PSPP 546 Syllabus
Fall, 2009

Course Information	
Course title:	Herbicide Physiology
Course number:	PSPP 546
Course discipline:	Biology
Course description:	This course is taught by Profs. William Dyer and Tracy Sterling (Montana State University) and Scott Nissen (Colorado State University). We will cover topics in herbicide classification, herbicide mode of action, and resistance mechanisms. The course is designed for students without traditional access to this course material, and is not designed to replace existing, on-campus courses at other institutions.
Course dates:	Tuesday, September 8, 2009 through Thursday, December 10, 2009
Prerequisites:	1. BCHM 340 General Biochemistry or equivalent 2. PS 540 Plant Physiology or equivalent 3. Or other courses with consent of instructors 4. PC with internet access (networked or modem)
Goals and Objectives	
Course goals:	To understand the fundamental physiology, biochemistry, and molecular biology of herbicides and their effects on plants; To study the physiological mechanisms of herbicide resistance; To examine the processes by which herbicides are discovered and developed for commercial release; and To investigate typical herbicide non-performance scenarios and practice troubleshooting field complaint situations.

Instructor Information	
Name:	William E. Dyer
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Biography:	
	I was born in Havre, Montana many years ago BC (Before Computers). Following an uneventful childhood and secondary education, I decided to join the work force and become a (reasonably) productive citizen. After a series of menial jobs including roofer, potato chip truck driver, waiter, cook, stick horse maker and ranch hand, I went back to college and eventually earned a Ph.D. in Biochemistry from Purdue University in 1988. My dissertation research involved the first cloning and characterization of the gene encoding the first enzyme of the aromatic amino acid biosynthetic pathway from any eukaryotic source. After several job offers, I decided to live and work in Bozeman, since MSU is a great school and this is such a beautiful place. I am now a Professor of Plant Physiology and Molecular Biology in the Plant Sciences and Plant Pathology Department. I teach several graduate and undergraduate courses in plant biology and plant biotechnology. I also run a research laboratory that focuses on developmental and evolved traits, specifically in weedy plants. In particular, we have worked extensively on the molecular control of seed dormancy and mechanisms of evolved herbicide resistance. Please see http://weeds.montana.edu/weedphys/weedphys.htm for more information on my lab's publications and current projects.

Instructor Information	
Name:	Tracy Sterling
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Biography:	My interest in weeds and plants started when I was in sixth grade and I decided to spruce up our flower beds in north Minneapolis with the beautiful, purple-flowered weed, Creeping Charlie (*Glechoma hederacea* L.). This invasive weed proceeded to take over the flower beds and grass yard. I also dug up our backyard to start a vegetable garden, but that's another story. My interest in plants and Agriculture led me to a Horticulture Degree from the University of Minnesota where I had the opportunity to work with a Weed Scientist as an undergraduate, a most valuable experience. My Master's degree at Michigan State University focused on the allelopathic potential of velvetleaf and my Ph.D at University of Wisconsin-Madison evaluated mechanisms of herbicide absorption and metabolism in plants. Here, at Montana State University, our weed physiology group focuses on understanding how environmental, insect and herbicide stresses influence crop and weed productivity. Research interests include determining the role of oxidative stress in weed/crop interactions; mechanism of alkaloid synthesis in a rangeland weed and its endophyte; mechanisms of herbicide absorption and degradation; modes of herbicide action and resistance; and the impact of the weedy plant genetic variability on biological control of weeds. The plant species we study include cotton and alfalfa as well as the poisonous rangeland weeds broom snakeweed, locoweed, African rue and yellow starthistle. Some specific projects orchestrated by my outstanding staff, students and postdocs, include characterizing toxic alkaloid production in locoweed plants and determining how environmental stress alters those levels, as well as finding out how crops and weeds deal with the various toxic oxygens produced under abiotic stress. Our goal is to find out HOW weeds are so successful. Maybe we can improve crops to do the same some day.

Instructor Information	
Name:	Scott Nissen
Email:	snissen@lamar.colostate.edu
Phone:	(970) 491-3489

Biography:		I was born on a small farm in Iowa shortly after the last ice age, but actually grew up in Illinois. After high school I thought I wanted to be an oceanographer, but soon realized that I was prone to sea-sickness, having been a flatlander all my life. I had a good friend who was attending the University of Montana and he was having a much better time in Montana then I was having in Florida so I transferred to the UM my sophomore year and graduated with a B.S. degree in botany. I decided to attend graduate school, but wanted some place to ski and go to school at the same time. The University of Nevada-Reno provided me with the opportunity to pursue both objectives so I applied for and was offered a graduate research assistantship in the Department of Plant, Soil and Water Sciences. My research topic involved the adsorption and bioavailability of two herbicides used in alfalfa. This was the beginning of my career in weed scientist. My first full-time position after my M.S. was as an area IPM specialist for Iowa State University based in Des Moines, Iowa. After two years in that position I had the opportunity to return to Montana in a similar position and also work toward a Ph.D. at Montana State University. Dr. Bill Dyer and I were actually graduate students together at MSU. After completing my Ph.D. at MSU, I was hired as a post-doc at the University of California, Davis where I worked more as plant physiologist than a weed scientist. My first faculty position was at the University of Nebraska-Lincoln where I worked on leafy spurge and developed a graduate class in herbicide mode of action. In 1995, I was offered a faculty position at Colorado State University that was a more traditional weed science position working with row crops and I continued to teach herbicide mode of action. In 1999, I began working with distance education specialists at the University of Nebraska-Lincoln and weed scientists from New Mexico State University, Kansas State Univeristy, Oregon State University, and the University of Nebraska-Lincoln to develop many of the online modules that will be used in this course. The efforts of this group were recognized by the American Distance Education Consortium in 2004 with a National Excellence in College and University Distance Education Award.

Policies

Expectations of Students	Because the participants in this course have diverse backgrounds and experience, we will spend the first few weeks reviewing background information on plant physiology, genetics, molecular biology, and biochemistry. This is a graduate level course and we expect student contributions at an appropriately advanced level. Examinations and discussion contributions should be written in a coherent, professional, and succinct fashion. Plagiarism in any form will not be tolerated.  You should plan to spend 10 to 15 hours per week in this course.
Course Organization	The course is organized by weeks, with each week of the semester beginning on a Monday. All assignments are due by 11:59 pm Mountain Standard Time (MST) on Sundays unless otherwise indicated. Late assignments are penalized 10% per day unless permission, reserved for emergencies, is granted by the instructors in advance of the due date.
Required Discussion	We will make extensive use of the Plant & Soil Sciences eLibrary (http://plantandsoil.unl.edu/croptechnology2005/pages/index.jsp) for background and introductory information. The Discussion Section is the heart of this course. Discussions will encompass the week  s reading assignments as well as providing you some practice in diagnosing and troubleshooting typical herbicide non-performance scenarios. Keep in mind that interactions with fellow students are as important to you in learning course material as those with the instructor. We encourage you to exchange questions and ideas with your classmates as well as the faculty. The instructors keep things moving and on track, and review student contributions for clarity and accuracy.
Examinations	The Pre-test, now available, provides a format for review during the first week of the course. To receive full credit you must post your responses by the due date. We will judge each response as correct or else send it back to you for reconsideration, usually with a comment or a hint about how you might strengthen your answer. Our goal is to bring everyone up to speed early in the course before introducing new material. You should therefore make every attempt to provide a correct response by the second time around; this will be necessary in order to receive full credit for the Pre-test. As always, please contact us if you are confused.
Grading Policy	Each eLesson from the Plant & Soil Science eLibrary is accompanied by a required quiz. Please see the  eLesson Instructions link on the course homepage for detailed information about these quizzes and the scoring criteria. The Final Exam will be a cumulative examination comprised of multiple choice, short answer, and essay questions. You must be prepared to synthesize and apply what youve learned in the course. During the exam, you may have at hand any

	available course resources such as reading materials, discussion sessions, and journal articles. This will be a timed exam, in that you will have 4 hours from the time you open the exam file in which to complete it. The Final Exam file will be available on-line one week prior to its due date, giving you substantial flexibility in choosing when to take the exam. Even though the exam should take you no more than 1 or 2 hours to complete, 4 hours are provided so that you will have plenty of time even if you experience an unexpected interruption. Final grades will be calculated as follows: Biography and Pre-test (10%); eLesson Quizzes (30%); Participation in Required Discussion (20%); Homework Assignments (20%); Final Exam (20%). We expect to grade on the basis of >90% = A, 80-89% = B, 70-79% = C, 60-69% = D, <60% = F. However, we reserve the right to curve the grades in the course so that grade cut-offs are lower but not higher than these suggested cut-offs.
Textbooks	
Recommended reading	*Herbicide Handbook of the Weed Science Society of America, 9th Edition.* 2008. http://wssa.net.
Recommended reading	*Herbicide Activity: Toxicology, Biochemistry, and Molecular Biology,* 1997. Roe, M.R., J.D. Burton, and R.J Kuhr, eds. IOS Press.
Recommended reading	*Physiology of Herbicide Action.* 1993. Devine, M.D., S.O. Duke, and C. Fedtke. Prentice-Hall, Inc. Englewood, NJ. 441 pp.