ENTM 7016 Biological Control (3 h)

Syllabus

Louisiana State University, Department of Entomology

Instructor

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Class time: TBD
Location: TBD

Description

Biological control is the use of natural enemies including predators, parasitoids, weed feeders and entomopathogens for the reduction of pest densities. This course will focus on the concepts of biological control of insects, mites and weeds in natural and managed ecosystems. The student will learn about the history of biological control including critical pest management programs that provided the foundation of the discipline. The biology and diversity of natural enemies will be presented. The course will cover the implementation of biological control including the importation of natural enemies or *classical biological control*, the deliberate increase of natural enemies or *augmentation biological control*, and the preservation and enhancement of resources to favor natural enemies or *conservation biological control*. In addition, the students will learn about techniques to monitor and evaluate natural enemies, federal regulations and the importance of educating the stakeholders about biological control. Having a solid understanding of biological control will help students in the development of effective pest management programs.

The course will consist of two 1-hour lectures and one 2-hour laboratory or discussion per week. Lectures will provide the foundational concepts on each topic outlined in the course schedule below. Laboratories will consist on practical exercises relevant to the subject of each week. Discussions will be summaries of review papers about biological control and will be led by students. There will be three assignments and a final term-paper.

Target Audience: Graduate students in the Department of Entomology, School of Plant, Environmental, and Soil Sciences and the School of Renewable Natural Resources

Details

Textbook: none required; readings will be distributed to students in class or sent by email.
Highly recommended: Van Driesche, R. and Bellows Jr., T. S. 1996. Biological Control. Springer.
Prerequisites: Introductory Entomology ENTM 2001 or permission of instructor.
Credits: 3

Learning goals	During this course, the student will learn: 1) Definitions and history of biological control. 2) Biology and diversity of natural enemies of insects and weeds. 3) Biological control approaches: classical, augmentation, and conservation. 4) Monitoring and evaluation of natural enemies. 5) Federal regulations of biological control. 6) Stakeholder communication in biological control.
Credit hour statement	As a general policy, for each hour a student is in class, he/she should expect to spend at least two hours preparing outside of class. Since this course is for three credit hours, the student should expect to spend around six hours outside of class each week reading, reflecting/reviewing, and completing assignments.

Biological Control- Class Schedule

Class	Main topic
Week 1	Importance of biological control in pest management
Week 2	Ideal characteristics of a biological control agent.
Week 3	Biology and diversity of parasitoids.
Week 4	Biology and diversity of predators.
Week 5	Biology and diversity of weed control agents.
Week 6	**Exam I**. **Assignment #1 due.**
Week 7	Biology and diversity of entomopathogens.
Week 8	Classical biological control.
Week 9	Conservation biological control.
Week 10	Augmentation biological control. **Assignment #2 due.**
Week 11	**Exam 2** and Biological control of weeds.
Week 12	Monitoring and evaluation of natural enemies.
Week 13	Integration of biological control in pest management.
Week 14	Laws affecting biological control in United States. **Assignment #3 due.**
Week 15	Communicating with stakeholders. **Term paper and student presentations.**
	Final Exam

Student Evaluation and Assignments

Evaluation will consist of three exams, assignments, summary reports and a final term-paper.

Exams	The exams will be multiple selection, short answers and essays from topics covered during lectures.
Assignment #1 Comparison of Nat. Enemies	There are several companies selling natural enemies over the internet. For each natural enemy below, the student will compare the pricing, quantities available, packaging, and availability of supporting information (e.g, identification, biology, release recommendation and impact on the target pest) among THREE companies. The five natural enemies are: (1) *Trichogramma* sp., there are several species, just select one; (2) *Chrysoperla*; (3) a predatory mite; (4) an entomopathogenic nematode, there are several species, just select one; and (5) an entomopathogen, there are several species, just select one. The student will pick only one natural enemy. The report must contain from whom you will purchase the natural enemy and a brief explanation of your reasons.
Assignment #2 Fact Sheet	The student will develop a fact sheet about an arthropod predator or parasitoid. This fact sheet will be placed in the Department of Entomology website. The target audience is the public in general, therefore, the language of the fact sheet should not be too technical. The contents of the fact sheet will be: common name, scientific name, a short description, distribution in United States, life cycle, target pest, impact, and selected references.
Assignment #3 Host-parasitoid collection	The student will prepare a collection of parasitoids and their hosts. Host remains should be preserved in gelatin capsules, vials, or any container suitable for preservation. Adult parasitoids should be pinned. The collection will be evaluated based on the number of different parasitoid-host collected, and the identification level of the host and parasitoid. The student should identify the specimens at least to the family level. The students will be encouraged (not mandatory) to document via short-videos or high quality pictures the process of parasitoid emergence.
Summaries	Weekly summaries are brief syntheses (not outline) of the review paper and should include take home messages. The summary must not exceed one page. There will be a discussion about the review paper every week. The discussion will be led by students.
Term Paper and Presentation	The term paper will consist of a six-page document on a subject of biological control relevant to the student thesis. For example, if the student is working on an ecology of an invasive chinch bug or a weed targeted for biological control, the paper could include a description of the native range of pest, a history of biological control attempts against this species, a description of the natural enemies known to attack this pest or close relatives, and a review of the management tactics (cultural, chemical

controls) that help or interfere with biological control. The student will give a 10-min oral presentation summarizing the findings.

Extra credit

Graduate students should have good public speaking skills. A free class on public speaking is offered by Dr. Matt McGarrity at University of Washington and available at Coursera https://www.coursera.org/learn/public-speaking. This is only 18h of short videos. Upon finishing this course, the student will get 10 extra credits.

Designing effective scientific presentations is critical for a researcher. This 42 min video provides great tips for presentations https://www.youtube.com/watch?v=Hp7Id3Yb9XQ. Upon finishing this video and implementing this approach on the class presentation, the student will get 5 extra credits.

Grading

Three exams (150 points each)	450 pts
Three special assignments	200 pts
First, 50 points	
Second, 50 points	
Third, 100 points	
Review paper summaries (10 pts each)	100 pts
Term paper and presentation	250 pts
Total	**1,000 pts**

Course grading scale

A+ = 97-100%
A = 94-96%
A- = 90-93%
B+ = 87-89%
B = 84-86%
B- = 80-83%
C+ = 77-79%
C = 74-76%
C-= 70-73%
D+ = 67-69%
D = 64-66%
D- = 60-63%
F = 0-59%

Academic Integrity

General Statement on Academic Integrity	Louisiana State University adopted the Commitment to Community in 1995 to set forth guidelines for student behavior both inside and outside of the classroom. The Commitment to Community charges students to maintain high standards of academic and personal integrity. All students are expected to read and be familiar with the LSU Code of Student Conduct and Commitment to Community, found online at www.lsu.edu/saa. It is your responsibility as a student at LSU to know and understand the academic standards for our community. Students who are suspected of violating the Code of Conduct will be referred to the office of Student Advocacy & Accountability. For undergraduate students, a first academic violation could result in a zero grade on the assignment or failing the class and disciplinary probation until graduation. For a second academic violation, the result could be suspension from LSU. For graduate students, suspension is the appropriate outcome for the first offense.
Plagiarism and Citation Method	As a student at LSU, it is your responsibility to refrain from plagiarizing the academic property of another and to utilize appropriate citation method for all coursework. In this class, it is recommended that you use Entomological Society of America, Style Guide. Ignorance of the citation method is not an excuse for academic misconduct. Remember there is a difference between paraphrasing and quoting and how to properly cite each respectively. One tool available to assist you in correct citations is the "References" function in Microsoft Word. This program automatically formats the information you input according to the citation method you select for the document. This program also has the ability to generate a reference or works cited page for your document. The version of Microsoft Word with the "References" function is available in most University computer labs. A demonstration of how to use this tool is available online atwww.lsu.edu/saa.
Group work and unauthorized assistance	All work must be completed without assistance unless explicit permission for group or partner work is given by the faculty member. This is critical so that the professor can assess your performance on each assignment. If a group/partner project is assigned, the student may still have individual work to complete. Read the syllabus and assignment directions carefully. You might have a project with group work and a follow up report that is independently written. When in doubt, e-mail the faulty member or ask during a class session. Seeking clarification is your responsibility as a student. Assuming group/partner work is okay without permission constitutes a violation of the LSU Code of Student Conduct.
Disability statement	Louisiana State University is committed to providing reasonable accommodations for all persons with disabilities. The syllabus is available in alternate formats upon request. Any student with a documented disability

needing academic adjustments is requested to speak with Disability Services and the instructor, as early in the semester as possible. All discussions will remain confidential. This publication/material is available in alternative formats upon request. Please contact the Disability Services, 115 Johnston Hall, (225) 578-5919.