

## **Insect Classification Online**

ENY 4161/ ENY 6166

3 Credits

- Instructor:** Dr. Andrea Lucky  
2108 Steinmetz Hall, Entomology-Nematology Building  
352-273-3952. Email is through the course website.
- Course Site:** This course is on Canvas at <https://lss.at.ufl.edu/>. Course-related email should be sent through the website and directed to TEACHERS for a prompt reply.
- Office hours:** I have no set office hours but am available to meet by phone, skype, or in person. Please contact me through the course email to make an appointment.

### **Course goals:**

The goal of this course is to provide you with a sound theoretical and practical understanding of insect diversity and the practice of classifying organisms. Lectures discuss the general principles of systematics, history of insect classification, construction and use of identification tools, nomenclature, and biology and evolutionary history of the hexapod orders. We also explore why competing classifications exist in taxonomy, and what existing classifications imply about broad patterns of evolutionary change and diversification within insects.

A collection is required that will refine your ability to identify insects to the level of order, family and species. Accumulating the required numbers of taxa will be possible only by employing a variety of collecting techniques and working with dichotomous keys. Building an insect collection, with correctly identified and curated specimens is an excellent way to learn, understand and employ the methods used by professionals to identify and classify not only insects, but living organisms in general.

**Learning Objectives.** After completing this course you should be able to:

- Identify hexapods to order and the majority of common insects to family by sight
- Identify adult insects to order and family using dichotomous keys
- Collect insects and field data in different habitats using a variety of techniques.
- Curate insect specimens properly, including labeling, pinning, point mounting, and preserving in ethanol.
- Describe the taxonomic process: how species are described, named and classified.
- Explain how key innovations in the life history of insects led to their incredible diversity.
- Interpret phylogenetic trees depicting the evolutionary relationships among insects

**Course Prerequisite:** ENY 3005, Principles of Entomology, or a similar course dealing with the classification of insects. Students are expected to be familiar with the insect orders before taking this class.

**REQUIRED TEXT:** Triplehorn, C.A. and N.F. Johnson. 2005. Borror and DeLong's Introduction to the Study of Insects, 7<sup>th</sup> edition. Thomson Brooks/Cole, Belmont, CA. (~\$80)

**Schedule of Topics:**

| Module | Topic                                      | Lectures   |
|--------|--|--|
| 1      | Introduction                               | Introduction to Insect Classification  |
| 2      | Collecting, Curating & Identifying Insects | Collecting insects   |
|        |  | Curating Insects   |
|        |  | Identifying Insects  |
| 3      | Major Insect Lineages                      | Major Insect Lineages  |
|        |  | Insect Morphology  |
| 5      | Early Insect Orders                        | Entognathous Hexapods  |
|        |  | Early Insect Orders  |
| 4      | Insect Classification Concepts I           | Systematics, Taxonomy, Classification & Phylogenetics  |
|        |  | Reading Phylogenetic Trees   |
| 6      | Orthopteroids: Polyneoptera                | Dictyoptera, Orthoptera, Phasmatodea, Dermaptera, Embioptera, Plecoptera, Zoraptera, Grylloblattodea, Mantophasmatodea |
|        |  | Exam 1   |
| 7      | Hemipteroids: Paraneoptera                 | Hemiptera: Heteroptera   |
|        |  | Hemiptera: Auchenorrhyncha & Sternorrhyncha  |
|        |  | Psocoptera, Thysanoptera, Phthiraptera & Hemiptera   |
| 8      | Hymenoptera                                | Hymenoptera  |
| 9      | Insect Classification Concepts II          | History of Classification  |
|        |  | Zoological Nomenclature  |
|        |  | Species Concepts   |
| 10     | Coleoptera, Neuroptera & Strepsiptera      | Coleoptera, Neuroptera & Strepsiptera  |
| 11     | Lepidoptera & Trichoptera                  | Lepidoptera & Trichoptera  |
| 12     | Diptera, Siphonaptera & Mecoptera          | Diptera, Siphonaptera & Mecoptera  |
| 13     | Insect Evolution                           | Insect Evolution   |
|        |  | Exam 2   |

\* This schedule is tentative and may change throughout the semester as needed.

**Course Grading Scale (%)**

|          |    |
|----------|----|
| 94-100   | A  |
| 90-93    | A- |
| 86-89    | B+ |
| 83-85    | B  |
| 80-82    | B- |
| 76-79    | C+ |
| 73-75    | C  |
| 70-72    | C- |
| 66-69    | D+ |
| 63-65    | D  |
| 60-62    | D- |
| 59-below | E  |

**Course Grading Criteria:**

|   | <b>Undergrad</b> | <b>Grad</b> |
|---|------------------|-------------|
| Midterm Exam                                  | 25%              | 20%         |
| Final Exam                                    | 25%              | 20%         |
| Quizzes, Exercises & Discussions              | 20%              | 10%         |
| Collection (and associated documents)         | 30%              | 30%         |
| Literature Review / Featured Creature Article | 0%               | 20%         |

**Insect Collection Requirements:**

|                           | <b>Undergrad</b> | <b>Grad</b> |
|---------------------------|------------------|-------------|
| # Orders                  | 18               | 22          |
| # Families                | 100              | 120         |
| # Species Identifications | 14               | 21          |

\*Further info about UF Grading Policies: <https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx>

**Class Materials:**

Students are responsible for *all* material distributed or discussed online. Make sure to check the website regularly for any changes or announcements about the class. It is your responsibility to pace yourself throughout the course. Due dates listed on the website are firm; make-ups (for quizzes, exercises, discussions and exams) are *not given* except under pre-arranged circumstances. If you have a conflict or problem, letting me know ahead of time may be all it takes to reach an arrangement.

**Succeeding in this Class:**

*Collect, collect, collect!* Success in this course is largely linked to the effort you make to collect insects in diverse environments *early* in the semester. Beyond the collection itself, keep in mind that the more orders and families you have, the more specimens you have for studying key morphological characters of these groups. Even if the weather is not perfect, you can find a lot of diversity once you start looking. Don't overlook urban environments and indoor habitats such as homes and greenhouses, especially if it is cold outside! You will need to collect many more insects than just the required number of Orders, Families and Species. This is because many of your insects will belong to the same families, but you won't know this until you have already curated and identified them.

*Plan ahead.* Plan to collect intensively for the first third of the course, curating specimens as you go and identifying insects in the groups that you are learning about in lecture. After about 5 weeks, switch your primary focus to *identification*, and work on the specimens that you have already collected and curated. This will allow you to become familiar with the identification keys in the textbook using your specimens. As you become proficient at recognizing common insect families, your collecting can become more targeted as you search for groups not yet included in your collection.

*Access a scope.* The diagnostic features of many insects are very small and can be best seen under magnification. It is assumed that you will have access to a dissecting microscope for this course. If you are in Gainesville you can contact me to arrange access to a scope in Entomology. Alternatively, contact a scientific laboratory or a high school science classroom to request use of their equipment. A high-quality hand lens (20X) can also be a great help in the field.

*Online courses.* Important due dates for this course are provided online, and it is your responsibility to be aware of them and plan your time accordingly. Read the Important Course Information on the course website, where there is a section about Succeeding in Online Courses.

### **Collecting:**

Collect, Collect, Collect! This is the most important piece of advice for your success with your insect collection. Collect MANY MORE insects than you expect to include in your final collection. Generally, you can expect to collect different types of insects with different sampling methods in different habitats, however, you will not necessarily know what kinds of insects you have collected until they are curated and identified.

During the course of the semester you will need to collect using different techniques in a variety of habitats to maximize your exposure to insect diversity. By doing so, it also maximizes the risk of coming across something that could harm you. Ticks, chiggers, spiders, biting flies, reptiles, plants and other environmental hazards may be encountered during these trips, so dress accordingly. Insect/tick repellent and sunscreen may also be necessary as you go collecting, along with snacks and water.

### **Quizzes, Exercises and Discussions:**

Quizzes, exercises and discussions are designed to improve and test your understanding of lecture material and insect recognition. Quizzes. One online sight-ID quiz is associated with each insect-ID module. These are designed to test your ability to identify insects by sight. Quizzes are short, so you will be expected to recognize the insects quickly, without consulting references. *Quizzes must be taken by the due date, and may not be made up without prior approval or a valid excuse.* Exercises reinforce concepts from lecture by giving you a chance to apply your knowledge. Each exercise will have specific instructions provided on the website. Discussions give the class an opportunity to share ideas and interact online. Please follow basic rules of 'netiquette' by being respectful of diverse opinions and using proper grammar.

### **Exams:**

Exams cover material related to insect identification (sight ID and Key Out) as well as concepts covered in lecture. Exams will test your ability to identify insect orders and families by sight and by using the keys in our class textbook, as well as your mastery of lecture material. The final exam will focus on lecture material from the second half of the semester, but will test your ability to identify orders and families from the entire course. Students who miss an exam without a valid excuse will receive an exam grade of zero.

### **Collection Requirements:**

All collection requirements are based on *adult insects*, and details are listed in the Collection Requirements Document on the website. Each collection must be accompanied by the following documents: 1) Collection contents list, 2) Citation List, 3) Key characters to species IDs and 4) Field Notes. See the Collection Requirements document for details. ***Collections submitted without these documents will not be graded and will receive a grade of zero.***

### **Mini collection:**

The mini collection is just that – a miniature version of your final collection. This assignment provides a benchmark to ensure you don't leave all your collecting and curation until the end of the course! You will submit a **photo** of your mini-collection, with specimens representing **at least 10 orders, 5 families and 2 species, all correctly identified, curated and labeled.** In

addition to pinned insects, your collection must include at least one point-mounted or double mounted specimen and one specimen with the wings spread. **A Collection Contents List, your field notes so far and references with key characters for your species-level IDs are also required** as part of the Mini Collection (see requirements for main collection for details of how to format them). As with your full collection requirement, please arrange the specimens with orders arranged phylogenetically (i.e., in the order found in the textbook) and identify each Order-level grouping with header labels pinned to the bottom of your box.

**Species Report (required for graduate students):**

Each graduate student will complete a report on the life history and classification of an insect species in the style of the Featured Creatures pages at <http://entnemdept.ufl.edu/creatures>. For your topic to be approved, the species must not currently be featured on the Featured Creatures website. **Alternatively**, graduate students may elect to complete a literature review of the published literature on a taxon of your choice. This could be a smaller insect order or a major subgroup of a megadiverse order. The review should begin where your textbook leaves off, i.e., approximately 2005, and summarize findings on family-level (or higher) systematics, classification, keys, and fossils. The review should include a synopsis of the current classification and a bibliography of important works.

Topics must be submitted for approval AND approved by the date listed on the website. Research for this project must include primary published literature - do not depend solely on Internet resources. The paper topic must be submitted for approval before Exam 1. References should be formatted in the style of the journal Systematic Entomology.

**Suggested references:**

Our textbook is the only required book for this course, however, there are many excellent resources available for learning about and identifying insects. You will need to seek out references to identify your insects to species-level, so look for papers, guides and websites with dichotomous keys and high quality identification information, not just photographs. Try to use up to date references as older ones may use outdated classification.

The following references are the types of textbooks and identification guides that you might find helpful during this course.

**Textbooks:**

Daly and Doyen's Introduction to Insect Biology and Diversity, 3rd Ed. J.B. Whitfield and A.H. Purcell III. Oxford University Press, 2012. ~ \$119.

The Insects: An Outline of Entomology, 5th Ed. P. J. Gullan, P. S. Cranston. 2014, Wiley-Blackwell. ~ \$100.

**Field Guides:**

Peterson Field Guides to various insect groups:

<http://www.houghtonmifflinbooks.com/peterson/insects.cfm> (especially Beetles, Moths)

Kaufman Field Guide to Insects of North America. Eric R. Eaton and Kenn Kaufman. Houghton Mifflin Harcourt, 2007. ~ \$15.

**Websites:** NOTE: Do Not Rely On Websites Alone! There are many excellent websites that can be helpful in identifying insects, but some are more reliable than others.

<http://entnemdept.ufl.edu/creatures/>  
[www.bugguide.org](http://www.bugguide.org)

## Academic Honesty, Software Use, Campus Helping Resources, Services for Students with General Information:

### **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.

0001 Reid Hall, 352-392-8565, [www.dso.ufl.edu/drc/](http://www.dso.ufl.edu/drc/)

**Absences and Make-Up Work.** Requirements for class attendance, make-up exams, assignments and other work are consistent with university policies that can be found at:

<https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx>

**If you are having problems in school** please make an appointment to see me, or if appropriate, call one of the counseling services below. Do not wait until the end of the semester!

### **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/](http://www.counseling.ufl.edu/cwc/)

- *Career Resource Center, First Floor JWRU, 392-1601, [www.crc.ufl.edu/](http://www.crc.ufl.edu/)*

### **Academic Honesty**

In 1995 the UF student body enacted an honor code and voluntarily committed itself to the highest standards of honesty and integrity. When students enroll at the university, they commit themselves to the standard drafted and enacted by students.

**The Honor 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.**

On all work submitted for credit by students at the university, the following pledge is either required or implied: **"On my honor, I have neither given nor received unauthorized aid in doing this assignment."** Students should report any condition that facilitates dishonesty to the instructor, department chair, college dean, Student Honor Council, or Student Conduct and Conflict Resolution in the Dean of Students Office.

\*It is assumed all work will be completed independently unless the assignment is defined as a group project, in writing by the instructor. This policy will be vigorously upheld at all times in this course.

### **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.