

**Syllabus for ENTM 7900 – Directed Studies in Entomology I:
Insect Behavior and Chemical Ecology
Fall 2013 (3 credit hours)**

Instructor: Henry Fadamiro, 346 Funchess Hall; 334-844-5098 (office) fadamhy@auburn.edu

Schedule: Fridays 10-12 noon

Location: Funchess Hall Room 358

Office Hours: After class and by appointment.

Required Reading: Articles from the literature are assigned and passed out in class.

Textbook Suggestions:

- Matthews, R.W and J.R. Matthews. 2010. *Insect Behavior*. 2nd Edition. Springer. 514 pp.
- Houck, L.D. and L.C. Drickamer (eds.). 1996. *Foundations of Animal Behavior – Classic Papers with Commentaries*. The University of Chicago Press. 842 pp.
- Cardé, R.T. and W. J. Bell. 1995. *Chemical Ecology of Insects 2*. Chapman & Hall. 433 pp.
- Ryan, M.F. 2002. *Insect Chemoreception: Fundamental and Applied*. Kluwer Academic Publishers. 330 pp.
- Millar, J.G. and K.F. Haynes (eds.). 2000. *Methods in Chemical Ecology*. Volume 1. 2nd Printing. Kluwer Academic Publishers. 390 pp.

COURSE OUTLINE

I. Introduction to insect behavior/ethology (Week 1)

- A. Introduction and conceptual frameworks
- B. Niko Tinbergen's four questions
- C. Conceptual pitfalls: anthropomorphism and teleology
- D. Ethogram

II. Programming and integration of behavior (Week 2)

- A. Nervous/hormonal coordinating mechanisms
- B. Innate and learned behaviors
- C. Memory and learning
- D. Insect intelligence

III. Movement/spatial adjustment (Week 3)

- A. Locomotion and orientation
- B. Insect flight: dispersal and migration
- C. Flight energetics and cost of migration

IV. Foraging and feeding behavior (Week 4)

- A. Feeding types and regulation of feeding
- C. Evolution of insect diet selection
- D. Foraging and food location strategies

V. Mating and reproduction (Week 5)

- A. Mating systems
- B. Courtship and copulation
- C. Oviposition behavior

VI. Defense (Week 6)

- A. Passive defense mechanisms (crypsis, mimicry and aposematic defenses)
- B. Active defense mechanisms (attack, aggressive, and group defenses)
- C. Chemical defenses

Midterm test (Week 7 - October 4)

VII. Visual communication (Week 8)

- A. Bioluminescence
- B. Light reception
- C. Functions of visual communication

VIII. Chemical communication (Weeks 9 & 11- No lecture in Week 10, October 25)

- A. Plant chemicals - primary and secondary compounds
- B. Insect-plant interactions
- C. Tritrophic interactions (including predator/parasitoid host location strategies)
- D. Coevolution of herbivores and plant allelochemicals
- E. Pheromone types and pheromone mediated behavior
- F. Mechanisms of orientation to odor

IX. The chemoreceptive organs (Week 12)

- A. The sensory neuron/associated cells
- B. Systematics of sensilla
- C. Circuitry of the sensillum/peripheral coding
- D. Processing by the CNS/antennal lobe

X. Techniques in insect chemical ecology/olfaction research (Weeks 13 & 14)

- A. Analytical techniques
- B. Electrophysiological techniques
- C. Behavioral techniques
- D. Applications of molecular techniques in insect olfaction research
- E. Laboratory experience in chemical ecology research

Grading Criteria:

Ethogram (10% of grade). Construct an ethogram (a catalog of observed behaviors) of any insect of your choice (could be your research insect). Behavior must be observed for at least one hour. Pictorial ethograms/video clips are recommended for maximum points (detailed discussed in class). Due on September 27.

Midterm exam (35% of grade)

October 4. This exam will include all material from the beginning of the class through the week of September 25.

Review paper/presentation (20% of grade)

- Review paper due on November 15. Review paper must be on a research topic of current interest in insect behavior and chemical ecology. Paper may be related to student's dissertation.
 - An abstract is due on October 18. Abstract should have ~250 words and summarize the topic (typed and double-spaced).
 - Review paper must be a maximum of 10 pages (double-spaced) including tables, figures, and references. It should be typed in Word. Use scientific format: Title, Author and Affiliation, Abstract, Introduction, Discussion, and References.
 - Powerpoint presentation of review paper will take place on November 29. Each presentation is for 10 minutes plus 5 minutes of questions and answers. Note that presentation will be peer-graded and constitute 25% of the review paper grade.

Final exam (35% of grade)

December 6, 2013. 10-12 noon. This exam will include all materials after midterm through end of class.