H&CS 5422
Biology and Management
of Weeds and Invasive Plants

Instructor: Kent Harrison - Office 310E Kottman Hall, 292-5056, harrison.9@osu.edu

Locations: 118 Parker Food Sci. Bldg. (lecture) and 334 Kottman Hall (lab)
Lectures MW, 3 – 3:50 pm, Labs Tues, 9:10-11, 11:30-1:20 pm

Texts: Weeds of the Midwestern United States and Central Canada, C. T. Bryson and M. S. DeFelice, eds., and HCS 422 Lab Manual (both required); Ecology of Weeds and Invasive Plants: Relationship to Agriculture and Natural Resource Management, 3rd ed., Radosevich, S. R., J. S. Holt, and C. M. Ghersa. (optional)

Lab Instructor: Bruce Ackley, 223 Kottman Hall, ackley.19@osu.edu, 292-1393

Course Goals:

1. To learn scientific principles and processes of weed biology and ecology in order to apply knowledge of those principles toward more efficient management of weeds and invasive plants.
2. To gain a fundamental understanding of the principles of modern weed management techniques, including cultural, mechanical, biological, and chemical control methods.
3. To gain awareness of environmental, social, and economic issues associated with management of weeds and invasive plants.

Weeks devoted	Lecture Topics Summary for HCS 5422
2	Weeds and Invasive Plants: Definitions, origin and evolution; plant life cycles and adaptations to agricultural and natural ecosystems; impacts on agroecosystems, natural ecosystems, and society.
5	Principles of Weed Biology and Ecology: Succession, resource allocation and the C-S-R strategy; community structure and the invasion process; seed dormancy and seed bank dynamics; invasibility of agricultural and natural ecosystems; genetics, fitness, evolutionary development, plant demography, and population dynamics.
4	Approaches to Vegetation Management: Risk assessment of weeds and invasive plants; management options in relation to invasion; non-chemical weed management methods - preventive, cultural, mechanical, and biological approaches.
4	Principles of Herbicide Chemistry, Physiology, and Environmental Fate. Introduction to herbicide “families” and modes of action; herbicide fate processes in plants and soil; herbicide toxicological issues; crop genetic

engineering and evolution of herbicide resistance; herbicide resistance prevention and management.

H&CS 5422 Lab Syllabus

LAB Expectations:

At the completion of this course students will be able to:

1) Identify the family characteristics of **19** different botanical families. This knowledge will enable students to more readily identify many weed species beyond the required list.
2) Identify **60** different species of weeds common to central Ohio. These species may occur in crop fields, forest edges, golf courses, home lawns, horticultural settings, roadsides, or in an unmanaged environment.
3) Identify the **life cycle and the botanical family** to which each of the **60** required species belong. A thorough understanding of life cycles is critical in understanding how to manage control measures.
4) Learn the Latin (or scientific) names for **all 60** weed species. Knowledge of Latin names is essential when communicating with professional botanists, horticulturalists, weed scientists, and with agronomists from other parts of the world.
5) Identify broadleaf species at the seedling stage ($\leq$ 2 true leaves) using a key.
6) Understand weed seed identification principles and Identify **20** weed species as seeds.
7) Gain some practical understanding of weed seed banks, their relevance to weed management in different environments.
9) Perform calculations necessary to calibrate a typical sprayer and for mixing herbicides.
10) Identify the injury symptoms and mode of action associated with the several common herbicides.

The **goal of this course** is to provide students with the **principles** of weed science. As an illustration of the instructors' definition of "principles", consider the following: the Herbaceous Plants of Maryland (Brown and Brown, 1984), a commonly used reference by OSU weed scientists, describes 105 families and 2173 species of monocotyledonous and dicotyledonous plants. The course text, Weeds of the Midwestern United States and Central Canada describes 49 families and 299 species of plants. Students of this course will learn **19** families and **60** species of plants in ten weeks. Therefore, students should not expect to have a mastery of weed identification after completing this course, rather the expectation should be to have a **mastery of the basic intellectual tools** that are necessary to successfully identify plants. A similar attitude should be applied when students are studying the control measures that are associated with weedy species. To have a command of the array of cultural, mechanical, and chemical weed control measures currently available requires additional study in the fields of agronomy, ecology, biochemistry, and plant physiology in addition to many hours of practical application in the field. This course is designed to provide an **introduction or "first exposure"** to some of these control measures and to provide a basic scientific explanation of how and why various control measures work.

Lab Grading:

ID worksheets (6 x 5)	30
Weed Ecology Worksheet	20
Sprayer Calibration Worksheet	5
Herbicide Mode of Action	10
Quizzes (7 x 10) (drop lowest)	60
Calibration Assignment	25
Plant Collection	100
Lab Practicals (2 x 50 pts ea.)	100
Total	350 total points possible*

*** The Lab constitutes 30% of the Final Course Grade for HCS 5422.**

Laboratory Weekly Schedule

Lab	Activities scheduled	Assignments Due
1	Introduction and instructions on plant collections. Monocot morphology, family characteristics, species ID.	Monocot ID worksheet
2	**QUIZ 1*: Monocot ID (from week 1).** Dicot morphology, characteristics, species ID	Dicot ID worksheet #1
3	**QUIZ 2: Dicot ID (from week 2).** Dicot morphology, characteristics, species ID (cont.)	Dicot ID worksheet #2
4	**QUIZ 3: Dicot ID (from week 3).** Dicot morphology, characteristics, species ID (cont.)	Dicot ID worksheet #3
5	**QUIZ 4: Dicot ID (from week 4).** Weed seed characteristics and ID	Seed ID worksheet
6	**QUIZ 5: Seed ID (from week 5).** Weed seedling ID	Seedling ID worksheet
7	Meet at Waterman Farm Weed biology/ecology project Collect soil for herbicide mode of action (MOA) expt.	Weed ecology worksheet
8	**QUIZ 6: (from week 6 – seedling ID).** Invasive and noxious weeds Plant seeds in trays for MOA experiment	Weed ecology worksheet
9	**LAB PRACTICAL EXAM #1 (Weed ID)**	
10	Herbicide mixture calculations and herbicide labels	
11	Identify & spray weeds for MOA experiment Herbicide injury symptoms and MOA (PRE & POST)	Mixture calculations assignment due
12	Herbicide application technology/sprayer calibration	Calibration worksheet; MOA assignment due
13	QUIZ 7: Application technology (from week 12)	WEED COLLECTIONS DUE TODAY!
14	**LAB PRACTICAL EXAM #2 (covers everything except weed ID)**	

*LAB Quizzes:

All students must take the **6** quizzes listed in the lab syllabus; however, the lowest quiz score will be dropped. **There will be NO make-up quizzes**.

HCS 5422 Course Policies

Students with Disabilities: Any student who feels s/he may need an accommodation based on the impact of a disability should contact me privately to discuss your specific needs. Please contact the Office for Disability Services (292-3307, 150 Pomerene Hall, www.ods.ohio-state.edu) to coordinate reasonable accommodations for students with documented disabilities.

Grading: Course grading will be based on the laboratory (30%), two or more problem sets (5%), two midterm exams (17.5% each) and the final exam (30%). There will be no make-up exams given except in cases of verifiable participation in university-sponsored academic function or medical excuse.

Course	Grade Point Distribution	Final Letter Grade Percentage Ranges	
Laboratory	**30%**	A = ≥94%	C+ = 77-79%
Problem Sets	5*	A- = 90 – 93%	C = 74-76%
Midterm Exam 1	17.5	B+ = 87 – 89%	C- = 70-73%
Midterm Exam 2	17.5	B = 84 – 86%	D+ = 67-69%
Final Exam**	30	B- = 80-83%	D = 60-66%
	100	E = <60%	

***Late Assignments: 10% off for every day late.**
****Final Exam is comprehensive. Date of Final Exam: Friday Dec. 6, 12:00 – 1:45 pm.**

Academic Misconduct

Suspected cases of academic misconduct (e.g., cheating on lecture exams or lab quizzes, plagiarism, turning in another person's work as one's own, or unauthorized use of course instructional materials - including REMOVAL OR DESTRUCTION OF PLANTS FROM OSU GREENHOUSES) will be turned directly over to the University Committee on Academic Misconduct. Academic misconduct is defined and examples are shown below.

From the OSU Code of Student Conduct (http://studentaffairs.osu.edu/pdfs/csc_12-31-07.pdf):

Academic misconduct is any activity that tends to compromise the academic integrity of the university, or subvert the educational process. Examples of academic misconduct include, but are not limited to:

1. Violation of course rules as contained in the course syllabus or other information provided to the student; violation of program regulations as established by departmental committees and made available to students;
2. Knowingly providing or receiving information during examinations such as course examinations and candidacy examinations; or the possession and/or use of unauthorized materials during those examinations;
3. Knowingly providing or using assistance in the laboratory, on field work, in scholarship or on a course assignment;

4. Submitting plagiarized work for an academic requirement. Plagiarism is the representation of another's work or ideas as one's own; it includes the unacknowledged word-for-word use and/or paraphrasing of another person's work, and/or the inappropriate unacknowledged use of another person's ideas;
5. Submitting substantially the same work to satisfy requirements for one course or academic requirement that has been submitted in satisfaction of requirements for another course or academic requirement, without permission of the instructor of the course for which the work is being submitted or supervising authority for the academic requirement;
6. Falsification, fabrication, or dishonesty in creating or reporting laboratory results, research results, and/or any other assignments;
7. Serving as, or enlisting the assistance of a substitute for a student in the taking of examinations;
8. Alteration of grades or marks by the student in an effort to change the earned grade or credit;
9. Alteration of academically-related university forms or records, or unauthorized use of those forms or records; and
10. Engaging in activities that unfairly place other students at a disadvantage, such as taking, hiding or altering resource material, or manipulating a grading system.