ENTMLGY 6410, Insect Ecology and Evolutionary Processes (AU 2014)

Section number, Columbus: 1010-LEC(31514)
Section number, Wooster: 101W-LEC(34038)

Class Description: This course overviews insect ecology from an evolutionary perspective focusing on factors influencing the diversity, distribution, and abundance of insects. Fundamental mechanisms underlying interactions between insects and their abiotic and biotic environment at the molecular, cellular, organismal, population, community, ecosystem, and landscape levels will be addressed and their integration emphasized. The role of insects as model systems in the development of general ecological and evolutionary principles will be high-lighted. 3 Credits, no laboratory

Instructors: Dr. Andy Michel, Dr. Mary Gardiner, and Dr. Dan Herms

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210 Thorne Hall	203B Thorne Hall	204 Thorne Hall
	311 Howlett Hall	

Credits, Level: 3 credits (lecture, no lab), advanced undergraduate and graduate

Prerequisite: General ecology course, or permission of instructor

Meeting Time and Location:

Tuesdays and Thursdays, 11:05 - 12:25
245 Kottman Hall (Columbus) video-linked to 206 Thorne Hall (Wooster).

Course Objectives: Students will learn:

1. Significance of insects as model systems in development of ecological and evolutionary principles.
2. Major transitions in the evolution of insects and other arthropods.
3. Biotic and abiotic ecological forces that drive insect evolution.
4. Molecular, physiological, population, and genetic level responses of insects to ecological forces.
5. Fundamental principles of insect population dynamics.
6. Functional role of insects in populations, communities, and ecosystems, including intra- and interspecific interactions, and trophic dynamics.

Course and Topic Outline

Aug 28: Course Introduction, Importance of Insects in Ecosystems (Michel / Herms)

Unit 1: Molecular and Evolutionary Ecology
Sep 2: Major transitions in insect evolution (Michel)

Sep 4: Evolutionary processes (Michel)
Sep 9: Fitness and Adaptation: A case study in Insect Resistance Management (Michel)
Sept 11: Molecular markers, population genetics and genomics (Michel)
Sept 16: QTLs, ecogenomics and genetics of ecologically relevant traits (Michel)
Sept 18: Speciation mechanisms (Wenger)
Sept 23: Life history evolution, ecological specialization (Herms)

Unit 2: Physiological Ecology
Sept 25: Diapause, and seasonality from an ecological perspective (Dr. Dave Denlinger)
Sept 30: Climate change and insect ecology (Herms)
Oct 2: Climate effects on distribution and abundance (Dr. Matt Ayres, Dartmouth College)
Oct 7: Chemical ecology (Dr. P. Larry Phelan)
Oct 9: Molecular plant-insect interactions (Dr. Raman Bansal)
Oct 14: Population dynamics: case study with gypsy moth (Herms)
Oct 16: **Mid-Term Exam on Units 1 and 2**

Unit 3: Trophic Interactions and Population Ecology
Oct 21: Plant-herbivore interactions (Herms)
Oct 23: Nutritional ecology (Herms)
Oct 28: Predator and prey dynamics (Dr. Luis Cañas)
Oct 30: Competition (Gardiner)
Nov 4: Mutualisms (Gardiner, Prajzner)
Nov 6: Plant defense theory (Herms)
Nov 11: Veterans Day – no class

Unit 4: Community, Ecosystem and Landscape Ecology
Nov 13: Defining and measuring niche space (Gardiner)
Nov 18 : ESA conference - no class
Nov 20: Food-web ecology (Gardiner)
Nov 27: Invasion ecology (Gardiner)
Nov 29: Thanksgiving-no class
Dec 2: Invasion genetics (Michel)
Dec 4: Landscape (spatial?) ecology (Gardiner)
Dec 9: Landscape genetics (Michel / Gardiner)

Final Exam, date TBD

C. Textbook: Not required. Course will be taught from lectures and readings assigned from the primary literature.

D. Evaluation: Grades will be based on results of one midterm, one final exam (40% each), and one term paper (mini-review) (20%).

Exams: One midterm and one non-comprehensive final (second midterm).

- Midterm 1: Demonstration of insect evolution and the genetic (Unit 1) and environmental (Unit 2) factors in adaptation.

- Midterm 2: Demonstration of how insect interact within populations, communities, ecosystems, and landscapes, including trophic interactions (Units 3 and 4).

Mini-Review: The objective of the mini-review is to explore a topic in more detail than can be addressed in class, and should integrate concepts presented in this class. Emphasis will vary with student interests, but must address fundamental mechanisms underlying the interactions between insects and their environment at the molecular, cellular, organismal, population, community, and/or ecosystem levels. Evolutionary implications of these interactions are appropriate, and integration across levels of biological organization will be viewed favorably. Topics related to student' 's thesis research are fair. An ideal paper will (1) identify a pattern or phenomena of ecological significance, (2) outline testable hypothesis(es) (theories) that provide a mechanistic explanation for this phenomena, (3) review evidence from the literature supporting both (background), (4) identify future research directions (e.g. knowledge gaps in background, testable predictions derived from the hypotheses, assumptions that have not been adequately tested).

Textbook: Not required. Course will be taught from lectures and readings assigned from the primary literature.

Evaluation: Grades will be based on results of one midterm, one final exam (40% each), and one term paper (20%).

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Course Grading Scale: standard percent scale, no curve. (e.g., 91-100% = A; 89 & 90 = A-; 87-88 = B+; 81-86 = B; 79-80 = B-; 77-78 - C+; 71-76 = C; 69-70 = C-; etc.

F. Academic Misconduct Statement: Students are expected to work independently, including on take home exams (but may share resources such as books), and will be held accountable for normally defined situations of academic misconduct (plagiarism, cheating, and other forms of misconduct as defined by the university). Such misconduct will not be tolerated in this course. According to Faculty Rule 3335-31-02, Academic Misconduct is defined as any activity which tends to compromise the academic integrity of the institution or subvert the educational process. Please see the Student Resource Guide or the instructor if you have questions about this policy.

G. Disability Statement: As this course is only lecture-based, it has restriction in regards to students with disabilities. However, if any student feels that she/he may need an accommodation based on the impact of a disability as documented through the Office for Disability Services (614-292-3307 in room 150 Pomerene Hall), we will work diligently to coordinate reasonable accommodations for students with such documented disabilities.