

Seminar: Exploiting Insect Behavior for IPM
ENY 6934, 1 credit
Spring 2018, Sections 0150 (Gainesville) and 0155 (Polycom)

Instructor: Dr. Xavier Martini
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Class period: Monday, (10:40 – 11:30)

Room: 1027 Steinmetz Hall and by Polycom

Office hours: One hour before class (by appointment) and immediately after class

Course Description: This course is one of the seminar courses offered each semester in the Department of Entomology & Nematology to meet core course requirements. The purpose of these seminars is to give students practice in preparing and presenting a 35-40 minute seminar on a topic that interests them. Master's students are required to take one credit of seminar and PhD students take two credits. This seminar focuses on methods used in IPM relating on insect behavior. Current technologies developed to disrupt and/or influence insect behavior and their application in the field will be reviewed. We will also go into the impact of insect behavior of other IPM methods.

Objectives and Goals:

- Understand how herbivore insects select their host and how we can use this knowledge in IPM
- Learn methods used in IPM to disrupt insect pest behavior.
- Review the different modalities to manipulate insect behavior (visuals, chemicals, acoustics, etc.)
- Investigate some of the current topics in insect behavior related to IPM.
- Learn to read journal articles critically.
- Gain practice in organizing and delivering a 35-40 minute teaching-type seminar.

Polycom access:

The conference ID for this class is 7834000. You can dial in beginning at 10:35. The cutoff will be 11:35 exactly to accommodate the next class that is using the room. Please mute your microphone when not speaking.

Topics to be covered:

During the first five weeks of class, the instructor will introduce students to the field of IPM. PDF readings to supplement the lectures will be posted on the course web site in Canvas (<https://lss.at.ufl.edu/> - click on e-Learning in Canvas).

Guest speakers will join us on the second through fifth class to discuss their research in insect behavior and IPM. From the sixth class until the end of the semester, students will present lectures on broad areas of insect behavior applied to IPM and will lead critique and discussion of one or two scientific articles of their choosing that are related to their topic.

January 8 Introduction to IPM and behavioral manipulation in IPM

Before class, read these two papers.

Readings

1. Rodriguez-Saona, C. R., & Stelinski, L. L. (2009). Behavior-modifying strategies in IPM: theory and practice. In *Integrated pest management: innovation-development process* (pp. 263-315). Springer Netherlands.
2. Foster and, S. P., & Harris, M. O. (1997). Behavioral manipulation methods for insect pest-management. *Annual review of entomology*, 42(1), 123-146.

At the end of the class, we will discuss the elements of an effective oral presentation

January 15 Martin Luther King Day – No Class

January 22 Use of insect behavior to improve insect trapping.

Readings: read the following chapters of the book “Biorational Tree-Fruits pest Management”

1. Leskey, T. C., Chouinard, G. É. R. A. L. D., & Vincent, C. (2009). Monitoring and management of the apple maggot fly and the plum curculio: honouring the legacy of RJ Prokopy. *Biorational tree fruit pest management*, 110-144.
2. Roitberg, B. D., Lauzon, C. R., Opp, S. B., & Papaj, D. R. (2009). Functional and behavioural ecology of tree-fruit pests: the four Fs of fruit flies (Diptera: Tephritidae). *Biorational Tree Fruit Pest Management*, 56-84.

Guest speaker – Dr. Russ Mizell (Emeritus Professor, NFREC, University of Florida)

January 29 Applications of acoustic lures in insect pest management

Readings

1. Polajnar, J., Eriksson, A., Virant-Doberlet, M., & Mazzoni, V. (2016). Mating disruption of a grapevine pest using mechanical vibrations: from laboratory to the field. *Journal of pest science*, 89(4), 909-921.
2. Polajnar, J., Eriksson, A., Lucchi, A., Anfora, G., Virant-Doberlet, M., & Mazzoni, V. (2015). Manipulating behaviour with substrate-borne vibrations–potential for insect pest control. *Pest management science*, 71(1), 15-23.

Guest speaker – Dr. Richard Mankin (USDA)

February 5 Manipulating chemical communication pathway to control insect pests

Readings

1. Witzgall, P., P. Kirsch, and A. Cork. 2010. Sex pheromones and their impact on pest management. *J. Chem. Ecol.* 36: 80-100.

2. Szendrei, Z., and C. Rodriguez-Saona. 2010. A meta-analysis of insect pest behavioral manipulation with plant volatiles. *Entomol. Exp. Appl.* 134: 201-210.

Guest speaker – Dr. Lukasz Stelinski (Associate professor) UF/IFAS North Florida Research and Education Center, Quincy)

February 12 Exploiting insect behavior in field situation

Readings

1. Gillette, N. E., Mehmel, C. J., Mori, S. R., Webster, J. N., Wood, D. L., Erbilgin, N., & Owen, D. R. (2012). The push-pull tactic for mitigation of mountain pine beetle (Coleoptera: Curculionidae) damage in lodgepole and whitebark pines. *Environmental entomology*, 41(6), 1575-1586.
2. Eigenbrode, S. D., Birch, A. N. E., Lindzey, S., Meadow, R., & Snyder, W. E. (2016). A mechanistic framework to improve understanding and applications of push-pull systems in pest management. *Journal of applied ecology*, 53(1), 202-212.

Guest speaker – Dr. Joe Funderburk (Professor) UF/IFAS North Florida Research and Education Center, Quincy)

Student Presentation Dates

February 19
February 26
March 5 – Spring Break – no class
March 12
March 19
March 26
April 2
April 9
April 16

Student Presentation Topics

Students will begin presentations on February 19th. We will have one student present per week but we may need to double up on a few weeks, depending on how many students are in the class. Students should select from one of the following topics. I have chosen these topics because they are broad enough to challenge your information gathering and synthesizing abilities. The topics are also very active areas of research right now so please use recent research papers as examples in your presentation. First come, first served! If you find that there are absolutely no topics in my list that interest you, you may choose another broad topic, in consultation with me.

Assign your fellow students one review-type article on the subject if you can find one, and one or two journal articles that you want them to read critically and discuss with you after the presentation, following the guidelines on p. 7.

1. Manipulation of predator/ parasitoid behavior to increase biological control.

2. The use of Push-Pull strategies in integrated pest management
3. Manipulating plant defense in relation to pest behavior in IPM
4. Use of feeding stimulants in IPM
5. Behavior manipulation of mosquitoes (or more broadly, blood-feeding insects)
6. The concept of “attract and reward” in integrated pest management
7. Manipulating behavior of social insects in IPM (ants, termites...)
8. The use of attract and kill strategies in integrated pest management
9. Sublethal effects of insecticides on insect pest behavior
10. Recent advances in host plant location and selection by herbivore insects
11. Non consumptive effects of natural enemies on insect pests
12. Behavioral avoidance of insecticides by insect pests
13. Influencing insect behavior through environmental manipulation
14. Behavior of entomopathogenic nematodes, and applications for IPM
15. Optical manipulation of arthropod pests and beneficials
16. Behavioral manipulation of urban pests (bed bugs, cockroaches etc.)
17. Integration of multimodal strategies to manipulate insect behavior
18. Behavioral manipulation with plant volatiles
19. Disruption of feeding behavior in insects vectoring plant pathogen

Prerequisites: Basic course in entomology (ENY 3005) or invertebrate zoology (ZOO 3203).

Textbook: None

Assignments and Methods by which the Student will be Evaluated and Grades Determined:

- Present a 35-40 minute seminar on a topic of interest chosen from the list above. Grades will be assigned based on the grading rubric on p. 8. Instructor evaluation of presentation (50 points); peer evaluation of presentation (10 points).
- Provide one review-type article or book chapter, if possible, and one or two journal articles for classmates; facilitate discussion of at least 10-15 min after the presentation (15 points).
- Attendance is mandatory at all class periods; every student should read the assigned journal articles critically and come prepared to discuss them (25 points).

Grading: This course will be graded on the following scale.

A	93-100
A-	90-92
B+	87-89
B	83-86
B-	80-82
C+	77-79
C	73-76
C-	70-72
D	60-69
E	<60

Critical Dates for Exams or Other Work: Student presentations will begin on February 19th. We will draw numbers to determine presentation order. After the drawing, you may switch dates with another student if you wish, but let me know.

Policy Related to Class Attendance: Attendance is mandatory. We meet for only 14 class periods so every class is critical. It is also considerate to attend the presentations of fellow students.

Policy Related to Make-Up Exams or Other Work: Missed presentations cannot be made up except in the case of prior excused absence or family or medical emergencies.

Class Demeanor Expected by Instructor: Please be considerate of your classmates by not chatting or texting during class. The banging of doors is very distracting to both students and professor, therefore please arrive on time and do not leave early. Turn off cell phones before coming into classroom.

Additional General Information: The following information applies to all courses at the University of Florida.

We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standard of honesty and integrity.

Academic Honesty: As a result of completing the registration form at the University of Florida, every student has signed the following statement: "I understand that the University of Florida expects its students to be honest in all their academic work. I agree to adhere to this commitment to academic honesty and understand that my failure to comply with this commitment may result in disciplinary action up to and including expulsion from the University."

Copyrighted Materials and Software Use: All students are required and expected to obey the laws and legal agreements governing copyrighted material and 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.

Accommodations for Students with Disabilities: Students requesting classroom accommodation must first register with the Dean of Students Office. The Dean of Students will provide documentation to the student who must then provide this documentation to the Instructor when requesting accommodation.

University Counseling Services: Resources are available on-campus for students having personal problems or lacking clear career and academic goals which interfere with their academic performance. These resources include:

1. University Counseling Center, 301 Peabody Hall, 392-1575, personal and career counseling;
2. Student Mental Health, Student Health Care Center, 392-1171, personal counseling;
3. Sexual Assault Recovery Services (SARS), Student Health Care Center, 392-1161, sexual counseling;
and
4. Career Resource Center, Reitz Union, 392-1601, career development assistance and counseling.

Critical Reading of Scientific Articles

Whenever you read a journal article, think about the following questions. Just because a paper has been published in a scientific journal, does not necessarily mean it was good science or it was well-written. As you are reading the assigned journal articles, think about these questions. We will use the answers to these questions as a starting point for our discussion of the assigned paper(s).

So, please come to class with the answers to these questions in your head or on a piece of paper and be prepared to talk about them.

1. What are the specific hypotheses (and alternative hypotheses) or questions that are being explored?
2. Do the authors relate the specific hypotheses to a larger area of science (i.e., the “big picture”)?
3. Do the hypotheses follow logically from the background material that is presented in the Introduction section?
4. Do the authors make specific predictions of outcomes after manipulative experiments or was their study purely descriptive or comparative?
5. Are the experimental design and the methods used appropriate to answer their questions?
6. Are the methods described well enough to be repeated by other research groups?
7. How were the data analyzed? Was the analysis appropriate or can you think of a better way to do it? Think also if the data could have been collected differently to facilitate the analysis.
8. Are the data portrayed effectively in figures and tables? Are they clear and necessary or could the data have been presented in the text?
9. Do the results match the predictions the authors made?
10. If results differ from predictions or from the published research of other groups, do they address the differences and suggest reasons?
11. What are the authors’ conclusions? Would you have reached the same conclusion from these results? Have they made a strong case for their conclusions? What else could you propose to bolster their conclusions? What kinds of data would have convinced you?
12. What are the implications of these findings for the subfield and entomology more generally? How can these findings be extended into the “big picture”.
13. Where should this research go next? What should the next experiments be?
14. You may also think about the quality of the presentation of the article. Does the paper tell a nicely packaged “story” with sound reasoning throughout the paper? Are there areas where the paper wanders from the argument? Are the major points of the paper accurately and consistently presented in the title, abstract, key words, introduction and conclusions? Was the writing easy to understand, interesting, and not too wordy?

Evaluation of Oral Presentations in Insect Behavior for IPM

Student name _____

Title _____

Presentation components	Grade 1.....10 poor....excellent	Comments
<p>Content (40%) - interesting subject matter; significance well established; informative introduction; well developed body of the presentation; strong ending and conclusions; 35-40 minutes</p>		
<p>Organization (20%) - no redundancy; logical and smooth transitions and flow</p>		
<p>Delivery (20%) - good eye contact; relaxed manner; appropriate pace of speech and use of pauses; effective use of pointer</p>		
<p>Visual aids (10%) - visually-pleasing slides (helpful, not distracting); good use of photos or diagrams as appropriate; well organized slide layout; font adequate size; well proofed</p>		
<p>Handling questions (10%) – repeat question; polite, concise and friendly response; seemingly at ease</p>		