be expected. If the student feels that there is no possibility for meeting this requirement, at a minimum, the student shall write a paper wherein s/he demonstrates the ability to apply some mathematical skill or principle in solving a botanical problem. Any ***Unique Skills*** development should be included here such as special training or hobby development. Evidence of any workshop attended, including subject, date, location, presenter, and synopsis. Catalogs of collections of photographic slides or prints, microscope slides, herbarium specimens, etc. could be used. Include photographs of representative samples of such work since some projects are difficult to store in a folder, such as a display made for a museum cabinet, special laboratory apparatus, etc. A particularly well maintained laboratory and/or field notebook might qualify as well.

(6) Affective Domain Development

Upon graduation, Botany majors should demonstrate significant value-added progress in developing the following **values**:

(a) *Appreciation* of the *diversity* of cultures and intellectual points of view.
(b) *Understanding* of *ethical issues* and responsibilities such as the environmental costs of excessive consumerism, impacts of technology upon society, etc.
(c) *Commitment* to the development of cultural perspectives that do not disparage others solely on the basis of an individual's or group's ethnicity, gender, religion, sexual orientation, marital status, age or disability.
(d) *Appreciation* that Botany follows the *Liberal Arts* tradition which is based upon the notion that, in a world of ideas, a person is not free or liberated from the bonds of ignorance if s/he makes decisions based upon closed-minded habits, prejudices, or unconscious emotions that preclude critical thinking. Additionally, graduates will need to demonstrate growth in their social obligation to communicate with the public on scientific and technical issues.
(e) *Appreciation* of the *aesthetic* attributes of nature, whether their studies are primarily in the field where entire ecosystems or biomes are investigated or in the laboratory where the microscope and biochemical techniques are used as tools for observing nature. Evidence of growth in the development of the affective domain is likely to be the most difficult to gather. Creativity and considerable thought will need to be exercised to meet this criterion. Experiences gained from such things as travel, either domestic or foreign; working with minority or disadvantaged groups of people; courses taken which address ethics or aesthetics, particularly as it relates to you as a Botanist; etc. upon reflection could be written up and become supporting evidence of such growth.

(7) Career Planning

a. ***Employment/Graduate School Assessment:*** Students shall provide evidence that they have researched the job market, have knowledge of careers for Botanists and professionals in allied plant sciences, or have researched graduate school programs and assessed their suitability for advanced degree studies relative to their own professional interests and strengths. This evidence may take various forms left to the discretion of the student.

b. ***Résumé:***
   (i) Work experience - Any activity for which the student was paid, e.g. Botany LS1105 tutor, Supplemental Instructor, Forest Service summer employment, museum curating, etc. Maintain a list of dates, places, duties/assignments, etc.
   (ii) Volunteer service - Science fair judging, Expanding Your Horizons conference, Science Olympiad, Botany Laboratory, Center for Environmental Services Conference, etc. are examples. This should not simply be a list of activities, but include details of when and where it was done, and what the student actually did.
   (iii)Extracurricular activities - Botany Club plant sale, Botany Club officer, ECOS officer, etc. (Including achievements and duties - e.g. arranged for the following speakers, chaired the following sub-committees, etc.)

c. ***Curriculum Vita:*** A current, updated and neatly printed vita, essentially representing a selection of materials from each of the other folders would be expected of the student. This would assist greatly in future employment searches or graduate school placement.

(8) Science as Process

All students who are exposed to Botany courses (majors, minors, support, and General Education students) should **understand and appreciate**, in addition to the core knowledge of Plant Biology, the nature of science, how science is applied to everyday problems, and significant botanical achievements. Teaching majors and minors should become aware of teaching strategies that accommodate multiple learning styles of their prospective students. For this folder of the portfolio a suggested means of providing evidence of understanding and appreciation of the nature of science as a process and a way of knowing, along with applications to everyday problems might be to prepare an ***outline of a lecture***, designed for a varied audience in terms of science background that would deal with these topics. The outline would address:

What is science? How is scientific inquiry carried out? How do we apply scientific methodology to solving everyday problems? What significant botanical achievements were made using these techniques? Those students who are contemplating teaching biology should, in addition, address current teaching strategies, through lesson plans, that not only deliver life science to students but demonstrates some understanding and sensitivity to the need for multiple learning styles of these prospective students.

Botany 4980: Portfolio Evaluation

Scoring rubric. Each folder will be scored on a 0-4 scale according to the attached rubric. Each raw score is then multiplied by that particular folder's weight factor. The weighted scores are added up to give a final score and grade which correspond to the WSU 0-4 grade point scale.

Folder	**Raw Score (0-4)**	**Weight Factor**	**Weighted Score**
1.A. Botany Student Essay		0.30	
1. B-E. Course Syllabi Academic Advisement Most Recent Transcript GRE, etc. (optional)		0.05	
2. Skills Development		0.05	
3. Special Achievements		0.05	
4. Capstone Experience		0.15	
5. Creativity		0.10	
6. Affective Domain		0.05	
7. Career Planning		0.05	
8. Science as a Process		0.15	
Overall Presentation of the Portfolio		0.05	
		Total Score	

1. A. Botany Student Essay

4 = Essay thoroughly addresses all three core concepts. Material from multiple sources (courses, primary literature, etc.) is integrated. Good narrative flow and transitions between topics. No erroneous or misleading information. Appropriate use of supportive graphs, charts, and tables is expected. An introduction prepares the reader for the information to follow. A summary ties things together at the end. Appropriate use of specific examples to illustrate points without getting tied up in minutiae.

Mechanics: outline or Table of Contents. Pages are numbered. Sources are cited correctly. Effective use of subheadings to show the organization of the essay. Few, if any, mechanical errors (spelling, punctuation, etc.).

Final version of the essay as well as earlier versions are included in the portfolio to illustrate development of knowledge and comprehension of Botany.

3 = One or two of the core concepts not well developed. Otherwise, as in 4.

2 = Two core concepts not well developed. Mechanical shortcomings are distracting. Organization of the essay is not apparent (no subheadings, Table of Contents). Only the final essay is provided.

1 = Poor development of all concepts. Poor integration of material. Level of coverage is inconsistent. Organization is not apparent. Only the final essay is turned in .

0 = Essay is missing or represents only a token attempt at composition

1. B-E. Other Knowledge and Comprehension Artifacts

4 = All required artifacts are present. The course syllabi are organized by subject area and chronologically; each is annotated to indicate if the course meets a major and/or minor requirement.

3 = Old transcript or a graduation evaluation in lieu of a transcript. No evidence of advising. Syllabi are complete, but not organized or annotated

2 = No recent transcript. No evidence of advising. Syllabi are incomplete.

1 = No recent transcript. No evidence of advising. Botany syllabi are incomplete; syllabi for support courses are missing.

0 = Folder has only a few syllabi.

2. Skills Development

4 = Artifacts are included to document all eight skill areas. The selected artifacts indicate progress in the various skills. Each artifact is annotated to indicate the skill, the level of proficiency, if the artifact was required for a class or was prepared specifically for the portfolio, etc.

3 = Six of the eight skills are documented; otherwise as in 4.

2 = Five skills documented. Little or no documentation of progress in the skills. Little or no annotation of the included artifacts.

1 = Four skills documented; no effort to show self-assessment. Little or no documentation of progress in the skills. Little or no annotation of the included artifacts.

0 = Folder appears to be a random collection of assignments from miscellaneous classes.

3. Special Achievements

4 = Artifacts are labeled and annotated - even if the information is mostly apparent from the certificate, etc.

3 = Artifacts are collected, some annotation.

2 = Artifacts are collected, no annotation.

1 = Little evidence of effort to have any materials for this folder.
0 = No artifacts

4. Capstone Experiences
4 = Complete documentation of the capstone experience: lab, field, or other type of notebook, project proposal, associated grant proposals, etc. Final product: written report, PowerPoint or poster presentation, etc. Student self-assessment of the experience.
3 = Final product: written report, PowerPoint or poster presentation, etc. Incomplete documentation of the capstone experience. Student self-assessment of the experience is poorly done or lacking.
2 = Final product is poorly done. Incomplete documentation of the capstone experience. Self-assessment is lacking.
1 = Incomplete documentation of the capstone experience. No final product or self-assessment.
0 = No capstone experience.

5. Creativity
4 = Artifacts indicate work significantly beyond requirements in course work; annotated.
3 = Artifacts indicate work beyond requirements in course work; annotated.
2 = Only course-related artifacts are included: anatomy drawings, ethnobotany weaving, etc.; annotated.
1 = Only course-related artifacts are included: anatomy drawings, ethnobotany weaving, etc.; not annotated.
0 = No artifacts

6. Affective Domain Development
4 = Artifacts indicate participation in activities significantly beyond requirements in course work; annotated.
3 = Artifacts indicate participation beyond requirements in course work; annotated.
2 = Only course-related artifacts are included; annotated.
1 = Only course-related artifacts are included; not annotated.
0 = No artifacts

7. Career Planning
4 = Resume and CV are current. The CV is complete and unambiguous, esp. with regard to contributions to group activities, clubs, etc. Evidence of job or graduate school investigations, with assessment.
3 = Resume and CV are current. Some aspects of the CV are not clear. Evidence of job or graduate school investigations; little or no assessment.
2 = Resume and CV are current. Little evidence of job or graduate school investigations.
1 = Resume or CV, not both. Little evidence of job or graduate school investigations.
0 = No resume or CV or are so poorly done as to be useless. No evidence of job or graduate school investigations.

8. Science as a Process
4 = Outline indicates that considerable thought has gone into topic selection and organization. Material from multiple sources (courses, primary literature, etc.) is integrated. No erroneous or misleading information. Appropriate use of specific examples to illustrate

points. Sources are cited. Early drafts as well as the final outline are included to show development of the student's understanding while working on this folder.
3 = Outline indicates that thought has gone into topic selection and organization. Otherwise, as in 4.
2 = The outline is perfunctory. Little effort at documentation of sources, use of examples. No draft versions.
1 = Poor development and organization of the outline. No draft versions.
0 = Outline is missing.

Overall Presentation of the Portfolio
4 = All materials are present. Folders are labeled. A Table of Contents lists the contents of the folders, guides the reviewer to the materials, and cross-references artifacts when appropriate. A digital format of appropriate materials is included.
3 = All materials are present. Folders are labeled. A Table of Contents lists the contents of the folders.
2 = Materials are incomplete. Table of Contents is perfunctory.
1 = Materials are incomplete; the portfolio appears to be a work in progress.
0 = No apparent effort expended in assembling and organizing the portfolio materials.

Assessment Plan

Learning Outcomes	How Assessed	When Assessed	Who Assesses
Plant/other organism similarity	1. Pre-Test	1. Pre-Test = Upon Admission to Program	1. Entire Faculty
Plants unique	2. Post-Test	2. Post-Test = Senior Capstone Courses (Botany 4970,4990)	2. Entire Faculty
Plant products	3. Exit Interview	3. Just Prior to Graduation	3. Entire Faculty
Field/laboratory research skills	1. Formative: Upper Division Courses 2. Summative: (Portfolio)	1. As Each Course is Completed 2. Capstone Courses-Senior Yr.	1. Individual Faculty 2. Entire Faculty
Critical thinking skills	1. Formative: Upper Division Courses 2. Summative: (Portfolio)	1. As Each Course is Completed 2. Capstone Courses-Senior Yr.	1. Individual Faculty 2. Entire Faculty
Problem solving skills	1. Formative: Upper Division Courses 2. Summative: (Portfolio)	1. As Each Course is Completed 2. Capstone Courses-Senior Yr.	1. Individual Faculty 2. Entire Faculty
Communication skills	1. Formative: Upper Division Courses 2. Summative: (Portfolio)	1. As Each Course is Completed 2. Capstone Courses-Senior Yr.	1. Individual Faculty 2. Entire Faculty
Information seeking skills	1. Formative: All courses (esp. Botany 2121) 2. Summative: (Portfolio)	1. As Each Course is Completed 2. Capstone Courses-Senior Yr.	1. Individual Faculty 2. Entire Faculty
Computer skills	1. Thesis/Seminar Courses 2. Portfolio	1. Senior Year 2. Capstone Courses-Senior Yr.	1. Thesis Advisor/ Seminar Instructor 2. Entire Faculty
Cooperative social skills	1. Employer Survey 2. Portfolio	1. When Co-op Course Taken 2. Capstone Courses-Senior Yr.	1. Department Chair/ Seminar Instructor 2. Entire Faculty
Self-assessment skills	1. Exit Interview 2. Portfolio	1. Just Prior to Graduation 2. Capstone Courses-Senior Yr.	1. Entire Faculty 2. Entire Faculty
Appreciation of diversity	PORTFOLIO	Capstone Courses-Senior Year	Entire Faculty
Ethics	PORTFOLIO	Capstone Courses-Senior Year	Entire Faculty
Non-discrimination	PORTFOLIO	Capstone Courses-Senior Year	Entire Faculty
Liberal Arts	PORTFOLIO	Capstone Courses-Senior Year	Entire Faculty
Aesthetic appreciation	PORTFOLIO	Capstone Courses-Senior Year	Entire Faculty

BOTANY STUDENT EXPECTED OUTCOMES GRID

	plant/other organism similarity	plants unique	plant products	field/lab res. skills	critical thinking skills	problem solving skills	comm. skills	computer skills	Info seek skills	coop. social skills	self-assess	apprec. div/ersity	ethics	non-discrim.	liberal arts	aesthetic apprec.	gen. ed support teaching
LS1203 (PB)	M	M	M	0	M	M	M	L	L	L	0	L	L	L	M	M	M
LS1303 (HA)	L	M	H	0	L	L	M	L	L	M	0	M	M	M	M	H	M
LS1370 (LS)	M	M	0	M	M	M	M	L	0	M	0	L	L	L	L	M	H
LS1403 (EA)	0	M	0	0	H	M	M	L	L	M	0	H	H	H	M	H	M
SI2104 (FF)	L	H	L	H	H	H	M	L	0	M	0	0	L	0	L	L	M
SI2114 (ES)	H	H	L	M	M	M	L	L	0	M	0	H	L	0	M	H	M
2121 (CB)	H	H	H	H	L	L	L	M	M	L	M	L	L	L	L	L	L
2203 (HG)	M	H	M	H	M	L	M	M	L	L	L	L	L	L	M	H	M
DV2303 (EB)	M	H	H	L	L	L	L	L	L	L	L	H	H	H	H	H	H
2413 (NR)	0	M	0	0	H	M	M	L	L	M	L	H	H	H	M	H	M
2503 (PC)	M	H	0	L	M	M	M	0	0	0	L	L	0	0	L	L	M
2600 (LS)	0	0	0	M	M	H	L	L	L	0	L	0	L	0	0	0	L
2830 (RB)	V	V	V	0	H	L	M	L	V	0	0	V	V	V	V	V	V
2920 (WPK)	V	V	V	V	V	V	V	V	V	V	L	V	V	V	V	V	V
2950 (FB)	L	H	L	H	L	L	L	L	0	H	L	0	H	L	L	H	L
3105 (AM)	M	H	L	H	H	M	M	0	L	M	M	M	0	0	L	L	L
3204 (PP)	L	M	0	H	H	H	H	M	H	M	M	M	L	0	0	0	H
3214 (S)	0	M	0	H	M	M	M	L	M	L	M	L	M	L	M	M	M
3303 (PG)	M	M	M	M	H	H	M	M	L	M	M	L	M	0	L	0	M
3340 (IR)	0	0	0	0	L	L	H	M	H	L	M	L	L	L	L	L	L
3454 (PE)	M	H	0	H	M	H	H	M	M	H	M	L	L	0	L	M	H
3473 (PG)	M	H	0	M	M	L	L	L	M	L	L	H	L	L	M	H	L

BOTANY STUDENT EXPECTED OUTCOMES GRID

	plant/other organism similarity	plants unique	plant products	field/lab res. skills	critical thinking skills	problem solving skills	comm. skills	computer skills	Info seek skills	coop. social skills	self-assess	apprec. div/ersity	ethics	non-discrim.	liberal arts	aesthetic apprec.	gen. ed support teaching
3504 (MY)	M	H	M	H	M	L	M	L	L	M	M	L	0	0	0	L	L
3514 (AG)	H	H	H	M	M	M	H	L	L	M	M	M	L	L	L	H	H
3523 (MB)	H	M	H	L	M	M	H	L	L	L	M	M	M	L	L	M	L
3624 (TX)	L	L	0	H	M	M	L	L	L	L	M	L	0	M	M	H	M
3641A (IF)	L	L	L	M	0	0	0	0	0	0	M	0	L	0	0	H	L
3641B (IF)	L	L	L	M	0	0	0	0	0	0	M	0	L	0	0	H	L
3641C (IF)	L	L	L	M	0	0	0	0	0	0	M	0	L	0	0	H	L
3641D (IF)	L	L	L	M	0	0	0	0	0	0	M	0	L	0	0	H	L
4113 (EV)	M	L	0	L	H	H	L	M	L	L	M	H	0	L	M	H	M
4252 (CC)	M	M	L	H	M	M	M	M	L	M	L	0	L	0	L	L	M
4750 (TB)	V	V	V	V	V	V	H	V	V	V	M	V	V	V	H	V	V
4800 (RE)	V	V	V	V	H	V	H	V	V	V	M	V	V	V	V	V	V
4830 (RB)	V	V	V	V	H	V	H	V	V	V	M	V	V	V	V	V	V
4840 (TR)	V	V	V	V	H	H	H	V	H	V	H	V	V	V	V	V	V
4850 (TRE)	V	V	V	H	H	H	H	M	V	V	H	V	V	V	V	V	V
4890 (COP)	V	V	V	M	M	M	H	M	V	H	H	V	V	V	V	V	V
4920 (WPK)	V	V	V	V	V	V	V	V	V	V	H	V	V	V	V	V	V
4950 (FB)	L	H	L	H	L	L	L	L	0	H	H	0	H	L	L	H	L
4970 (BT)	V	V	V	H	H	H	H	H	V	V	H	V	V	V	V	V	V
4980 (PSA)	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H
4990 (SM)	V	V	V	V	H	H	H	H	V	V	H	V	V	V	V	V	V
5030 (BT)	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V

Key: 0 = Outcome not addressed M = Addressed at Moderate Level V = Addressed at Variable Levels L = Addressed at Low Level H = Addressed at High Level

General Education Courses

Relatively small class sizes at Weber State University, even in General Education courses, have traditionally allowed instructors the opportunity to address numerous learning skills that cannot easily be addressed within large classes. The skills include critical thinking, problem-solving, communication, computer skills, information seeking skills, and cooperation/social responsibility skills. Since we include these same skills in our portfolio requirement for the Botany major, we are more mindful of these when we deal with General Education courses.

Through the process of engaging students in the classroom we seek to develop student critical thinking and problem-solving skills which are then used to better articulate ideas through written exercises, both for regular class work and during essay portions of examinations. In the Environment Appreciation course, for example, students learn about the need to develop cooperation/social responsibility skills as they work in teams on writing assignments. Such teams, if functioning well, serve as a learning community outside the classroom help students develop other skills of importance. This use of writing teams is predicated on the idea that college should imitate real-world or real-life environments and we try to impress upon General Education students that real-life employment or graduate studies usually involves teams of people whose success is dependent upon the cooperative skill of each individual within the team.

Assessment of success in achieving these skill objectives is made through written examinations (often essays at least in part), written assignments with a significant portion devoted to reaction to and analysis of thought-provoking materials, feedback from writing teams and their self-assessed success, and informal assessment of class discussion and interaction.

During the latter part of the 2006-2007 academic year, following nearly two years of inputs, the College of Science General Education Committee proposed a mission statement with respect to General Education within the College of Science along with a set of Learning Outcomes for both the Physical and Life Sciences as Foundations of the Natural Sciences. These General Education Learning Outcomes were formally adopted by the WSU Faculty Senate on April 19, 2007 as they appear below. As of this writing, the General Education courses offered through the Department of Botany are being reviewed with respect to these Learning Outcomes and where the courses lack or appear weak in any of these outcomes, they are being modified. This review process will be completed by the start of the fall semester of 2008 at which time the modified outcomes will be implemented.

March 28, 2007

Natural Sciences General Education Program

Mission Statement

The mission of the natural sciences general education program is to provide students with an understanding and appreciation of the natural world from a scientific perspective.

Science is a way of knowing. Its purpose is to describe and explain the natural world, to investigate the mechanisms that govern nature, and to identify ways in which all natural phenomena are interrelated. Science produces knowledge that is based on evidence and that knowledge is repeatedly tested against observations of nature. The strength of science is that ideas and explanations that are inconsistent with evidence are refined or discarded and replaced by those that are more consistent.

Science provides personal fulfillment that comes from understanding the natural world. In addition, experience with the process of science develops skills that are increasingly important in the modern world. These include creativity, critical thinking, problem solving, and communication of ideas. A person who is scientifically literate is able to evaluate and propose explanations appropriately. The scientifically literate individual can assess whether or not a claim is scientific, and distinguish scientific explanations from those that are not scientific.

Foundations of the Natural Sciences
Learning Outcomes

After completing the natural sciences general education requirements, students will demonstrate their understanding of general principles of science:

1. **Nature of science**. Scientific knowledge is based on evidence that is repeatedly examined, and can change with new information. Scientific explanations differ fundamentally from those that are not scientific.
2. **Integration of science**. All natural phenomena are interrelated and share basic organizational principles. Scientific explanations obtained from different disciplines should be cohesive and integrated.
3. **Science and society**. The study of science provides explanations that have significant impact on society, including technological advancements, improvement of human life, and better understanding of human and other influences on the earth's environment.
4. **Problem solving and data analysis.** Science relies on empirical data, and such data must be analyzed, interpreted, and generalized in a rigorous manner.

The Life Sciences
Learning Outcomes

Students will demonstrate their understanding of the following characteristics of life:

1. **Levels of organization:** All life shares an organization that is based on molecules and cells and extends to organisms and ecosystems.
2. **Metabolism and homeostasis:** Living things obtain and use energy, and maintain homeostasis via organized chemical reactions known as metabolism.
3. **Genetics and evolution:** Shared genetic processes and evolution by natural selection are universal features of all life.
4. **Ecological interactions:** All organisms, including humans, interact with their environment and other living organisms.

The Physical Sciences
Learning Outcomes

Students will demonstrate their understanding of the following features of the physical world:

1. **Organization of systems**: The universe is scientifically understandable in terms of interconnected systems. The systems evolve over time according to basic physical laws.
2. **Matter**: Matter comprises an important component of the universe, and has physical properties that can be described over a range of scales.
3. **Energy**: Interactions within the universe can be described in terms of energy exchange and conservation.
4. **Forces**: Equilibrium and change are determined by forces acting at all organizational levels.

D. ACADEMIC ADVISING

D 1 *Individuals and Processes Used to Advise Major/Minor Students:*

The department chair initially advises all incoming Botany majors, Botany minors, students with Botany as a BIS emphasis area, and students in Botany related pre-professional programs. Until the 2001-2002 academic year, advising was done on an individual basis, with most advising occurring when a student declared Botany as a major or when a major or minor came in to be cleared for graduation. Additionally, students were encouraged to seek advising from faculty whose professional interest matched the student's interests. Attempts to randomly assign students to faculty for advising had limited success. In Autumn 2001, the Botany Department started a new, one credit course, Botany 2121, *Career Planning for Botanists*. One objective of this course was to improve advising. It made little sense to advise Botany students on an individual basis when we could advise a small group with more efficacy and efficiency. After initial advising about degree requirements by the department chair, students are encouraged to take the *Career Planning for Botanists* course (offered every semester and taught by the department chair) to learn more about required course work, the Botany student portfolio, suitable electives for particular areas of Botany, extracurricular activities, etc. During this course, students are encouraged to seek more specific advice from faculty whose research interests match that of the student. This process involves all faculty and is becoming more important as students choose to do undergraduate

research and write up a thesis. No matter how advising is done, all majors, minors, and BIS Botany emphasis students must be cleared for graduation by the department chair. Therefore, even in advising schemes that distribute the students among several advisors, the chair would still have considerable advising responsibilities.

Another vehicle for advising that cannot be overlooked is the informal networking that takes place amongst the majors who work closely in the room set aside for majors, minors, BIS students, and pre-professional students. Most of these students also belong to the Botany Club and most of the faculty are available each week when students have their club meetings. Advising is often carried out in these two settings. Senior students become a valuable advising asset to underclassmen. The department is fortunate to have senior students that form an excellently functioning learning community outside of the classroom. Continual interaction with faculty serves as quality control so that this advising is yet another tool for communication of requirements, course sequencing, and pre- and post-graduate opportunities for students.

D 2 ***Data on the Quality of Advising, Including How/When Data Were Collected and Description of Advising Changes Made as a Result of the Data Collected:***

Data on advising are primarily collected during graduating senior Exit Interviews. Students who have received departmental advising or advising from the College of Science advisor, have been pleased with the advising they received. Complaints are few with the vast majority of students pleased with the availability of advising from the department. Consensus seems to be that Botany is regarded as a small and caring department with faculty and staff having the student's best interests in mind at all times. Their doors are always open and students who need advice get it when they need it. As Weber State University develops more undergraduate research opportunities, faculty mentoring becomes one of the most important components of advising. Over the last few years, more Botany students are taking advantage of this form of advising.

From the interviews as well as questions that students asked during miscellaneous advising sessions, we learned that students wanted information beyond course scheduling. They were interested in career information, graduate school information, suggestions for support courses outside of the department and the College of Science, availability of internships, summer enrichment opportunities, etc. Consequently, the *Career Planning for Botanists* (Botany 2121) course was developed and is playing a very important role in advising.

D 3 ***Evaluation of Academic Advising According to the Standards Provided:***

a. *Programs must have a strategy for advising their major/minor students which is continually assessed for its effectiveness.*

An advising program is in place. Initial advising is primarily from the department chair at the time students declare a major or minor in Botany. Follow up advising occurs through: (1) Botany 2121, *Career Planning for Botanists*, (2) students select faculty for research mentoring, (3) students seek out selected faculty whose interests match their own, and (4) informal networking of student majors in a learning community outside of the classroom and

the Botany Club interactions of students with informal faculty inputs. The effectiveness of advising is assessed via feedback from graduating majors in the Exit Interview.

b. *Students must receive assistance in planning their individual programs of study.*

This is done via advising from the department chair, the *Career Planning for Botanists* course, and faculty sought out by students with similar interests as well as for research mentoring.

c. *Students must receive assistance in making career decisions and in seeking placement, whether in employment or graduate school.*

This is done via Botany 2121, Botany Club speakers with jobs in various Botany professions, and extensive posting of job vacancies, internship opportunities, graduate school flyers, etc. in the majors' lounge as well as informal chats with students who ask specific faculty and staff about these issues. During the Botany 2121 course, students are exposed to the Office of Career Development's science specialist who also invites students to visit that office for both job listings and graduate school opportunities. Students are encouraged to attend yearly job fairs as well as the newly instituted graduate school fair. Students must also visit our
Department website for access to the Online Botany Student Handbook (http://departments.weber.edu/botany/Handbook/welcome.htm).
Here they are provided with information: (i) program requirements, including a printable checklist, (ii) portfolio, (iii) thesis, (iv) scholarships, & (v) careers in Botany.

E. FACULTY

E 1 *General*

As Appendix B and C indicate, the Department of Botany is made up of tenured/tenure-track faculty that are well-trained in diverse areas of expertise. They all hold PhDs from a variety of institutions both in the US and Canada.

Faculty conduct research and remain current in their areas of expertise. Of the six full-time faculty, two have extensive post-doctoral experience. Two of the six are female which represents a net loss of one since our last hire, five years ago, replaced a female with a male. Also, of the six, two are Canadians and one is part Native American. Every effort is made to hire new faculty from diverse backgrounds and that the pool of applicants itself is as diverse as possible.

The full-time faculty is augmented by two adjunct faculty, both of whom are women who hold MS degrees. One holds a Botany Teaching Masters degree and teaches one course each semester (*Environment Appreciation*) in our evening program as well as one concurrent enrollment course at the high school where she is an award-winning contracted teacher (Biology Teacher of the Year, NABT Utah, 1997). The other adjunct holds a Masters degree in Biological Anthropology and teaches our *Plants in Human Affairs* course, in the evening program, only when it makes enrollments which it has not for several years. She is a very gregarious and popular teacher who is very committed to our students and takes popular

summer research trips to the rainforests of Guatemala and Belize. The department has used these same two adjunct faculty for several years. These faculty were chosen for their knowledge and experience and teach introductory courses only. We feel that by limiting the number of adjunct faculty, quality and consistency are better maintained.

The number of faculty is sufficient to offer a wide range of courses which serve the needs of students in all of our degree programs. Our program offers enough diversity in its courses to enable students to choose tracks of specialization within the scope of Botany which prepare them for careers in the field, laboratory, teaching or graduate school. Our adjunct faculty members offer students additional opportunities for evening classes at different locations.

Our department has sufficient breadth to provide a quality education in basic botany, environmental awareness and responsibility as well as specialty areas including plant anatomy, ecology, evolution, geography, plant tissue culture, physiology, morphology, propagation, taxonomy, algology, marine biology, genetics, ethnobotany, mycology, and soils. Faculty are also proficient in field and laboratory skills and techniques, plant specimen collection, preservation and preparation which are taught to students through laboratory courses, field trips and directed research. We seek to provide mentors and role models for all of our students and have succeeded in achieving a faculty composition that meshes with the needs of our student body. There has been considerable stability in the departmental faculty. In the past 40 years only two members have left for reasons other than retirement. Ironically enough this has been the same position. With one exception during the mid 1980s, when faculty have retired, they have been replaced by well qualified faculty who can teach the same courses, and often have additional strengths which add to our departmental offerings.

Our program's mission is to provide our students with a strong foundation in botany, a sense of responsibility to the environment, and sufficient breadth and depth of knowledge to succeed in their chosen field.

The Botany faculty are actively involved in professional development activities including research, field work (in the U.S. and abroad), grant writing, teaching improvements, conferences/workshops, professional presentations, consulting, etc., which are supported through departmental, institutional, and external funding sources.

E 2 ***Methods Used to Orient New Faculty:***

<u>All new Contract Faculty/Staff are required to attend the following:</u>

1. A workshop on Sexual Harassment to learn how to recognize and avoid it.
2. A workshop on disabilities awareness to ensure ADA compliance.
3. A safety seminar sponsored by the Department of Public Safety.
4. An orientation session seminar sponsored by the Human Resources Department which ideally includes a campus tour.
5. Attend a Driver's Training Workshop and pass a driving test.

New Contract Faculty:

1. New faculty are encouraged to attend the annual College of Science Retreat prior to the fall semester where they are introduced to the rest of the college faculty and participate in college discussions and planning sessions for the coming year.

2. All new tenure track faculty are required to attend a retreat sponsored by the Teaching and Learning Forum to assist them in the transition to teaching at Weber State University.

3. New faculty are encouraged to attend a variety of teaching workshops on teaching strategies, presentation formats, etc. sponsored by various campus groups (e.g. Teaching and Learning Forum, Communication Arts and Technologies, etc.).

4. Upon request, new faculty are given copies of syllabi and texts for classes that are/have been taught by other faculty in the department to give them a frame of reference when developing their own courses, although faculty have academic freedom in course development.

5. New faculty are given a safety orientation of the Botany laboratories and greenhouses, including hazardous waste collection and storage, proper chemical handling, safety equipment (i.e. fire extinguishers, showers, etc.)

6. The size and composition of the department are such that new faculty are encouraged to ask other department members about any issues or questions that arise.

7. New faculty are mentored by the chair and usually one or more other faculty member(s).

Adjunct Faculty:

1. The department has used adjunct faculty sparingly since we do not have an extensive evening and off-campus program. When we have offered courses off-campus these have been general education, introductory courses. The current two adjunct faculty members both have a proven track record of excellence in teaching. Both hold MS degrees (one in Botany, the other in Biological Anthropology) and are familiar with W.S.U. along with its mission and Policy and Procedures Manual. Orientation has been a minor requirement in both cases and highly individualized. Efforts have been made to include the adjuncts in department meetings, field trips, and social functions.

2. The concurrent enrollment program which offers college credit for courses taught in high school involves one of our adjunct faculty who teaches at that high school. She attends all workshops and training sessions of the program, which are extensive.

E 3 ***Development Plans and Development Opportunities for Faculty:***

Contract Faculty:

1. Faculty are encouraged to attend seminars/workshops that are available on teaching strategies, presentation technologies, assessment, etc. offered through a variety of sources on campus (e.g. Teaching and Learning Forum, CATS, etc.).

2. Faculty are encouraged to attend and participate in professional meetings/conferences related to professional development in teaching or their area of expertise in order to remain current.

3. Funding (at least partial) for travel and registration fees for professional meetings/conferences is available through the department or other university sources.

Adjunct Faculty

1. Adjunct Faculty are encouraged to attend seminars/workshops that are available on teaching strategies, presentation technologies, assessment, etc. offered through a variety of sources on campus (e.g. Teaching and Learning Forum, CATS, etc.). These are now offered at times that Adjunct Faculty can attend and are co-sponsored by the Adjunct Faculty Task Force.

E 4 ***Evidence of Effectiveness:***

Contract Faculty

1. Contract faculty are evaluated annually by the Botany Department Chairman with regards to teaching, scholarship and service. The evaluation is then reviewed by the Dean in order to assist the faculty in the improvement of teaching, scholarly activities, service, and in the determination of merit pay.

2. Tenured faculty are required to have at least two written student evaluations conducted per academic year. The faculty member chooses student evaluations from two classes per year to be included in his/her professional file.
Non-tenured, tenure-track faculty must provide written student evaluations for each course taught each semester. Summaries are made by the faculty of these evaluations and included in their professional file to be used for tenure and promotion decisions.

3. Graduating seniors are interviewed by the entire faculty during Exit Interviews and asked to point out the strengths and weaknesses they perceive in the department. These are discussed by the departmental faculty and evaluated in terms of improving the department.

4. Although the chairman does much of the student advising in the department, all faculty and staff become advisors from time to time. As soon as students know what specialty they wish to pursue they are encouraged to seek out that faculty to serve as a mentor. As more undergraduate research is conducted at WSU, faculty mentoring is becoming more common

and mentors become the first line of advising for the student. The department however, is small, informal and students network well limiting the need for formal advising.

5. Botany Department graduates continue to be successful in obtaining jobs with a variety of employers, including the Forest Service, USDA, local businesses, Division of Wildlife Resources, Red Butte Gardens and Arboretum, etc. and are in high demand among government and private employers (personal communication with faculty). In addition, Botany graduates are very successful in graduate programs as well as science teaching positions.

6. The Botany faculty are actively involved in professional and scholarly activities including research projects, successful grant writing, publishing, consulting, and presenting papers and/or posters at professional meetings.

7. The Botany faculty provide a great deal of service to the university and community through membership/chair on college and university committees, Faculty Senate, community organizations' Boards of Directors, overseeing Science Fair, etc. They are recognized campus-wide for this service as evidenced by Dr. Harley's receipt of the Faculty Governance Award in 2005, the most prestigious recognition for Faculty Senate service.

Adjunct Faculty

1. Student evaluations from every course taught are reviewed by the department Chair who discusses the results with the faculty.

2. Adjunct faculty are encouraged to self-assess their pedagogical methods and discuss these with other faculty.

3. Adjunct faculty are encouraged to attend special workshops for adjuncts offered throughout the academic year designed to improve instruction and communication with various campus entities.

E 5 ***Departmental Teaching Standards Expected of all Faculty and how Faculty are Made Aware of These Standards:***

The departmental teaching standards are essentially those of the university, as set down in PPM 8-11 (Evaluation of Faculty Members) and PPM 9-5 (Faculty Responsibilities to Students). Opportunities to foster awareness of and adherence to these standards are created in various ways. There is constant dialogue, both between individual faculty and in the department as a whole, on how to improve teaching and learning in our courses. All classes taught by Botany faculty, both contract and adjunct, are required by the department to have syllabi that list the course outline, assignments, grading policies, and other pertinent information. We review all departmental syllabi to check for completeness, offer suggestions to one another, and make sure that various sections of the same course covered similar material. While professors are free to choose content for their courses, the department has broad control over what is taught to ensure that course titles and catalog descriptions match content. We were pleased to discover a high amount of similarity among course sections, and good quality syllabi present for all courses.

All faculty are expected to do the best job possible in their teaching. In hiring decisions, candidates are required to teach a regular class in addition to giving a research seminar. This gives the department a feel for the candidates' teaching style and ability to connect with undergraduate students. Previously demonstrated teaching ability and interactions with WSU students during the interview process are also weighted heavily. In the exit interview with our graduating seniors, many of the questions we ask deal with curriculum issues such as possible improvements or problems in the curriculum, student satisfaction, breadth of training they feel they have received in their major, etc. We feel that this is an excellent way to get feedback on our program and ensure that we are meeting our students' needs.

New hires are told when they interview that the department is teaching-centered, and the bulk of their time will be spent interacting with students in and out of class. We also try to hire like-minded individuals whose primary interest lies in teaching. Mentoring is provided on an informal but very workable basis by experienced faculty, both by providing advice and guidance and also by modeling appropriate behavior. New faculty learn what is expected of them, in part, by observing the established faculty. Our department is proud of its teaching quality and the rapport we have with our students, and we strive to help students any way that we can.

All faculty are informed of the PPM and its importance to guiding the operation of all aspects of the university. In addition, faculty are informed of the College of Science Tenure document as well as their expectations relative to the teaching standards embedded in the *Annual Review of Faculty* process.

In summary, the model teacher in the Department of Botany is: knowledgeable and current about the subject matter; enthusiastic about botany, teaching, and students; organized during class; constantly challenging students to apply knowledge in problem solving; one who requires students to go beyond bare facts to consider implications; approachable in and outside of class; innovative; and supportive of students and their activities.

E 6 ***Typical Contract and Adjunct Faculty Teaching Pedagogies:***

A hallmark of the Department of Botany has been the commitment of the faculty to providing meaningful laboratory and field experiences for all students who take a Botany course. For over 40 years general education students in fall classes have had the opportunity to go on a field trip to the Uinta Mts. In 2003 we instituted a similar experience for spring semester students with a trip to Antelope Island in the Great Salt Lake. Semester conversion made it difficult for departments to maintain the equivalent ratio of laboratory and lecture hours in their courses. For the other two life science departments, the proportion of a class spent in laboratories went down. For Botany, we maintained or increased the laboratory and field time for our students. It is in these parts of our courses that we can best provide our students opportunities for active learning, group work, problem-based learning, and similar pedagogies.

E 7 ***Measures used to Determine the Quality of Teaching for Both Contract and Adjunct Faculty:***

The main tool we use to determine the quality of teaching is the student course evaluations as well as peer evaluations of faculty during their tenure/promotion reviews. While tenured faculty are required by the university to be evaluated in 2 courses per year, most have students evaluate them in every course they teach, which is the requirement for non-tenured, tenure-track faculty. The department chair and the individual faculty member review the evaluations, and discuss them in the annual review of the faculty. We get some information about the quality of our teaching from our graduating seniors during their exit interviews. Each faculty member is evaluated during the tenure and promotion process, and a teaching portfolio documenting the quality of instruction is part of the peer review process. The University Policies and Procedures Manual specifies that teaching is the primary responsibility of WSU faculty and gives guidelines on how evaluations of teaching quality are to be made by the department chair, dean of the college, etc. Members of our department have also received or been nominated for various teaching awards, which we feel is an indicator of the quality of our instruction.

E 8 ***Processes Must be in Place to Determine Appropriate Teaching Assignments and Service Workloads, to Guide and Mentor Contract/Adjunct Faculty, and to Provide Adequate Support for Activities Which Implement the Program's Mission.***

Since there is a great deal of continuity in our department, upper division classes are consistently taught by the same faculty member, depending on the area of specialization. Introductory classes with multiple sections are generally taught by 2-3 faculty members and often one adjunct (off campus section), with each faculty member teaching the one or two introductory courses most related to their area of specialization/interest. In this manner, faculty can concentrate on improving each course they teach from year to year, rather than developing new teaching materials for new courses every year. Every effort is made to minimize the number of class preps an instructor has each semester. In addition, every effort is made to accommodate each faculty member's schedule and preferences in terms of teaching classes back to-back and having ample preparation time, especially prior to laboratory classes. Faculty are also committed to cover sabbatical leaves of others if adjuncts cannot be found. Ten to 14 credit hours are assigned each semester so that each faculty member has a total of 24 credit hours per year. The Chair is given 50% reduction in teaching load to compensate for the duties as Chair.

Service workloads are determined by each faculty member's willingness and time allowance for service. This may vary from year to year if teaching and/or scholarship require more time in a given year (e.g. development of a new course, work on a grant, etc.). The small size of our department necessitates that all faculty members work together on departmental curriculum, etc. Faculty are encouraged to serve on a variety of college and university committees prior to and after their tenure review. In addition, community and professional service are valued.

The Chair encourages new faculty to begin their service component in their second year or second semester at the earliest. This gives them a chance to develop their teaching materials and become accustomed to their teaching loads without additional pressures. Typically, new

faculty are first asked to serve as departmental representatives on College of Science committees that do not meet very often (e.g. college museum committee, etc.) and that do not require a great deal of time and knowledge of other departments' programs (e.g. college curriculum committee, etc.).

E 9 ***Teaching is systematically monitored to assess its effectiveness, and revised periodically to reflect new objectives and to incorporate improvements based on appropriate assessment methods.***
For both contract and adjunct faculty, there is evidence of:

a. ***effective creation and delivery of instruction***

Our evidence of instructional quality comes from student course evaluations, peer reviews of teaching, feedback from employers, graduate school acceptance, student essays on core Botany concepts, student portfolios, and the exit interviews with our graduating seniors. We also constantly self-assess our class performance. This is documented in the teaching portfolio and our annual reviews.

b. ***ongoing evaluation and improvement of instruction***

Our department has decided what we want our students to know, in what classes they get that information or skill, and how we assess their knowledge or skill mastery. We have constructed a grid that is available online so that students can see what skills and information they should be getting from each class. As our classes have undergone several rounds of review in the last few years, we have updated and revised this information. We review all syllabi for each instructor in the department and suggested areas of improvement for each. This also allows us to make sure that different sections of the same course are receiving similar information.

Our annual reviews show that faculty are constantly updating themselves by doing such things as: attending teaching workshops on- and off-campus; keeping current in their field by attending scientific meetings, conducting research, and publishing; and exploring new methods of instruction. Faculty and staff in the department often collaborate to improve instruction in various courses, especially new courses or those taught by more than one faculty member. We also use student feedback from course evaluations and exit interviews with graduating seniors to improve our instructional methods.

c. ***innovation in instructional processes***

Members of our faculty have made presentations to other educators both on- and off-campus about innovations we have made in our courses. Some of these presentations include a photosynthesis play developed for our introductory majors class, development of our laboratory safety course, and the portfolio of knowledge, skills, and accomplishments required for graduation for our majors.

In our annual reviews, each faculty member is pushed by the chair of the department to find better ways to teach students. This has resulted in hands-on activities in courses with a lecture format, additional field trips in many courses, and inquiry-based laboratory exercises. We also use comments from student course evaluations and feedback from senior exit interviews to stimulate course innovations.

One half of the Botany faculty have taught or are currently teaching in the Honors Program. These courses provide an opportunity to experiment with novel approaches to instruction which then can be taken to a larger setting. Additionally, through our Topics in Botany course, we have opportunities to not only experiment with pedagogical methodologies but with subject content as well which have very positive impacts on teaching in general.

E 10 *A Formal, Periodic Review Process for all Contract/Adjunct Faculty:*

Full-time faculty are formally reviewed by the Chair annually. The Chair then discusses the results with the Dean.

The review process is as follows. The faculty/staff member fills in a form including his/her accomplishments since the last review and a list of goals that s/he hopes to accomplish in the coming year. In addition, faculty provide student evaluations from at least two classes that s/he taught since the last review. Non-tenured, tenure-track faculty provide evaluations from all courses. These materials are submitted to the Chair for review and a time is scheduled for each faculty to meet with the Chair. At their meeting, the list of accomplishments is discussed as are the previous year's goals. The faculty's progress toward achievement of the goals are summarized by the Chair. Additional items/issues are addressed at this time. The Chair then evaluates and ranks the faculty in terms of teaching, scholarship and service. A copy of the evaluation is given to the faculty for review and signature and s/he has the opportunity to discuss the results with the Chair, prior to the Chair's discussion with the Dean.

There is no formal review process for adjunct faculty, however, students evaluate each class taught and adjuncts meet with the chair to discuss results

F. SUPPORT STAFF, ADMINISTRATION, FACILITIES, EQUIPMENT AND LIBRARY

F 1 *Support Staff*

The department currently is supported by the services of one Professional Staff (Laboratory Manager) and one half-time Classified Staff (Secretary). Both, because of their competence, training, and experience, are indispensable to the operation of our program. The Secretary is shared with the Department of Microbiology so she splits her time between two departments. This arrangement is marginally successful, simply due to the tremendous competence of the present hire. Her work in the two departments makes for a fairly seamless process though she cannot be physically present for ½ of the time. This has costs associated with it as the Chair must cover some of her duties during her physical absence. It would be considerably better to have a full-time Classified Staff person in the department.

The title of Secretary is obsolete and antiquated as the responsibilities of the position have changed radically over time. Many more complex responsibilities have been incurred by this position as a result of changing centralized computing systems, more complex budget tracking, room scheduling during times of competing needs, providing faculty support, administrative report preparation, communications with various publics, student advisement

concerns, registration problem-solving, and clearance for graduation. The term Secretary should be replaced by Office Specialist or Administrative Assistant and pay made commensurate with the changed responsibilities. As most folks in academia quickly realize, this is a key position for a department and we just happen to have one of the most competent and hard-working Classified Staff in the institution. She holds a BS degree in English and, through the many years of experience, has become so well-versed in the department and its curriculum, its faculty expertise, etc. that she is a very capable first-line advisor to students for our program. She has an exceptional personality and is excellent as liaison between the department, administration, students, and the public.

Our Laboratory Manager holds a B.S. in Conservation Biology and an M.S. in Forest Ecology and is extremely proficient in all aspects of the job. She is an invaluable resource to both faculty and students. In addition to her many duties as Laboratory Manager she is very familiar with our program and provides students with current information on job openings, graduate schools, and a sympathetic ear when needed. She also trains and oversees the department's service award and fellowship recipients who assist in the laboratory and greenhouses. She assists our Botany Club in its activities and fund-raisers (plant propagation, sales, programming, etc.,) and has taken an active role in recruitment activities (Career Day, Major's Fair, etc.). Her position and personality provide an important liaison between the students and faculty.

F 2 ***Administrative support of the program***

F 3 ***Budget***

Except for times when budget cuts are incurred due to enrollment shortfalls, the budget for the department appears marginally adequate. Tuition and state appropriations, grants (both internal and external), donations, and laboratory fees are currently sufficient to cover the cost of operation. Being a small but viable program, the issue of funding seems to be less critical than for large programs. The principal source of support is legislative appropriations and its E & G budget allocation. These are generally deemed marginally adequate since occasional special funding through either student laboratory fees, grants, special legislative appropriations for technology enhancement, or private donations have been made available for equipment purchases outside the capability of the current expense budget. The support of the College of Science has been tremendous even in very difficult times. In short, resourcefulness is a hallmark of our department's operation.

F 4 ***Describe the Adequacy of the Facilities and Equipment Available to the Program:***

1. *Facilities*

a. Fourth Floor Classrooms

Semester conversion precipitated a change in utilization of the department's classrooms/laboratories on the fourth floor of the Science Laboratory Building. One room (SL424) was completely remodeled as a multimedia room with laboratory benches to provide work space for microscopy work. Courses with primarily "wet" laboratories or a mixture of microscopy and wet laboratories are scheduled in the other rooms. Consequently, upper division courses that had met primarily in SL421 prior to conversion now meet in SL424.

The original design of SL424 was to support an audio-tutorial general botany course (100-level, general education, entry to the major/minor). The entry courses for majors and minors are now two 2000-level laboratory intensive courses (which carry SI but not LS credit) that meet in SL421, with the equipment and supplies to support those courses now housed in that room. The conference room that had formerly served to hold recitations for the audio-tutorial class has now become an extremely popular majors' "lounge".

b. Classroom Space in Lind Lecture Hall

The space for lectures is adequate given our current enrollment needs. It has taken several years to finally bring the lectures rooms, for which we have primary authority, up to the standards expected of such facilities by way of technological tools. Patience and financial sacrifice has resulted in adequate facilities.

c. Herbarium

To date, our herbarium has served us well. It houses nearly 23,000 specimens, representing mostly the flora of North Central Utah and collections dealing with the ethnobotany of the Great Basin. Space, however, has become a problem. Our cabinets are full, yet thousands of new specimens are needed in order to represent the ecological and morphological diversity of the plants in our area. If we develop a Forensic Botany course to be used in the Criminal Justice program, more space for a reference collection of plant materials will be needed. A small wet room would be desirable for ethnobotanical studies as well.

d. Plant Culture Facility

A small room with light banks and its own heating/cooling system has been set aside for growing plants in culture. This room is used by the Botany and Microbiology Departments. The adjacent room contains laminar flow hoods and belongs to the College of Science as a whole. It is also primarily used by the Botany and Microbiology Departments and is adequate at present.

e. Greenhouse

The basic structure of the greenhouse facility is sound and the design is good. The floors were coated and sealed in 1999. The misters, drains, and watering system work well. However, the glasshouses are showing the problems you would expect after almost 40 years. The motors that operate the louvers have been replaced. The glass has needed to be re-caulked for several years. The temperature control system currently involves setting four different temperature limits on four different thermostats (primary bench heaters, auxiliary heater, the louver controls, and the evaporative cooler). There are recurring problems with the electrical connections between the thermostats and the equipment each controls. The greenhouse also houses a walk-in growth chamber. The lighting in this chamber is becoming an issue as the ballasts need to be replaced seemingly on a constant basis.

2. *Equipment*

Over the past few years, the safety equipment of the laboratories has improved considerably. We now have a full shower and several eye wash units as well as a flammables storage cabinet and an explosion proof refrigerator.

There is sufficient basic laboratory equipment to meet our needs: balances, pH meters, glassware, mixers, hot plates, storage containers, and storage space (cabinets, refrigerators and freezers). We have adequate and appropriate space to store chemicals. Recently, three aging student-grade visible light spectrophotometers were replaced with two new ones. These join a UV-Vis spectrophotometer and a microplate reader for analytical work. We also have a very good collection of electrophoresis and chromatography equipment. The microplate reader, a dedicated computer and software for the reader, and a refrigerated centrifuge were the main items purchased with an NSF-ILI grant in 1997.

The laboratory rooms also house three benchtop growth chambers, two refrigerated growth chambers, and an incubator. These are rather aged and will need to be replaced.

The microscopes available for student use are in good to excellent condition. Sixteen microscopes were purchased for the introductory botany courses nine years ago. These microscopes experience hard usage in the hands of inexperienced users - and it shows. The Laboratory Manager is invaluable in keeping these microscopes in good working order. Over the decade, 12 new microscopes have been purchased for upper division courses. Recently we added six new dissecting microscopes for the upper division courses. New dissecting microscopes for lower division use are being purchased using laboratory fees over a period of time. There is also a microscope equipped for video recording. There are two portable video/computer projection systems. We are also in the process of making our introductory botany laboratory into a smart lab by adding multimedia equipment.

Computer needs are adequately to excellently met, depending on the age of the system. The Dean of the College of Science has made a commitment to replacing faculty computers on a four-year cycle. Other computers in the department are replaced on an as needed basis.

F 5 *Library*

Significant gains have been made in our science library holdings and information access during the period since our last self-study. Major databases, such as Science Direct - College Edition and Bio-one have been added and have made an enormous difference in the ability of students and faculty to access current information. Special one-time legislative appropriations have made a big difference in the past as well. The library has also maximized its use of limited funds to find the lowest cost means of delivering information resources such as electronic vs. print media, especially using the UALC consortium, and making more interlibrary loan resources available for both student and faculty research. Library resources are made more accessible and information gathering more efficient. Courses and less formal workshops and seminars lead by library personnel have made our students more aware of all electronic information available. Significant progress is being made in this most critical area of resource needs. Since one of the skill sets identified in our Portfolio involves "Information Seeking", the information resources of the library have played a more meaningful role in student preparation. Each semester, the Science Librarian gives a special orientation lecture to the students in the "Career Planning for Botanists" class that gets them started in the right direction when seeking learning resources. She also leads an orientation session for the Senior Seminar/Portfolio class students. Having them get to know her is very helpful because in the future she becomes a very important resource when doing information resource gathering.

F 6 ***Methods used to orient new professional/classified staff, as well as ongoing Development plans and development opportunities for staff.***

ALL NEW CONTRACT FACULTY/STAFF ARE REQUIRED TO ATTEND THE FOLLOWING:

1. A workshop on Sexual Harassment to learn how to recognize and avoid it.

2. A workshop on disabilities awareness to ensure ADA compliance.

3. A safety seminar sponsored by the Department of Public Safety.

4. An orientation session seminar sponsored by the Human Resources Department that ideally includes a campus tour.

5. Attend a Driver's Training Workshop and pass a driving test.

6. Made aware of and encouraged to take WSU courses of interest as part of their benefits package.

PROFESSIONAL STAFF:

1. The Laboratory Manager is given tours of the campus, Science Laboratory Building and the Botany laboratories and is instructed on laboratory safety, chemical and waste storage, etc.

2. The Laboratory Manager is given a tour of the greenhouses by the faculty greenhouse director and discusses greenhouse matters with him on a regular basis.

3. The Laboratory Manager is encouraged to ask questions of the faculty and staff on general or specific job-related issues.

4. Pesticide safety training is provided by the greenhouse director.

5. The Laboratory Manager is given a comprehensive *"job description"* which outlines the duties of the laboratory manager and s/he is encouraged to ask questions as they arise. They are instructed to keep a list of duties not included in the *"job description"* that develop to be included in the next iteration of the job description.

6. Development opportunities and plans are drawn up as part of the annual Performance Review and Enrichment Program (PREP). These involve goal setting and strategies for achieving those goals that include resources.

CLASSIFIED STAFF:

1. Secretaries are required to attend a workshop on scheduling.

2. Secretaries are required to attend workshops on using the university computer system (e.g. registration, student records, etc.).

3. Secretaries are encouraged to attend workshops on online courses, etc.

4. Funding is available through a grant to enable classified staff to attend various training seminars in Salt Lake City.

5. Development opportunities and plans are drawn up as part of the annual Performance Review and Enrichment Program (PREP). These involve goal setting and strategies for achieving those goals that include resources.

F 7 ***Process used to review professional/classified staff.***

The process of review of both professional and classified staff involves the annual PREP (Performance Review and Enrichment Program) of the University. Staff members are first asked to complete a form covering seven key questions:

1. What were your major job accomplishments last year?
2. What are your strongest skills? What skills would you like to develop or improve?
3. What additional tools, training, or development activities would enhance your job performance?
4. What are your goals for the coming year? (These goals may be training, development, or project-based.)
5. Where would you like to be professionally in five years? What additional skills and training would you need to be prepared for that position?
6. Does your job description accurately reflect your actual job responsibilities?

The staff member then meets with the supervisor (Chair) where not only is this above completed form discussed in detail, but a Performance Review is completed, discussed and signed off by both the supervisor and the staff member with copies shared with both parties as well as the Personnel Office of the University. This Performance Review involves the supervisor's assessment and performance ranking on a number of factors. These factors are: (a) Job Knowledge, (b) Quality, (c) Self-Management, (d) Community and Teamwork, and (e) Leadership (for individuals that supervise others such as students on work-study, fellowship recipients who had assignments in the greenhouse, etc.) On each of these factors, then overall, the supervisor assesses them as Exceeding Job Requirements, Meeting Job Requirements, or Falling Short of Job Requirements.
This review summary is then discussed and both parties sign off on the outcome and the results filed in both the department as well as the Personnel Office for consultation the following year.

G. RELATIONSHIPS WITH EXTERNAL COMMUNITIES

G 1 *Relationships that Exist between the Program and the External Communities of Interest:*

During the forty-five years that Weber State University has been a four year institution, the Department of Botany has been interested and active in creating and maintaining a program of instruction that best serves the needs of its students. Our faculty have always been engaged in maintaining contact with employers and graduate schools to get a sense of their needs. This continual contact has allowed our faculty to create a meaningful curriculum and modify it when necessary. At one time we tried to assemble a standing committee that could advise us on issues relating to curriculum and employment. This approach was never successful. It was difficult, sometimes impossible, to get the committee together for meetings. Once assembled, the committee was usually ineffective for many reasons, including: inter-agency squabbling, lack of commitment on the part of the committee members, and the fact that usually none of the participants representing outside agencies held degrees in botany (most being biologists, range or wildlife managers, etc.) This committee soon disintegrated because it did not function. A much more successful, although not so formal, approach finally evolved. Today our faculty are still committed to gathering information from outside our university that is helpful in allowing us to create the best possible opportunities for our students. We do it individually as faculty within the confines of our particular areas of specialization. We visit, telephone, work with, advise, and conduct research with professionals outside our department. Our department chairman attended many meetings designed to address the needs of botany departments in the United States. These meetings of the National Council of Botany/Plant Biology Department Chairs/Heads were especially helpful during the decades of the 80s and 90s. The last meeting of the group, however, was at Cornell University in October 1995. We have still maintained contact with many of the institutions offering botany programs to compare data of mutual interest.

Today we maintain close contact with our alumni, obtaining feedback regarding their successes and failures. We engage in activities with groups like the Sierra Club, the Audubon Society, the Nature Conservancy and the Ogden Nature Center. We visit other campuses, work with and discuss issues with other faculty. Several of our faculty have traveled through five continents, taking students on field trips, meeting other scientists and/or working with indigenous people. We attend professional meetings, and present papers. We serve as advisors to high school science programs. We ask questions, offer suggestions and bring back to our department the information we have gathered. We consider these issues and collectively make decisions based on the information we have assembled.

G 2 *Description of How Relationships Contribute to the Improvement of the Curriculum, Equipment, Faculty, Budget, etc.:*

Feedback from all of the above-mentioned sources have helped us to make many changes in our curriculum, the most recent major revisions taking place right after semester conversion. Recognizing that our approach had primarily been geared to preparing students for graduate school and after listening to the needs expressed by representatives of the U.S. Forest Service and the Utah Division of Wildlife Resources, we remodeled our curriculum to add a new field oriented path (Track B) designed to best prepare students for field-related

careers such as ecology, environmental science, and natural resource management. So far, many students have expressed satisfaction with this approach. In 2002, another emphasis (Track C) was added to add flexibility for those students either transferring into our program from elsewhere or wishing a general Botany focus.

We try to make adjustments in the allocation of our limited resources so as to purchase materials needed to accomplish specific tasks. We have received some scholarship money, gifts to our library and some equipment. However, as a relatively young university, gifts to our department from our alumni have not been many. Our alumni are just now becoming established well enough to consider the granting of such gifts. Information from our Development Office indicates that encouraging progress is being made which portends well for the future.

G 3 ***Evaluation of these Relationships According to the Standards Provided:***

a. There must be a relationship between the program and the external community

The Department of Botany at Weber State University has a very effective liaison mechanism and relationship with the external community in place. It does not consist of a formally organized external advisory committee, however, which maybe its greatest strength.

b. The relationship must have a clearly defined role and evidence of its contribution to the program (curriculum, equipment, faculty, budget, etc).

The reason we seek advice from former students, professionals and the community at large is to gather the most relevant information available so that as faculty we can provide the best opportunities for our students. As mentioned above, the most recent change in our curriculum was a direct product of responding to the concerns and needs of the external community in addition to feedback we received while developing our Student Learning Objectives and Assessment Plan. The development of a degree that enhances the opportunities for employment, after fours years of college, grew from discussions with a variety of resource managers.

H RESULTS OF PREVIOUS PROGRAM REVIEW AND FUTURE DIRECTIONS

The findings of the previous program review conducted in 2002 appear below. The department response to these findings appear immediately following.

Botany Program Review
October 2002

Reviewers:
Dr. Kathryn L. MacKay, (Team "Captain"), Associate Professor, History Department, WSU,
Dr. Randolph J. Scott, Associate Professor, Communication Department, Weber State University
Dr. Gordon Uno, Chair of Department of Botany and Microbiology and David Ross Boyd Professor of Plant Reproductive Biology, University of Oklahoma
Mr. Glen E. Lyon, (Alumnus), Application Engineer, Software Support Group, Campbell Scientific, Inc.

The Botany Program is recognized at Weber State for doing a lot of good with few resources. Most faculty members are active on the campus in faculty governance and in interdisciplinary projects. Most faculty members are admired for their research and involvement in professional organizations. And most faculty have been involved in faculty development initiatives on campus designed to help faculty improve their teaching in support of student learning.

We take particular note of these strengths of the Botany Program:

1. Faculty members are active scholars, doing research and bringing their research into their teaching. Faculty members are committed to student learning and have good working relations with many of their students.
2. Although laboratory space and equipment continues to be inadequate, facilities have improved since the last program review in 1994. Grants and gifts have enabled the program to improve laboratory and computer spaces and plant storage areas.
3. The student portfolio method of evaluating student learning continues to be effective, particularly with the addition to the curriculum of 2121, an orientation to the portfolio. The Botany student portfolio project is admired on campus and has recently been used as the model for the new Honors Program portfolio project.
4. Students feel well supported in their Botany Program. Photos of scholarship students and of student field trips are on public display. The Botany Club is an active Association of Registered Organizations (ARO) student organization. The letter sent to promising students in the general education courses continues to be an effective recruitment tactic.
5. Library resources have been improved since 1994 as part of a university-wide effort to strengthen those resources for faculty and students.
6. The Botany Program has used student assessments of the program such as the exit interview to give additional support to students by way of a greater emphasis on advisement and by way of the class on careers in botany.

We note challenges for the Botany Program:

1. The small size of the Program means that students feel faculty are approachable. And some faculty do engage their students in their research projects. However, as greater efforts are made university-wide to increase development of and support for undergraduate research, the Botany Program should consider ways to involve more of their students in their own research and/or in other projects - perhaps by increasing

internship opportunities, particularly with local agencies and businesses which should then also be involved in assessing the student's work.

- Perhaps the program could work with the University Administration and other departments to obtain materials, supplies, and equipment that would improve the undergraduate research experience.

2. The small size of the Program means that it is not highly visible to students on the campus.

   - Strategies to increase visibility (and recruitment of students) on campus might include campus xeriscape projects, community garden projects and "eating well' projects, a campus "heritage" display of living native plants.
   - Perhaps the Program might join in on a college-wide student poster session (in the library or student union building) in which the research projects of science students are made visible to the larger campus.
   - Perhaps the program might expand its efforts (perhaps in continuing cooperation with Utah State) to offer additional courses of general interest to students such as: flora of Utah, plant biotechnology, plant care and cultivation.
   - The Program might consider ways to promote the minor - particularly in conjunction with other majors such as Anthropology and Geography-Urban Planning.

3. Laboratory spaces continue to be inadequate •especially in equipping labs with computers so that some experiments can take simultaneous advantage of internet resources.

   - Having an ethernet port in the green house in order to collect real time monitoring data is an example. (According to Fall 2002 *IT's News*, a newsletter from the Information Technology division, wireless Ethernet connections are being installed on campus by the Systems and Network Management department of IT. Because of the greater flexibility this offers, the Program should consider this over a "wired" connection.)
   - Perhaps the Program might develop partnerships with businesses and agencies to allow students to use their more up-to-date equipment, or to see demonstrations.

4. The Program is making good efforts--as part of university-wide efforts--to improve assessment of student learning.

   - The Program might consider using alumni evaluations in addition to student evaluations and exit interviews.
   - The Program should review the Policy and Procedures Manual regarding the method of students evaluating classes.

5. Alumni could also be involved in developing more internship opportunities for students - perhaps more often at the junior level. Alumni could also be involved in sponsoring and organizing field trips.

6. The adjunct faculty seem very involved in the Program •working with students and colleagues. They need more formal space in which to meet students.

Response to the Botany Program Review
November 1, 2002

The Program Review of the Botany Department at Weber State University, conducted in the Fall of 2002, addressed six main challenges faced by the department. Incorporated within these challenges were areas that need improvement and recommendations on how to facilitate these changes. The Botany Program agrees with the findings of the report and plans are underway to implement some of the recommendations as early as Spring 2003, with more to follow in Fall 2003. The department's response to this review is as follows.

Challenge 1:
The Botany Program should consider ways to involve more of their students in their own research and/or in other projects.

Recommendation:
a) Increase internship opportunities, particularly with local agencies and businesses which should then also be involved in assessing the student's work.
b) Work with the University Administration and other departments to obtain materials, supplies, and equipment that would improve the undergraduate research experience.

Response:
The suggestion to create internships with local agencies is well taken. We realize that most of our graduates that succeed in careers in Botany have held one or more internships while in college. We have had department discussions on how to increase student interest and involvement in internships and have even considered requiring students to have an internship prior to graduation. Although we encourage students to take advantage of these opportunities, many are not willing to leave the state, even temporarily. Local opportunities are limited, but the best chances would be with the Forest Service, Fish and Wildlife Service, Utah Department of Agriculture, and the Utah Department of Environmental Quality. This is certainly worth pursuing further. There are many out-of-state and some in-state internships available, particularly in the summer, with government agencies, environmental groups and research universities. Unfortunately, there are not many local businesses that do research in Botany, although co-op experiences with local nurseries may be possible. Many local companies have been reluctant in the past to offer paid internships and we suspect the same might apply at least until the economy improves. If we could help supplement internships, by grants or money solicited through the Development Office, the likelihood of local business participation would undoubtedly increase. We will survey some local agencies/businesses to determine the level of interest and commitment for such endeavors.

Last summer the Botany Department was part of an interdisciplinary grant awarded by the Hemingway Fund, along with the Microbiology and Zoology departments, to obtain summer internship money for students to conduct research with faculty mentors. Additional funding will be given this summer. Further collaborative efforts will be pursued and will become

more feasible when the Tech Ed Building is renovated, providing additional lab space and interdisciplinary contact.

One problem we have faced in getting more students involved in projects and internships has been timing. We have not had consistent access to students early enough in their programs for lengthy project or internship planning. With Botany 2121, we now have access to students early in their programs. However, even with early and ongoing announcements and advisement about projects, we face two problems that are up to the students to overcome:
1. students who are unable to engage in projects because of work and family commitments
2. students who want projects or internships handed to them, without the work of application, planning, etc.

We hope that with the implementation of an improved advising system, students will become more aware of the importance and availability of internships and they will be more likely to pursue them. We may also be more successful if we offered a four week block from May to June for students interested in working on short-term research projects.

In terms of equipment, the Botany Department has applied for and received in-house grants for equipment with the Microbiology and Geosciences departments. We will continue to pursue these opportunities as they become available.

Challenge 2:
The small size of the Program means that it is not highly visible to students on the campus.

Recommendations:
Strategies to increase visibility (and recruitment of students) on campus might include campus and community projects, participation in college-wide student research poster sessions (in the library or student union building), expanding efforts (perhaps in continuing cooperation with Utah State) to offer additional courses of general interest to students such (E.g. flora of Utah, plant biotechnology, plant care and cultivation), and promoting the minor with majors such as Anthropology and Geography-Urban Planning.

Response:
Every year, the department's student organization, the Botany Club, holds a two-day plant sale which is widely advertised and serves as the club's major fund-raiser. People campus-wide and from the community attend the sale which generates enough revenue to fund one student scholarship per year. The club is currently involved in a xeriscape landscaping project adjacent to the Science Lab building. The involvement of the department and the Botany Club in community projects has been discussed and could include projects in landscape/gardens, composting, weed control, and water conservation. These types of activities yield good publicity for both our department and our students.

The Botany Department's fall field trip to the Uinta Mountains has been an annual event for over thirty years. Over eighty students campus-wide enrolled in Botany courses attend each year. Reporters from the campus newspaper are invited, although they do not always come. A few years ago the trip was also written up in the local newspaper. Last year we started an annual spring field trip to Antelope Island and we have discussed the possibility of offering scenic trips elsewhere in Utah that would be open to the public.

We have quite a bit of campus exposure via Botany LS1403 (Environment Appreciation). However, as a core requirement in the School of Business, this in not necessarily a positive exposure for the department. Botany LS1203 (Plant Biology), new last year, has shown enrollment increases each semester, and should serve as a good recruitment vehicle for the department. There has also been discussion to offer the popular Botany 2203 (Home and Garden Plants) as a general education course. It used to be offered as such, but we were limited by the number of LS courses we could offer. We removed its LS status, but we may revisit this issue.

Zoology and the GIS program have student research presentations. The College of Science as a whole would benefit from a single effort with campus-wide publicity. Some entities on campus are trying to start a campus-wide presentation of student projects. (This has come up with the Women's Studies program. The goal seems to be next academic year.) An additional source of exposure would be student presentations at the Utah Academy of Arts, Letters and Science.

As a result of our Program Review, we have discussed the possibility of offering courses that would appeal to the general public either through Continuing Education or through local high schools' lifelong learning programs. We have already scheduled a class for Fall 2003 on *Utah Pioneer Herbal Medicines* as a night class to be offered through Continuing Education. Other courses discussed include *Local Flora*, *Homeopathic Uses of Plants*, *Flower Arranging* , *Xeriscaping*, and gardening classes on *Cottage Gardens, Zen Gardens,* and *Feng-Shui Gardens*. We have also discussed establishing a Wetlands Certificate Program and a Horticultural Therapy Certificate Program. In instances where our mission and that of Utah State conflict, we would seek a mutually beneficial arrangement.

Increasing the number of Botany minors would increase SCHs, especially in upper division courses. However, the minor itself does not count in our statistics. Only majors, Biology composites (1/2 and BIS (1/3) student are credited to the department. One way to increase some enrollments and the department's visibility on campus would be to encourage Social Sciences students to take Botany LS1303 toward their general education requirement.

Challenge 3:
Laboratory spaces continue to be inadequate-especially in equipping labs with computers so that some experiments can take simultaneous advantage of internet resources.

Recommendations:
a) Install wireless Ethernet connections to offer greater flexibility in places such as the green house in order to collect real time monitoring data is an example.
b) Develop partnerships with businesses and agencies to allow students to use their more up-to-date equipment, or to see demonstrations.

Response:
a) There may not be a great need for internet access in labs currently, however portable devices for data collection and analysis, such as the various Licor units, may prove helpful. Instructors of the labs that could use such equipment (ecology, physiology, house and garden plants) will compile a list and apply for RSPG/ARCC money.

b) Partnerships with agencies/businesses for equipment use could be explored at the same time we survey regarding internships

Challenge 4:
The Program should continue and expand its good efforts to improve assessment of student learning.

Recommendations:
a) Consider using alumni evaluations in addition to student evaluations and exit interviews.
b) Review the Policy and Procedures Manual regarding the method of students evaluating classes.

Response:
a) Currently , it is difficult to track alumni. However, the Alumni Office is making an effort to do so. Once we have a better capability we agree that it would be valuable to have alumni evaluate the department, their education at WSU and how their experience in the Botany Department prepared them for their career/future. We also agree that an anonymous, written evaluation would be beneficial in addition to exit interviews for graduating seniors. Students may feel more comfortable making criticisms or suggestions anonymously. We will add a written evaluation as part of the process for Spring 2003. We have received good feedback in our exit interviews in the past and have begun to implement some of the changes that were suggested.
b) The department does not fully understand the concern regarding the method in which student evaluations of classes are conducted. We all teach one or two lower division courses (perhaps multiple sections of one), and usually one or two upper division classes per semester. Each upper division course is taught by only one faculty member, depending on the area of his/her specialty. The current department policy for student evaluations is to have at least one upper division and one lower division course evaluated each year, preferably each semester. Almost every upper division course is evaluated each year, given the distribution of these courses among faculty. Due to the fact that many of the lower division courses are taught by more than one faculty member, most sections of these are evaluated every semester in order to produce somewhat meaningful data. The PPM 8-11 states that "...each year each faculty member shall have student evaluations administered and compiled...in at least two of the courses that the faculty member teaches. The two courses to be evaluated each year will be determined through consultation between each faculty member and his/her department chair...". Since our policy is to evaluate most courses taught each semester, with at least one upper and one lower division course per faculty member evaluated per year (as stipulated by the Chair), we feel that our evaluation method falls within the criteria set forth in the PPM. We also feel that in evaluating more than two classes per faculty member each year, the Chair is able to get a better idea of the overall student perception of our department's quality of courses and instruction.

Challenge 5:
Alumni involvement in the department

Recommendations:
Involve alumni in developing more internship opportunities for students- perhaps more often at the junior level and in sponsoring and organizing field trips.

Response:
As stated in #4 above, we hope that it will soon be easier to track alumni. We agree that there are a number of ways in which alumni could become involved in the department. It would undoubtedly be possible to involve them in helping to organize specific field trips. It might be possible to have them or their employers sponsor trips, although this might be more difficult. Another possible way to get alumni involved is to have them give guest lectures, in classes or to larger audiences, or become involved in other departmental projects.

Challenge 6:
The adjunct faculty seem very involved in the Program-working with students and colleagues. This involvement could be enhanced.

Recommendations:
Provide more formal space in which adjunct faculty could meet students.

Response:
We would love to provide space for adjunct faculty. Given the ongoing office crunch in the Science Lab building, formal space just won't be available. Even as faculty acquire laboratory and equipment space in other buildings, they will still have offices in SL. With enough college pressure for office space, there could be increased lobbying for construction of Phase 2 of the science building.

H 2 ***Update on Challenges since last review***

Since the above responses to identified challenges, the job and internship opportunities have increased significantly for our students. During the last five years we have had many more internships available than the number of students we could provide. This portends well for the future of our recruitment efforts. Of note also is the fact that we hear from various agencies such as the US Forest Service and the Utah Division of Wildlife Resources that our students are preferred as assistants for summer employment over others from in and out of state.

As with job and internship opportunities, undergraduate research has taken a major step forward at WSU. We now have an Office of Undergraduate Research (OUR) which serves as a coordinator for all undergraduate research, assists students in securing grants for their research and provides some support for faculty mentors when students report results of their research at regional, national, or even international meetings. (One challenge that has emerged from more undergraduate research is adequate support for faculty mentors. Discussions with the Development Office about finding donor monies to support such efforts is very promising.) The College of Science has also secured additional space for student and faculty research in an adjacent building. More students are selecting the Thesis Readings, Thesis Research, and Thesis route for part of their capstone experiences. It is safe to say that a culture of undergraduate research is developing at WSU and Botany is an integral part of the process.

Several students have presented the results of their research at the WSU Undergraduate Symposia over the years as have faculty from Botany at the Annual Faculty Forum where

current research is reported through posters and paper presentations. At the most recent forum in October, 2007, Dr. Gene Bozniak was selected to deliver the keynote *"Last Lecture"*.

The WSU undergraduate research journal, ERGO, was launched in spring of 2007. Of the nine full length research papers published in the inaugural issue, two were by botany students.

The addition of Dr. Ron Deckert to our faculty has had a very positive impact on the increasing number of students becoming interested in research. He has mentored several students funded by the National Science Foundation Research Experience for Undergraduates, two RS& PG grants, and one ARCC equipment grant. Two of his students presented the results of their research at the WSU Undergraduate Research Symposium in 2005 and one, Ms Shaunna Goldberry, was selected in a nationwide competition to present her research on mycorrhizae and *Bromus tectorum* at the National Conference on Undergraduate Research in Ashville, NC in April 2006. Later that summer she attended the 5th International Conference on Mycorrhizae, held in Granada, Spain. Her presentation was very well-received and had several international researchers asking her if this was her PhD or Post-Doc research. She was proud to say it was an undergraduate research project at WSU.

Successful undergraduate research supervised by faculty mentors goes a long way in increasing the department's visibility on campus. Also working with other colleges on interdisciplinary topics such as providing a Medicinal Botany course for the College of Health Professions and a Forensic Botany course for the College of Social and Behavioral Sciences add to this visibility. Our fieldtrips during each semester gets considerable press coverage from time to time so that students certainly know that we exist and that botanists are involved in interesting issues. The visibility provided by Botany Club activities is significant. Their numerous on and off campus projects gets the message out that botany is a field worthy of pursuit.

Laboratory space is marginally adequate for classes and research, especially since the acquisition of surplused space in the Technical Education building, however, as we expand our collections of plant material, especially those things beyond vascular plants, we will require additional space to house curated material. We now have a large collection of mycorrhizae from the Great Salt Lake ecosystem which is made available to other scientists that will need to be added to the Herbarium in a permanent collection. This will require significant new space such as that which could be provided through a new building. Such a building would also provide space for adjunct professors who would interact more with tenured faculty and students.

Most significant progress has been made in the area of assessment, especially through our student portfolio and exit interviews. Several alumni have reported that they secured jobs strictly on the basis of the portfolio which encourages both faculty and students to continue to invest the effort in the development and improvement in this process.

Goals and Plans for next 3-5 years:

1. Follow-up on the methods developed during the last few academic years to improve the **development of the student portfolio** as a capstone experience. The department felt that students needed help in the formative development of the portfolio between the period they are first introduced to the concept in the *Career Planning for Botanists* course and the summative evaluation during their senior year and the capstone experiences. We integrated an opportunity for the student majors to enhance formative development of their portfolios by offering a successful section of *Readings in Botany* course, specifically designed for that purpose. We also decided that students needed assistance in preparing for a summative assessment and developed a three-hour *Summative Portfolio Assessment* course. This is being offered in fall of 2007 for the first time. This is perhaps our highest priority curricular goal for the short-term. This course will become a regular course for a faculty member whose major course, Plant Physiology, was moved from an every year class to an every other year offering.

2. Explore avenues to **compensate faculty for mentoring student research**. We are providing more opportunities for students to conduct research and funding is being made available for student projects. Funding for faculty has not kept pace with undergraduate student funding. The College of Science has had conversations with the Development Office and prospects for funding this effort from donations are promising.

3. Seek avenues for **enhancing student recruitment** into, not only Botany, but the Sciences in general. Currently there seems to be a lack of public awareness that our collective futures depend heavily upon our scientific literacy and the technological development based on that science. This is not only a local or regional problem but a national one and we must do our part in addressing it. A concerted effort here will necessitate coordination with campus recruitment as well as developing a College-wide plan.

4. **Maintain the disciplinary culture and professionalism of Botany as a distinct program.** The National Council of Plant Biology Department Chairs/Heads called for *"more broadly trained Botanists"* at its 1995 Cornell University Meeting. To this end and with the Assessment Plan in place, we have revised our curriculum. The Botany program at Weber State University is the only such program of its kind within the state of Utah. Uniqueness is considered, by accreditation teams, a positive feature of an institution. We believe that with our Student Portfolio in place, we have an ideal tool for monitoring student progress and ultimately reaching a high level of student mastery of skills and development of knowledge and comprehension of Plant Biology. We will, however, need to recruit additional new students.

5. Continue to **evaluate our mission, goals, objectives and expected student learning outcomes** to ensure the best possible curriculum and matching assessment techniques.

6. Be mindful of and demonstrate a commitment to the **mission** of the institution to foster a learning environment where every member is valued, where **inclusivity** is achieved, and where, in addition to the *cognitive* and *conative* (skills) domains of learning, the *affective* domain of learning is actively pursued on the part of both the faculty and the students.

7. Develop **full department status** for the Department of Botany. While we have made gains in this plan by restoring the Laboratory Manager position to full-time a few years ago, the secretary position must be made a full-time position. Sharing a half-time secretary continues to be a burden to everyone concerned. The secretary position also needs to be re-classified as Office Specialist or Administrative Assistant and pay increased accordingly.

8. Accept our increasingly important role as **linking traditional botany with present-day implications of technology.** For example, do our students and the varied publics we serve understand fully the implications of: (a) industrial scale agriculture vs. sustainable agriculture, (b) plant genetic engineering, including practical, environmental and ethical issues, (c) application of miscellaneous *"-omics"* (genomics, proteomics, metabolomics) methodologies to answer basic questions about plant functions, taxonomic relationships, evolution, etc.?

9. **Increase the herbarium collection** by 10,000 vascular plant specimens along with respective databases. A computer database was developed by the Curator and a student working on a Beishline Scholarship to assist in accessing information contained in the collection. Recently the Curator developed a cooperative arrangement with a computer science class who are providing manpower to improve this database, which will be very useful, state of the art, and essentially developed at no cost to the department. The Herbarium collection will also need to be expanded to include fungi, algae, and mosses, which will necessitate expanding the space into a new building.

APPENDIX A

Department of Botany

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]	**5,573**	**5,918**	**5,634**	**5,151**	**4,156**
Student FTE Total [2]	**185.77**	**197.27**	**187.80**	**171.70**	**138.53**
Student Majors [3]					
Botany	53	53	51	59	60
Biology Composite	11	19	23	17	27
Program Graduates [4]					
Bachelor Degree(Botany)	0	1	3	11	5
Bachelor Degree(Biology Comp.)	2	0	1	5	3
Student Demographic Profile [5]	**53**	**53**	**51**	**59**	**60**
Female	20	22	23	28	28
Male	33	31	28	31	32
Faculty FTE Total [6]	**7.84**	**7.54**	**7.79**	**8**	**7.52**
Adjunct FTE	2.06	1.73	2.01	2.22	1.74
Contract FTE	5.78	5.81	5.78	5.78	5.78
Student/Faculty Ratio [7]	**23.69**	**26.16**	**24.11**	**21.46**	**18.42**

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.

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

	2002-2003	2003-2004	2004-2005	2005-2006	2006-2007
Adjunct FTE (2 part-time)	2.06	1.73	2.01	2.22	1.74
Contract FTE	5.78	5.81	5.78	5.78	5.78
Total FTE	7.84	7.54	7.79	8.0	7.52

APPENDIX C

Botany Program

Contract/Adjunct Faculty Profile

(NOTE: data provided by Institutional Research)

NAME	GENDER	ETHNICITY	RANK	TENURE STATUS	HIGHEST DEGREE	YEARS OF TEACHING			AREAS OF EXPERTISE
						WSU	OTHER	TOTAL	
Eugene G. Bozniak	M	White	Prof.	Tenured	Ph.D.	38	0	38	Algology Marine Biology
Stephen L. Clark	M	Native American	Prof.	Tenured	Ph.D.	42	0	42	Plant Taxonomy Ethnobotany Rare and Endangered Plants
Dawn M. Gatherum	M	White	Prof.	Tenured	Ph.D.	36	0	36	Horticulture Soils
Suzanne M. Harley	F	White	Prof.	Tenured	Ph.D.	18	2	20	Plant Physiology
Ron Deckert	M	White	Asst.	Tenure-Track	Ph.D.	5	0	5	Plant Anatomy Mycology
Barbara A. Wachocki	F	White	Prof.	Tenured	Ph.D.	15	0	15	Plant Ecology
Nancy Clark	F	White	Adjunct	-	MS	12	5	17	Science Education Biology, Botany
Susan Young	F	White	Adjunct	-	MA	14	10	24	Paleoethnobotany Cultural uses of plants

APPENDIX D

Botany Program

Contract Staff Profile

(NOTE: data provided by Institutional Research)

NAME	GENDER	ETHNICITY	JOB TITLE	YEARS OF EMPLOYMENT			AREAS OF EXPERTISE
				WSU	OTHER	TOTAL	
Margaret Harris	F	White	**Laboratory Manager (Prof. Staff)**	3	0	3	Chemical & media preps Greenhouse management Lab preparations Inventory mgt. Purchasing/Equipment acquisition Writing lab protocols Chemical & waste storage & mgt.
Carrie Minnoch	F	White	**Secretary II (Class. Staff)**	20	18	38	Departmental budget oversight Proficient in all computer applications necessary Scheduling (classes, rooms, etc.) Faculty support (exam prep, etc.) Faculty support in extracurricular projects (Science Fair, Sci. Acad., etc.)

Vita of Ron J. Deckert

Department of Botany
Weber State University
Ogden, UT 84408
phone (office): 801-626-7283
email: rdeckert@weber.edu

Current Position

Assistant professor
Department of Botany
Weber State University
Ogden, UT

Education

Ph.D in botany, University of Guelph — December, 2000
Bachelor of Science, (Specialized Honours Plant Biology, Botany emphasis) with 'distinction', University of Guelph — December, 1995

Professional Experience

Weber State University, Department of Botany
Ogden, Utah, USA
Assistant professor — 2003 to present

Northern Arizona University
Department of Biological Sciences
Flagstaff, Arizona, USA
Postdoctoral fellow — 2001-2003

Research Interests

The interaction of plants and their microbial symbionts with their biotic and abiotic environment.

Summary of Fellowships and Scholarships

***External*:**

- Natural Sciences and Engineering Research Council of Canada (NSERC) Postdoctoral Fellowship (March 2001)
- Ontario Graduate Scholarship (declined) (April 1998)
- NSERC Postgraduate Scholarship PGS-B (March 1998)
- Ontario Graduate Scholarship (second half declined, January 1996)
- NSERC Postgraduate Scholarship PGS-A (March 1996)
- John Macoun Travel Bursary (Canadian Botanical Association)

***Internal*:**

- Research, Scholarship and Professional Growth Award, (two awards) Weber State University

- Academic and Resources Computing Committee Grant, Weber State University
- Seven internal scholarships at the University of Guelph (one departmental, six college-wide)

Publications

Xu, H., Deckert, R.J., and D.J. Garbary. *Ascophyllum* and its symbionts. X. Ultrastructure of the interaction between *A. nodosum* (Phaeophyceae) and *Mycophycias ascophylli* (Ascomycetes) (in press), CANADIAN JOURNAL OF BOTANY.

Hart, S.C., Gehring, C.A., Selmants, P.C., and R.J. Deckert. 2006. Carbon and nitrogen elemental and isotopic patterns in macrofungal sporocarps and trees in semiarid forests of the south-western USA. FUNCTIONAL ECOLOGY 20: 42-51

Deckert, R.J., and D.J. Garbary. 2005. *Ascophyllum* and its symbionts. VIII. Interactions among *Ascophyllum nodosum* (Phaeophyceae), *Mycophycias ascophylli* (Ascomycetes) and *Elachista fucicola* (Phaeophyceae). ALGAE: 20: 363-368

Garbary, D.J., Deckert, R.J., and C.B. Hubbard. 2005. *Ascophyllum* and its symbionts. VII. Three-way interactions among *Ascophyllum nodosum* (Phaeophyceae), *Mycophycias ascophylli* (Ascomycetes) and *Vertebrata lanosa* (Rhodophyta). ALGAE 20: 353-361

Deckert, R.J. and D.J. Garbary. 2005. *Ascophyllum* and its symbionts. VI. Microscopic characterization of the *Ascophyllum nodosum* (Phaeophyceae), *Mycophycias ascophylli* (Ascomycetes) symbiotum. ALGAE 20: 225-232.

Bailey, J.K., Deckert, R., Schweitzer, J.A., Rehill, B.J., Lindroth, R.L., Gehring, C. and T.G. Whitham. 2005. Host plant genetics affect hidden ecological players: links among *Populus*, condensed tannins, and fungal endophyte infection. CANADIAN JOURNAL OF BOTANY 83: 356-361

Swaty, R.L., R. J. Deckert, T.G. Whitham and C.A. Gehring. 2004. Ectomycorrhizal abundance and community composition shifts with drought: predictions from tree rings. ECOLOGY 85: 1072-1084

Deckert, R.J., Hsiang, T. and R.L. Peterson. 2002. Genetic relationships of endophytic *Lophodermium nitens* isolates from needles of *Pinus strobus*. MYCOLOGICAL RESEARCH 106: 305-313.

Deckert, R.J., Melville, L.H. and R.L. Peterson. 2001. Structural features of a *Lophodermium* endophyte during the cryptic life-cycle phase in the foliage of *Pinus strobus*.MYCOLOGICAL RESEARCH 105: 991-997.

Deckert, R.J., Melville, L.H., and R.L. Peterson. 2001. Epistomatal chambers in the needles of *Pinus strobus* L. function as microhabitat for specialized fungi. INTERNATIONAL JOURNAL OF PLANT SCIENCES 162: 181-189.

Deckert, R.J. and R.L. Peterson. 2000. Distribution of foliar fungal endophytes of *Pinus strobus* between and within host trees. CANADIAN JOURNAL OF FOREST RESEARCH 30: 1436-1442.

Book Chapter

Garbary, D. J. & Deckert, R. J**.** 2001. Three part harmony - *Ascophyllum* and its symbionts. In: Cellular Origin and Life in Extreme Habitats, Vol. 4 Symbiosis: mechanisms and model systems. (J. Seckback, ed.) 311-321. Kluwer, Dordrecht. 808 pp.

Invited Seminars:

In the sky, below the earth, and under the sea: fungal symbionts of plants and algae. Sigma Xi seminar, Weber State University, Ogden, Utah, November, 2004.

Forests of land and sea. Plenary lecture at the Canadian Botanical Association meetings, Antigonish, Nova Scotia, Canada, August 2003.

Life in a leaf: endophytes of white pine. Friday Integrated Biology seminar series, Northern Arizona University, Flagstaff, Arizona, U.S.A., March 2001.

Presentations

Deckert, R.J., Theimer, T.C., Whitham, T.G. and C.A. Gehring. Ectomycorrhizal species differences between moth resistant and susceptible pinyon pine: the role of herbivory vs. host plant genetics. Southwestern Association of Biologists meetings, Portal, Arizona, October 2002.

Deckert, R.J., Theimer, T.C., Whitham, T.G. and C.A. Gehring. Fungal species differences in the ectomycorrhizal community of pinyon pine (*Pinus edulis*) associated with the herbivore *Dioryctria albovitella*. Ecological Society of America meetings, Tucson, Arizona, August 2002.

Deckert, R.J., Melville, L.H., and R.L. Peterson. Structural details of the occupation of *Pinus strobus* L. needles by *Lophodermium* endophytes during the latent period. 7th International Symposium on the Microbiology of Aerial Plant Surfaces. Berkeley, California, August 2000.

Deckert, R.J., Melville, L.H., Thomas, K.L., and R.L. Peterson. Epistomatal chambers in the needles of *Pinus strobus* L. (eastern white pine) function as microhabitat for specialized fungi. Canadian Botanical Association Meetings, London, Ontario. June 2000.

Deckert, R.J. and R.L. Peterson. Epistomatal chambers in *Pinus strobus* L. needles as habitat for phylloplane fungi. Great Lakes Mycology Workshop, Peterborough, Ontario. March 1999.

Deckert, R.J. and R.L. Peterson. Endophyte mediation of herbivory and pathogenesis in *Pinus strobus* L. (White pine). Confor '97, Graduate Student Conference on Forestry, Thunder Bay, Ontario, February 1997.

Deckert, R.J. and R.L. Peterson. Cultural isolation and scanning electron microscopic examination of foliar endophytes of *Pinus strobus* L. (White pine). Canadian Botanical Association Meetings, Charlottetown, Prince Edward Island, June 1996.

Deckert, R.J. and R.L. Peterson. A study of foliar endophytes of *Pinus strobus* L. using culture and scanning electron microscopy. Great Lakes Mycology Workshop, Toronto, Ontario, March 1996.

Presentations by co-author (indicated by asterisk):

Garbary, D.J*., Deckert, R.J. and C. Hubbard. A tripartite symbiosis among two photosynthetic marine algae and the ascomycete, *Mycophycias ascophylli* (oral paper). Canadian Botanical Association Meetings, Kelowna, British Columbia, June 2001.

Other Presentations

In addition to the presentations listed above, I have been senior author for posters presented at international meetings (International Botanical Congress (1999), International Congress on Symbiosis (1997), International Conference on Mycorrhizae (2003) and been co-author on four student presentations at the local level (WSU), one at the national level (National Conference on Undergraduate Research, 2006) and one at the international level (International Conference on Mycorrhizae, 2006).

Other Research Experience

Collaborative research: Marine mycology.
St. Francis Xavier University (Antigonish, Nova Scotia, Canada). 2000 to present.
Collaborator: Dr. David Garbary
Ascophyllum nodosum (Knotted wrack) and its obligate fungal and algal symbionts.

Research assistant: *Isoetes* taxonomy
University of Guelph (Guelph, Ontario, Canada). Mar. 1996 – Dec. 2000
Supervisor: Dr. Donald Britton
Isoetes spp. classification using scanning electron microscopy

Research assistant: Ornamental plant pathology
University of Guelph (Guelph, Ontario, Canada). May 1994 – May 1995
Supervisor: Dr. Tom Hsiang
Fungal isolation and culture, culture collection maintenance, fungicide evaluation

Teaching – Current WSU Courses

- BTNY 1203 Plant Biology
- BTNY 1303 Plants in Human Affairs
- BTNY 2114 Evolutionary Survey of Plants, plus laboratory
- BTNY 3105 Plant Anatomy, plus laboratory
- BTNY 3504 Mycology, plus laboratory
- BTNY 4113 Plant Evolution
- BTNY 4800 Individual Research

Teaching Assistantships (Department of Botany, University of Guelph)
2000 – Plants and Human Use
1999 – Plants and Human Use
1998 – Introductory Biology, Introductory Plant Biology
1997 – Ecology, Introductory Plant Biology
1996 – Ecology, Fungi

Training and Mentoring
I have mentored four undergraduate student researchers while at Weber State University and trained them in field ecology, experimental design, fungal isolation and culture. My current undergraduate students have been very successful at obtaining internal funding for conducting research and have presented their findings at local, national and international meetings. One is in the process of preparing a manuscript for submission to a peer-reviewed journal. During my postdoctoral training in the Mycorrhizal Ecology lab at Northern Arizona University, I trained several graduate and undergraduate students in mycological technique as well as DNA extraction, PCR and RFLP protocols, and microtechnique.

Symposia and meetings attended
2006 National Conference on Undergraduate Research, April 5-8, Asheville, North Carolina
2003 Canadian Botanical Association Meetings. August, Antigonish, Nova Scotia..
2002 Annual meeting, Southwestern Association of Biologists, October 18-20, Portal Arizona.
2002 87th Annual meeting, Ecological Society of America, August 4-9, Tucson, Arizona.
2001 Workshop on Biocomplexity in Pinyon-Juniper Woodlands, January 29-31, Flagstaff, Arizona.
2000 7th International Symposium on the Microbiology of Aerial Plant Surfaces, August 3-8, Berkeley, California.
2000 Canadian Botanical Association/Canadian Society of Plant Physiologists Meetings, June 24 – 28, London, Ontario.
2000 Ecology: Achievement and Challenge, Joint Meeting of the British Ecological Society and the Ecological Society of America, April 10-13, Orlando, Florida.
1999 33rd Plant Development Workshop October 16, Guelph, Ontario.
1999 26th Annual meeting, Microscopical Society of Canada, May 26-28, Guelph, Ontario.
1999 XVI International Botanical Congress, August 1-7, St. Louis, Missouri.
1999 19th Great Lakes Mycology Workshop, March 27-28, Peterborough, Ontario.
1998 32nd Plant Development Workshop, October 10, Montreal, Quebec.
1997 Botanical Society of America/Canadian Botanical Association Meetings, August 3-7, Montreal, Quebec.
1997 Second International Congress on Symbiosis, April 13-18, Wood's Hole, Massachusetts.
1997 17th Great Lakes Mycology Workshop, April 5-6, Guelph, Ontario.
1997 Confor '97, Graduate Student Conference on Forestry, February 7-9, Thunder Bay, Ontario.
1996 Canadian Botanical Association Meetings, June 23-27, Charlottetown, Prince Edward Island.
1996 16th Great Lakes Mycology Workshop, March 2-3, Toronto, Ontario.
1995 Canadian Botanical Association Meetings, June 24-28, Guelph, Ontario.

Professional Service

Grant reviews: National Science Foundation: Ecological Biology Cluster, and Microbial Observatories cluster

Natural Sciences and Engineering Research Council of Canada

Manuscript reviews: Canadian Journal of Botany, Canadian Journal of Forest Research, Ecology, Ecology Letters, Functional Ecology, Mycologia, Mycological Research

Secretary: Sigma Xi, WSU chapter, 2005

University Service roles:

Department, College, and University Committees:

1. 2003 to present – Animal Care and Use Committee, WSU.
2. 2003 to present – Academic Research and Computing Committee, WSU.
3. 2003 to present – College of Science Undergraduate Research Committee, WSU.
4. 2003 (Fall) Engineering Technology Building Remodel Committee, WSU.
5. Spring 2000 – Graduate student representative on departmental search committee for department chair (Dept. of Botany, Guelph)
6. 2000 – Graduate student representative on departmental short-term planning committee (Dept. of Botany, Guelph)
7. 1998 – 2000 Graduate student representative on departmental curriculum committee (Dept. of Botany, Guelph)
8. 1998 – 2000 Graduate student representative on joint health and safety committee (Dept. of Botany, Guelph)
9. 1996 – Graduate student representative on departmental computer committee (Dept. of Botany, Guelph)

Professional Affiliations

Member, American Association for the Advancement of Science
Member, Canadian Botanical Association
Member, Ecological Society of America
Member, Mycological Society of America
Member, Sigma Xi

Other interests

Hatha Yoga
Outdoors (hiking, camping)
Blues, Bluegrass, and World music

VITA

STEPHEN LEWIS CLARK
Professor of Botany
Director of the Herbarium
Director, Institute of American Indian Botany

Dept. of Botany
Weber State University
Ogden, Utah 84408
801-626-6182

EDUCATION

B.S.	1964	Weber State College, Ogden, Utah
M.S.	1967	Utah State University, Logan, Utah
Ph.D.	1980	Brigham Young University, Provo, Utah

PROFESSIONAL EXPERIENCE

Big Game Range Inventory, Utah Fish and Game Dept., summers 1961-64
Desert Range Inventory, Bureau of Land Management, summer 1965
Watershed Management Research, Farmington Canyon, Davis Co., Utah, summers 1967-68
Utah State University, Teaching Assistantship, 1964-65
Weber State University, Faculty, 1967 to present
Brigham Young University, Visiting Faculty, 1975-76, 1988-89
Research Assoc., Brigham Young University, Rare and Endangered Plants, Manti LaSal, summer 1977
Taxonomist, BLM, Rare and Endangered Plants of the Arizona Strip, summers 1978-79
Taxonomist, USFS, Noxious Weeds of the Intermountain Region, summer 1980
Visiting Faculty, College of Eastern Utah, San Juan Center, summers 1981-82
Taxonomist, Utah Div. of Parks and Recreation, Fort Buenaventura, summers 1981-82
Taxonomist, Utah Div. of Parks and Recreation, Antelope Island, summer 1980
Faculty, BYU Continuing Education, Ogden Center, 1974-76
Taxonomist, Utah State University, Research project on leafy spurge, summer 1983
Professor in residence, BYU summer camp - Aspen Grove, summers 1984 and 1986
Correspondent, Ogden Standard Examiner, A Naturalists View, 1985-88
Founder and Director, Institute of American Indian Botany, Weber State University, 1984-present
Taxonomist, Rare and Endangered Plants of Zion Nat. Park, National Park Service, summers 1987, 1988, 1989
Visiting Faculty, Teton Science School, University of Wyoming, summer 1987
Taxonomist, Fish Lake National Forest, U.S. Forest Service, Richfield, Utah, summer 1988
Taxonomist, U.S. Forest Service, Dixie National Forest, Rare and Endangered Plants, 1988
Taxonomist, The Nature Conservancy, Rare and Endangered Plants, S.E. Utah, 1988
Taxonomist, Hanging Gardens of Zion National Park, 1987, 1988, 1989
Taxonomist, Dames & Moore, Phoenix AZ, Riparian Communities, Rare and Endangered Plants, No. Utah-Idaho, 1988
Taxonomist, U.S. Forest Service, Rare and Endangered Plants, Richfield District, Richfield District, 1989
Taxonomist, Bureau of Land Management, Rare and Endangered Plants, South-central Utah, 1989

Taxonomist, Dames & Moore, Vegetative Communities, Rare and Endangered Plants - Southwest Intertie Project, Utah-Nevada-Idaho, 1989
Taxonomist, Dames & Moore, Rare and Endangered Plants, Natural gas line on Manti-LaSal Forest, 1989
Taxonomist, U.S. Dept. of the Army, Flora of Dugway Proving Grounds, Tooele, Co., Utah, 1990-91
Taxonomist, Dames & Moore, Rare and endangered plants, Kearns River Pipeline, 1990
Taxonomist, Utah Dept. of Transportation, Revegetation of Highways, 1990
Taxonomist, Engineering Services, Denver, Co. Weed Research, U.S. Air Force, 1993
Taxonomist, Jordanelle Utah Project, Rare and endangered plants, 1994
Faculty, Science and Math Education Center, Weber State University, summer ecology programs for secondary teachers, 1996-present
Group Leader, Flora of Rainforests, Belize, C.A., June-Aug.1998
Group Leader, Plant Geography and Ethnobotany of the mountains and upper Amazon River of Peru, So. America, April, 2000
Botanist, Plant Geography and Ethnobotany of Kenya, Africa, Aug. 2000
Botanist, Plant Geography and Ethnobotany of Australia, Aug. 2001
Botanist, Plant Geography and Ethnobotany of Thailand, Aug. 2002
Botanist, Plant Geography and Ethnobotany of Botswana, Aug. 2003
Summer Undergraduate Research. NSF. Ethnobotany of *Scirpus maritimus*. Two students. 2004
Botanist, Ethnobotanical Studies in Chiapas, Mexico. Aug. 2005
I will be leading a group of students and faculty up the Amazon River in June, 2008

PROFESSIONAL SOCIETIES

American Society of Plant Taxonomists
Sigma Xi
American Botanical Council

PRESENT RESEARCH INTERESTS

Flora of Utah
Ethnobotany of the Great Basin
Taxonomy of *Penstemon* (Scrophulariaceae)
System theory in evolution and morphogenesis

PUBLICATIONS

Insect Pollinators as possible isolating mechanisms in the *Penstemon cyananthus* Hook. species complex. Proceedings of the Utah Academy of Sciences, Arts and Letters, vol. 43, Part 1, 1966 p. 160-161.

Common edible wild plants. Weber State College Press, Ogden, Utah 1967, 20 p.

Chromosome numbers in the *P. cyananthus* Hook. species complex. Taxon 18 (2):213, Apr. 1969.

Chromosome numbers in *P. compactus* (Keck) Crosswhite. Taxon 11-19 (6):918, Dec. 1970.

Marsh and Aquatic Plants of Utah. Weber State College Press, 136 pages, Feb. 1969.

A Field Guide to the Common Local Flora. Weber State College Press, 61 pages, June 1972.

A new combination in *Penstemon* (Scrophulariaceae). Great Basin Naturalist, vol. 35 No. 4, Dec. 1, 1975.

Notes on *Penstemon* (Scrophulariaceae): A New Status for *P. cyananthus* Hook, ssp. *subglaber* Pennell. Great Basin Naturalist, vol. 37, No. 1, Mar. 1977.

Chromosome number in *P. leonardii* Rydb., *P. platyphyllus* Rydb., and *P. palmeri* Gray. Taxon 26 (1): 107-109, Feb. 1977.

Montia linearis (Portulacaceae): A new record from Utah. Great Basin Naturalist, vol. 41 No. 2, June 30, 1981. p. 269.

A Flora of the Central Wasatch. Fine Print Press, Ogden, Utah, 1999, 206 p.

Woody Plants of Utah. Weber State University Press, Ogden, Utah, Jan. 2000, 37 p.

UNPUBLISHED PAPERS AND PRESENTATIONS

Taxonomy of the *Penstemon cyananthus* Hook. complex, First International Congress of Evolutionary Biology. Boulder, Colorado, 1970.

Ethnobotany of Calf Creek, Utah. Brigham Young University, Provo, Utah, 1979.

Evolution of floras within the Galapagos Islands. University of Utah, Salt Lake City, Utah, 1993.

Floristic and ethnobotanical studies in Central Mexico. Weber State University, Ogden, Utah, 1997.

Ethnobotany of the Southern Piute. Weber State University, June, 2000.

AWARDS AND HONORS

Kenan Fellowship. National Tropical Botanical Garden, Kuai, USA. 2002-2003.

CURRICULUM VITAE

Suzanne M. Harley
Professor of Botany
Department of Botany
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Weber State University
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Education:

1979-1983	University of California, Santa Cruz Degree awarded: Ph.D., Biology Dissertation: The Castor Bean Lectins
1977-1979	University of California, Riverside Degree awarded: B.S., Biochemistry (summa cum laude)
1973-1974, 1975-1977	Creighton University, Omaha, Nebraska (1973-74, 1975-76 College of Arts and Sciences, 1976-77 College of Pharmacy)

Research Experience:

1992-1996 and 2000	Department of Botany and Microbiology, University of Oklahoma, Norman, OK Spent summers studying clathrin coated vesicles. The most recent aspects of this work focused on removal of the coat proteins of clathrin coated vesicles. (The work included sabbatical leaves for Spring Quarter 1996 and Autumn Semester 2000.)
1989-	Department of Botany, Weber State University, Ogden, UT Current interests: single celled C4 photosynthesis, ATPase responsible for leaf folding by *Mimosa* (sensitive plant), botanical work of Charles Darwin
1985-1989	Department of Botany and Microbiology, University of Oklahoma, Norman, OK Postdoctoral research on intracellular trafficking of vacuolar proteins in developing pea cotyledons.
1985	Department of Biology, University of California, Los Angeles, CA Postdoctoral research purifying proteins from castor bean glyoxysomes.
1983-1984	Department of Biological Sciences, Plant Biochemistry Group, University of Warwick, Coventry, England

Postdoctoral research characterizing enzymes involved in the post-translational processing of castor bean lectins.

1979-1983 Department of Biology, University of California, Santa Cruz, CA
Doctoral research on the action of castor bean lectins on plant ribosomes and the enzymes involved in lectin degradation during germination of castor bean seeds.

1978-1979 Department of Biochemistry, University of California, Riverside, CA
Undergraduate research project comparing protein bodies, lectins, and g lycosidases of various legume seeds.

Teaching Experience:

1989-present Professor, Department of Botany, Weber State University
Tenured, May 1993
Associate Professor, 1991-1996
Assistant Professor, 1989-1991

The courses that I currently teach on a regular basis are indicated with an asterisk. Courses numbered in the hundreds were taught when WSU was on quarters.

Biology of the Plant Cell (Botany 2503)
Cell Culture (Botany 4252; cross-listed with Microbiology)
General Botany (Botany 110; discontinued)
Laboratory Safety (Botany/Chemistry/Geosciences/Microbiology/Physics 2600)
*Perspectives in the Life Sciences: The Botany of Charles Darwin (Honors 1510)
*Plant Biology (Botany 1203)
*Plant Genetics (Botany 3303)
*Plant Form and Function (Botany 2104)
Plant Growth and Development (Botany 322; discontinued)
*Plant Physiology (Botany 3204)
Plants in Human Affairs (Botany 1303)
*Portfolio Summative Assessment (Botany 4890)
Principles of Botany (Botany 1105; discontinued)
*Readings in Botany: Portfolio Development (Botany 4830)
Research Design (Botany 298; discontinued)
*Senior Seminar (Botany 4990)
Supplemental General Botany (Botany 111; discontinued)
Topics in Botany (Botany 4750)
Plant Molecular Biology
Plant Biochemistry

1987-1989 Visiting Assistant Professor, Department of Botany and Microbiology, University of Oklahoma
General Botany (Botany 1114)

1979-1983 Teaching Assistant, Department of Biology, University of California, Santa Cruz
Microbiology Laboratory
Plant Physiology Laboratory

Grants:

1998 Grant from the Research, Scholarship, and Professional Growth Committee, Weber State University, to study the effects of industrial biocides on exoenzymes of deteriogenic microorganisms (co-investigator)

1998 Grant from the Research, Scholarship, and Professional Growth Committee, Weber State University, to investigate seasonal fluctuations in the parenchyma cells of wood, bark, and needles of pine and spruce trees (co-investigator)

1996 Grant from the Research, Scholarship, and Professional Growth Committee, Weber State University, to present a paper on microscale biochemistry labs at the annual conference of the National Association of Biology Teachers

1995 National Science Foundation - Instrumentation and Laboratory Improvement Program: Microscale Plant Physiology Labs

1995 Grant from the Research, Scholarship, and Professional Growth Committee, Weber State University, to purify and characterize chlorophyllase from pea leaves

1993 National Science Foundation - Research Opportunity Award
Three years of summer support at the University of Oklahoma: Characterization of Clathrin Coated Vesicles

1993 Grant from the Research, Scholarship, and Professional Growth Committee, Weber State University, to study GTP-biding proteins

1992 Grant from the Research, Scholarship, and Professional Growth Committee, Weber State University, to study ribonucleases from castor beans

1992 Grant from the Research, Scholarship, and Professional Growth Committee, Weber State University, to revise the General Botany Program

1991 Grant from the Research, Scholarship, and Professional Growth Committee, Weber State University, to continue work on proteases from castor beans

1989 Grant from the Research, Scholarship, and Professional Growth Committee, Weber State University, to study proteases and glycosidases of castor beans

Awards:

2005 Weber State University Faculty Governance Award

2004 Weber State University - Faculty Grand Prize Winner, Accreditation Super Challenge

1983 NATO Postdoctoral Scholarship

1980 National Science Foundation Doctoral Fellowship (three years)

1979 University of California Regents' Fellowship

1979 Co-valedictorian, College of Natural and Agricultural Sciences, University of California, Riverside

1979 Outstanding Young Botanist Award, Botanical Society of America

1978 Myron Wilson Scholarship, University of California, Riverside

Research Publications:

Lin HB, Harley SM, Butler JM, Beevers L. 1992. Multiplicity of clathrin light chain-like polypeptides from developing pea (*Pisum sativum* L.) cotyledons. J. Cell Sci. 103: 1127-1137

Gonzalez E, Harley SM, Brush MD. 1990. Purification of glyoxysomal polypeptides. Immunocharacterization and subcellular localization of catalase in maturing and germinated castor bean seeds. Protoplasma 156: 130-138

Harley SM, Beevers L. 1989. Coated vesicles are involved in the transport of storage proteins during seed development in *Pisum sativum* L. Plant Physiol. 91: 674-678

Harley SM, Beevers L. 1989. Isolation and partial characterization of clathrin-coated vesicles from pea (*Pisum sativum* L.) cotyledons. Protoplasma 150: 103-109

Harley SM, Beevers L. 1988. Terminal *N*-acetylglucosamine containing proteins and *N*-acetylglucosamine binding proteins from organelles and membranes of developing pea (*Pisum sativum* L.) cotyledons. J. Plant Physiol. 133: 629-634

Harley SM, Beevers L. 1987. Isozymes of β-*N*-acetylhexosaminidase from pea seeds (*Pisum sativum* L.). Plant Physiol. 85: 1118-1122

Harley SM, Beevers H. 1986. Lectins in castor bean seedlings. Plant Physiol. 80: 1-6

Harley SM, Lord JM. 1985. In vitro endoproteolytic cleavage of castor bean lectin precursors. Plant Sci. 41: 111-116

Lord JM, Harley SM. 1985. *Ricinus communis* agglutinin B chain contains a fucosylated oligosaccharide side chain not present on ricin B chain. FEBS Lett. 189: 72-76

Harley SM, Beevers H. 1985. Characterization and partial purification of three glycosidases from castor bean endosperm. Phytochemistry 24: 1459-1464

Harley SM, Beevers H. 1984. Ricin inhibition of in vivo protein-synthesis in castor beans. Plant Sci. Lett. 36: 1-5

Harley SM, Beevers H. 1982. Ricin inhibition of *in vitro* protein synthesis by plant ribosomes. Proc. Natl. Acad. Sci. USA 79: 5935-5938.

Teaching Publications:

Nielson LR, Harley SM. 1996. Chemotaxonomy: simple tests for distinguishing between anthocyanins and betacyanins. Journal of Biological Education 30: 88-90.

Harley SM, Rasmussen, CG. 1993. Staining for ribonuclease activity in polyacrylamide gels. The American Biology Teacher 55: 366-368.

Harley SM. 1993. Use of a simple, colorimetric assay to demonstrate conditions for induction of nitrate reductase in plants. Amer. Biol. Teacher 55: 161-164

Research Manuscripts:

Lin HB, Harley SM, Wood PC, Beevers L. Characterization of H^+-ATPase activity associated with clathrin coated vesicles of *Pisum sativum* L.
Lin HB, Wood PC, Harley SM, Beevers L. Evidence for a single clathrin light chain in plant clathrin coated vesicles.

Watson, BS, Harley SM, Beevers L. Isolation and characterization of clathrin coated vesicles from wheat germ.

Teaching Manuscripts:

Harley SM. The lectins of pea, lentil, and fava bean.

Harley SM, Russin, CT. Photosynthesis play.

Harley SM. Microscale plant physiology labs.

Harley SM. Investigating the mode of inheritance of soy leaf color.

Research Papers Presented:

Harley SM, Beevers L. Evidence for an Inactive Vacuolar ATPase in Plant Clathrin Coated Vesicles. WSU Faculty Forum, February 2006.

Harley SM, Beevers L. *In Vitro* Reconstruction of the Uncoating Process for Clathrin Coated Vesicles. WSU Faculty Forum, February 2005.

Harley SM, Beevers L. Identification of a cytosolic protein needed for the release of adaptor proteins from clathrin coated vesicles. Quadrennial Joint Meeting of the American Society of Plant Biologists and the Canadian Society of Plant Physiologists at the Rhode Island Convention Center, Providence, Rhode Island, July 21-25, 2001.

Sondossi M, Carter B, Harley SM, Wachocki BA. Use of formaldehyde dehydrogenase to elucidate the mechanism of action and availability of formaldehyde in formaldehyde-adduct biocides. Annual Meeting of the Society for Industrial Microbiology at the Nugget Hotel, Reno, Nevada, August 3-7, 1997.

Lin HB, Harley SM, Wood PC, Beevers L. Evidence against an active vacuolar-type ATPase associated with plant clathrin coated vesicles. Quadrennial Joint Meeting of the American Society of Plant Physiologists and the Canadian Society of Plant Physiologists at the Hotel Vancouver and Hyatt Regency Hotel, Vancouver, British Columbia, August 2-6, 1997.

Bates PL, Young P, Harley SM. Chlorophyllase isozymes from pea leaves. Annual Meeting of the American Society of Plant Physiologists at the New Charlotte Convention Center, Charlotte, North Carolina, July 29-August 2, 1995.

Harley SM, Lin HB, Beevers L. Differences between two populations of coated vesicles from developing pea seeds provide evidence for an endosome compartment in plants. Joint Annual Meeting of the American Society of Plant Physiologists and the Canadian Society of Plant Physiologists at the Hyatt Regency Hotel, Minneapolis, Minnesota, July 31-August 4, 1993.

Taggart TM, Harley SM. Comparison of ribonucleases from three different tissues of castor bean (*Ricinus communis* L.) seedlings. Joint Annual Meeting of the American Society of Plant Physiologists and the Canadian Society of Plant Physiologists at the Hyatt Regency Hotel, Minneapolis, Minnesota, July 31-August 4, 1993.

Lin HB, Harley S, Beevers L. Identification and characterization of plant clathrin light chains. Annual Meeting of the American Society for Cell Biology at the John B. Hynes Convention Center, Boston, Massachusetts, December 8-12, 1991.

Harley SM. Comparison of hydrolases from endosperm, cotyledons, and leaves of castor bean (*Ricinus communis* L.). Annual Meeting of the Pacific Division of the American Association for the Advancement of Science at Utah State University, Logan, June 23-27, 1991.

Harley SM, Beevers L. Clathrin coated vesicles from pea cotyledons. Annual meeting of the American Society of Plant Physiologists at Bally's Hotel, Reno, Nevada, July 10-14, 1988.

Harley SM, Beevers L. Clathrin coated vesicles from developing pea cotyledons. Seventh Annual Plant Biochemistry and Physiology Symposium at the University of Missouri, Columbia, April 6-8, 1988.

Harley SM, Beevers L. *N*-Acetylglucosamine elution of proteins from organelle membranes of developing pea cotyledons. Annual meeting of the American Society of Plant Physiologists at Chase Park Plaza Hotel, St. Louis, Missouri, July 19-23, 1987.

Harley SM, Beevers L. Glycosidases in developing pea cotyledons. Annual meeting of the American Society of Plant Physiologists at Louisiana State University, Baton Rouge, June 8-12, 1986.

Harley SM, Beevers H. Ricin inhibition of protein synthesis in castor bean. Annual meeting of the American Society of Plant Physiologists at Colorado State University, Fort Collins, August 7-11, 1983.

Harley SM, Beevers H. Characterization and partial purification of three glycosidases from castor beans. Annual meeting of the American Society of Plant Physiologists and Canadian Society of Plant Physiologists at Laval University, Ste.-Foy, Quebec, Canada, June 14-18, 1981.

Teaching Papers Presented:

Harley SM. Wachocki BA. An introduction to statistics within a general botany course. Plant Biology 2007 (American Society of Plant Biologists) and Botany 2007 (Botanical Society of America) Joint Congress at the Chicago Hilton, Chicago, IL, July 7-11, 2007.

Harley SM. The Botany of Charles Darwin. Joint Annual Meeting of the American Society of Plant Biologists and the Canadian Society of Plant Physiologists/Société Canadienne de Physiologie Végétale at the Hynes Convention Center Boston, MA, August 5-9, 2006.

Harley SM, Russin CT, and Bush RA. Photosynthesis: A Play in Two Acts and a Grand Finale. Annual meeting of the American Society of Plant Biologists in Orlando, FL, July 24 - July 28, 2004.

Wachocki BA, Harley SM. An interdisciplinary laboratory safety course. Quadrennial Joint Meeting of the American Society of Plant Biologists and the Canadian Society of Plant Physiologists at the Rhode Island Convention Center, Providence, Rhode Island, July 21-25, 2001.

Harley SM, Trivett, C. Photosynthesis: A Play in Two Acts and a Grand Finale. Utah Science Teachers Association Annual Mid-Winter Conference, Ogden Eccles Conference Center, Ogden, UT, February 4, 2000.

Harley SM. Microscale Plant Physiology. Quadrennial Joint Meeting of the American Society of Plant Physiologists and the Canadian Society of Plant Physiologists at the Hotel Vancouver and Hyatt Regency Hotel, Vancouver, British Columbia, August 2-6, 1997.

Harley SM. Microscale Labs: Application to Enzyme Induction. National Association of Biology Teachers Annual Convention, New Charlotte Convention Center, Charlotte, North Carolina, October 16-19. 1996.

Harley SM. A Trilogy of Proteins. Annual Meeting of the American Society of Plant Physiologists at San Antonio Convention Center, San Antonio, Texas, July 31-August 4, 1996.

Harley SM. Student investigations of enzyme induction. Sixth National Conference of the Council on Undergraduate Research, North Carolina Central University, Durham, North Carolina, June 27-29, 1996.

Nielson LR, Harley SM. Chemotaxonomy: simple tests for distinguishing between anthocyanins and betacyanins. Annual Meeting of the American Society of Plant Physiologists at the New Charlotte Convention Center, Charlotte, North Carolina, July 29-August 2, 1995.

Harley SM, MacKay KL, Wurst G. Teaching the Women's Study Core: Women's Research Methodologies. The 16th Annual Conference of the National Women's Studies Association, University of Oklahoma, Norman, June 21-25, 1995.

Harley SM. Combining WAC and SPEAC via Poster Presentations. WAC/SPEAC Annual Conference, Weber State University, February 16, 1995. (Joint conference of Writing Across the Curriculum and Speaking Across the Curriculum programs.)

Harley SM. Investigative laboratory assignments in botany. Fifth National Conference of the Council on Undergraduate Research, Bates College, Lewiston, Maine, June 20-24, 1994.

Warr CA, Harley, SM. Comparison of methods used to stain proteins following polyacrylamide gel electrophoresis. Joint Annual Meeting of the American Society of Plant Physiologists and the Canadian Society of Plant Physiologists at the Hyatt Regency Hotel, Minneapolis, Minnesota, July 31-August 4, 1993.

Harley SM. Investigative laboratory assignments in botany. Fifth National Conference of the Council on Undergraduate Research, Bates College, Lewiston, Maine, June 20-24, 1994.

Harley SM, Rasmussen CG. Enzyme activity staining following polyacrylamide gel electrophoresis: a student laboratory exercise on analysis of ribonucleases. Annual Meeting of the American Society of Plant Physiologists at the Lawrence Convention Center, Pittsburgh, Pennsylvania, August 1-5, 1992.

Harley SM. *In vivo* assay of nitrate reductase: adaptation to a student laboratory exercise on induction of nitrate reductase. Annual Meeting of the American Society of Plant Physiologists at the Albuquerque Convention Center, Albuquerque, New Mexico, July 28-August 1, 1991.

Invited Seminars:

A Tale of Two Vacuoles: A Lesson in Changing Perceptions. A seminar presented to the Weber State chapter of Sigma Xi, Ogden, UT, January 29, 2003.

Clathrin Coated Vesicles and Storage Protein Deposition. A seminar presented to the Weber State University Botany Club, Ogden, UT, May 4, 1993.

The Role of the Internal Secretory Pathway in Seed Storage Protein Synthesis. A seminar presented to the Department of Botany at Brigham Young University, Provo, Utah, October 17, 1991.

Synthesis and Accumulation of Seed Storage Proteins. A seminar presented to the Department of Microbiology, Weber State University, October 11, 1991.

How to be Toxic: A Lesson from the Castor Bean. A seminar presented at Weber State College for the Sigma Xi program. February 8, 1990.

The Role of Clathrin Coated Vesicles in the Intracellular Transport of Protein Body Constituents. A seminar presented to the Department of Botany and Microbiology, University of Oklahoma, Norman, March 9, 1989.

Biosynthesis and Intracellular Trafficking of Protein Body Proteins. A seminar presented to the Department of Botany and Microbiology, University of Oklahoma, Norman, September 12, 1985.

Co- and Post-translational Processing of Ricin. A seminar presented to the Department of Biological Sciences, University of Warwick, Coventry, England, December 6, 1984.

The Castor Bean: A Lesson in Coping with a Toxin. A seminar presented to the Department of Biological Sciences, University of Warwick, Coventry, England, January 19, 1984.

Workshops Presented:

Harley SM. Using Dot Blots for fast detection of proteins with antibodies (immunodetection). A workshop presented to high school, 2 yr. college, and 4 yr. college instructors at the 1993 National Association of Biology Teachers Convention at the Marriott Copley Place Hotel, Boston, Massachusetts, November 17-21, 1993.

Western Blotting, for the Biotechnology Workshop Series sponsored by the Weber State University Biotechnician Training Program on the campus of Weber State University, Ogden, UT, May 1, 1992

Guest Lectures:

2007 Honors 1110 Introduction to Honors: Does Charles Darwin Fit the Criteria of Genius?

2003 Botany 2920 Pioneer Medicines: Chemicals of Medicinal Plants

2002 Botany 4750 Medicinal Plants: Secondary Metabolites

Course Materials Prepared:

Botany 4970 Thesis in Botany, Botany 4980 Portfolio Summative Assessment, and Botany 4990 Senior Seminar, Prepared a detailed evaluation rubric for the Botany Student Portfolio.

Botany SI2104 Plant Form and Function. Wrote, with Rachael Bush, a lab manual when this course was first taught. The most recent revision in 2006-07 was done with Barbara Wachocki. This revision increased the quantitative aspects of some of the labs that the students do. Labs that now include statistical comparison of data by ANOVA and t-tests include: production of adventitious roots in response to indolebutyric acid, comparison of stomatal densities of upper epidermis and lower epidermis of leaves from a variety of plant types, and seed output and viability of Wisconsin Fast Plants in response to different concentrations of fertilizer. Application of the t-test has also been added to the existing exercise that introduces data analysis.
http://faculty.weber.edu/sharley/2104/2104.htm

Honors LS1510 Perspectives in Life Science: The Botany of Charles Darwin. Charles Darwin's experimental work resulted in several books on plant movements, carnivorous plants, and pollination biology. These books provide a framework for exploring three basic areas of botany: plant development, plant metabolism and nutrition, and plant reproduction, respectively. After extensive reading and re-reading of Darwin's books and papers, I developed a collection of selected readings from Darwin's original writings and lab exercises and demonstrations based on his work.

Botany 3303 Plant Genetics. Developed laboratory exercises and wrote Plant Genetics Laboratory Manual. Stopped using a published general genetics textbook in 1999 because of the heavy slant in virtually all genetics texts toward the pre-med market. Consequently, prepared a note packet and problems workbook that specifically deals with Plant Genetics. This packet is now a CD of notes, problem sets, lab protocols, and PowerPoint slides that is passed out to students on the first day of class. Information I collected while working on Honors LS1510, Perspectives in the Life Sciences: The Botany of Charles Darwin led to revisions in Plant Genetics with regard to plant reproductive strategies. I have also selected a case study from the archive at SUNY-Buffalo to cover some of the social and ethical aspects of genetics engineering of crop plants.
http://faculty.weber.edu/sharley/3303/3303.htm

Botany LS1203 Plant Biology. When this class was initially taught, no textbook was selected. I prepared a website with an extensive collection of links to support the class. At that time, it was the only Botany class, aside from the online 1303, with a web site. Even though a textbook is now required, a website of notes, links, syllabus, etc. is maintained.
http://faculty.weber.edu/sharley/1203/1203.htm

Botany 3240 Plant Physiology. Developed laboratory exercises and wrote Plant Physiology Laboratory Manual. This initial manual was replaced by a new manual (Microscale Plant Physiology Labs) I wrote in conjunction with an Instrumentation and Laboratory Improvement Grant from the National Science Foundation. December 2000 saw the completion of the sequence of the *Arabidopsis thaliana* genome. Consequently, I completely overhauled the lecture portion of Plant Physiology to accommodate the incredible amount of information that is being collected thanks to the use of *A. thaliana*, especially in the areas of plant development and hormones.

Botany 4750 Plant Biochemistry. Prepared a CD of notes and illustrations.

Botany LS1105 Principles of Botany. Prepared a two part use of Wisconsin Fast Plants to introduce students to the fundamentals of research design and documentation. Designed (with Chris Trivett and Rachael Bush) a photosynthesis play to provide students the opportunity to act out the steps of photosynthesis and see photosynthesis as a continuous and dynamic process.

Botany 2503 Biology of the Plant Cell. Developed a note packet which later became a website.

Prepared numerous demonstrations and short lab exercises to students with some practical experience in the techniques of cell biology in an otherwise lecture class. Subjects covered in these exercises include: chromatography (column and thin layer), electrophoresis (agarose and polyacrylamide), DNA isolation, immunoblotting, microscopy, photosynthesis, and aerobic respiration (in conjunction with programmed cell death).

http://faculty.weber.edu/sharley/2503/2503.htm

Botany 110 General Botany (an audio-tutorial course consisting of 10 modules)

Wrote the narrative and developed exercises and demonstrations for five of the modules: The Eukaryotic Cell, Cellular Processes, Photosynthesis and Respiration, Genetics, and Plant Growth and Development.

Botany/Microbiology 425 Cell Culture. Developed laboratory exercises and wrote the half of the laboratory manual dealing with plant tissue culture.

Botany 322 Plant Growth and Development. Developed laboratory exercises and wrote Plant Growth and Development Laboratory Manual.

General Websites Created to Provide Information to Botany Students:

Autumn Semester trip to the Uinta Mountains
http://faculty.weber.edu/sharley/field_trip/ft_home.htm

Spring Semester trip to Antelope Island State Park
http://faculty.weber.edu/sharley/AIFT/home.htm

Online Botany Student Handbook
http://departments.weber.edu/botany/handbook/welcome.htm

Workshops Attended:

Education Forum Field Trip: Chicago Botanic Garden, including the special Slow Life exhibit on plant movements. Plant Biology 2007 (American Society of Plant Biologists) and Botany 2007 (Botanical Society of America) Joint Congress at the Chicago Hilton, Chicago, IL, July 7-11, 2007.

Education Forum Field Trip: The Field Museum and Botany Department, Chicago, IL. Plant Biology 2007 (American Society of Plant Biologists) and Botany 2007 (Botanical Society of America) Joint Congress at the Chicago Hilton, Chicago, IL, July 7-11, 2007.

Designing Effective Library Assignments by Megan Davie, JaNae Kinikin, and Wade Kotter (WSU Stewart Library. April 2007.

A Survival Guide to Disabilities in the Classroom by Jeff Morris (Services for Students with Disabilities). February 2007.

Case Studies in the Classroom by Susannah Gal, SUNY-Buffalo at the Joint Annual Meeting of the American Society of Plant Biologists and the Canadian Society of Plant Physiologists/Société Canadienne de Physiologie Végétale at the Hynes Convention Center Boston, MA, August 5-9, 2006.

Reflective Learning by Adam Johnston (Physics) and Eric Amsel (Psychology). WSU Teaching and Learning Forum, September 2005.

Enhancing the Lecture, given by Greg Anderson, Computer Science. WSU Teaching and Learning Forum, April 2005.

Working with College-Tier Students, given by Paul Caldarella, Psychology & Dale Ostlie, Dean of the College of Science. WSU Teaching and Learning Forum, February 2005.

Higher Order of Thinking: Critical and Creative Problem-solving, given by Bill Clapp, CEET. WSU Teaching and Learning Forum, January 2005.

Due Process: Dealing with Students, given by Frank Guliuzza, Political Science. WSU Teaching and Learning Forum, November 2004.

Academic Honesty: Beyond Plagiarism, given by Theresa Kay, Psychology. WSU Teaching and Learning Forum, October 2004.

The Scholarship of Teaching and Learning, given by Cliff Nowell, Economics & John Cavitt, Zoology. WSU Teaching and Learning Forum, September 2004.
Education Forum Field Trip: Behind the scenes at The Land Pavilion at Epcot, Walt Disney World. Annual meeting of the American Society of Plant Biologists in Orlando, FL, July 24 - July 28, 2004

Developing Critical Thinking Skills: Strategies for Teachers by Richard Greene, Philosophy Dept. WSU Teaching and Learning Forum, February 2004.

Strategies for Teaching to Meet Learning Style Needs by Marilyn Lofgreen, Teacher Education Dept. WSU Teaching and Learning Forum, January 2004.

Alternative Assessment: What Is It? How Do I Do It? by Adam Johnston, Physics Dept. WSU Teaching and Learning Forum, November 2003.

Common People, Uncommon Thoughts: Notetaking, Thinking and Writing by John Schwiebert, English Dept. WSU Teaching and Learning Forum, October 2003.

Dealing with Plagiarism: Prevention Strategies by Sundy Watanabe, English Dept. WSU Teaching and Learning Forum, September 2003.

7th Biotechnology Educators Conference at Virginia Tech in July 2002. The conference is four days of hands-on workshops in biotechnology. Participation in these workshops led to significant revision of the lab portion of Plant Genetics.

ASPP/Fast Plant Workshops. University of Wisconsin, Madison, June 26-27, 1998. A series of workshops sponsored by the American Society of Plant Physiologists and the Wisconsin Fast Plants Program.

Tissue Printing. A workshop sponsored by the American Society of Plant Physiologists at the New Charlotte Convention Center, Charlotte, North Carolina, July 29, 1995.

Scholarly and Professional Writing Workshop. Weber State University, April 21, 1995.

Speaking Excellence Across the Curriculum Workshop. Weber State University, November 18, 1992.

Oligonucleotides as Inhibitors of Gene Expression. A teaching workshop sponsored by the American Society for Cell Biology, Education Committee at the John B. Hynes Convention Center, Boston, Massachusetts, December 8, 1991.

Women's and Multicultural Voices across the Curriculum Workshop. Sponsored by Weber State University at Snowbird, Utah, September 12-14, 1991.

Writing Across the Curriculum Workshop. Sponsored by Weber State University at Sherwood Hills, Utah, September 4-5, 1991.

Recombinant DNA Workshop, University of Oklahoma Health Sciences Center, Oklahoma City, May 10-12, 1987.

Courses taken:

Weber State University - Environmental Management Series, sponsored by the Center for Environmental Services

Chemistry of Hazardous Materials (10 hours)	4/94
Hazardous Waste Treatment, Storage, and Disposal (10 hours)	5/94
Hazard Communication/Worker Right-to-Know (10 hours)	3/95

University Service:

2007-2008 Department of Mathematics (College of Science), Regents' Review Team

2007 Reviewer for ERGO (WSU's undergraduate research journal)

2007-present Matthew Sheppard Scholarship Committee

2006-present Faculty Board of Review

2005-2007 University Ranking Tenure Committee

2005-2006 Jerry and Vickie Moyes College of Education Ranking Tenure Committee
University

2005-2006 Vice President of Student Affairs Selection Committee

2005-2006 Affirmative Action Advisory Committee
Title IX Subcommittee

2004-2005 Department of Economics (College of Business and Economics), Peer Review Committee and Ranking Tenure Evaluation Committee

2003-2005 Appointment, Promotion, Academic Freedom, and Tenure Committee of the Faculty Senate, Liaison

2003-present Department of Botany Webmaster

2002-2003 College of Science, Dean Selection Committee

2002-2003 Department of Botany, Faculty Search Committee

2002-2003 Salary, Benefits, and Fiscal Planning Committee of the Faculty Senate

2002-2004 Women's Studies Executive Committee

2001-2002 Department of Physics, Faculty Search Committee

1998-2000 Faculty Board of Review, Weber State University (chair, 1999-2000)
2006-present

1998-2000 Student Fee Recommendation Committee, Weber State University
2003-2007

2004-2007 Subcommittee to review special requests

1998-2000 Athletic Board, Weber State University
2002-2004
2005-present

1999-2000, 2002-2004, 2005-present
Student Welfare Subcommittee of the Athletic Board, Weber State University (chair, 1999-2000)

2006-present	Sports Structure Subcommittee
1998-1999	Strategic Planning Subcommittee of the Athletic Board, Weber State University
1998-1999	Academic Integrity Sub-Committee of the NCAA Certification Self-Study Steering Committee, Weber State University
1998-1999 2001-2005	College of Science Ranking Tenure Committee (Chair in 1998-1999, 2002-2005)
1998	Task Force to revise the Academic Program Review Process, Weber State University
1998	Ad Hoc Committee to review the CAAP exam
1998	Department of Botany, Faculty Search Committee
1997-1998	Curriculum and General Education Committee of the Faculty Senate
1997-1999	Semester Conversion Advisor, Department of Botany, Weber State University
1997-1998	College of Arts and Humanities Ranking Tenure Committee
1997-1999	Snowbird Group (mostly dealt with assessment issues)
1996-1997	Acting Chair, Department of Botany, Weber State University
1996-1997	First Year Experience Advisory Board
1996-1997	Faculty representative to the Weber State University Alumni Board
1996-1997	Department of Microbiology Rank and Tenure Committee
1996-1997	Department of Botany Rank and Tenure Committee (chair)
1996-1997	Peer review committees for Botany, Microbiology, Zoology, and History departments
1995-1996	Peer review committee for the History Department
1995	Department of Botany, Faculty Search Committee
1993-1995	Chair of the Department of Botany Curriculum Committee, Weber State University

1993-1994 Athletics Subcommittee of the Weber State University Strategic Planning Task Force

1993-1994 Scholarly Activities Working Group of the Weber State University Accreditation Self-Study Steering Committee

1991-1997 Research, Scholarship, and Professional Growth Committee, Weber State University
1992-1993 Chair

1993-1997 Liaison from the Executive Committee of the Faculty Senate

1991-1993 Affirmative Action Advisory Committee, Weber State University

1991-1993 Chair of the Hiring Subcommittee of the Affirmative Action Advisory Committee, Weber State University

1991-1997 Faculty Senate, Weber State University
2003-2006

1993-1997, 2003-2005 Executive Committee of the Faculty Senate, Weber State University

1996-1997 Vice Chair, Faculty Senate, Weber State University

1991-present Chemical Hygiene Officer for the Department of Botany

1991- 2000 University Chemical Hygiene Committee, Weber State University

1991-1993 Coordinator for the College of Science Biotechnician Training Program, Weber State University

1991-1992 College of Science Academic Computing Committee, Weber State University

1989-1993 Advisory Committee for the College of Science Biotechnician Training Program, Weber State University

1989-1995 Department of Botany Liaison to the Library, Weber State University

1989-1996 College of Science Curriculum Committee, Weber State University

1989-2005 College of Science Safety Committee, Weber State University

2002-2003 Chair

Professionally-related Community Service:

Utah Science Olympiad
Cell Biology Coordinator 1998, 1999, 2000, 2001, 2002, 2003, 2004, 2005)

Heredity Coordinator 2006, 2007

Greenhouse tour for Morgan Scout Troop 2006, 2007

Utah State Science and Engineering Fair, Weber State University. Judged projects by junior and senior high school students. April 1990, 1991, 1992, 1993, 1994, 1995, 1996.

St. Joseph's Grade School (Ogden, UT) Science Fairs. Judging projects for Grades 4-6 and Grades 7-8. March 1990, 1991, 1992, 1993, 1994.

Utah Math/Science Network - Expanding Your Horizons Conference at Weber State University. Presented workshops on identifying plant pigments to junior and senior high school girls. November 1989, 1990, 1991, 1992, 1993.

Presentation to Central Middle School on what botanists do (October 2004)

Presentation to Highland Middle School on carnivorous plants (November 2004)

Presentation on undergraduate research to S4 Program (Science Seminar for Superior Students) at Weber State University. March 28, 2003.

Presentation on undergraduate research to S4 Program (Science Seminar for Superior Students) at Weber State University. February 19, 1998.

Presentation on carnivorous plants to S4 Program (Science Seminar for Superior Students) at Weber State University. January 17, 1991.

Other Professional Service

2001-2004 Textbook reviewer for Benjamin Cummings

1996-2000 Reviewer for *Plant Physiology* and *Bioscience*.

1994-2000 Textbook reviewer for Wm. C. Brown (McGraw-Hill)

Professional Memberships:

American Association for the Advancement of Science
American Society of Plant Biologists (formerly the American Society of Plant Physiologists)
National Science Teachers Association
National Association of Biology Teachers

VITA

EUGENE GEORGE BOZNIAK

EDUCATION

B.Sc. University of Alberta, Edmonton, Alberta, Canada 1963, Major - Botany

M.Sc. University of Alberta, Edmonton, Alberta, Canada 1966, Major - Botany
Thesis*: "Periodicity and Ecology of the Phytoplankton in Two Alberta Lakes"*

Ph.D. Washington University, St. Louis, Missouri, USA 1969, Major - Aquatic Ecology
Dissertation: *"Laboratory and Field Studies of Phytoplankton Communities"*

PROFESSIONAL EXPERIENCE

(1) Field Assistant on a Waterfowl Ecology Project, Alberta Fish and Wildlife Division and the U.S. Fish and Wildlife Service. Summers of 1963-65

(2) Teaching and Research Assistant, University of Alberta and Washington University - Botany, Biology and Ecology. 1963-1968

(3) Honorary Jr. Fellow of Botany, Center for the Biology of Natural Systems, Washington University, St. Louis, Missouri. 1967-1969

(4) Assistant Professor of Botany, Weber State College, Ogden, Utah. 1969-1973

(5) Associate Professor of Botany, Weber State College, Ogden, Utah. 1973-1977

(6) Associate of the Center for Water Resources Research, Utah State University, Logan, Utah. 1974-Present

(7) Hydrobiologist and Consultant to Government of Kenya - Ministry of Water Development - Kenya National Master Water Plan. 1976-1978

(8) Consultant Tippetts-Abbott-McCarthy-Stratton (T.A.M.S.) - Consulting Engineers, New York, N.Y. 1976-1978

(9) Professor of Botany, Weber State University, Ogden, Utah. 1977-Present

ADMINISTRATIVE EXPERIENCE

Chairman
Department of Botany, Weber State University, Ogden, Utah. 1978-1984, 1988-Present

Chairman

Numerous Faculty Senate Standing Committees Weber State University - including: Research and Professional Growth Committee, Learning Resources Committee, College of Science Tenure/Ranking Committee, School of Natural Sciences M. Ed. Sci. Emphasis Planning Committee, Faculty Board of Review, Salary, Benefits, Budget, and Fiscal Planning Committee, University Ranking/Tenure Evaluation Committee, as well as a Presidential special committee: Unity Task Force.

Membership

Faculty Senate (12 years)
Executive Committee - Faculty Senate 1983-1985
Numerous Committees Campus, School and Department-wide

TEACHING EXPERIENCE

Botany Laboratories - University of Alberta 1963-66
Biology Laboratory - Washington University 1966-67
General Botany (A-T) - Weber State University 1967- 1994
Economic & Ethno-Botany - W.S.U. 1969-1997
Local Utah Flora - W.S.U. 1969-1985
Phycology - Algology - W.S.U. 1970-Present
Marine Biology - W.S.U. 1971-Present
Aquatic Ecology (Zoology) - W.S.U. 1973-74
Natural Resource Conservation - W.S.U. 1969-1999
Senior Seminars - W.S.U. - 1970-Present
Advanced Field Botany - W.S.U. 1970-Present (So. & No. Utah, Arizona, Oregon and Mexico)
Environment Appreciation - W.S.U. 1972-Present
Honors (Contemporary Issues) - W.S.U. 1975-1988
Research Design - W.S.U. 1983-1988
Elementary Field Botany - W.S.U. 1985-Present
Study Abroad Program - Spain - 1986, Costa Rica - 1990
Life of Charles Darwin - 1986-1987
Understanding Science - 1989
Life Science for Elementary Teachers - 1990
American Individualism from Lincoln to the Present (An Interdisciplinary Honors Course in Social Science, Humanities and Natural Science) - 1991
Honors: Clashing Views on Controversial Environmental Issues - 1992-Presen

PUBLICATIONS

BOZNIAK, E.G., "Periodicity and Ecology of the Phytoplankton in Two Alberta Lakes" M.Sc. Thesis, University of Alberta 1966

BOZNIAK, E.g., "Laboratory and Field Studies of Phytoplankton Communities" Ph.D.Dissertation,Washington University, St. Louis, Copyright 1969

BOZNIAK, E.G., and L.L. KENNEDY, "Periodicity and Ecology of the Phytoplankton in an Oligotrophic and Eutrophic Lake" Can. Jour. Bot. 46: 1259-1271, 1968

BOZNIAK, E.G., N.S. SCHANEN, B.C. PARKER, & C.M. KEENAN, "Limnological Features of a Tropical Meromictic Lake" Hydrobiologia 34: 524-532, 1969

E.L. HOBBS, D.L. CHADWICK, E.G. BOZNIAK, "A Comparison of Audio-Tutorial and Lecture Demonstration Teaching of General Botany" Ut. Acad. Proc. Vol. 53: 118, 1976

BOZNIAK, E.G., "A Comparative Study of the Karatina Sewage Ponds During two 24-hour Sampling Periods" Republic of Kenya, Ministry of Water Development Publication, June 1978

BOZNIAK, E.G., "Study of Selected Waste Stabilization Ponds in Kenya" Republic of Kenya, Ministry of Water Development Publication, June 1978

BOZNIAK, E.G., Gary L. MALECHA, and Candadai SESHACHARI, "American Individualism from Lincoln to the Present: An Interdisciplinary Teaching/Learning Experience" Proceedings of the 9th Annual Conference on Nontraditional/Interdisciplinary Programs, Virginia Beach, Virginia May 13-15, 1991. (p 9-16) 1991

BOZNIAK, Eugene G. "Enriching the Learning Environment In and Out of the Classroom" pp 67-71, in "The Inauguration of a Metropolitan University" published by Weber State Univeristy, Ogden, Utah, 1992

BUCHANAN, Hayle "Wildflowers of Southwestern Utah" with Photography by Eugene G. BOZNIAK. Published by Bryce Canyon Natural History Association, June 1992

BOZNIAK, E.G. “Challenges Facing Plant Biology Programs” Plant Science Bulletin 40(2): 42-46, 1994

DeVon EKENSTAM, Milton R. SOMMERFELD, and Eugene G. BOZNIAK (1994)

"A Freshwater Brown Alga New To North America", Journal of the Arizona-Nevada Academy of Science, Proceeding of the 38th Annual Meeting, Glendale , AZ, Vol. 29:24, April, 1994.

DeVon EKENSTAM, Milton R. SOMMERFELD, and Eugene G. BOZNIAK (1994) "*Ultrstructure of an Unidentified Fresh Water Brown Alga*", *Journal of Electron Microscopy Technique*

CIVIC

Utah Audubon Society (Board of Directors) 1970-1971
Utah Audubon Society (Secretary) 1971-1973
Utah Audubon Society (President) 1973-1975
Utah Audubon Society (Board of Directors) 1979-1981
Environment Center of Ogden (ECO) Board of Directors and Consultant 1971-1975
Environment Center of Ogden (ECO) Assistant Director 1972-1974
Ogden Nature Center Steering Committee 1973-1976
Ogden Nature Center (Co-Chair) 1979-1980
Ogden Nature Center (Board of Directors) 1979-1992
Member-Multiple Use Advisory Council - Bureau of Land Management Salt Lake District (Wildlife) 1979-1982
Ogden City Urban Forestry Advisory Council - 2003-Present, Co-Chair 2006-Present

PROFESSIONAL SOCIETIES

East Africa Natural History Society
East African Wildlife Society
Environmental Ethics
Fauna and Flora Preservation Society
International Oceanographic Foundation
International Phycological Society
Kenya Museum Society
Phycological Society of America
Society for Economic Botany
Western Society of Naturalists

FIELDS OF INTEREST

Freshwater Phytoplankton Ecology
Phytoplankton Community Structure
Wastewater Lagoon Systems
Nature Photography
Fruits of Economic Importance
Production of Beta-Carotene in Dunaliella salina in the G.S.L.

Constructing Wetlands for Wastewater Treatment (Workshops, Colorado State University)

TEACHING AWARDS

Presidential Distinguished Professor, W.S.U. 1984-85
Nominated for the Utah Academy of Sciences, Arts, and Letters "Distinguished Teaching Award," 1984-85
Nominated for the Crystal Crest "Master Teacher Award" 1985 and 1989
Nominated for the W.S.U. Faculty Award in Teaching, March 1991
1992 Honors CORTEZ Professor, May 22, 1992
Inducted into the Phi Kappa Phi Honor Society, May 28, 1992
1995 Spencer Seager Distinguished Teaching Award in Science, June 7, 1995
2007- Selected by the WSU Teaching & Learning Forum to deliver the "Last Lecture" Oct. 23, 2007

Vita
Dawn M. Gatherum

Present Position: Professor
Date of Appointment 1 July, 1995
College: Science Department/Program: Botany

Education

Institution	Discipline	Degree Earned	Date
Utah State University	Plant Science	Ph.D.	1995

Teaching Experience

Weber State University
12 years tenure track
22 years adjunct, evening and day classes.

Total 34 years at WSU

Teaching Developments:

Botany 1303 - Plants in Human Affairs online course
Botany 1203 - Plant Biology - Power Point lecture notes
Botany 1403 - Environment Appreciations - conversion of note to power point presentation
Botany 2203 - Development of laboratory manual.
Botany 3214 - Lecture notes to power point presentation
Botany 2950/4950 - Collection of herbarium mounts plants & annually new power point presentation of plants in the field.
Collection of native and introduced plants species of Hawaii

RESEARCH, SCHOLARSHIP, CREATIVE ACTIVITIES

Current Research

Introduction and monitoring effectiveness of biocontrol agents on Yellow starthistle (Centaurea solstitialis), Musk thistle (*Carduus mutans*), Leafy spurge (*Euphorbia esula*)**,** Purple loosestrife (*Lythrum salicaria* L.)**,** and Diffuse knapweed (*Centaurea diffusa)* in Weber County, Utah.

Data collection and analysis of the use of greenhouses without heat and the growing cold crops in the state of Utah during the fall, winter months and spring months.

Refereed Journal Publications:

Gatherum, D.M., and E.B. Walker. 1996. St. John's Wort - Analytical Method for *Hypericum perforatum*. American Herbal Pharmacopoeia. July, 1997. Pp 1-21.

Gatherum, D.M. J.L.Anderson, S.D. Seeley, and J.L. Frisby. 1996 'Delicious' Apple Responses to Rowcover Microclimate. Acta Hortaculturae Vol. 2 No. 451, pp. 750-755. (Considered a refereed journal by Utah State University)

Abstracts

Gatherum, DM J.L.Anderson, S.D. Seeley, and J.L. Frisby. 1995 'Delicious' Apple Responses to Rowcover Microclimate. HortScience Vol Montreal Canada

Gatherum, DM J.L.Anderson, S.D. Seeley, and J.L. Frisby. 1996 'Hemrod' Grape Responses to Rowcover Microclimate. HortScience Vol 32, No. 3, pp 443.

Gatherum, D.M., J.L. Anderson, S.D. Seeley, and J.L. Frisby. 1999 'Delicious' Apple Responses to Rowcover Microclimate. Proceedings of the 28th National Agriculture Plastics Congress. Pp 139, May 19-22, 1999.

Gatherum, D.M. and J.L. Anderson, S.D. Seeley. & J.L. Frisby. 2000. 'Delicious' Apples Response to Rowcover Microclimates. Proceeding of the 15th International Congress for Plastics in Agriculture and the 29th National Agricultural Plasctics Congress page 508.

Published

Gatherum, D.M., W.G. Miles, and O.S. Cannon. 1970 Inheritance of Tomato Seeds to Germinate. Proceeding of the Utah Academy of Sciences, Art and Letter. Vol. 47.1.

Gatherum, D.M. 1996. Review. The Garden in Winter by Rosemary Verey. Published in the December, 1996, Plant Science Bulletin.

Oral Presentations

Attended the American Society for Plasticulture's in San Diego, California Feb 23-26, 2002. Presented Oral session research entitle "Row Cover Manipulation of Peach Tree Microclimate".

Attended the American Society for Plasticulture's 28th National Agriculture Plastics Congress Meetings in Tallahassee, Florida, May 19-22, 1999 and presented a paper titled "Row Cover Manipulation of Grape Microclimate"

Seminars

Attended Higher Education Trends and Their Implications for Academic Advising by David Crockett, Vice President of USA Group Noel-Levitz National Center for Enrollment Management at Weber State University Feb. 17, 1999.

Attended Red Butte Native Plant Conference at the Homestead, Nov. 19-21, 1998.

Attended Utah Forestry Council Meetings sponsored by the Utah Community Forest Council in Ogden, Utah, Nov., 1998

CPR Red Cross certification course, Feb., 1998.

Attended the Utah Horticulture Meetings in Provo, Utah, Jan., 1998.

Attended Tree Appraisal Workshop sponsored by the Utah Community Forest Council in Salt Lake City, Oct., 1997

Attended the American Society for Horticulture Science meetings in Salt Lake City, Utah, July, 1997.

B. Unpublished manuscripts, thesis, dissertation, within-institution reports, etc. (author(s), title, date, intended future of the work).

Book Review

Colour in the Flower Garden by Gertrude Jekyll for the Plant Science Bulletin. Summer, 1996.

Part IV Chapter's 10-14 of Environmental Science - Earth as a Living Planet by Botkin and Keller. Winter, 1998.

Gatherum, DM 1996. Review. We Made a Garden by Margery Fish. Published in the Winter 1996 Plant Science Bulletin.

Dissertation

Gatherum, DM 1995. 'Delicious' Apple and 'Himrod" Grape Responses to Rowcover Microclimate. Dissertation

Thesis

Gatherum, DM 1973. Low Temperature Germination of Tomato Seeds. Thesis

Within-Institution

Botany 1203 - 2007 lecture presentations to power point
Botany 1403 - 2007 conversion of lectures notes to power point presentation
Botany 2203 Home and Garden Plants Laboratory Manual
Botany 3214 - 2006 revision of soils Lecture notes booklet
Gatherum, DM Botany 1303. Past, Present, and Future Uses of Plants Correspondence Study Guide.
Gatherum, DM Botany 1303. Past, Present, and Future Uses of Plants Correspondence Study Guide.
Harley, S.M., DM Gatherum, and E.G. Bozniak Botany 110 Modular Exercises and Modular Scripts
Gatherum, DM 1998 Botany 1303. Plants in Human Affairs Correspondence Study Guide.
Gatherum, DM 1998 Botany 1303. Plants in Human Affairs Online Study Guide.

C. Papers and/or addresses to professional groups (use full reference notation: Author(s), title, organization, where presented, date). Note: only include addresses to professional groups, not community groups.

Oral Session

Gatherum, DM, J.L.Anderson, S.D. Seeley, and J.L. Frisby. 1996 'Delicious' Apple Responses to Rowcover Microclimate. The American Society for Plasticulture's 28th National Agriculture Plastics Congress. May 19-22, 1999

Gatherum, DM, J.L.Anderson, S.D. Seeley, and J.L. Frisby. 1996 'Delicious' Apple Responses to Rowcover Microclimate. International Society for Horticulture Science, Montreal, Canada. August 1995

Gatherum, DM, J.L.Anderson, S.D. Seeley, and J.L. Frisby. 1996 'Delicious' Apple Responses to Rowcover Microclimate. Utah State Horticultural Society. Provo, Utah. January 1994

Poster Session

Edward B. Walker and D. M. Gatherum, "Analysis of Hepericin Pigments in *Hypericum perforatum*, NORM98, 53rd Northwest Regional Meetings of the American Chemical Society, Pasco, Washington, June 18th, 1998.

Gatherum, DM, J.L. Anderson, S.D. Seeley, and J.L. Frisby. 1997 'Himrod' Grape Responses to Rowcover Microclimate. 94th Annual International Conference of the American Society for Horticultural Science. Salt Lake City, Utah. Accepted for July, 1997

Gatherum, DM, J.L. Anderson, S.D. Seeley, and J.L. Frisby. 1996 'Delicious' Apple Responses to Rowcover Microclimate. 6th International Symposium on Integrating Canopy, Rootstock and Environmental Physiology in Orchard Systems. Penticton British Columbia. July, 1996

Department

Advisor to Botany Club	1989-present
Supervisor, Science Education Student Teachers	1996-1998
Chairperson, Scholarship committee	1995-present
Committee member, Curriculum Committee	1995-2000
Chairperson, Act group "Small Groups in Large Classes"	1994-1995
Advisor to 15 Botany majors.	1995-1998
Member, Academic Advisement Showcase Committee	1995-present

College

Committee member Spencer L. Seager Distinguished Teaching Award	2006-present
Chairman, College of Science Graduation Committee	1996-present
Search Committee member for new Aquatic Ecologist in the Zoology Department.	Winter 1996
Committee member, Honor/Awards/Scholarship Committee	1995-present
Committee member for the Science Process and Experimental Design for first and second year secondary science teachers.	1995-1996
Committee member Tenure and Promotion Committee	2005-2007

University level

Selection Committee Campus Horticulturist	Fall 2007
Committee member Faculty Senate	1999-2006
Executive Committee Faculty Senate	2005/2006, 2003/2004, 2002/2003
Committee member, Environmental Task Force "Xeriscape"	1998-2000
Committee member, Admissions, Standards, and Student Affairs Committee (ASSA).	1996-present
Liaison for the USU/WSU Applied Horticulture Program	1995-present
Selection committee for Outstanding Staff Member of the University Faculty representative.	1996
Selection committee for Endowed Professorship, School of Social Sciences	Summer 1996

Committee member, Constitutional Review, Apportionment, and
Organization Committee. 1995-1996

B. Academic or nonacademic administrative performance as program director, department chair, director of substantial grant, center director, or any position which involved supervision of human and/or financial resources (include dates).

Director, Ritchey Science and Engineering Fair of Utah 1998-present
Assistant Director, State Science and Engineering Fair of Utah 1995-1998

C. Positions held or membership in professional organizations.

Chairperson, Weber County Weed Board Sept.,1999-present
Committee member, Weber County Weed Board 1997-1999
Co-Chairman Weber River Cooperative Weed Management Area 2002-present

Awarded:

As a collaborator with Dr. Scheuyler Seelely (USU)**,** et al on a Community/University Research Initiative Grant FY02-03 titled "Digital Orchard Irrigation Scheduling: Saving Water with Measurements". Research/Education to benefit the Utah fruit grower. Total award was $44,919.00 to begin July 1, 2002.

2005 coauthor of Utah Weed Supervisors Association USFS Grant for $10,000 for the Weber River Cooperative Weed Management Area.

2006 coauthor of Utah Weed Supervisors Association USFS Grant for $8,000 for the Weber River Cooperative Weed Management Area.

2007 coauthor of Utah Weed Supervisors Association USFS Grant for $6,200 for the Weber River Cooperative Weed Management Area.

Presentations:

Co-teacher of several units of instruction for the Utah State University sponsored Master Gardener course Fall, 2001.

Consulting:

Weekly consultations with faculty, staff, and members of the community on plant problems and solutions.

PROFESSIONAL SERVICE: Please list briefly all activities in which you gave direct service to your profession. This includes **chairing a professional organization, service on a board in a professional society, etc.**

Committee member:

Boy Scouts of America District Commissioner - Lake Bonneville District, Trapper Trail Council Aug. 1999 - July 2002

Director: Science and Engineering Fair of Utah, 1998 - present

Chairman: Weber County Weed Board, Oct. 1999 - present
Weber River Cooperative Weed Management Area (CWMA) with Box Elder, Davis, Morgan, and Weber Counties to make the CWMA eligible for more federal monies to control invasive and noxious weeds. 1999- present

AWARDS:

2006 Spencer L. Seager Distinguished Teaching Award
1997 Crystal Crest Master Teacher of the year
1985 Outstanding Staff Employee - Weber State University
1979 Utah Public Employee Association Higher Education District Outstanding Public Employee

BARBARA ANN WACHOCKI

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E-Mail: bwachocki@weber.edu

789 Oak Drive
South Ogden, UT 84403

EDUCATION

Ph.D. Biological Sciences (Plant Ecology) 1992
Minor: Hazardous Waste Control (Chem. Engineering)
Wayne State University, Detroit, MI
Dissertation: *Maternal Effects of seed size and sex ratio in spinach*

M.S. Biological Sciences (Plant Ecology), 1984
Wayne State University, Detroit, MI

B.S. Biological Sciences, 1980
Second Major: Political Science
Wayne State University, Detroit, MI

CERTIFICATIONS

Certified Hazardous Materials Manager (CHMM), Institute of Hazardous Materials Management, January 1991-2000

Graduate Certificate of Hazardous Waste Control, College of Engineering, Wayne State University, August 1990

State of Michigan Emergency Medical Technician License, June 1981

PROFESSIONAL EXPERIENCE
I. TEACHING EXPERIENCE

Full Professor	Botany Department, Weber State University, Ogden, Utah	03/02-present
Associate Professor	Botany Department, Weber State University, Ogden, Utah	03/96-03/02
Assistant Professor	Botany Department, Weber State University, Ogden, Utah	07/92-03/96
Courses taught:	Environment Appreciation, Plant Form and Function, Introduction to Natural Resource Management, Plant Ecology, Plant Cell Culture, General Botany, Laboratory Safety, Range Management, Research Design, Botany Field Trip, Senior Seminar, Directed Readings and Directed Research	
Adjunct Faculty	Microbiology Department, Weber State University	09/90-06/94
Course taught:	Introductory Microbiology	

Graduate Teaching Assistant	Dept. of Biological Sciences, Wayne State University Detroit, Michigan	09/81-06/87 & 06/88-06/90
Labs instructed:	Basic Biology I, Basic Biology II, Introductory Microbiology, Developmental Biology of Plants (graduate level course)	
Lecture Instructor **Course taught:**	College of Lifelong Learning, Wayne State University Man and His Environment	Summer 1989
Lecture Instructor **Course taught:**	Dept. of Biological Sciences, Wayne State University Basic Biology I	Summer 1988

II. RELATED EMPLOYMENT EXPERIENCE

Acting Department Chair	Botany Department, Weber State University Ogden, Utah	Fall 2002
Director	Center for Environmental Services, Weber State University	02/92-7/98
Research Fellow	Center of Excellence for Chemical Technology, Weber State University	01/91-05/91
Graduate Research Assistant	Department of Biological Sciences, Wayne State University, Detroit, MI	07/87-07/88
Staff Member	High Desert Ecology Earthwatch Expedition, Utah	08/87
Lab Assistant	Isolation of fungal contaminants of commercial products, Biosan Laboratories, Ferndale, Michigan	Spring 1987
Assistant	Preparation of the EPA Great Basin Research Plan	Summer 1986
Greenhouse Operator	Department of Biological Sciences Wayne State University, Detroit, MI	Summer 1983

PUBLICATIONS
Published Articles:

Wachocki, Barbara A., Mohammad Sondossi, Stewart C. Sanderson, Bruce L. Webb, and E. Durant McArthur. Impact of tebuthiuron on biodiversity of high elevation mountain big sagebrush communities. *Shrubland Ecosystem Genetics and Biodiversity: Proceedings*, pp. 216 -223 (Sept. 2001).

Alados, C.L., J.M. Emlen, **B.A. Wachocki,** and D.C. Freeman. Instability of development and fractal architecture in dryland plants as an index of grazing pressure, *Journal of arid environments*, 38(1):63-76 (1998).

Freeman, D.C., **B.A Wachocki**, M.J. Stender, D.E. Goldschlag, and H.J. Michaels. Seed size and sex ratio in spinach: Application of the Trivers-Willard hypothesis to plants, *Ecoscience*, 1(1):54-63 (1994).

Abstracts:

Wachocki, Barbara A., and Suzanne M. Harley. *An Interdisciplinary Laboratory Safety Course.* The Quadrennial Joint Meetings of the American Society of Plant Biologists and the Canadian Society of Plant Physiologists, Providence, RI, July, 2001.

McArthur, E. Durant, Stewart C. Sanderson, **Barbara A. Wachocki**, Mohammad Sondossi, and Bruce L. Webb. *Tebuthiuron Impact and Persistence in High Elevation Mountain Big Sagebrush Communities.* The Society of Range Management 54th Annual Meeting, Kailua-Kona, Hawaii, Feb. 17-23, 2001.

Matyjasik, M., D Lombardi, N. Keate, and **B. Wachocki**. *Wetland Water Chemistry in the Great Salt Lake Area, Utah.* Geological Society of America Annual Meeting, Reno, NV, November, 2000.

Wachocki, Barbara A., Mohammad Sondossi, Stewart C. Sanderson, Bruce L. Webb, and E. Durant McArthur. *Impact of Tebuthiuron on Biodiversity of High Elevation Mountain Big Sagebrush Communities.* Abstracts of Shrubland Ecosystem Genetics and Biodiversity Symposium, Brigham Young University, Provo, UT, June 13-15, 2000.

Sondossi, M. and **B. Wachocki**. *Fundamentals of microbial ecology applied to biocide treated systems.* Abstracts of the 11th International Biodeterioration and Biodegradation Symposium, Crystal City, VA, August 1999.

Wachocki, B.A., M Sondossi and H.W Rossmoore. Characterization of resistance development to Isothiazalone biocide in *Pseudomonas* species. Society for Industrial Microbiology Annual Meeting, Aug. 3-7, 1997. Reno, NV

Sondossi, M., B. Carter, S.M. Harley and **B.A. Wachocki**. Use of formaldehyde dehydrogenase to elucidate the mechanism of action and availability of formaldehyde in formaldehyde-adduct biocides. Society for Industrial Microbiology Annual Meeting, Aug. 3-7, 1997. Reno, NV

Merianos, J.J., M. Sondossi, **B.A. Wachocki** and H.W Rossmoore. Factors involved in mode of action of imidazolidinyl urea and diazo-lidinyl urea biocides. Society for Industrial Microbiology Annual Meeting, Aug. 3-7, 1997. Reno, NV

Sondossi, M., and **B.A. Wachocki**. Hazardous waste minimization: use of industrial biocides to control microbiological contamination as a pollution prevention measure (extended abstract). Industrial and Engineering Chemistry Division, American Chemical Society Meeting, Sept. 9-11, 1996. Birmingham, AL

Wachocki, B.A., D.E. Goldschlag and D.C. Freeman. Tetramorphism in spinach. Supplement to *The American Journal of Botany* (Abstracts), 81(6):65 (1994).

Wachocki, B.A., M.J. Stender, D.E. Goldschlag, and D.C. Freeman. Seed size and progeny sex ratio in spinach. Supplement to *The American Journal of Botany* (Abstracts), 76(6): (1989).

Pingerelli, P.L., **B.A. Wachocki**, and H. Mizukami. Spectroscopic investigation of the interaction of trifluoroperazine with bovine brain S100a protein. *Biophys. J.*, 55, 123a (1989).

MANUSCRIPTS IN PREPARATION

Wachocki, BA, DE Goldschlag, and Freeman, DC. Tetramorphism in Spinacia oleracea

Wachocki, B.A., M Sondossi and H.W Rossmoore. Characterization of resistance development to Isothiazalone biocide in *Pseudomonas* species.

Sondossi, M., B. Carter, S.M. Harley and **B.A. Wachocki**. Use of formaldehyde dehydrogenase to elucidate the mechanism of action and availability of formaldehyde in formaldehyde-adduct biocides.

Merianos, J.J., M. Sondossi, **B.A. Wachocki** and H.W Rossmoore. Factors involved in mode of action of imidazolidinyl urea and diazo-lidinyl urea biocides.

Wachocki, BA, M.J. Stender, and D.C. Freeman. The effects of seed size on growth and fitness in spinach.

Wachocki, B.A, J. Vitale, and D.C. Freeman. The use of seed characteristics in the identification of female and monoecious Spinacia oleracea L. var. america.

PRESENTATIONS

I. **Biological Sciences:**

a. **Oral Presentations:** (* after name indicates presenter)

McArthur, E. Durant*, Stewart C. Sanderson, **Barbara A. Wachocki**, Mohammad Sondossi, and Bruce L. Webb. *Tebuthiuron Impact and Persistence in High Elevation Mountain Big Sagebrush Communities.* The Society of Range Management 54th Annual Meeting, Kailua-Kona, Hawaii, Feb. 17-23, 2001.

Wachocki, Barbara A*., Mohammad Sondossi, Stewart C. Sanderson, Bruce L. Webb, and E. Durant McArthur. *Impact of Tebuthiuron on Biodiversity of High Elevation Mountain Big Sagebrush Communities.* Abstracts of Shrubland Ecosystem Genetics and Biodiversity Symposium, Brigham Young University, Provo, UT, June 13-15, 2000.

Sondossi, M*. and **B. Wachocki**. *Fundamentals of microbial ecology applied to biocide treated systems.* Abstracts of the 11th International Biodeterioration and Biodegradation Symposium, Crystal City, VA, August 1999.

Wachocki, BA*. Evolutionary significance of sex in plants: Polymorphism in spinach. Sigma Xi Lecture series, Weber State University, April 13, 1998. Ogden, UT

Wachocki, BA*. Tetramorphism in spinach. Invited speaker, Grand Valley State University, Feb. 1998. Allendale, MI

Wachocki, BA*. Use of bioindicators to monitor environmental remediation progress. Invited speaker, Grand Valley State Univ., Feb. 1998. Allendale, MI

Horne, D., and **BA Wachocki** (co-presenter). Fungi: The good, the bad and the ugly. Expanding Your Horizons, WSU, Nov. 1998. Ogden, UT

Wachocki, BA*. Sex among the flowers. Expanding Your Horizons, WSU, Nov. 1997. Ogden, UT

Wachocki, B.*. Use of bioindicators to monitor environmental remediation progress (extended abstract). Industrial and Engineering Chemistry Division, American Chemical Society Meeting, Sept. 9-11, 1996. Birmingham, AL

Sondossi, M.*, and **B.A. Wachocki**. Hazardous waste minimization: use of industrial biocides to control microbiological contamination as a pollution prevention measure (extended abstract). Industrial and Engineering Chemistry Division, American Chemical Society Meeting, Sept. 9-11, 1996. Birmingham, AL

Wachocki, BA*, DE Goldschlag, and DC Freeman. Tetramorphism in spinach. Botanical Society of America Meeting, Aug. 7-11, 1994. Knoxville, TN

Wachocki, BA*. Environmental risks to human health in Utah. Utah Department of Environmental Quality Public Advisory Committee on the Environment, July 28, 1994. Salt Lake City, UT

Wachocki, BA (part of panel). "Getting Excited about Engineering and Technology", Math Engineering Science Achievement (MESA) Training, Nov. 1994. Salt Lake City, UT

Wachocki, BA*, MJ Stender, DE Goldschlag, and DC Freeman. Seed size and progeny sex ratio in spinach. Botanical Society of America Meeting, Aug. 14-18, 1989. Toronto, Canada

Wachocki, BA*. Biological indicators of environmental contamination. Certified Hazardous Materials Managers-Michigan, First Annual Educational Conference, June 19, 1989. Troy, MI

b. **Posters:** (* after name indicates presenter)

Thorsted, Kimberly*, J. Winter, **B. Wachocki**, and M. Sondossi. *Effect of Tebuthiuron on Mycorrhizal Associations in High Elevation Plant Communities*. Weber State Undergraduate Research Symposium, Ogden, UT, Spring 2005. (Student presentation).

Wachocki, Barbara A., and Suzanne M. Harley*. *An Interdisciplinary Laboratory Safety Course.* The Quadrennial Joint Meetings of the American Society of Plant Biologists and the Canadian Society of Plant Physiologists, Providence, RI, July, 2001.

Matyjasik, M.*, D Lombardi, N. Keate, and **B. Wachocki**. *Wetland Water Chemistry in the Great Salt Lake Area, Utah.* Geological Society of America Annual Meeting, Reno, NV, November, 2000.

Wachocki, B.A.*, M Sondossi and H.W Rossmoore. Characterization of resistance development to Isothiazalone biocide in *Pseudomonas* species. Society for Industrial Microbiology Annual Meeting, Aug. 3-7, 1997. Reno, NV

Sondossi, M.*, B. Carter, S.M. Harley and **B.A. Wachocki**. Use of formaldehyde dehydrogenase to elucidate the mechanism of action and availability of formaldehyde in formaldehyde-adduct biocides. Society for Industrial Microbiology Annual Meeting, Aug. 3-7, 1997. Reno, NV

Merianos, J.J., M. Sondossi*, **B.A. Wachocki** and H.W Rossmoore. Factors involved in mode of action of imidazolidinyl urea and diazo-lidinyl urea biocides. Society for Industrial Microbiology Annual Meeting, Aug. 3-7, 1997. Reno, NV

Pingerelli, PL*, **BA Wachocki**, and H Mizukami. Spectroscopic investigation of the interaction of trifluoroperazine with bovine brain S100a protein. Biophysical Meetings, 1989.

II. **Hazardous Materials/Environmental Management**
Oral Presentations:

NOTE: Authorship of presentations made with co-presenters is considered equal. Authors are listed alphabetically and this does not reflect degree of contribution.

BA Wachocki, The Certified Hazardous Materials Manager (CHMM). 12th Annual Utah Conference on Safety and Industrial Hygiene, Oct. 31, 1995. SLC, UT

Siegfreid, D and **BA Wachocki**. (co-presenter). Pollution prevention for small business. Department of Economics Entrepreneurial Lecture Series, Weber State University, Winter 1995. Ogden, UT

Wachocki, BA. "Summary of the Ranking of Environmental Risks to Human Health: Subcommittee on Human Health Risks", UDEQ Public Advisory Committee, July 1994. SLC, UT

Siegfreid, D and **BA Wachocki**. (co-presenter). Pollution prevention in the home, business and school. Utah Society of Environmental Educators Annual Conference, Nov. 5, 1994. Logan, UT

Bernkopf, S, D Siegfreid, and **BA Wachocki**. (co-presenter). An ounce of prevention is worth a pound of cure. Utah Medical Health Association, Spring, 1994. Salt Lake City, UT

Wachocki, BA. Biological indicators of environmental contamination. Certified Hazardous Materials Managers-Michigan First Annual Educational Conference, June 19, 1989, Troy, MI

GRANT APPLICATIONS

I. Funded External Grants
Co-investigator/Collaborator:

a. Botany/Biological Sciences:

USFS — Use of tebuthiuron to promote biodiversity in high elevation closed stands of mountain big sagebrush ($96,000), Nov. 1995- July 1999 (National Agricultural Pesticide Impact Assessment Program) (Collaborators from USFS Desert Shrub Research Lab, WSU Dept. of Microbiology and Dept. of Botany, and Brigham Young University

Dept. of the Interior Bureau of Reclamation — Weber State University water-wise xeroscape demonstration garden ($ 5,000) Sept. 1998 (Co-investigator with Dr. Bryan Dorsey (Geography Dept.) on behalf of the Weber State University Environmental Issues Committee

II. Internal Grants (Research, Scholarship and Professional Growth (RS&PG) and Hemingway Grant Funding

Exploration of a Cattle Range Field Study, Summer 2007, mentor for student research grant for Gabriel Behling, Undergraduate Research Experience in Biology

The role of *Mycobacterium* in hyper- sensitivity pneumonitis in mice ($ 1,800) March 1999 (Collaborators from WSU Microbiology and Botany Depts.) (RS&PG)

Effects of industrial biocides on exoenzymes of deteriogenic microorganisms ($ 530) May 1998 (Collaborators from WSU Botany Dept. and Microbiology Dept.) (RS&PG) (Principal Investigator)

Effects of low level electromagnetic frequencies on biological systems ($ 2,594) March 1997
(Collaborators from WSU Physics, Microbiology and Botany Depts.) (RS&PG)

Developmental stability in plants as an indicator of environmental contamination ($ 575) May 1995 (RS&PG) (Principal Investigator)

Effects of environmental stressors on multicellular behavior of *Proteus mirabilis* (continuation)
($ 800) March 1994 (Collaborators from WSU Microbiology, Geosciences and Botany Depts.)(RS&PG)

Effects of environmental stressors on multicellular behavior of *Proteus mirabilis* ($ 810) March 1993 (Collaborators from WSU Microbiology, Geosciences and Botany Depts.)

COMMITTEE WORK WHILE AT WEBER STATE UNIVERSITY

Departmental

Dept. of Botany Ranking and Tenure Committee, **Chair**	2005/2006
Member, Dept. of Microbiology Ranking and Tenure Committee	2005/2006
Member, Dept. of Geosciences Ranking and Tenure Committee	2005/2006
Search Committee for Department of Botany, **Chair**	2003
Plant Anatomist	
Acting Department **Chair**	Fall 2002
Botany Department Curriculum Committee	1992-1995
Peer Review Committee for Promotion	1992

College of Science

Member, Due Process Committee	2006-present
Member, Search Committee for Department of Microbiology	2004
Microbial Physiologist & Virologist	
Member, Search Committee for Department of Geosciences	2004
Remote Sensing/GIS Geoscientist	
Member, Search Committee for Department of Geosciences	1997
Environmental Geoscientist	
College of Science Environmental Studies Program, **Chair**	1995-1998
Planning Committee	
Member, Search Committee for Department of Zoology	1995
Physiologist	
Botany Rep. to College Computer Committee	1992-1998
Building Marshall (College of Science)	1995-2004

University

Faculty Senate (College of Science Representative)	2006-present
Parking Committee, **Chair** I became Chair in October 1998	1997-2004
Environmental Issues Committee	1997-present
Faculty Senate (College of Science Representative)	1997-1999
Environmental Studies Program Planning Committee, **Chair** I was elected Chair in Autumn 1995	1995-1998
Search Committee for University Hazardous Waste Specialist	1998
Academic Advisement, Admissions and Standards Committee	1997-1998
Search Committee for University Safety Specialist	1996
Search Committee for University Hazardous Waste Specialist	1995
Search Committee for University Safety Officer	1995
Search Committee for Grants and Contracts Officer, **Chair**	1993
Center for Environmental Services Advisory Board	1992- 1996
Community Partnerships Advisory Committee	1991-1996
Community Partnerships Advisory Committee	1991- 1995

State

Member (Weber State University Representative), Intermountain Consortium on Aridlands Research	1994-present
Member, Utah State Office of Education, Global Change in Education Planning Committee (UCETE) (founding member)	1995-1999
Member, Utah Consortium of Higher Education Environmental Training Programs	1994-1999
Member, Utah Public Advisory Committee on the Environment, Utah Department of Environmental Quality	1994-1998
Member, Utah State Office of Education, Utah Team for Global Change Education at regional/national workshop, NASA's Jet Propulsion Laboratory, Pasadena, CA	1995
Member, Pollution Prevention Across the Curriculum Conference Planning Committee	1993-1994
Member, Pollution Prevention Across the Curriculum Consortium and Conference Planning Committee	1994-1998

Community

Member, Ogden Nature Center Advisory Board	1995-1997
Member, Mission 2000 Task Force on Innovative Building Materials	1993-1994

HONORS AND AWARDS

Vice President, Biological Sciences Alumnae Association, Wayne State University, 1989-1991

Graduate Student Representative, Department of Biological Sciences, Wayne State University, 1983-1986, 1988-1989

Provost's Enhancement of Graduate Research Assistanceship Award, Wayne State University, 1987-1988

Biological Sciences Graduate Student Association, Board of Directors, Wayne State University, 1986-1987

PROFESSIONAL ASSOCIATIONS

ICAR (Intermountain Consortium on Aridlands Research)
Botanical Society of America (BSA)