PLB 435 - Plant-Insect Interactions Fall 2015

Instructor: Dr. Sedonia Sipes, Associate Professor, Dept. of Plant Biology
Office: LSII 473 phone 453-3213
Email ssipes@plant.siu.edu
Office hours: Tues/Thurs 1-3 or appt.

Course Description: Plants and insects have played major roles in influencing each other's evolutionary diversification. In fact, much of the plant diversity we see today is due to the evolutionary influence of insects, and likewise much of the astounding insect biodiversity, much of which we have not even catalogued, is due to the driving force of adaptive plant defenses to herbivory. Plant-insect interactions are receiving increasing attention from biologists in many fields. This course will be an evolutionary and ecological examination of the interactions between plants and insects. Topics will include herbivory, pollination relationships, ant-plant mutualisms, host plant choice, specialized vs. generalized relationships, seed and fruit dispersal, coevolution/cospeciation, and chemical ecology. Pest management and ecomonic entomology may be covered peripherally to the aforementioned topics but are NOT the primary focus of the course. Prerequisites Biol 200a and 200b (General Biology) or equivalent; Biol 307 (General Ecology) or equivalent. For graduate students and senior undergraduates.

Objectives

1. To gain an appreciation for the biodiversity of plants and herbivorous insects.
2. To learn about the various kinds of relationships between plants and insects.
3. To examine the concepts of ecological specialization and generalization as they relate to these interactions.
4. To understand how plants and insects have directly and indirectly affected each others' evolution.
5. To examine some of the morphological, behavioral, and physiological adaptations exhibited by plants and insects that have evolved as a result of these interactions.
6. To develop skills in reading from the primary scientific literature, and to become familiar with a tiny portion of the huge literature dealing with plant-insect interactions.

General course format: Generally, there will be two lectures per week (usually M & W), and F will be reserved for discussion of a relevant paper from the literature. The Friday of the first week will be an exception; there will be lecture instead of discussion the first Friday.

Text: The primary textbook for the course is:
Insect-Plant Biology, 2nd edition 2005
By Louis M. Schoonhoven, Joop J.A. van Loon, and Marcel Dicke
Oxford University Press
ISBN 0-19-852595-8

Readings will be assigned from this and several other books (see attached references) as well as current and classic journal articles; these will be available as pdfs on Blackboard. Friday discussions will involve reading assignments of classic and current literature – expect to read a book chapter plus 1-2 papers from the literature each week.

Grading: Midterm 25% Final 25%, term paper 25%, participation in discussions 10%, homework 15%
A= 90% or above B = 80-89% C = 70-79% D = 60-69% F = below 60%

Discussions: The paper for the week will be made available at least by the preceding Monday. Part of your grade will be participation in the discussions. You should read the paper carefully and prepare notes ahead of time (more details to follow).

Homework: Each Friday after discussion you should turn in the outline or summary (no more than one page, typed).

Term Paper: The term paper is meant to be a thoughtful exploration of an exciting and/or controversial subject relating to plant-insect interactions. I will be happy to "pre-approve" your topic, help you focus or narrow it if necessary, and provide some assistance in finding references. Your paper should contain a large component of your own thought and synthesis rather than just paraphrasing of existing review papers.

The exact number of pages or references is less important than the content. References should include primary literature (peer-reviewed original research papers) in addition to review articles and/or book chapters). The use of non-scholarly web-based resources (e.g. Wikipedia, ".com" sites) should be avoided. Read enough papers, and write enough pages, to produce a well-reasoned synthesis and argument that is based on the most relevant, up-to-date sources. Typically, this requires around 10 double-spaced pages, IF your writing is succinct.

The term paper should be logically organized and well-written, with proper grammar and spelling. I do not care in what style you cite your reference, but the format should be consistent. **Undergraduates must turn in a draft by Nov. 6** so that I can provide you with comments for improvements. This is optional for graduate students. Final term paper is due Nov. 23. You will be required to submit an electronic Word or pdf file of your term paper. You will be required to turn in both the draft and final version of your paper through turnitin.com. You will need to create a user profile on this website and then access the page I have made for this class. More details to follow.

Exams: Will be in short answer and essay format. Any material covered in readings (including discussion papers) or lecture may show up in exams. You should be prepared to integrate examples from the discussion papers and book readings into answers on exams.

Some assigned readings in addition to your Schoonhoven book will come from the following books. PDFs of assigned sections will be on D2L.

Jolivet, P. 1998. Interrelationship between insects and plants. CRC Press, Boca Raton, FL. 309 p.

Herrera, Carlos M., and Olle Pellmyr. 2002. Plant-animal interactions: an evolutionary approach. Blackwell Science, Malden MA. 313 pp.

<u>Tentative</u> Course Outline

Week	Reading	Topics
Week 1 Aug 24-28	Handout, Schoonhoven Ch. 1	Why study plant-insect interactions? "Bugs for Dummies": basic insect biology, lifecycles, herbivorous insect orders and (some) families
Week 2 Aug 31-Sep 4	Jolivet Ch 1,2: 1-25	"Land Plants for Dummies" Timing of diversification of major groups of insects and plants
SEP. 7 LABOR DAY HOLIDAY		
Week 3 Sep 9-11	Schoonhoven Ch. 3,5	Intro to herbivory: Plants as insect food, evolution of herbivory.
Week 4 Sep 14-18	Schoonhoven Ch. 2	Host-plant specialization vs. generalization
Week 5 Sep 21-25	Schoonhoven Ch 10	Affects of herbivory on plant fitness and reproduction; compensatory reactions
Week 6 Sep 28-Oct 2	Schoonhoven Ch. 4	Plant secondary chemistry, chemical ecology
Week 7 Oct 5-9	Schoonhoven Ch. 6,7	Host–plant selection Pollination ecology: History of pollination, insects that pollinate, "floral syndromes"
OCT. 10-13 FALL BREAK		
Week 8 Oct. 14-16	Schoonhoven Ch. 12 Herrera Ch. 6	MIDTERM Mon. October 14 and/or 16
Week 9 Oct 19-23		Pollinator foraging: constancy vs. specialization, specialization vs. generalization, chemistry and other factors affecting host choice
Week 10 Oct 26-30		Pollinator affects on plant gene flow; competition among pollinators for floral resources; competition among plants for pollinator services.
Week 11 Nov 2-6	Herrera Ch. 7: 211-235	Chemical ecology of pollination **Term paper draft due Nov. 6th (required for undergrads, optional for grads)**
Week 11 Nov 9-13	Jolivet Ch. 4: 55-69	Ant-plant interactions: Ant-guard systems, myrmecochory, harvester ants
NOV. 11 VETERAN'S DAY HOLIDAY		
Week 12 Nov. 16-20	Schoonhoven Ch. 10	Multilevel ant-plant interactions: Leafcutter ants (ant/plant/fungi/bacteria), homopteran/ant/plant.
Week 13 Nov. 23	Schoonhoven Ch. 11	Community aspects of plant-insect interactions TERM PAPER DUE ON TURNITIN.COM BY NOV 24 5:00 PM
NOV. 25-29 THANKSGIVING BREAK		
Week 14 Nov 30-Dec 4		Co-evolution sensu Ehrlich & Raven
Week 15 Dec. 7-11		Co-speciation, diffuse co-evolution, implications for pest management, invasive species Carnivorous plants
FINAL EXAM Wed. December 16, 10:15-12:15 p.m.		