BSPM 556, FALL 2012

BIOLOGICAL CONTROL OF PLANT PESTS

3 credits, T & Th: 9:00 – 10:15 AM, E005 – Plant Sciences Building

Instructor:
Paul Ode C210 Plant Sciences Building 491-4127 paul.ode@colostate.edu

Office hours:
I always welcome drop-in visits and appointments for meetings can be arranged by e-mail, phone, or in person.

Course Objectives:
The overall objective of this course is to cover the principles of modern biological control of plants and insects. Particular attention will be paid to fundamental ecological principles affecting the practice of biological control including invasive species biology, population dynamics, and predator–prey/parasitoid–host interactions.

Course Description:
Management of weeds and insect pests of plants using biological control agents such as insects, bacteria, viruses, and fungi.

Student Learning Objectives:
In this course, students will:
1. learn the ecological and evolutionary principles behind biological control programs
2. develop the ability to critically evaluate the success or failure of extant plant and insect pest biocontrol programs.
3. develop written and oral communication skills through the written evaluation of current biocontrol programs and oral presentation of these arguments.

Lectures:
In general, lectures will cover background material in a traditional lecture format, whereas discussions will be primarily devoted to class discussions of readings to reinforce the concepts presented in lectures. Readings for lectures will be posted on RamCT Blackboard at least 2 or 3 days (ideally a week) before the lecture period.

Supplemental Readings and Discussions:
Book chapters and articles from the primary literature will support material covered in lecture. Ten class periods will be devoted to student-led discussions of primary literature articles that will allow for in depth exploration of topics presented in lecture (see 'Lecture Schedule' below). Each student is expected to co-lead two discussion sessions in the semester. Pairs of students will select two (perhaps one, lengthy article) journal articles (e.g. one 'classic'/'foundational' paper and one recent paper) that relate to material introduced in lecture. Proposed journal articles should be cleared with me one to two weeks before the discussion period so that I can post the articles one week before the discussion period on RamCT.

Discussion leaders should meet with each other the week preceding the discussion period to carefully analyze the articles and come up with a list of discussion prompts to ensure a lively discussion amongst all students (e.g. recap the highlights of the paper, what key aspects of points of disagreement?, points of confusion?, critique of experimental design – does the experimental design allow the authors to test their objectives?). Everyone is expected to read these articles beforehand and to actively participate in each discussion.

Paper and Oral Presentation:
Each student will research a biological control system of their choice, write a paper, and give an oral presentation to the class. Papers should be approximately 10 pages, double-spaced excluding any figures, tables, and citations. The goal is to provide a review and a critique of a biological control system focusing on why the particular system was successful or not as well as some of the practical problems or controversies surrounding your specific biological control project. Each student will present a brief 20 minute presentation on their research project on one of the last two class periods of the semester. More information is provided about this assignment at the end of this document.

Academic Integrity: A summary of the University's Academic Integrity Policy may be found at the following website: http://facultycouncil.colostate.edu/files/manual/sectioni.htm#I.7.2

Cheating on exams or submitting plagiarized work demoralizes everyone in the class and will not be tolerated. The minimum penalty for cheating and/or plagiarism in this class is a zero for the exam and this score will count towards your final grade (i.e. you can not replace this score for your score on the essay). Students caught cheating on exams will be reported to the Office of Conflict Resolution and Student Conduct Services. Major infractions may result in a hearing and a permanent notation on your transcript that you were found guilty of academic dishonesty and possible dismissal from the University.

Even if you think you know what plagiarism is, I encourage you to take the 'Plagiarism Self Test' on the TILT website: http://tilt.colostate.edu/integrity/resources/quiz/index.cfm for more information about what constitutes plagiarism.

Course Grading:

	Points
Exam (in class)	100
Paper, peer-review, and oral presentation (see below)	150
Final Exam	100
Discussion participation	50
Totals	400

Letter Grade	Percentage	Total points
A	≥ 90%	≥ 360
B	≥ 80%	≥ 320
C	≥ 70%	≥ 280
D	≥ 60%	≥ 240
F	< 60%	< 240

Lecture Schedule:

Date	Day	Topic
		Introduction
21 Aug	T	Lecture: What is biological control?
23 Aug	Th	Lecture: Biological control and invasion biology (read: ch. 7 "The invasion crisis" pp. 69-79 in R van Driesche, M Hoddle, T Center. 2008. Control of Pests and Weeds by Natural Enemies, Blackwell Publishing, Oxford, UK).
		Biology of biocontrol agents
28 Aug	T	Lecture: Biocontrol agents of weeds (read: ch. 5 "Weed biocontrol agent diversity and ecology" pp. 45-55 in R van Driesche, M Hoddle, T Center. 2008. Control of Pests and Weeds by Natural Enemies, Blackwell Publishing, Oxford, UK).
30 Aug	Th	Lecture: Biocontrol agents of insect pests: pathogens and nematodes (read: ch. 6: "Arthropod pathogen diversity and ecology" pp. 56-66 in R van Driesche, M Hoddle, T Center. 2008. Control of Pests and Weeds by Natural Enemies, Blackwell Publishing, Oxford, UK).
4 Sep	T	Lecture: Biocontrol agents of insect pests: predators (read: ch. 4: "Predator diversity and ecology", pp. 29-44 in R van Driesche, M Hoddle, T Center. 2008. Control of Pests and Weeds by Natural Enemies, Blackwell Publishing, Oxford, UK).
6 Sep	Th	Discussion leaders: Javier and Rachael
11 Sep	T	Lecture: Biocontrol agents of insect pests: parasitoids (read: ch. 3: "Parasitoid diversity and ecology", pp. 11-28 in R van Driesche, M Hoddle, T Center. 2008. Control of Pests and Weeds by Natural Enemies, Blackwell Publishing, Oxford, UK).
13 Sep	Th	Discussion leaders: Anh Ha and Amber
		Ecological Fundamentals
18 Sep	T	Lecture: Population dynamics
20 Sep	Th	Discussion leaders: Daniel and Jane
25 Sep	T	Lecture: Host-parasitoid, predator-prey, herbivore-weed population dynamics
27 Sep	Th	Discussion leaders: Ben and _____

2 Oct	T	Lecture: Life table analyses (read Bellows TS Jr, van Driesche RG, Elkinton JS. 1992. Life-table construction and analysis in the evaluation of natural enemies. Annual Review of Entomology 37: 587-614).
4 Oct	Th	Discussion leaders: Rachael and Javier
9 Oct	T	Lecture: Evolution and biological control
11 Oct	Th	Discussion leaders: Daniel and Ben
16 Oct	T	Midterm exam – in class
		Practice of biological control
18 Oct	Th	Lecture: Classical biological control
23 Oct	T	Lecture: Augmentative biological control
25 Oct	Th	Discussion leaders: Nuha and Casey
30 Oct	T	Lecture: Negative effects of biological control: non-target impacts
1 Nov	Th	Discussion leaders: Jane and Anh Ha
6 Nov	T	Lecture: Host-range testing and risk assessment
8 Nov	Th	Discussion leaders: Amber and Nuha
13 Nov	T	NO CLASS: ESA: work on presentations
15 Nov	Th	NO CLASS: ESA: work on presentations
20 Nov	Fall Recess – no class	
22 Nov	Fall Recess – no class	
27 Nov	T	Discussion leaders: Casey and _____
29 Nov	Th	Oral Presentations
4 Dec	T	Oral Presentations
6 Dec	Th	Oral Presentations
13 Dec	Th	Final Exam (9:40-11:40 AM)

Case Study Paper and Presentation

Each student is expected to develop a case study of a biological control system (either of a weed or a pest insect). While this could be a system with which you are familiar from your own research, you'll gain more out of this exercise by choosing a system with which you are less familiar. Students should write a brief (~10 pages) paper and give a short (~15-20 minute) oral presentation on the case study. Please see me by 30 September to discuss topics and get approval.

Paper (100 points): Papers should be approximately 10 pages long, excluding any figures, tables, and references. Figures and tables, if any, and references are to be included after the 10 (or so) pages. Use 12 point font and 1 inch margins. Papers should provide both a historical review of the pest and the biocontrol efforts that have been implemented to control this pest, the economic and/or aesthetic damages caused by the pest, and a critical assessment of whether the biocontrol efforts have been successful. If biocontrol efforts are considered successful, what factors are important in maintaining its success? If biocontrol efforts have not been successful, what, in your opinion, would be necessary steps to improve biocontrol in the systems on which you are reporting? In your critique, focus on important conceptual, ethical, and/or implementation issue(s) (e.g. non-target effects, selection of biocontrol agents, how many introductions are necessary, importance of intraguild predation). I strongly encourage you to let your class mates and/or myself read earlier drafts of your papers so that your final, submitted version is as high quality as possible. Final drafts are due November 29th.

Oral presentation (50 points): On the last three class periods (November 29th, December 4th and 6th), each student will give a 15-20 minute oral presentation (preferably using PowerPoint or similar) that succinctly covers the points developed in your paper; allow five minutes or so for questions.