WEED ECOLOGY & MANAGEMENT

PSE 403-0001 (65836)

3 Credits

Fall 2017

Tuesday and Thursday, 9:30 – 10:45

Deering Hall 101C

Prerequisite: PSE 100 (or BIO 200 or FES 100) and BIO 319 (or FES 407 or WLE 200), or permission

Instructor: Eric Gallandt, Professor of Weed Ecology and Management

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COURSE DESCRIPTION

Weed Ecology & Management aims to familiarize students with fundamental aspects of weed biology and ecology that affect population and community dynamics and guide management principles. This class also provides students depth and breadth of theory and applied examples of technical approaches to weed management, thereby establishing many possible tools to draw upon in efforts to manage weeds. Theory and examples will be drawn primarily from agronomic and horticultural cropping systems.

LEARNING OUTCOMES

Synthesize information regarding weed biology, ecology and management into integrated weed management systems.
Justify the system's components
Describe its implementation
Evaluate the weed management system based on congruence with the goals of integrated weed management, cropping system function, farming system sustainability, and environmental stewardship.

Course Schedule (subject to minor revision)

	Date	Topics / Activities	Readings
1	8/29	***I. INTRODUCTION*** Course overview Impacts of Weeds	
2	8/31	Weed Management Projects ****** Meet at UMaine Greens ******	Brown and Gallandt (2017) To each their own: Case studies of four successful, small-scale organic vegetable farmers with distinct weed management strategies. Brown and Gallandt (2017) A systems comparison of contrasting organic weed management strategies.
3	9/5	***II. WEED BIOLOGY*** Weed Identification and Life Cycles Weedy Traits	Stewart-Wade et al. (2002) The biology of Canadian weeds. 117. *Taraxacum officianle* G.H. Weber ex Wiggers.
4	9/7	Annual Weeds: Dormancy, Germination and Establishment	Harper (1977) Chapter 3. Dormancy.
5	9/12	Annual Weeds: Weed Seedbanks	Baskin and Baskin (2006) The natural history of soil seed banks of arable land.
6	9/14	Biennial and Perennial Weeds	Håkansson (2003) Soil Tillage Effects on Weeds.
	9/15	****** Field Trip — All Day ******	Jabbour et al. (2013) Mental models of organic weed management: Comparison of New England US Farmer and expert models.
7	9/19	***III. WEED ECOLOGY*** Introduction to Community Ecology	Booth & Swanton (2002) Assembly theory applied to weed communities.
8	9/21	Invasion Ecology	Cousens & Mortimer (1995) The dynamics of geographic range expansion.

1	Date	Topics / Activities	Readings
9	9/26	Local Dispersal and Spatial Dynamics	Cousens & Mortimer (1995) Dispersal within and between populations.
10	9/28	Weeds and Climate Change	Peters et al. (2014) Impact of climate change on weeds in agriculture: a review.
11	10/3	Competition	Gallandt and Weiner (2007) Crop-weed competition
		EXAM 1	
12	10/5	***IV. WEED MANAGEMENT***	
		A. Principles and Practices	
		1. Reduce Seedling Density	
		a. <u>Herbicides</u>	
		i. Herbicide Classes and Mode of Action	Duke (2012) Why have no new herbicide modes of action appeared in recent years?
–	10/10	***<u>Fall Break, No Class</u>***	
13	10/12	ii. Applying Herbicides	
14	10/17	iii. Herbicide Selectivity and Resistance	Heap (2014) Global perspective of herbicide-resistant weeds
15	10/19	iv. Herbicide Resistant Crops	Green (2012) The benefits of herbicide resistant crops.
16	10/24	No class	Zimdahl (1999) Chapter 17. Herbicides and the environment
17	10/26	b. <u>Cultivation</u>	Gallandt et al., (2017) Developments in physical weed control.
18	10/31	c. <u>Reduce the Weed Seedbank</u>	Gallandt (2014) Weed management in organic farming.
19	11/2	d. <u>Mulch to Prevent Establishment</u>	Coolong (2012) Mulches for weed management in vegetable production.

1	Date	Topics / Activities	Readings
20	11/7	**2. Reduce Damage Per Surviving Weed**	
		a. Enhance Competitive Ability of Crop	Mohler (2001) Enhancing the competitive ability of crops.
21	11/9	b. Reduce Competitive Ability of Weed—Biological Control	Cripps et al. (2011) Classical biological control of *Cirsium arvense*: Lessons from the past.
		EXAM 2	
22	11/14	***B. Integrated Weed Management***	
		Multiple Stresses	Liebman and Gallandt (1997) Many little hammers
23	11/16	Crop Diversification	Liebman and Staver (2001) Crop diversification for weed management
24	11/21	Discussion: Weed the Soil, Not the Crop	Nordell and Nordell (2009) Weed the soil, not the crop.
–	11/23	***No Class — Thanksgiving***	
25	11/28	Economics of Weed Management	Wiles (2003) Economics of weed management: Principles and practices.
26	11/30	Discussion: The future of integrated weed management	Young et al. (2017) Moving integrated weed management from low level to a truly integrated and highly specific weed management system using advanced technologies.
27	12/5	Presentation of Weed Management Projects	
28	12/7	Presentation of Weed Management Projects	
–	12/11	***FINALS WEEK***	

GRADES

Exams may include short answer questions and calculations drawing upon material from lecture, lab, and assigned readings. Emphasis, however, will be placed on essay questions and problem solving that will require synthesis of materials from lecture and assigned readings. Questions will be distributed for completion outside of class.

Grades will be based on the following distribution of points:

	Points
Exam 1	100
Exam 2	100
Final Exam (Comprehensive)	100
GM Crops and Herbicide Resistant Weeds Debate	100
Weed Management Project and Presentation	100
Participation/in class discussion	100
TOTAL:	600

Final Grades

Final grades will be based on the points earned as a percent of total points possible.

Grade	(%)		(%)		(%)		(%)
A	96-100	B+	87-89	C+	77-79	D+	66-69
A-	90-95	B	83-86	C	73-76	D	60-65
		B-	80-82	C-	70-72		

REQUIRED TEXT

None. Recommended: Liebman, M., C.L. Mohler and C.P. Staver (2001) Ecological Management of Agricultural Weeds. Cambridge University Press. 532 pgs.

REQUIRED READINGS

A collection of readings will be available from the course Blackboard Site. You are expected to complete assigned readings prior to the indicated class period and come to class with questions and prepared to discuss in detail the salient points of the readings.

COURSE POLICIES

Make-up exams

Make-up exams will not be offered without prior approval. Homework papers will not be accepted after assigned deadlines.

Academic Honesty Statement

Academic honesty is very important. It is dishonest to cheat on exams, to copy term papers, to submit papers written by another person, to fake experimental results, or to copy or reword parts of books or articles into your own papers without appropriately citing the source. Students committing or aiding in any of these violations may be given failing grades for an

assignment or for an entire course, at the discretion of the instructor. In addition to any academic action taken by an instructor, these violations are also subject to action under the University of Maine Student Conduct Code. The maximum possible sanction under the student conduct code is dismissal from the University.

Students Accessibility Statement

If you have a disability for which you may be requesting an accommodation, please contact Student Accessibility Services, 121 East Annex, 581-2319, as early as possible in the term.

Course Schedule Disclaimer (Disruption Clause)

In the event of an extended disruption of normal classroom activities, the format for this course may be modified to enable its completion within its programmed time frame. In that event, you will be provided an addendum to the syllabus that will supersede this version.

Sexual Discrimination Reporting

The University of Maine is committed to making campus a safe place for students. Because of this commitment, if you tell a teacher about an experience of sexual assault, sexual harassment, stalking, relationship abuse (dating violence and domestic violence), sexual misconduct or any form of gender discrimination involving members of the campus, your teacher is required to report this information to the campus Office of Sexual Assault & Violence Prevention or the Office of Equal Opportunity.

If you want to talk in confidence to someone about an experience of sexual discrimination, please contact these resources:

- For confidential resources on campus: Counseling Center: 207-581-1392 or Cutler Health Center: at 207-581-4000.
- For confidential resources off campus: Rape Response Services: 1-800-310-0000 or Spruce Run: 1-800-863-9909.
- Other resources: The resources listed below can offer support but may have to report the incident to others who can help:
    - For support services on campus: Office of Sexual Assault & Violence Prevention: 207-581-1406
    - Office of Community Standards: 207-581-1409
    - University of Maine Police: 207-581-4040 or 911
    - See the OSAVP website for a complete list of services at http://www.umaine.edu/osavp/