

**ENTOMOLOGY (ENTMLGY) 5500
BIOLOGICAL CONTROL OF ARTHROPOD PESTS
SPRING SEMESTER 2020 (ONLINE)
COLLEGE OF FOOD, AGRICULTURAL AND ENVIRONMENTAL SCIENCES (FAES)**

Instructor: Dr. Luis Cañas

Dr. Cañas

E-mail (preferred): canas.4@osu.edu

Phone: 330-263-3818 (from the OSU Columbus campus phones, 5-3818)

Office: 105 Thorne Hall Annex, OARDC, 1680 Madison Ave, Wooster, Ohio.

Office hours are by appointment.

Available to answer questions via email or by phone.

Class location:

Online

Class days and times:

Self-paced, but times and dates for discussion will be arranged with the class.

Course Description:

This course covers the philosophy, science, and practice of biological control. Successes and failures, and methods, of biological control of insects, mites, mollusks, nematodes, and weeds will be explored. Biology of major biological control agents including parasites, predators, and pathogens will be covered. Methods of enhancing biological control through importation, conservation, and augmentation will be discussed, as well as regulations and controversies about non-target effects of biological control.

Course credits:

3

Pre-requisite: No pre-requisites are needed.

Course Objectives:

1. Students will explain the ecological basis of biological control and its utility in sustainable pest management.
2. Students will explain host-parasite (or pathogen) relationships and how the biology of various biological control agents of insects, mites, slugs, nematodes and weeds, needs to be understood in the context of integrated pest management.
3. Students will identify factors affecting the successes and failures of biological control agents and ways to manage them to achieve positive results.
4. Students will describe research approaches to discover, assess, and develop novel biological control agents.
5. Students will describe the human influence on natural biological control.

Course structure:

Lectures: For this class the lectures will be recorded and will be made available via computer through Carmen (<https://carmen.osu.edu/>). The topics are listed in the syllabus. The lectures and exercises have the equivalent of the material that would be presented on two 75 minute classes per week. Therefore, please plan accordingly to spend adequate time viewing the lectures. Material will be added to Carmen either on Wednesday each week.

Exercises and assignments: Assignments and exercises will be provided throughout the duration of the class. These will be posted on Carmen and will explicitly show the due date. When possible, examples and/or rubrics will be made available. All assignments and exercises need to be submitted using Carmen drop boxes that will be set up for such purpose. Please plan on submitting these in an appropriate format (Word, Excel, pdf). Each assignment will have suggestions regarding accepted formats for submission.

Computer access requirements:

- Students must have access to the internet to access required course materials posted on Carmen.
 - OSU's Carmen site is an education tool that allows interaction between instructors and students and helps to share information about courses. Carmen can be found at: <https://carmen.osu.edu>
 - The syllabus, lectures, partial lecture notes, assignment descriptions, review materials, quizzes or exams, and other class information are posted on Carmen.
 - Usually Firefox (PC), Chrome (PC) and Safari (MAC) have worked well with Carmen. Please check on our Carmen webpages for additional information.
- For live discussion we will use Zoom (<https://osu-cfaes.zoom.us/>). Links to Zoom will be added to Carmen. When first using Zoom, please make sure you connect with sufficient time to resolve any issues.

Course technology

For help with your password, university e-mail, Carmen, or any other technology issues, questions, or requests, contact the OSU IT Service Desk. Standard support hours are available at <https://ocio.osu.edu/help>, and support for urgent issues is available 24x7.

Self-Service and Chat support: <http://ocio.osu.edu/selfservice>

Phone: 614-688-HELP (4357)

Email: 8help@osu.edu

TDD: 614-688-8743

Baseline technical skills necessary for online courses

Basic computer and web-browsing skills

Navigating Carmen

Technology skills necessary for this specific course

CarmenConnect text, audio, and video chat

Preparing presentation using Power Point or similar

Necessary equipment

Computer: current Mac (OS X) or PC (Windows 7+) with high-speed internet connection

Webcam: built-in or external webcam, fully installed

Microphone: built-in laptop or tablet mic or external microphone; headset is preferred

Cell phone (for live meetings only): in the event you experience sound issues because of the speed of your internet connection, you will be able to connect using your cellphone (through Zoom). However, these are toll calls and it would be best if you use the cellphone when you have an unlimited nationwide call plan.

Grading:

There will be weekly quizzes; assignments, an oral presentation, and a final project. Class participation will take two forms: participation in discussions each week and participation in live discussions using Zoom (dates will be added in Carmen). Guidelines for the final project will be provided in Carmen.

Point totals are summarized below:

Item	Points	% of total
Lecture quizzes (N=12, each 10 points)	120	27
Assignments or exercises (N=10, each 10 points)	100	23
Oral presentation	50	11
Class discussion (N=14, each 10 points, drop 2 lowest)	120	27
Final project	50	11
Total	440	100

Lecture quizzes and assignments missed for legitimate reasons (illness, etc.) must be made up before the next quiz or assignment or (in the case of the final) before the end of the second week of the summer second term.

Grades will be assigned according to the following scale:

Percentage		Points		Grade
93	more	409	more	A
90	< 93	396	408	A-
87	< 90	383	395	B+
83	< 87	365	382	B
80	< 83	352	364	B-
77	< 80	339	351	C+
73	< 77	321	338	C
70	< 73	308	320	C-
67	< 70	295	307	D+
60	< 67	264	294	D
less	< 60	less	263	E

Lecture quizzes:

Some lectures will be associated with a quiz that must be taken using Carmen. The quiz will open at the same time as the lecture and will remain open for a week. The deadlines will be posted on Carmen. Please make sure to take the quizzes at an appropriate time before the deadline.

Assignments or Exercises:

Students will receive assignments based on the material taught at particular times during the class. Each assignment will be posted on Carmen and will have details about deadlines. The assignments should be submitted electronically using Carmen using the corresponding drop box.

Oral presentation:

A specific rubric for the oral presentation will be posted on Carmen. The goal of this presentation is to help the student understand how to support/refute ideas based on findings from searches from primary literature about biological control. The presentation will be done using Zoom. Students will prepare their oral presentation using PowerPoint or similar and will connect with Dr. Canas at an agreed time. Once in Zoom, students will be given presentation rights so they can give their presentation.

Final project:

A rubric for the final project will be will be posted on Carmen the 3rd week of classes. The goal of this project is to help the student understand how to develop a step by step guideline to start a biological control program.

Textbook (optional):

Bellows, T. S., and T. W. Fisher (eds.). 1999. Handbook of biological control. Academic Press, San Diego, California, USA. Available as online book from OSU library.

GENERAL POLICIES:**Late Policy:**

An assignment that is handed in late will be reduced in value 10 percent per day that it is late.

Incomplete Grade Policy:

Incomplete grades will be given only in special circumstances as outlined in university policy.

<http://trustees.osu.edu/rules/university-rules/chapter-3335-8-instruction.html>

Academic Integrity Policies for this online course

- **Quizzes and exams:** You must complete the lecture quizzes and exams yourself, without any external help or communication.
- **Written assignments:** Your written assignments, including discussion posts, should be your own original work. I will provide examples of how to cite references, however if you use reference software such as Endnote you should use the Journal of Economic Entomology style (<http://endnote.com/downloads/styles>). You are encouraged to ask a trusted person to proofread your assignments before you turn them in--but no one else should revise or rewrite your work.
- **Reusing past work:** In general, you are prohibited in university courses from turning in work from a past class to your current class, even if you modify it. If you want to build on past research or revisit a topic you've explored in previous courses, please discuss the situation with me.
- **Falsifying data or results:** All exercises you will do in this course are intended to be learning experiences; you should never feel tempted to make up data or your library research look more successful than it was.
- **Collaboration and informal peer-review:** The course includes opportunities for formal collaboration and discussion with your classmates. While study groups and peer-review of major written projects is encouraged, remember that comparing answers on a quiz or assignment is not permitted. If you're unsure about a particular situation, please feel free just to ask ahead of time.

Ohio State's academic integrity policy

Academic integrity is essential to maintaining an environment that fosters excellence in teaching, research, and other educational and scholarly activities. Thus, The Ohio State University and the Committee on Academic Misconduct (COAM) expect that all students have read and understand the University's *Code of Student Conduct*, and that all students will complete all academic and scholarly assignments with fairness and honesty. Students must recognize that failure to follow the rules and guidelines established in the University's *Code of Student Conduct* and this syllabus may constitute "Academic Misconduct." <https://studentlife.osu.edu/resources/> and search for code of student conduct.

The Ohio State University's *Code of Student Conduct* (Section 3335-23-04) defines academic misconduct as: "Any activity that tends to compromise the academic integrity of the University, or subvert the educational process." Examples of academic misconduct include (but are not limited to) plagiarism, collusion (unauthorized collaboration), copying the work of another student, and possession of unauthorized materials during an examination. Ignorance of the University's *Code of Student Conduct* is never considered an "excuse" for academic misconduct, so I recommend that you review the *Code of Student Conduct* and, specifically, the sections dealing with academic misconduct.

If I suspect that a student has committed academic misconduct in this course, I am obligated by University Rules to report my suspicions to the Committee on Academic Misconduct. If COAM determines that you have violated the University's *Code of Student Conduct* (i.e., committed academic

misconduct), the sanctions for the misconduct could include a failing grade in this course and suspension or dismissal from the University.

If you have any questions about the above policy or what constitutes academic misconduct in this course, please contact me.

Other sources of information on academic misconduct (integrity) to which you can refer include:

- The Committee on Academic Misconduct web pages ([COAM Home](#))
- *Ten Suggestions for Preserving Academic Integrity* ([Ten Suggestions](#))

Eight Cardinal Rules of Academic Integrity (www.northwestern.edu/uacc/8cards.htm)

Special Needs and Accommodations:

Any student who feels he or she may need an accommodation based on the impact of a disability should contact the instructor privately to discuss your specific needs. Please contact the Office for Disability Services at 614-292-3307 (Fax: 614-292-4190; VRS: 614-429-1334; Email: slds@osu.edu) in room 098 Baker Hall, 113 W. 12th Ave. Columbus, OH 43210 to coordinate reasonable accommodations for students with documented disabilities. <http://slds.osu.edu/>

Accessibility of course technology

This online course requires use of Carmen (Ohio State's learning management system) and other online communication and multimedia tools. If you need additional services to use these technologies, please request accommodations with your instructor.

- [Carmen \(Canvas\) accessibility](#)
- Streaming audio and video
- Synchronous course tools

General Information:

Additional information on general Ohio State University Policies can be found at: <http://trustees.osu.edu/assets/files/RuleBook/UniversityFacultyRules.pdf>

Feedback and response time:

I am providing the following list to give you an idea of my intended availability throughout the course. (Remember that you can call 614-688-HELP at any time if you have a technical problem.)

Grading and feedback: For large weekly assignments, you can generally expect feedback within 7 days.

E-mail: I will reply to e-mails within 24-48 hours on school days.

Discussion board: I will check and reply to messages in the discussion boards every 24-48 hours on school days.

Discussion and communication guidelines

The following are my expectations for how we should communicate as a class. Above all, please remember to be respectful and thoughtful. There will be two types of discussion: weekly discussions using Carmen, and live discussions using Zoom.

- **Weekly discussion using Carmen discussion board:** Participation in class discussions is mandatory (see grading). I will expect each student to post at least two comments on each week's discussion board. These could be questions or comments in response to a question or comment. In addition, I will prepare a schedule during the first week of class when a particular student will be the leader of the discussion for that week. As leader of the discussion, the student will be in charge of initiating the discussion if needed, or to stimulate the discussion to continue. I will provide an example during the first week. As if you were writing a research paper, you should

remember to write using good grammar, spelling, and punctuation. Informality (including an occasional emoticon) is fine for non-academic topics.

- **Live discussions via Zoom (scheduled, see syllabus):** I will expect each student to participate in live discussions (3 in total). The time will be selected during the first week. The students will connect using Zoom (specific details will be posted on Carmen) and will discuss issues relevant to a topic I will select. The topic most likely will be selected from comments observed during the weekly postings on our discussion board. The discussion will last 20 minutes.
- **Tone and civility:** Let's maintain a supportive learning community where everyone feels safe and where people can disagree amicably. Remember that sarcasm doesn't always come across online.
- **Citing your sources:** When we have academic discussions, please cite your sources to back up what you say. (For the textbook or other course materials, list at least the title and page numbers. For online sources, include a link.)

Backing up your work: Consider composing your academic posts in a word processor, where you can save your work, and then copying into the Carmen discussion.

Biological control of arthropod pests (ENTMLGY 5500), schedule of topics. Specific topics might change of day.
New material will be opened each Wednesday at midnight.

Week	Lecture Topics (Recorded lectures posted on Carmen)	Lecture Quizzes	Discussions and Assignments
1	Introduction to the course; forms of biological control, and descriptions of functional groups of biological control agents. Ecological basis for biological control: predator-prey dynamics.	Quiz 1	Discussion 1 - introduction and current trends in biological control
2	Classical biological control: foreign exploration, quarantine, establishment, and evaluation. Biology of parasitic and predatory insects.	Quiz 2	Discussion 2 – great successes with biological control Assignment 1: examples of classical biological control. Live discussion 1; Wednesday January 15 at 8:00 PM EST via Zoom Link will be provided in Carmen
3	Biology of predatory mites and spiders. Mass rearing and utilization of parasitic and predatory insects and mites.	Quiz 3	Discussion 3 – when biological control goes wrong Assignment 2: find places where biological control agents are sold Ask for information about agent
4	Biology, mass-production, and application of entomopathogenic nematodes. Biology of entomophilic nematodes.	Quiz 4	Discussion 4 – mass production of biological control agents Assignment 3: visit to location where biological control is used. Interview and ask what are the keys for successful biological control program
5	Biology and mass-production of insect-pathogenic bacteria.	Quiz 5	Discussion 5 - mass production of biological control agents Assignment 4: find current paper about mass production of biological control agents
6	Biology and mass-production of insect-pathogenic fungi. Biology and mass-production of insect-pathogenic viruses.	Quiz 6	Discussion 6 – use of fungi and viruses in biological control Assignment 5: find current paper about use of fungi and viruses in biological control
7	Recent discoveries in biological control.	Quiz 7	Discussion 7 – recent discoveries in biological control Assignment 6: find current paper about biological control Live discussion 2: Wednesday February 19 at 8:00 PM EST via Zoom
8	Transgenics and biological control. Tri-trophic interactions and biological control.	Quiz 8	Discussion 8 – Transgenics and biological control. Tri-trophic interactions. Assignment 7: find current paper about transgenics and biological control.

Week	Lecture Topics (Recorded lectures posted on Carmen)	Lecture Quizzes	Discussions and Assignments
9	Biological control in practice.	Quiz 9	Discussion 9 – Biological control in practice Assignment 8: find papers about implementing biological control.
10	Spring Break – No classes		
11	Social and economic aspects of biological control.	Quiz 10	Discussion 10 – social and economic aspects of biological control. Assignment 9: find papers about the social and economic aspects of biological control.
12	Conservation of wildlife areas and biological control.	Quiz 11	Discussion 11 – conservation of wildlife areas and biological control. Assignment 10: find papers about habitat and landscape manipulation and biological control. Live discussion 3: Wednesday March 25 at 8:00 PM EST via Zoom
13	Biological control in Canada and other parts of the world.	Quiz 12	Discussion 12 – biological control in Canada and in the World.
14-15	Biological control presentations and project		Discussion 13 – presentations and projects Discussion 14 – presentations and projects

Final exam: no final exam. But final project will be due before final exam week.