

TROPICAL ENTOMOLOGY

ENY 3563

Summer A 2019

Credits: 3

PRINCIPAL INSTRUCTORS

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COURSE OBJECTIVES

This course provides the student an overview of the ecology, diversity, and agricultural and veterinary importance of insects in the tropics. Insects are the most diverse multicellular organisms in the tropics. Their roles in nature have diversified into most habitats where they are fungivores, herbivores, necrophages, coprophages, saprophages, parasitoids, parasites, and predators. They provide critical ecosystem services such as decomposition, nutrient recycling, pollination, and biological control. Tropical insects are used as bioindicators of ecosystem health and conservation needs, in butterfly farming, live material in insect zoos, and models in literature, art, and sculpture.

In this course, the student will learn:

1. Basic concepts about the tropics and tropical ecosystems;
2. Faunistic richness of insects in the tropics;
3. Seasonality and survival in tropical environments;
4. Dung beetles in tropical environments;
5. Termites in tropical environments;
6. Ants in tropical environments;
7. Insect conservation;
8. Tropical insect-plant interactions;

9. Pollination of tropical plants by insects;
10. Mimicry in tropical insects;
11. Entomophagy in the tropics;
12. Economic importance of tropical insects in tropical crops;
13. Medical and veterinary importance of tropical insects.

COURSE FORMAT

The narrated PowerPoint presentations form a series of 14 **LECTURES** covering 13 basic themes listed above. All presentations are available in Canvas through UF eLearning (elearning.ufl.edu). Each presentation is accompanied by a **READING ASSIGNMENT** to provide further information on the lecture topic. The lecture and reading should be viewed before the discussion session (see Course Outline), so that all students are able to answer questions posed during the discussion. Students should also prepare any questions they have from viewing the presentations and present them in the appropriate discussion.

Participation in **DISCUSSIONS** (Room 1027 in Steinmetz Hall or via Zoom, 9:30am MWF) is a critical component of this course. Live interaction with the instructors and other students is a very important part of the learning experience. Students should be willing to share opinions, perceptions, and experiences. Every lecture has five discussion questions associated with it. Please review the discussion questions and consider information in the lecture and assigned reading to be able to respond to the questions during the discussions. Each session will be recorded, and a link to each recording will be provided.

COURSE SCHEDULE

May 13: First Day of Class

- Participant introductions, course overview, syllabus, student expectations and knowledge of tropical entomology.

May 15: Ecological Diversity and the Tropics

- Discussion of Lecture 1 and assigned reading with Dr. Cave.

May 17: Faunistic Richness of Insects in the Tropics

- Discussion of Lecture 2 and assigned reading with Dr. Miller.
- Lecture 1 synopsis due.

May 20: Seasonality and Survival in Tropical Environments

- Discussion of Lecture 3 and assigned reading with Dr. Miller.
- Lecture 2 synopsis due.
- Deadline for approval of Featured Creature.

May 22: Dung Beetle Ecology in the Tropics

- Discussion of Lecture 4 and assigned reading with Dr. Cave.
- Lecture 3 synopsis due.

May 24: Termites in the Tropics

- Discussion of Lecture 5 and assigned reading with Dr. Scheffrahn.
- Lecture 4 synopsis due.

May 27: Memorial Day Holiday**May 29: Ants in Tropical Ecosystems**

- Discussion of Lecture 6 and assigned reading with Dr. Cave.
- Lecture 5 synopsis due.

May 31: Insect Conservation

- Discussion of Lecture 7 and assigned reading with Dr. Daniels.
- Lecture 6 synopsis due.

June 3: Midterm Exam

- Exam open from 7:00am to 11:59pm.

June 5: Tropical Insect-Plant Associations I

- Discussion of Lecture 8 and assigned reading with Dr. Cave.
- Lecture 7 synopsis due.

June 7: Tropical Insect-Plant Associations II

- Discussion of Lecture 9 and assigned reading with Dr. Cave.
- Lecture 8 synopsis due.

June 10: Pollinators of Tropical Plants

- Discussion of Lecture 10 and assigned reading with Dr. Ellis & Dr. Mallinger.
- Lecture 9 synopsis due.
- Featured Creature draft due.

June 12: Mimicry and Entomophagy

- Discussion of Lecture 11 and assigned reading with Dr. Cave.
- Lecture 10 synopsis due.

June 14: Insects in Tropical Agriculture I

- Discussion of Lecture 12 and assigned reading with Dr. Cave.
- Lecture 11 synopsis due.

June 17: Insects in Tropical Agriculture II

- Discussion of Lecture 13 and assigned reading with Dr. Cave
- Lecture 12 synopsis due.

June 19: Medical and Veterinary Importance of Tropical Insects

- Discussion of Lecture 14 and assigned reading with Dr. Kaufman.
- Lecture 13 synopsis due.
- Featured Creature final version due.

June 21: Last Day of Class

- Graduate student presentations.
- Lecture 14 synopsis due.
- Final exam open from noon June 21 to midnight June 22.

STUDENT PERFORMANCE ASSESSMENTS

The **EXAMS** are on-line. The midterm exam (**June 3, 2019**) will cover all lecture and reading assignments up to and including Lecture 7. The final exam (**June 21-22, 2019**) will only cover Lectures 8-14 and their associated reading assignments. The format of the exam is in two parts. Part 1 has 35 multiple-choice questions (1 point each). Part 2 has 14 short answer questions (5 points each). There will be a time limit for each part. Each student is responsible for writing thoughtful short responses to at least three of each lecture's discussion questions. These responses will be submitted through the Canvas course site by midnight of the indicated deadline date. Each question's response should be academically well written in your own words, proofread for spelling and grammar, and be at least a paragraph (minimally 3-4 sentences) in length. Copy/paste from any source is not acceptable.

Lecture **SYNOPSIS** are brief syntheses of the information presented in each lecture's PPT(s), assigned reading, and discussion. You should write a well-written, coherent overview (not an outline) of the principal concepts and topics addressed to indicate you have thoroughly studied the material and comprehend it. The synopsis must not exceed one page with text single-spaced and 1" margins on all sides. Include your name on each synopsis. Each lecture's synopsis should be delivered through the course's e-Learning site and is due at noon after the next discussion session (see Course Schedule for delivery dates of synopses). Each synopsis is worth 7.5 points. You may miss two synopses without penalty. There is no extra credit for submitting more than 12 synopses, but if more than 12 synopses are delivered, then the highest 12 scores will be calculated in the final grade. A synopsis delivered after the due date will be penalized 2 points for each calendar day it is late. **Proper grammar, correct spelling, and clear writing will be considered in the evaluation of these synopses.**

Each student is required to develop a "**FEATURED CREATURE**" (FC) fact sheet on an insect of the tropics that is NOT CURRENTLY AVAILABLE in or planned for FC (entnemdept.ifas.ufl.edu/creatures/). Students must upload their first draft and final draft documents through the course's eLearning site. All deadlines are midnight of the day that they are due. Late submissions will be penalized 10% on the individual component grade for each 24 hours after **each** deadline.

The Tropical Featured Creature article grade will be determined through a multi-step evaluation process that includes topic approval, submission of a first draft, return of review

evaluation, and submission of a final draft. Please be sure to read the following to ensure that you are meeting the deadlines. Visit entomology.ifas.ufl.edu/creatures/FC_format.pdf for the FC-specific guidelines.

1. Students must contact Dr. Cave to receive approval of their creature **BEFORE** proceeding. **The topic must be chosen and approved by May 20, 2019.** (10 pts.)
2. To be eligible for full credit, the first draft must be submitted through the course's site in UF eLearning by **June 10, 2019.** The draft is expected to be a nearly complete document with significant material provided in each category. Dr. Cave or one of the other instructors in that area of specialization will review and score these drafts for effort, form, and overall progress. (40 pts.). Reviewer comments will be provided no later than June 14.
3. Final drafts of papers are due on **June 19, 2019.** You will be scored on the completeness of the overall document, thoroughness of the subject matter, incorporation of appropriate original or fully credited illustrations and/or images, incorporation (or not) of suggested revisions provided by the instructors (not all suggestions must be incorporated, but you must justify when recommendations are not incorporated), and proper grammar and punctuation. (50 pts.)

STUDENT LEARNING ASSESSMENT

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|---|----------------|
| Two exams (105 points each) | 210 pts |
| Twelve lecture synopses (7.5 points each) | 90 pts |
| <u>Tropical Featured Creature article</u> | <u>100 pts</u> |
| TOTAL | 400 pts |

NOTE: This course is co-taught with ENY5566. Students registered for ENY3563 have requirements different from those for ENY5566 students.

GRADES AND GRADE POINTS

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|-------------|-------------|-------------|-------------|-----------|
| A = 100-93% | B+ = 89-87% | C+ = 79-77% | D+ = 69-67% | |
| A- = 92-90% | B = 86-83% | C = 76-73% | D = 66-63% | E = 59-0% |
| | B- = 82-80% | C- = 72-70% | D- = 62-60% | |

For information on current UF policies for assigning grade points, see <https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx>

ASSIGNED READING

Lecture 1:

No reading assignment.

Lecture 2:

Wiens, J. J., and M. J. Donoghue. 2004. Historical biogeography, ecology, and species richness. *Trends in Ecology and Evolution* 19: 639-644.

Lecture 3:

Novotny, V., and Y. Basset. 2005. Host specificity of insect herbivores in tropical forests. *Proceedings of the Royal Society B* 272: 1083-1090.

Lecture 4:

Nichols, E., S. Spector, J. Louzada, T. Larsen, S. Amezquita, M. E. Favila, and The Scarabaeine Research Network. 2008. Ecological functions and ecosystem services provided by Scarabaeinae dung beetles. *Biological Conservation* 141: 1461-1474.

Lecture 5:

Constantino, R., and A. N. S. Acioli. 2006. Termite diversity in Brazil (Insecta: Isoptera) [pp. 117-128]. *In: Soil Biodiversity in Amazonian and other Brazilian Ecosystems* (F. M. S. Moreira, J. O. Siqueira, and L. Brussaard, editors). CAB International, Egham, Surrey, UK.

Lecture 6:

Cardoso, P., T. L. Erwin, P. A. V. Borges, and T. R. New. 2011. The seven impediments in invertebrate conservation and how to overcome them. *Biological Conservation* 144: 2647-2655.

Lecture 7:

Klimes, P., C. Idigel, M. Rimandai, T. M. Fayle, M. Janda, G. D. Weiblen, and V. Novotny. 2012. Why are there more arboreal ant species in primary than in secondary tropical forests? *Journal of Animal Ecology* 81: 1103-1112.

Lecture 8:

Richards, L. A., and D. M. Windsor. 2007. Seasonal variation of arthropod abundance in gaps and the understorey of a lowland moist forest in Panama. *Journal of Tropical Ecology* 23: 169-176.

Lecture 9:

Bronstein, J. L., R. Alarcón, and M. Geber. 2006. The evolution of plant–insect mutualisms. *New Phytologist* 172: 412-428.

Lecture 10:

Bawa, K. S. 1990. Plant-pollinator interactions in tropical rain forests. *Annual Review of Ecology and Systematics* 21: 399-422.

Lecture 11:

Pal, P., and S. Roy. 2014. Edible insects: Future of human food – a review. *International Letters of Natural Sciences* 21: 1-11.

Lecture 12:

Neuenschwander, P. 2001. Biological control of the cassava mealybug in Africa: A review. *Biological Control* 21: 214–229.

Lecture 13:

Berecha, G., R. Aerts, B. Muys, and O. Honnay. 2015. Fragmentation and management of Ethiopian moist evergreen forest drive compositional shifts of insect communities visiting wild Arabica coffee flowers. *Environmental Management* 55: 373–382. DOI: 10.1007/s00267-014-0393-9.

Lecture 14:

Reisen, W. K. 2009. Epidemiology of vector-borne diseases [pp. 19-33]. *In: Medical and Veterinary Entomology, Second Edition* (G. R. Mullen and L. A. Durden, editors). Academic Press, New York, NY.

UNIVERSITY OF FLORIDA POLICIES AND ASSISTANCE

Absences and Make-Up Work

Requirements for class attendance and make-up exams, assignments, and other work are consistent with university policies found at: catalog.ufl.edu/UGRD/academic-regulations/attendance-policies/.

Online Course Evaluation Process

Students are expected to provide feedback on the quality of instruction in this course by completing online evaluations at evaluations.ufl.edu. Evaluations are typically open during the last two or three weeks of the semester, but students will be given specific times when they are open. Summary results are available to students at evaluations.ufl.edu/results/.

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: www.dso.ufl.edu/SCCR/honorcodes/honorcode.php.

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.

Campus Helping Resources

Students experiencing crises or personal problems that interfere with their general well-being 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/cwc/*

Counseling Services

Groups and Workshops

Outreach and Consultation

Self-Help Library

Training Programs

Community Provider Database

☐ *Career Resource Center, First Floor JWRU, 392-1601, www.crc.ufl.edu/*

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 with disabilities requesting accommodations should first register with the Disability Resource Center (352-392-8565, www.dso.ufl.edu/drc/) by providing appropriate documentation. Once registered, students will receive an accommodation letter which must be presented to the instructor when requesting accommodation. Students with disabilities should follow this procedure as early as possible in the semester.

0001 Reid Hall, 352-392-8565, www.dso.ufl.edu/drc/

Distance Courses

Each online distance learning program has a process for, and will make every attempt to resolve, student complaints within its academic and administrative departments at the program level. See www.distance.ufl.edu/student-complaint-process.