

**Insect Classification**  
(ENY 4161 02EA, ENY 6166 02EF)

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**Course Objectives:**

The goal of this course is to provide you with a sound theoretical and practical understanding of both 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. Laboratory work focuses on the means of recognition of the major groups of insects (order and family); in-class exercises illustrate concepts discussed in lecture. A collection is required that will further refine your ability to identify insects to the level of order, family and in many cases species. Accumulating the required numbers of taxa will be possible only by employing a variety of collecting techniques. 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 classify not only insects, but living organisms in general.

Upon completion of this course you will be able to:

- Sight identify all hexapods to order and the majority of common insects to family
- Describe key innovations in life history, growth, development and behavior for each insect order.
- Draw a phylogenetic tree depicting the relationships among hexapod orders
- Collect insects and record field data in any habitat using a variety of different methods, and list the strengths and weaknesses of each technique
- Preserve insects by pinning, point mounting, slide mounting and preservation in ethanol.
- Prepare specimens for deposition into a museum collection, including labeling, packing and shipping.
- Describe the taxonomic process: how species are described, named and classified.
- Explain the importance of insects to global biodiversity and conservation.

**Course Prerequisites:**

ENY 3005, Principles of Entomology, or a similar course dealing with the classification of insects.

**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, Blemont, CA.

**Additional Recommended Resource:**

Borror, D.J. and R.E. White. 1970. Insects of America North of Mexico. Peterson Field Guide Series 19. Houghton Mifflin Co., Boston, MA.

**Final Grading Scale:**

Scale: Percentage	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

For further information about the current UF Grading Policies for assigning grade points, go to <https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx>.

**Grading Criteria:**

	<b>Undergraduate</b>	<b>Graduate</b>
Midterm Exam	18%	15%
Final Exam	18%	15%
Lab exercises and quizzes	20%	17%
Collection	34%	30%
Class participation (collecting, discussions, etc.)	10%	6%
Library Project (Lit Review <b>or</b> Feature Creature)	0%	17%

<b>COURSE SCHEDULE</b>	
<b>Week</b>	<b>Topic</b>
1	Course introduction, Sign-out collection equipment Collection methods
2	Pinning and curation, Insect morphology
3	Major insect lineages Classification, taxonomy and systematics Understanding homology
4	Tools for identification Preparing insect specimens for transport Entognathous hexapods and minor insect orders
5	Ephemeroptera, Odonata + Neoptera Polyneoptera
6	Collecting Field Trip Neuropteroids and Paraneoptera
7	Hemiptera: Sternorrhyncha + Slide mounting Mini Collection due, Lit review topic due Review for Midterm
8	Midterm Hemiptera: Auchennorhyncha + Heteroptera
9	Coleoptera Species concepts and descriptions
10	Lepidoptera & Trichoptera Zoological nomenclature
11	Diptera Principles of Phylogenetics
12	Hymenoptera Evolution, biodiversity & conservation of insects
13	FIELD TRIP - FL State Collection of Arthropods Open lab time
14	History of Insect Classification

	THANKSGIVING
15	Open lab
	Collection due Review for Lab Practical
16	Lab Practical Final , Final Written Exam, Grad. Literature Review due

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

### Attendance:

Students are responsible for *all* material distributed in and/or discussed in class. In the case of skipped classes, students are advised to obtain lecture notes and handouts from classmates unless there is a legitimate excuse, in which case I will be happy to help. Make-ups are not given except under circumstances of excused absence. Letting me know of a conflict or problem ahead of time may be all it takes to reach an arrangement.

### Field Trips:

During the course of the semester we will go to a variety of habitats to maximize your exposure to immature insects. By doing so, it also maximizes the risk of coming across something that could harm you. Ticks, chiggers, widow spiders, mosquitoes, biting flies, reptiles, plants and other environmental hazards will be encountered during these trips, so dress accordingly. Appropriate dress includes closed-toe shoes, long pants, long sleeve shirt and a hat. Although this recommendation does not completely eliminate the risks associated with outdoor activity, it does reduce it considerably. A change of clothes is a good idea if you are one that doesn't mind getting into your work. Insect/tick repellent and sunscreen may also necessary for these trips along with snacks and water.

On Sept 25<sup>th</sup>, the class will have a required collecting trip to a location around Gainesville. We will meet in our classroom at the normal class time (see schedule) and will take Entomology Department vans to a suitable collection site for the duration of the class period (perhaps longer if everyone can stay.)

### Literature Review (required for graduate students):

Each graduate student will conduct a review of the published literature on a taxon of your choice. The taxon should be one of the smaller insect Orders or a major subgroup of one of the megadiverse Orders (Coleoptera, Diptera, Hymenoptera, or Lepidoptera). *Your choice of a taxonomic group must be made and approved by the instructor no later than Oct 4<sup>th</sup>*. The literature review should begin where your textbook leaves off, i.e., approximately 2005. You should summarize findings on family-level (or higher) systematics, classification, keys, and fossils. Please include a synopsis of the current classification and a bibliography of important works. I expect you to primarily use the primary published literature - do not depend solely on resources available on the Internet. This literature review will be due **at the beginning of the final exam period (Dec 8<sup>th</sup>)**.

**Lecture Exams:** Lecture exams will be composed of *at least* one of the following types of questions: multiple choice, short answer, fill in the blank, long essay or short essay. The final lecture exam is not cumulative.

**Laboratory Exercises and Quizzes:** The laboratory exercises and quizzes will only cover material presented in lecture or lab from the two most recent class periods. No quizzes can be made up without prior approval, but the lowest quiz score will be dropped. Exercises will generally focus on the students applying concepts recently presented, either individually or in a group setting.

**Mini collection:** On Oct 4 your mini collection will be due at the beginning of class (9:30am). This is to make sure that you don't leave all your collecting till the end of the course. You should plan on turning in specimens representing **at least 10 orders** that are correctly pinned, labeled and identified. In addition to your pinned insects (which are to be identified and properly labeled) please also include at least one point mounted specimen, at least one specimen in a vial containing alcohol (EtOH) and at least one slide-mounted specimen. A **"Collection Contents List" is also required** with the Mini Collection (see requirements for main collection for details of how to format this.) As with your full collection requirement, please arrange the specimens phylogenetically (i.e., in the order found in Triplehorn and Johnson) and include header labels in your box indicating each order.

**Collection Requirements:**

For undergraduate students: 18 Orders, 100 families and 15 species identifications

For graduate students: 22 Orders, 120 families and 20 species identifications.

Each collection is to be accompanied with a **citation list** of materials used to make species determinations. If I cannot find a work listed in your list of citations, I will be suspicious of your determination and will investigate further... I suspect that most of the references you use for making species determinations will be books and scientific journals. If you use references from the www, you need to include with your List of Citations a reference to the site (with URL) a printed copy of the information available on the websites cited, and the key characters used to make the species determination.

Each correctly identified **order** is worth 2 points; each correctly identified **family** and **species** determination (genus and species) is worth 1 point – *points will be awarded for each taxon only once*. The remaining 25 points will be based upon the curatorial quality of the specimens (i.e., properly mounted and labeled). No credit will be given for specimens that are in such bad shape that we cannot identify them!

I will award +2pts extra credit for each additional (correctly identified) insect Order included in the collection that is above the Order requirement specified above.

If the collection and its components are turned in after 9:30am Nov 29, **30pts. per day will be deducted from the collection grade** (beyond 10am on Nov 29).

## Collection Curation Guidelines:

- 1) In addition to a locality label, each specimen is to contain an identification label indicating to which Order and Family it belongs. For the specimens that are determined to species, the genus and species are to be placed on the identification label with the order and family names (see template example), and the borders of these labels (bearing species names) are to be colored green. The green borders will aid us in finding the species determinations while grading your collection.
- 2) All specimens belonging to each insect Order are to be grouped together under a separate “header label” (containing the name of the Order). This header label should be pinned to the bottom of the insect box. Insects that are correctly identified to Order (via the ID label on the same pin as the specimen) but are not placed under the correct “Order header label” will result in 2 points being subtracted from the overall score given to the collection.
- 3) With the insect collection, each student is required to turn in a “Collection Contents List.” This list should list how many specimens are present in the collection for every family. In addition, families need to be grouped within the Order they appear in the collection. **If no “Collection Contents List” is turned in with the collection, the collection will not be graded and a score of zero will be entered for the collection requirement.**

Ex. COLEOPTERA

Carabidae – 4 specimens  
Dytiscidae – 1  
Halplidae – 1  
Cantharidae – 4

LEPIDOPTERA

Nymphalidae – 3 specimens  
Geometridae – 1  
Danaidae – 1  
Saturniidae – 2

*Note: The spelling of names on Collection Contents List is important – use care and be accurate.*

- 4) Specimens should be both listed on the “Collection Contents List” and placed in the Collection, in the order in which they appear in “Triplehorn and Johnson, 2005” as applies to Order only, for example from Protura to Hymenoptera. This is to ensure that your collection is organized from the most basal to the most derived taxa. This will allow you see a progression of morphological specialization across Insecta and will aid us in locating certain insect taxa when grading your collection.
- 5) The insect collection, “collection contents list” and “list of citations used for species determinations” are all due at the beginning of the period on Nov 29<sup>th</sup> (i.e., 9:35am). **No lists, collection grade = 0.**

### Collection Specimen Guidelines:

- 1) Specimens that were used for the collection requirement of another course must not be included in the collection required for this course. Specimens turned in from this category will result in a collection grade of zero.
- 2) Specimens to be used for the insect collection requirement must have either been collected by the student turning in the collection, or specimens collected by a classmate who is currently enrolled in ENY 4116, 6166.
- 3) Specimens collected by a classmate that were subsequently traded or given to another classmate and used in their collection must bear a label which indicates who **collected** the insect.
- 4) All identifications of specimens are to be made by the **owner** of the collection. These identifications include those made for material acquired through trading with classmates.
- 5) Rules concerning “Academic Misconduct” apply to all specimens and specimen labels submitted (turned in) for the insect collection requirement of this course. A violation of these Rules could result in dismissal from the University.



## **Academic Honesty, Software Use, Campus Helping Resources, Services for Students with Disabilities**

### **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.

*(Source: 2011-2012 Undergraduate Catalog)*

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.

### **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/)*

### **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/)