AGRONOMY 479
WEED SCIENCE
Spring 2017

I. General Information

AGRN 479G (Weed Science) is a 3 credit hour course that covers the identification, biology and distribution of weeds; weed interference of desirable plant growth; herbicide classification, use and environmental fate; appropriate application of chemical, cultural, biological and mechanical weed control methods.

Lecture: MW 8:00-8:50 a.m., Knoblauch 226
Laboratory: T 8:00-9:50 a.m., Knoblauch 226 or AFL – Agronomy Unit or Agricultural Greenhouse

Prerequisites: AGRN 373 – Integrated Pest Management

Instructor: Dr. Mark Bernards
Knoblauch Hall 227
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Office Hours: M 12:00-12:50 p.m.; T 10:00-10:50 a.m., W 10:00-10:50 a.m., Th 12:00-12:50 a.m. or by appointment.

Required Texts:

1. Ross MA, Lembi CA. 2009. Applied Weed Science – Including the Ecology and Management of Invasive Plants. Pearson-Prentice Hill, Upper Saddle River, New Jersey.
2. Bryson CT, DeFelice MS. 2010. Weeds of the Midwestern United States and Central Canada. University of Georgia Press, Athens, Georgia.
3. Bradley KW, Johnson B, Smeda R, Boerboom C. 2009. Practical Weed Science for the Field Scout. University of Missouri Extension, Columbia, MO. (*Provided by Instructor*).
4. Loux MM, Doohan D, Dobbels AF, Johnson WG, Young BG, Legleiter TR, Hager A. 2016. Weed Control Guide for Ohio, Indiana and Illinois. Ohio State University Extension Publication 789. Available for purchase ($14.75) at http://estore.osu-extension.org/2017-Ohio-Indiana-and-Illinois-Weed-Control-Guide-P464.aspx or the 2016 edition may be downloaded at http://bulletin.ipm.illinois.edu/?p=3539

Supplementary Texts:

1. Davis A. et al. 2005. Integrated Weed Management: "One Year's Seeding . . ." Michigan State University Extension Bulletin E-2931.
2. Stubbendieck JL, Coffin MJ Landholt LM. 2003. Weeds of the Great Plains. Nebraska Department of Agriculture, Lincoln, NE
3. Taylor E, Renner K, Sprague C. 2008. Integrated Weed Management: Fine Tuning the System. Michigan State University Extension Bulletin E-3605.
4. Uva RH, Neal JC, DiTomaso JM. 1997. Weeds of the Northeast. Cornell University Press, Ithaca, NY.

II. University Policies and Expectations

Student rights and responsibilities: A complete description is available at www.wiu.edu/provost/students.

Disruptive Student Policy: Students who interfere with normal class function or the ability of other students to learn may be asked to leave the class for the day. For repeated offenses, a student may be removed from the course. Details may be found at: http://www.wiu.edu/vpas/policies/disrupst.php

Academic Integrity: http://www.wiu.edu/policies/acintegrity.php Western Illinois University, like all communities, functions best when its members treat one another with honesty, fairness, respect, and trust. . . It is the student's responsibility to be informed and to abide by all University regulations and policies on Academic Integrity. Plagiarism, cheating, and other forms of academic dishonesty constitute a serious violation of University conduct regulations. Students who engage in dishonesty in any form shall be charged with academic dishonesty. . . Any student, faculty member, or staff person who has witnessed an apparent act of student academic dishonesty, or has information that reasonably leads to the conclusion that such an act has occurred or has been attempted, has an ethical responsibility for reporting said act(s).

The policy for AGRN 373: Any confirmed act of academic dishonesty (especially plagiarism or cheating) will result in the loss of all points associated with that assignment, and may result in an "F" for the course.

Equal Opportunity: http://www.wiu.edu/policies/affirmact.php Western Illinois University complies fully with all applicable federal and state nondiscrimination laws, orders, and regulations. The University is committed to providing equal opportunity and an educational and work environment for its students, faculty, and staff that is free from discrimination based on sex, race, color, sexual orientation, gender identity and gender expression, religion, age, marital status, national origin, disability, or veteran status.

Sex-Discrimination and Misconduct: University values, Title IX, and other federal and state laws prohibit sex discrimination, including sexual assault/misconduct, dating/domestic violence, and stalking. If you, or someone you know, has been the victim of any of these offenses, we encourage you to report this to the Title IX Coordinator at 309-298-1977 or anonymously online at: http://www.wiu.edu/equal_opportunity_and_access/request_form/index.php. If you disclose an incident to a faculty member, the faculty member must notify the Title IX Coordinator. The complete Title IX policy is available at: http://www.wiu.edu/vpas/policies/titleIX.php

Disabilities: Students with disabilities: In accordance with University values and disability law, students with disabilities may request academic accommodations where there are aspects of a course that result in barriers to inclusion or accurate assessment of achievement. To file an official request for disability-related accommodations, please contact the Disability Resource Center at 309-298-2512, disability@wiu.edu or in 143 Memorial Hall. Please notify the instructor as soon as possible to ensure that this course is accessible to you in a timely manner.

Education Majors: The state teaching license requires all education majors to receive a grade of a "C" or better in this course in order to meet its requirements. With the university +/- grading system, receiving a "C-" or below will require you to retake this course or find a substitute course to meet School of Agriculture graduation requirements.

III. Course Expectations and Policies

1. Live the Golden Rule. Treat others with respect and courtesy in your conversation and actions. Turn off and put away electronic devices (phones, tablet computers, laptop computers, etc.) during the class period unless directed to use them for class activities. Inappropriate use of an electronic device will result in loss of participation points for that day.
2. Show up. Attendance and punctuality is expected. Notify the instructor in advance if you have any reason to miss a class period through the O.A.R.S system (http://wiu.edu/oars). A minimum of 24 h notice (email or phone) is required if there is any cause to miss a quiz or exam. If you do miss a class, do not ask the instructor "Did I miss anything important?" It is your responsibility to make arrangements to get the information you missed and to make up any missed assignments.
3. Participate. Be prepared for class discussions by completing readings, answering questions, taking notes, asking questions, and working effectively with other students on lecture and laboratory activities.
4. Study. You should plan to spend a minimum of 5 hours outside of class each week to master the

material. Reading assignments relating to each lecture/lab will be particularly beneficial.

5. Complete assignments. Assignments not turned in on the assigned date may have 10% of the total potential points deducted for each day after the due date. The instructor will generally return exams and assignments within 1 week.
6. The use of tobacco is prohibited in Knoblauch Hall, nor is it allowed during sessions at the AFL.
7. Students must wear sturdy, close-toed to participate in lab sessions at the AFL. The wearing of long pants is highly recommended.

Two dismissals due to disruptive or unprofessional behavior will result in a permanent disbarment from the course and a final grade of "F" will be assigned.

IV. Course Objectives

At the conclusion of this course you should be able to:

a. Identify approximately 80 weedy species, describe their basic biology and list the Latin binomial name
b. Explain what factors contribute to the "weediness" and invasive potential of a species
c. Explain how and when weeds interfere with the growth of desirable species or damage a landscape
d. Identify appropriate non-herbicide techniques for managing weeds based on the biology of the weed species
e. Describe factors that affect herbicide activity, movement, and fate in soil
f. Describe how herbicides enter, move within, and affect plant growth and development
g. Explain why herbicides may be selective and why plants may become resistant to them
h. Differentiate herbicide active ingredients into the appropriate herbicide site of action
i. Diagnose herbicide injury and symptomology for eleven herbicide mechanisms of action
j. Explain how to manage to prevent and to address herbicide resistance
k. Demonstrate the ability to select herbicides appropriate for weed management in a specific cropping system, and then calculate proper rates to apply those herbicides
l. Complete an experiment related to weed biology or management
m. Create a weed management plan for a specific management area

V. Grading

Probable Grade components	Portion
Participation	12%
Attendance	8%
Assignments	30%
Quizzes/Exams	50%

Grading Scale

Percentage	Grade	Percentage	Grade
93.0-100	A	73.0-76.9	C
90.0-92.9	A-	70.0-72.9	C-
87.0-89.9	B+	67.0-69.9	D+
83.0-86.9	B	63.0-66.9	D
80.0-82.9	B-	60.0-62.9	D-
77.0-79.9	C+	<59.9	F

VI. Learning Assessment

Participation: A composite of preparedness for class and engagement in class and laboratory discussions and activities. Preparedness may be assessed through Western Online quizzes, quizzes or writing assignments at the beginning of a class period, etc. Engagement means that you are prepared for class and participate in class discussions and activities.

Attendance: Attending class is expected and will improve your ability to learn the material and to contribute to the classroom community. Each student will be allowed 2 "vacation" days (for funerals, interviews, oversleeping, etc). More than 2 "vacation" absences will result in the loss of attendance percentage points (2 points per absence). Absence for WIU-sanctioned activities (i.e., team travel, presenting at conferences, etc.) will not count against "vacation" days. Absence due to illness will be evaluated on a case-by-case basis and will not count against the vacation days. Students who accumulate 9 or more "vacation days" will NOT receive a passing grade.

Major Assignments: Various assignments will be given throughout the semester to help you achieve the course objectives. Major assignments will include:

- Scientific article reviews (40 points each). You will be asked to write three reviews during the semester, one article related to each of the following topics:
    - Biology, ecology or competitive effects of a weed
    - Weed management methods or Herbicide resistance
    - Herbicide physiology or environmental fate

  The instructor will provide several options for each topic that you may choose from, or you may propose an article to him that you are more interested in. However, it must be from one of the following journals: Weed Science, Weed Research, Weed Technology, Weed Biology and Management, Invasive Plant Science and Management, or Pest Management Science. Specific questions to address in your review will be provided in class. Each review will be approximately 2-3 pages typed, double spaced or an oral presentation.
- Group (3 students per group) Research Project and Presentation (240 pts). Formulate a research question related to weed science and conduct a research project using the WIU School of Agriculture Greenhouses. Results of the project will be presented at the WIU Undergraduate Research Day April 19, 2017.
- Weed Management Plan (60 pts). Develop a comprehensive, adaptive Weed Management Plan for a plant production system in which you have interest.
- Pictorial collection (120 pts)??? Prepare a presentation with photographs you have taken of 20 winter annual weed and early spring weed seedlings (assignment may be modified depending on the weather)

Lab quizzes/exams: A quiz will be given many laboratory periods that will review material covered in previous lab sessions. In addition, there will be a Weed ID laboratory exam in which you will be asked to identify species by common name, Latin binomial and/or life cycle.

Lecture quizzes: Quizzes will be given approximately every other week and will review material covered in the lectures. The quizzes will include multiple choice, true-false, fill in the blank, and short essay questions.

Final exam: Approximately 40% of the final will address topics covered in lectures the final 2 weeks of class, and the balance will assess your ability to answer the course objectives.

VII. Probable Course Calendar

Date	Topic (Location of Lab)	Reading/Assignment Due
Jan 17	Introduction, Weed List, Weed seed collection, Research groups **(KH 226)**	
Jan 18	What makes a plant "weedy?"	AWS 1-8, 21-25
Jan 23	Life as a seed in the soil seed bank	AWS 26-32, posted material
Jan 24	Reading Scientific Articles **(KH 226)**	Posted article
Jan 25	How do weeds interfere with desirable plant growth?	AWS 13-21
Jan 30	Do plants know what other plants are nearby even when they are small?	AWS 350-353
Jan 31	Design your class project experiment **(AFL)**	**/ Research topic**

Date	Topic (Location of Lab)	Reading/Assignment Due
Feb 1	Begin experiments – Meet at Greenhouse	
Feb 6	*Lec Quiz 1.*	
Feb 7	*Online class.* What do I really need to know about weed ecology?	AWS 35-44 / **Online response**
Feb 8	*Online class.* What are the negative ecological impacts of invasive species?	AWS 7-10, 44-52 / **Online response**
Feb 13	*Lincoln's birthday. No class*	
Feb 14	Weed ID 1 **(AFL)**	**Peer Review Article Summary 1 due.**
Feb 15	*Review Quiz 1.* Traits of Invasive Species	AWS 53-63
Feb 20	How do invasive weeds invade?	AWS 64-72
Feb 21	Plant Biology Pictionary & Weed ID 2 **(AFL)**	AWS 74-89 / **Definitions**
Feb 22	Soil Jeopardy	AWS 91-97 / **Definitions**
Feb 27	*Lec Quiz 2*. Preventative Weed Management	AWS 106-110, Posted material
Feb 28	~~Weed Management Resources and Weed ID~~Weed management in organic systems **(KH 226)**	~~Bring paper or digital version of Ohio, Indiana, Illinois Weed Guide~~AWS 505-521
Mar 1	*Review Lec Quiz 2.* Mechanical and Physical Weed Management	AWS 110-118, Posted material
Mar 6	Cultural & Biological Weed Management	AWS 118-128, Posted material
Mar 7	~~Weed management in organic systems (KH 226)~~Weed Management Resources, Weed Management Plan Field History Assignment **(AFL)**	~~AWS 505-521~~Bring paper or digital version of Ohio, Indiana, Illinois Weed Guide
Mar 8	Herbicide History	AWS 128-137
M 13-17	**Spring Break**	
Mar 20	Herbicide Chemistry	AWS 137-141 / **Weed Management Field History Due**
Mar 21	Herbicide Calculations and Sprayer Calibration **(AFL)**	/ **Weed management resources worksheet due**
Mar 22	Plant Metabolism & Plant-related Selectivity ~~Herbicide Uptake & Movement~~	AWS 181-189 / **Peer Review Article 2 due** ~~AWS 154-160~~
Mar 27	*Lec Quiz 3*. Soil adsorption and herbicide solubility	AWS 192-199
Mar 28	Weed ID 3 (AFL) & Weed Management Plans	
Mar 29	*Review Lec Quiz 3*. Herbicide half-life	AWS 199-207
Apr 3	Herbicide Mode of Action Schemes	AWS 160-169, PWS pp. 8-18
Apr 4	**Preparing Research Posters,** Weed ID 4 **(AFL)**	
Apr 5	Synthetic Auxins and Aromatic amino acid inhibitors	AWS 170-173, 226-239
Apr 10	Branched-chain amino acids, Carotenoid pigment inhibitors, Grass-specific lipid synthesis inhibitors,	AWS 172-176, 239-257
Apr 11	Herbicide ID 1 & Weed ID 5 **(AFL)**	
Apr 12	Photosystem II-, Photosystem I-, PPO-, and Glutamine synthesis-inhibitors	AWS 176-179, 260-278 / **Research Fair posters due for printing**

Date	Topic (Location of Lab)	Reading/Assignment Due
Apr 17	*Lec Quiz 4.* Very-long chain fatty acid synthesis inhibitors, microtubule inhibitors	AWS 179-181, 279-291
Apr 18	Herbicide ID 2, Troubleshooting **(AFL)**	AWS 522-531
Apr 19	*Review Lec Quiz 4.* **Undergraduate Research Fair**	
Apr 24	Mechanisms of Herbicide Resistance	AWS pp 209-218 / **Peer Review Article 3 due**
Apr 25	Weed ID 6, Invasive Weed Detection **(AFL)**	Posted material
Apr 26	The Wicked problem of managing for herbicide resistance	AWS pp 220; Posted material
May 1	12 Step Program for Herbicide Resistant Weeds	AWS pp 218-225; Posted material
May 2	*Weed ID Exam* **(AFL)**	
May 3	Course Review	**Weed Management Plans Due**
May 8	**FINAL EXAM, 8:00-9:50 a.m., KH226**	