

**Seminar in Insect Chemical Ecology**  
**ENY 6934, 1 credit**  
**Spring 2021, Sections 28FE (live) and 4449 (online)**

**Instructor:** Dr. Heather McAuslane  
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**Class period:** Friday, periods 6-7 (12:50 – 2:45 p.m.)

**Room:** 1031 Steinmetz Hall and by Zoom

<https://ufl.zoom.us/j/93998714179?pwd=dTNJMVZET0t1TnJtSEc5OWRjb3lEQT09>

Meeting ID: 939 9871 4179  
Passcode: 960369

**Office hours:** Immediately after class and at other times by appointment (via Zoom or MS Teams)

**Physical Presence requirement:** This course is listed as 80-99% online. Thus, there is a physical presence requirement. All students will be expected to present their talk in room 1031 Steinmetz Hall or via Zoom from a classroom at their Research and Education Center with their faculty supervisor in attendance (and any other interested audience members). Alternatively, REC students can practice their talk in the same room as their faculty supervisor in order to get input on their talk before they present via Zoom in class.

**Course Description:** This course is one of the seminar courses offered each semester in the Department of Entomology & Nematology to meet the 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 current topics in insect chemical ecology.

**Objectives and Goals:**

- Learn terminology used in chemical ecology research.
- Appreciate the importance of bioassays in determining the biological function of natural products.
- Be familiar with the physiological and molecular basis for chemoreception.
- Understand the chemical analytical techniques available for natural product separation, isolation, and identification in order to collaborate productively with natural product chemists.
- Investigate some of the current topics in insect chemical ecology.
- Learn to read journal articles critically.
- Gain practice in organizing and delivering a 35-40 minute teaching-type seminar.

**Zoom access:**

You can join the Zoom meeting from your desktop/laptop by clicking on this link <https://ufl.zoom.us/j/93998714179?pwd=dTNJMVZET0t1TnJtSEc5OWRjb3lEQT09>. You should have a

microphone and camera. This will be particularly important when it is your turn to present (and we'd love to see your face during all meetings!). You will be prompted to download Zoom when you click on the link above, if you don't already have it on your computer. Make sure your IT administrator allows you to add it to your computer. You can join each meeting starting at 12:45. The meeting will cut off at 3:00. Please mute your microphone when not speaking.

### **Topics to be covered:**

During the first five weeks of class, the instructor will lecture to introduce students to the field of insect chemical ecology. 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). Read the review-type articles and the book chapters for information and read the journal articles critically, following the guidelines on p. 9 of this syllabus for critiquing scientific articles.

Guest speakers will join us on the second through fifth class to discuss their research in chemical ecology. From the sixth class (February 19<sup>th</sup>) or seventh (February 26<sup>th</sup>) until the end of the semester, students will present lectures on broad areas of chemical ecology and will lead critique and discussion of a scientific article of their choosing that is related to their topic.

### **January 15 Introduction to Chemical Ecology**

Before class, read these two papers.

#### Readings

1. Raguso, R. A., A. A. Anurag, A. E. Douglas, G. Jander, A. Kessler, K. Poveda, and J. S. Thaler. 2015. The raison d'être of chemical ecology. *Ecology* 96: 617-630.
2. Pickett, J.A., G. I. Aradottir, M. Birkett, T. Bruce, K. Chamberlain, Z. R. Khan, C. Midega, L. Smart, and C. Woodcock. 2012. Aspects of insect chemical ecology: exploitation of reception and detection as tools for deception of pests and beneficial insects. *Physiol. Entomol.* 37: 2-9.

We will discuss the elements of an effective oral presentation (excerpted from the web site of Dr. Jeff Radel <http://www.kumc.edu/SAH/OTEd/jradel/effective.html>). See other resources on the Week 1 module in Canvas.

### **January 22 Insect Behavior and Chemical Ecology – the Bioassay**

Before class, read Hare (1998) and Knolhoff and Heckel (2014) for information and critically read and analyze paper by Saul-Gershenz and Miller (2006).

#### Readings

1. Hare, D. 1998. Bioassay methods for terrestrial invertebrates, pp. 212-270. *In Methods in Chemical Ecology: Vol. 2 Bioassay Methods*. Kluwer Academic Publishers, Boston.
2. Knolhoff, L. M., and D. G. Heckel. 2014. Behavioral assays for studies of host plant choice and adaptation in herbivorous insects. *Annu. Rev. Entomol.* 59: 263-278.
3. Saul-Gershenz, L. S., and J. G. Millar. 2006. Phoretic nest parasites use sexual deception to obtain transport to their host's nest. *Proc. Nat. Acad. Sci.* 103: 14039-14044.

*Guest speaker – Dr. Caitlin Rering (Research Chemist, USDA CMAVE, Gainesville)*

## January 29 Chemoreception, Neural Integration, and Electrophysiology

Before class, read first two papers for information and critically read and analyze paper by McBride et al. (2014).

### Readings

1. Hansson, B. S., and M. C. Stensmyr. 2011. Evolution of insect olfaction. *Neuron* 72: 698-711.
2. Riffell, J.A. 2012. Olfactory ecology and the processing of complex mixtures. *Curr. Op. Neurobiol.* 22: 236-242.
3. McBride, C. S., F. Baier, A. B. Omondi, S. A. Spitzer, J. Lutomiah, R. Sang, R. Ingell and L. B. Vosshall. 2014. Evolution of mosquito preference for humans linked to an odorant receptor. *Nature* 515: 222-227.

### Video

<http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3197296/>

Syed, Z., and W. S. Leal. 2011. Electrophysiological measurements from a moth olfactory system. *J. Vis. Exp.* 49: 2489. Published online Mar 29, 2011. doi: [10.3791/2489](https://doi.org/10.3791/2489)

*Guest speaker – Dr. Tolulope Morawo, UF/IFAS Indian River Research and Education Center*

## February 5 The Dreaded “C” in Chemical Ecology: Chemical Separation, Isolation and Identification

Before class, read Miller and Sims (1998) and Alborn et al. (2007) for information and critically read and analyze paper by Schroeder et al. (2006).

### Readings

1. Millar, J. G., and J. J. Sims. 1998. Preparation, cleanup, and preliminary fractionation of extracts, pp. 1-37. *In Methods in Chemical Ecology: Vol. 1 Chemical Methods.* Kluwer Academic Publishers, Boston.
2. Alborn, H. T., T. V. Hansen, T. H. Jones, D. C. Bennett, J. H. Tumlinson, E. A. Schmelz, and P.E.A. Teal. 2007. Disulfoxy fatty acids from the American bird grasshopper *Schistocerca americana*, elicitors of plant volatiles. *Proc. Nat. Acad. Sci.* 104: 12976-12981.
3. Schroeder, F. C. M. L. del Campo, J. B. Grant, D. B. Weibel, S. R. Smedley, K. L. Bolton, J. Meinwald, and T. Eisner. 2006. Pinoresinol: A lignol of plant origin serving for defense in a caterpillar. *Proc. Nat. Acad. Sci.* 103:15497-15501.

*Guest speaker – Dr. Hans Alborn (Research Chemist, USDA CMAVE, Gainesville)*

## February 12 Application of Chemical Ecology to Insect Pest Management

Before class, read first three papers for information and critically read and analyze paper by Knight et al. (2014).

### 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.
3. Pickett, J. A., and Z. R. Khan. Plant volatile-mediated signaling and its application in agriculture: successes and challenges. *New Phytol.* 212: 856-870.
4. Knight, A.L., R. Hilton, E. Basoalto, and L. Stelinski. 2014. Use of glacial acetic acid to enhance bisexual monitoring of tortricid pests with kairomones lures in pome fruits. *Environ. Entomol.* 43: 1628-1640.

*Guest speaker - Lukasz Stelinski (Citrus Research and Education Center, Lake Alfred)*

**February 19**      **Guest speaker or activity or first student presentation (depends on class enrollment)**

- Paper critique/journal
- Pair activity -your insect – goal, observations, bioassay, traits, methodology

### **Student Presentation Dates**

February 26  
 March 5  
 March 12  
 March 19  
 March 26  
 April 2  
 April 9  
 April 16

### **Student Presentation Topics**

Students will begin presentations on February 19 or 26th. 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. 9.

- Chemical mimicry in insects
- Chemical ecology of plant-pollinator interactions
- Chemical ecology of non-pollinator mutualisms
- Induced direct chemical defenses of plants against herbivorous insects

- Indirect plant chemical defenses against insects (i.e., tritrophic interactions involving plants, herbivores and parasitoids/predators)
- Chemical ecology of mosquitoes (or more broadly, blood-feeding insects)
- Chemical ecology of ticks
- Chemical ecology of social insects (limit to one family or order – e.g., Apidae, Formicidae or Isoptera) – several students can do this topic if they choose different taxa.
- Contributions of the “-omics” to the advancement of chemical ecology research
- Eavesdroppers - illicit use of insect chemical communication systems (i.e., how parasitoids and predators listen in on communication between insects to find their prey/hosts)
- Recent advances in host plant location and selection by insect herbivores
- Chemical detection of natural enemies by arthropods
- Insect olfactory neurophysiology and molecular biology
- Chemical ecology of phytophagous mites
- Use of sequestered plant compounds by insects in intraspecific and interspecific interactions
- Recent advances in chemical ecology of sex attraction in insects
- Interactions among herbivores, plants and microbes (plant pathogens and endosymbiotic mutualists)
- Role of symbiotic microorganisms in insect pheromonal communication

**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. 10. 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-	90-92.99

B+	87-89.99
B	83-86.99
B-	80-82.99
C+	77-79.99
C	73-76.99
C-	70-72.99
D	60-69.99
E	<60

**Critical Dates for Exams or Other Work:** Student presentations will begin on February 19<sup>th</sup> or 26<sup>th</sup>. 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.

**Online Course Evaluation Process:** Student assessment of instruction is an important part of efforts to improve teaching and learning. At the end of the semester, students are expected to provide feedback on the quality of instruction in this course using a standard set of university and college criteria. Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online via GatorEvals. Guidance on how to give feedback in a professional and respectful manner is available at: <https://gatorevals.aa.ufl.edu/students/>. Students will be notified when the evaluation period opens and can complete evaluations through the email they receive from GatorEvals, in their Canvas course menu under GatorEvals, or via <https://ufl.bluera.com/ufl/>. Summaries of course evaluation results are available to students at: <https://gatorevals.aa.ufl.edu/public-results/>.

### COVID Response Statements

We will have face-to-face instructional sessions to accomplish the student learning objectives of this course. In response to COVID-19, the following policies and requirements are in place to maintain your learning environment and to enhance the safety of our in-classroom interactions.

- You are required to wear approved face coverings at all times during class and within buildings. Following and enforcing these policies and requirements are all of our responsibility. Failure to do so will lead to a report to the Office of Student Conduct and Conflict Resolution.
- This course has been assigned a physical classroom with enough capacity to maintain physical distancing (6 feet between individuals) requirements. Please utilize designated seats and maintain appropriate spacing between students. Please do not move desks or stations.
- Sanitizing supplies are available in the classroom if you wish to wipe down your desks prior to sitting down and at the end of the class.
- Follow your instructor's guidance on how to enter and exit the classroom. Practice physical distancing to the extent possible when entering and exiting the classroom.

- If you are experiencing COVID-19 symptoms ([Click here](#) for guidance from the CDC on symptoms of coronavirus), please use the UF Health screening system and follow the instructions on whether you are able to attend class. [Click here](#) for UF Health guidance on what to do if you have been exposed to or are experiencing Covid-19 symptoms.
- Course materials will be provided to you with an excused absence, and you will be given a reasonable amount of time to make up work. Find more information in the university attendance policies.

For students who participate online: Our class sessions may be audio visually recorded for students in the class to refer back and for enrolled students who are unable to attend live. Students who participate with their camera engaged or utilize a profile image are agreeing to have their video or image recorded. If you are unwilling to consent to have your profile or video image recorded, be sure to keep your camera off and do not use a profile image. Likewise, students who un-mute during class and participate orally are agreeing to have their voices recorded. If you are not willing to consent to have your voice recorded during class, you will need to keep your mute button activated and communicate exclusively using the "chat" feature, which allows students to type questions and comments live. The chat will not be recorded or shared. As in all courses, unauthorized recording and unauthorized sharing of recorded materials is prohibited.

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

### **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/process/student-conduct-honor-code>.

### **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.

### **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, <https://disability.ufl.edu/>

### **Campus Helping Resources**

Students experiencing crises or personal problems that interfere with their general wellbeing 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](http://www.counseling.ufl.edu)
  - Counseling Services
  - Groups and Workshops
  - Outreach and Consultation
  - Self-Help Library
  - Wellness Coaching
- U Matter We Care, [www.umatter.ufl.edu/](http://www.umatter.ufl.edu/)
- Career Connections Center, First Floor JWRU, 392-1601, <https://career.ufl.edu/>.
- Student Success Initiative, <http://studentsuccess.ufl.edu>.

### **Student Complaints:**

- Residential Course: <https://sccr.dso.ufl.edu/policies/student-honor-code-studentconduct-code/>.
- Online Course: <http://www.distance.ufl.edu/student-complaint-process>

## 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 Chemical Ecology

Student name \_\_\_\_\_

Title \_\_\_\_\_

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