

BIOLOGICAL CONTROL

ENY 5241

SPRING 2014

Instructor: Dr. Ronald D. Cave
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Credits: 4
Interactive videoconferences:
Mondays 8:30-10:25am EST

Invited Instructors:

Dr. Steven Arthurs
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Description and Objectives. This course examines the fundamental concepts of applied biological control of insects and mites. Overviews of the diversity and biology of entomophagous nematodes, entomopathogens, predators, and parasitoids are presented. Current philosophies, strategies, and tactics of classical, augmentation, and conservation biological control are discussed. Specific cases of applied biological control are studied. Methods for monitoring and evaluating natural, Federal laws, and public education are addressed. Narrated slide presentations and readings provide information for the basis of interactive discussions. An oral presentation on a topic directly related to biological control and a Featured Creature article are prepared and delivered each student.

In this course, the student will learn:

1. Definitions of biological control.
2. History of biological control.
3. Diversity and biology of the natural enemies of insects and mites.
4. Applied biological control strategies: classical, augmentation, and conservation.
5. Natural enemy monitoring and evaluation.
6. Federal laws affecting biological control.
7. Grower and homeowner education in biological control.

The **NARRATED POWERPOINT PRESENTATIONS** (PPTs) are short lectures on selected topics divided into 11 chapters. All presentations are available on Sakai. These PPTs should be viewed during the week preceding the appropriate discussion session so that the student is capable of answering questions posited during the session.

The **VIDEOCONFERENCED DISCUSSION SESSIONS** are held every Monday morning (except MLK holiday and spring break). During these sessions, students will have an opportunity to ask questions, request clarification on specific topics in the narrated PPTs, and share experiences and opinions. In the remaining time, students will be divided into groups, and each group will be given a question for which the group members will prepare a response within 15 minutes. Questions for each chapter will be delivered to all students a few days before the

appropriate discussion session, but assignment of specific questions to groups will not be done until the appropriate discussion session. A spokesperson in each group will present the group's response to the entire class, but any student in the group may add comments to the spokesperson's group response.

Three **EXAMS** are taken on-line. Students may use your notes, books, and Internet as resources and may even discuss responses with other students. However, because the exams are time-limited, students should prepare themselves for the exam beforehand rather than depend on finding information during the exam. For short answer question, all responses must be in your own words. The exam schedule is as follows:

**Exam I: February 6 time TBD

**Exam II: March 13 time TBD

**Exam III: April 10 time TBD

LECTURE SYNOPSES are brief syntheses of the information presented in each week's PPTs and assigned reading. You should write an overview (not an outline) of the principal concepts and topics addressed to indicate you have thoroughly studied the material and comprehend it. Each chapter's synopsis should be delivered through Sakai and is due one day after the videoconference in which that chapter's material is discussed (see Course Schedule for delivery dates of synopses). Each synopsis is worth up to 10 points, but you may miss one synopsis without penalty. A late synopsis will be penalized 2 points for each calendar day it is late. **Grammar, neatness, formatting, and spelling will be considered in the evaluation of these assignments.**

Two **SHORT ASSIGNMENTS** are worth up to 20 points apiece.

Short Assignment #1: Communication posted on course site on Sakai

- Send a communication to **Introductions** under the **COMMUNICATIONS FORUM**
- In the communication, give your name, major, and hometown
- State why you are in the course (for example, required course, want to control pests in my organic garden)
- Describe any previous experience with pest management
- Describe your career goals and how pest management might fit in
- Posting a photograph is optional.

SHORT ASSIGNMENT #1 IS DUE JANUARY 16, 2014. A late assignment will be penalized 2 points for each calendar day it is late.

Short Assignment #2: Comparative analysis of 5 commercially available natural enemies

For each of the four natural enemies listed below, locate three companies on-line that sell them (the three companies need not be the same for all five natural enemies). For each natural enemy, compare the commercialization of it among the three companies. Compare pricing, quantities available, packaging, and availability of supporting information (*e.g.*, release recommendation, biology, anything else). Also, mention from whom you would purchase the natural enemy and briefly explain your choice. The four natural enemies are:

1. *Trichogramma* sp. (there are several species but all attack insect eggs; select ONE species and compare it across the three companies)
2. *Chrysopa/Chrysoperla* (predators commonly called aphid lions and green lacewings)

3. A predatory mite (many different species are available, select ONE species and compare it across the three companies)
4. An entomophagous nematode (many different species are available, select ONE species and compare it across the three companies)
5. An entomopathogen (many different species are available, select ONE species and compare it across the three companies)

Provide the name of each company mentioned and its website address.

SHORT ASSIGNMENT #2 IS DUE March 20, 2014. A late assignment will be penalized 2 points for each calendar day it is late.

FEATURED CREATURE ARTICLE: Each graduate student is required to develop a “Featured Creatures” (FC) fact sheet on an arthropod predator or parasitoid that is NOT CURRENTLY in or planned for FC (<http://creatures.ifas.ufl.edu/>). Use the “Assignments” feature of Sakai to complete the uploads. All deadlines are noon of the day that they are due. Late submissions will be docked 2 points on the individual component grade for each 24 hrs after **each** deadline.

Visit http://entomology.ifas.ufl.edu/creatures/FC_format.pdf for the FC-specific guidelines for article preparation. The content should include the taxonomy of the natural enemy, identification, biology, management tactics, images, and references.

The Featured Creatures article grade will be determined through a multi-step evaluation process that includes topic approval, submission of a 1st draft, return of a peer-review evaluation, and submission of a final draft. Please be sure to read the following to ensure that you are meeting the deadlines. Failure to adhere to the schedule and process will result in lost points.

1. Students must contact the instructor to receive topic approval before proceeding. The topic must be chosen and approved by **February 4, 2014**. (5 pts)
2. To be eligible for full credit, the first draft must be submitted to the instructor in electronic form (Sakai ASSIGNMENT link) by **April 2, 2014**. These are expected to be nearly complete documents with significant material provided in each category. The instructor will review the draft for effort, form, and overall progress. (15 pts)
3. Final drafts of Featured Creature articles are due **April 23, 2014**. The assignment will be evaluated on the completeness of the overall document, thoroughness of the subject matter, incorporation of appropriate original artwork and the incorporation (or not) of suggested revisions (not all suggestions must be incorporated, but you must justify when comments are not incorporated) provided by the instructor. (50 pts)

The **STUDENT PRESENTATION**, also an individual effort, is a synthesis of information from literature and/or experience on a topic directly related to any aspect of biological control of insects and mites. The topic of the paper **MUST** be approved by the instructor (RDC) no later than **February 11, 2014**. No two presentations on the same topic may be done, so decide on a topic and have it approved by the instructor soon. The presentation should be 12-18 in duration and will be delivered either **April 14 or April 21, 2014**. A well-written abstract of 300-500 words should be delivered through Sakai by **April 10, 2014**. A late abstract will be penalized 2 points for each calendar day it is late. In the abstract, you must cite 3-5 journal articles and/or books and no more

than 4 websites; provide the complete references of all literature cited and the URL for all websites cited. Use of information gathered from Wikipedia is not allowed. Citation of Wikipedia will automatically result in a 0 on the project paper. **Grammar, neatness, formatting, and spelling will be considered in the final evaluation of your paper.** It is highly recommended that the instructor review your draft before its final submission.

The presentation will be scored as follows:

- Approval of topic by February 11, 2014 – 5 points
- Quality and organization of slides – 20 points
- Quality of oral delivery – 20 points
- Meaningful, thorough, and well-organized content on subject matter – 40
- Abstract – 15 points

STUDENT ASSESSMENT:

Three exams (80 points each)	240 pts
Ten lecture synopses (10 points each)	100 pts
Two short assignment (20 pts each)	40 pts
Featured Creature article	70 pts
Presentation	100 pts
TOTAL	550 pts

COURSE GRADING SCALE:

A	= 90-100%
B+	= 86-89%
B	= 80-85%
C+	= 76-79%
C	= 70-75%
D+	= 66-69%
D	= 60-65%
F	= 0-59%

Absences and Make-Up Work

Requirements for class attendance and make-up exams, assignments and other work are consistent with university policies that can be found at:

<https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx>.

Academic Honesty

As a student at the University of Florida, you have committed yourself to uphold the Honor Code, which includes the following pledge: *“We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honesty and integrity.”* You are expected to exhibit behavior consistent with this commitment to the UF academic community, and on all work submitted for credit at the University of Florida, the following pledge is either required or implied: *“On my honor, I have neither given nor received unauthorized aid in doing this assignment.”*

It is assumed that you will complete all work independently in each course unless the instructor provides explicit permission for you to collaborate on course tasks (e.g., assignments, papers,

quizzes, exams). Furthermore, as part of your obligation to uphold the Honor Code, you should report any condition that facilitates academic misconduct to appropriate personnel. It is your individual responsibility to know and comply with all university policies and procedures regarding academic integrity and the Student Honor Code. Violations of the Honor Code at the University of Florida will not be tolerated. Violations will be reported to the Dean of Students Office for consideration of disciplinary action. For more information regarding the Student Honor Code, please see: <http://www.dso.ufl.edu/SCCR/honorcodes/honorcode.php>.

Software Use:

All faculty, staff and students of the university are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Because such violations are also against university policies and rules, disciplinary action will be taken as appropriate.

Campus Helping Resources

Students experiencing crises or personal problems that interfere with their general well-being are encouraged to utilize the university's counseling resources. The Counseling & Wellness Center provides confidential counseling services at no cost for currently enrolled students. Resources are available on campus for students having personal problems or lacking clear career or academic goals, which interfere with their academic performance.

University Counseling & Wellness Center, 3190 Radio Road, 352-392-1575, www.counseling.ufl.edu/cwc/

Counseling Services, Groups and Workshops, Outreach and Consultation, Self-Help Library Training Programs, and Community Provider Database

Career Resource Center, First Floor JWRU, 392-1601, www.crc.ufl.edu/

Services for Students with Disabilities

The Disability Resource Center coordinates the needed accommodations of students with disabilities. This includes registering disabilities, recommending academic accommodations within the classroom, accessing special adaptive computer equipment, providing interpretation services and mediating faculty-student disability related issues. Students requesting classroom accommodation must first register with the Dean of Students Office. The Dean of Students Office will provide documentation to the student who must then provide this documentation to the Instructor when requesting accommodation

0001 Reid Hall, 352-392-8565, www.dso.ufl.edu/drc/

Distance Courses

Each online distance learning program has a process for, and will make every attempt to resolve, student complaints within its academic and administrative departments at the program level. See <http://distance.ufl.edu/student-complaints> for more details.

COURSE SCHEDULE

January 6-10:

- Participant introductions, course overview, syllabus, general discussion of biological control.
- Do Short Assignment #1.
- View PPT of Chapter 1: Introduction to biological control of insects and mites.

January 13-17:

- Discussion of Chapter 1: Introduction to biological control of insects and mites.
- Chapter 1 synopsis due January 14.
- View two PPTs of Chapter 2: Desirable characteristics in a good biological control agent; Biology, diversity, and application of entomophagous nematodes.
- Short Assignment #1 due January 16.

January 27-31:

- Discussion of Chapter 2: Desirable characteristics in a good biological control agent; Biology, diversity, and application of entomophagous nematodes [STEVE ARTHURS].
- Chapter 2 synopsis due January 28.
- View three PPTs of Chapter 3: Diversity and biology of entomopathogens.

February 3-7:

- Discussion of Chapter 3: Diversity and biology of entomopathogens [PASCO AVERY].
- Chapter 3 synopsis due February 4.
- Final day for approval of Featured Creature topic: February 4.
- View two PPTs of Chapter 4: Diversity and biology of predators.
- Exam I: February 6

February 10-14:

- Discussion of Chapter 4: Diversity and biology of predators.
- Chapter 4 synopsis due February 11.
- Final day for approval of oral presentation topic: February 11.
- View two PPTs of Chapter 5: Diversity and biology of parasitoids.

February 17-21:

- Discussion of Chapter 5: Diversity and biology of parasitoids.
- Chapter 5 synopsis due February 18.
- View two PPTs of Chapter 6: Classical biological control.
- View video on invasive mole crickets

February 24-28:

- Discussion of Chapter 6: Classical biological control.
- Chapter 6 synopsis due February 24.
- View three PPTs of Chapter 7: Weed biological control by insects.
- View video on tropical soda apple.

March 10-14:

- Discussion of Chapter 7: Weed biological control by insects [RODRIGO DIAZ].
- Chapter 7 synopsis due March 11.
- View two PPTs of Chapter 8: Augmentation biological control.
- View videos on augmentation biological control in strawberries and in foliage plants.
- EXAM II: March 13

March 17-21:

- Discussion of Chapter 8: Augmentation biological control.
- Chapter 8 synopsis due March 18.
- Short assignment #2 due March 20.
- View two PPTs of Chapter 9: Conservation biological control.

March 24-28:

- Discussion of Chapter 9: Conservation biological control.
- Chapter 9 synopsis due March 25.
- View two PPTs of Chapter 10: Natural enemy monitoring and evaluation.

March 31-April 4:

- Discussion of Chapter 10: Natural enemy monitoring and evaluation.
- Chapter 10 synopsis due April 1.
- View two PPTs of Chapter 11: Federal laws affecting biological control; Grower and homeowner education in biological control.
- First draft of Featured Creature article due April 2.

April 7-11:

- Discussion of Chapter 11: Federal laws affecting biological control; Grower and homeowner education in biological control.
- Chapter 11 synopsis due April 8.
- Oral presentation abstract due April 10.
- Exam III: April 10

April 14-18:

- Student presentations

April 21-25:

- Student presentations
- Final Featured Creature article due April 23