

WELCOME TO ENY 3005/5006L

PRINCIPLES OF ENTOMOLOGY LAB

Online Course Fall Spring 2020

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Overview

This class provides the laboratory activities for the ENY 3005/5006 web course. ENY3005/5006 and ENY 3005L/5006L are co-requisites. In this lab, you will learn the anatomy of an insect, how to identify an insect to order, how to collect and curate insects, and you will learn a bit about how insects fit into our lives.

There are a series of lab activities for you to complete during the semester. Some of the assignments are interactive virtual labs, some are hands-on labs that you must report on, and some are just for you to read through for the information. The first few labs will give you a foundation that will help you learn to identify insects so you can begin working on your collection. You will notice that there is one lab report (pest management). This experiment will take time to set up and will take a while to collect the data, so be sure to read it ahead of time. Besides the insect collection and lab report, there will be a lab exam at the end of the semester and several worksheets along the way.

All of the lab material can be found in Canvas at elearning.ufl.edu. **Assignments should be posted to the assignment link in Canvas.** *Please follow the "Complete by" date on this syllabus.* Again, please refer to the course outline for assignment due dates. If you have questions about assignments, please e-mail the TA through Canvas and copy the instructor. The TA will be your primary contact for the lab portion of the class. If you are having difficulty with a particular lab, be sure to reach out during the week so we can provide you some guidance. If you wait until the weekend, we may not be available to respond. Please include ENY3005L or ENY5006L in the subject line, and we will try to respond in 48 hours.

Where to start:

During the first week of class, you will need to review this syllabus and take a syllabus quiz. You will need to score 100% to receive credit, so you need to be sure to review all the details and take the quiz until you can answer all the questions correctly. You will want to begin your insect collection as soon as possible since you want the best weather to collect your specimens. During the first week, you should read the "Collection and Curation" information in Canvas. This explains the materials you will need for the required insect collection as well as the different collecting and curating

techniques. You will likely come back and review this lab as you begin to curate and label your specimens, but knowing what is ahead of you will motivate you to start work on the collection early in the semester. Labs 1 and 2 (Internal and External Morphology) contain very important information that will help you with your collection, so please make sure that you these get done on time so you can correctly identify and curate the insects you are collecting. You'll notice that the second half of your textbook contains keys to insect orders and families. During the third lab, you will learn how to use those keys to discover what insects you have collected.

Insect Collection

Although the first two labs prepare you with information about insects, you do not have to wait to begin collecting. Also, having actual specimens to look at will help you when you are learning the insect orders during Unit 3 of lecture material. If you do collect insects before getting your insect collecting kit, please put them in baggies or some type of container with the dates and place of collection, then store in your freezer until you are ready to pin them. Your collection will be ongoing throughout the semester. There are no scheduled weeks for collection trips, so you are expected to collect when you can. If you have any problems or need suggestions, please contact the TA and instructor. **IMPORTANT:** You will be collecting adult insects, so note that only soft-bodied insects are curated in alcohol. You are not required to use alcohol vials. For this class, you may pin or point all specimens. The shipping of alcohol is becoming more and more restricted, so you may want to pin all of your specimens. If you are hand delivering your specimens, you are welcome to use alcohol vials for your soft bodied insects, but keep in mind that alcohol vials should be shipped outside of the main collection to avoid breakage of specimens. One loose vial can destroy all the pinned specimens. Please do not put moth balls in your collection. You're welcome to use them after you get your collection back, but for your TA's safety, please do not include them when you turn in your collection.

Shipping your "bugs"

Since this is a web class, there are students across the US and even in other countries. Take into account the weather conditions in your area and plan to collect on warm, sunny days. Also, feel free to set up collection trips and invite others from the class. You never know, someone may be close enough to attend. Oh, while we are on that subject, if someone collects a specimen for you, please add their name as the collector at the end of the locality label. You can trade up to 10% of your specimens with others in the class, but the other 90% must be collected by you. Please don't wait until the last minute to collect. Curation takes some time, so you want to leave the last few weeks before the collection is due to work on labeling and pinning. ***Collections will not be returned to you unless you have made prior arrangements with your instructor.*** If your collection needs to be mailed back to you, you must provide a pre-paid shipping label with your collection. We cannot send you a bill for shipping costs, so please pre-pay if you would like your collection returned. You will work hard on your collection, so this syllabus goes into detail on how to properly ship your specimens so they are not damaged. **Also, be sure to take photos of your collection before you ship it in case there is some damage during the shipping process.**

This is going to sound like a lot of rules, but we want to avoid shipping disasters. Please understand that these rules are made from prior experience so we can avoid any issues with shipping. The carrier is your choice, but we prefer UPS or FedEx because they can print a return label and include it in the box. If you send your collection by USPS, you can include stamps for the shipping amount and an address label with your collection. Keep in mind that all previous shipping labels will need to be removed, so if you are using that nice box from your Amazon order, be sure to pull off the labels, or the collection just may end up being delivered back to you. Oh, also if you are using the USPS and have anything (tape, labels, or sticker) that says "Priority Mail", you have to send enough pre-paid postage to cover "Priority Mail" shipping. It is a more expensive option, so sometimes students ship the collection Priority and want it returned regular mail. If that is your desire, be sure to provide shipping materials that can be used to cover the "Priority Mail" labels. (If you need to use tape at the US Post Office, it will be Priority Mail tape, so keep that in mind when you go to ship your collection). On a personal note that will help us, UF will no longer ship collections back through campus mail, so we must hand deliver the return collections to the post office. Remember to include the postage with your collection, so we don't have to make multiple trips to return collections. If you do want your collection returned, please send your collection in a package that can be used for return shipping as well. I know we are just getting started with the class, but now you can begin thinking about how you want to handle your collection.

Donating your collection

Have you ever wondered what happens to the collections that are graded and not returned? Collections not returned will be donated for education and outreach events. All specimens that are graded are marked so they can't be recycled into other graded collections, but they are perfectly fine for teachers to use in the classroom. Who knows? You may visit a school one day and see your insects in a teaching collection for 4-H, FFA, or biology classes.

Important note about illegal and dishonest Insect collecting:

Note that it is illegal to collect plants or animals in State and National Parks without a permit. Specimens collected illegally will not receive credit, and you may receive a fine or other sanctions from the park service.

All insects must include accurate locality labels including the collector's name if the specimen was not collected by you personally. (Only 10% of your specimens may be traded between students currently in the class).

Purchased insects are not allowed and will be reported as academic dishonesty. Specimens that have ever been in a graded collection are not allowed, and specimens that come from a maintained colony are not allowed (UF, USDA, etc.). Collections are marked each semester as they are graded and specimens may NOT be recycled from past collections. Nor may they be used in future collections (unless allowed on the syllabus). Collections submitted with any falsified label information, or marked, purchased, or illegally collected specimens will be marked as a zero, and the student will be referred to the Dean of Students Office for academic dishonesty. This could result in a failing grade and sanctions from the University of Florida. – Do not purchase your specimens.

How should your collection look?

This may be understood, but you would be surprised at some of the creative ways students find to submit their insect collections. I am going to provide you with some resources to purchase insect collecting kits, so you can take a look at those options. Feel free to shop around and see what you can find, but remember that the collection should be submitted in a box of some type. Collections submitted outside of a collection box (i.e. on poster board, corkboard, or Styrofoam) will not be accepted. With that being said, please do not pin your insects to the box. You will need some foam to hold the insect pins in place. Yes, we have dug through packing peanuts deep into a box to find that the insects were pinned in the bottom of a box the size of a microwave. Technically, they were in a box, but they all had to be removed to be graded. I share this funny story with you so you can think about your options. Yes, we have also had an insect collection pinned to the bottom of a used pizza box. Insects that are poorly curated will not be graded, and each collection should be presented in a professional manner (neat, orderly, clearly marked labels on each specimen, all Lepidopterans properly spread, specimens intact, etc.). You are investing time in this collection, so you want it to be good. This collection is worth 100 points and will take some time to complete. Generally speaking, insects have a short life-span, so you may choose to collect and feed insects until they die of natural causes before you curate them. That is fine as long as you begin your collecting early and give yourself time. Speaking of killing insects, if you submit insects that are pinned but are still alive, you will receive a 10-point deduction in your grade. (Yes, this too has happened.) You may use the freezer, ethyl acetate, or nail polish remover to euthanize your specimens humanely. Larger insects may take hours in a fully charged kill jar to succumb, so consider using a freezer for large specimens.

Specimen Identification and Labeling

Each specimen must be pinned or spread properly (all legs), and must be in good condition. **All specimens should be identified to order** and should be properly labeled. (For a label template, please see the link on Canvas. You'll need to enable macros in MS Word.). An index listing your specimens in phylogenetic order must accompany your collection. Graduate students should include the family names on the index as well. An example will be posted in the collection and curation lab. Be sure to neatly arrange the insects under the order label (photo examples follow).

Collections should be mailed or delivered to your instructor or TA (address above). Please contact your instructor or TA for details. If you are mailing your collection, please follow the instructions in the curation lab. Late collections will be penalized 5 points for the first day and 10 points for each additional day.

Collection Packaging Details Review

Insects can become damaged in shipping, so please take care when preparing them for shipment. Remember that you may no longer be able to ship alcohol, so may need to pin all specimens. If you have large specimens, please secure them with pins on the sides so they do not spin (brace pinning). Also, please put a piece of cardboard or poster board over your collection so the pins do not bounce loose during shipment (pins will become imbedded in foam, so you should avoid a foam top). All pins should be pushed down in the foam until they reach the bottom of the box, but do NOT press on the top cardboard or foam or the pins will stick to the top and will be damaged when the box is opened. **Keep in mind that we have to open and grade the collections, so please do not completely tape around the inner or outer box lid and also take care when using bubble wrap that you allow your collection to be easily opened without damage.** Test your box by gently rotating it vertically and side to side. If any insects move, be sure to secure them. Do not ship vials in the same area as the pinned insects. Vials can destroy your collection if they come loose in transit. You may place the index on the top of the piece of cardboard you add to the top of the pins in the collection box. Please see the information on page one if you would like your collection returned.

Insect collection - Arrangement and shipping tips



Specimens are placed under the order label. Specimens should be arranged neatly.



Specimens are arranged neatly and extra pins (braces) are used to prevent movement in shipment. You may use vials if you are going to hand deliver your collection.



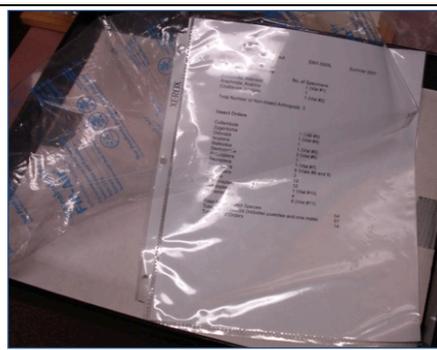
Group insects by order and be sure the pins are firmly in the foam base.



If vials are sent in a collection, they should be secured firmly to prevent damage to pinned specimens. It is best to ship vials outside of the collection box.



Glass vials should be separated from pinned specimens for shipping purposes.



Cardboard goes over the pinned specimens with the index on top. Be sure not to press the cardboard into the pins, as the heads of the pins may stick.

- All specimens need to have a locality label and be identified to Order.
- Please see the collection grading rubric online. At a minimum your collection should contain:

Insect Collection Guidelines	
ENY 3005	
50 adult insects of different species (No immatures – check for those wing buds). Please do not submit more than 60 total insect specimens. <ul style="list-style-type: none"> • Duplicate specimens and immature specimens will not be counted. • Specimens may not be purchased, may not come from previously graded collections, or may not come from colonies (USDA, Colleges, etc.) • Up to 10% of your collection may be traded with other students currently enrolled in the class. The collector's name must be included on the label. 	
14 representative orders	
2 Lepidopterans properly spread – All legs must be spread.	
5 insects mounted on points	
3 non-insect arthropods identified to order (these specimens may be pinned because of shipping) *these do not count towards your adult insects	
Collection index	
ENY 5006	
65 adult insects of different species (No immatures – check for those wing buds). <ul style="list-style-type: none"> • Please do not submit more than 75 total insect specimens. • Duplicate specimens and immature specimens will not be counted. • Specimens may not be purchased, may not come from previously graded collections, or may not come from colonies (USDA, Colleges, etc.) • Up to 10% of your collection may be traded with other students currently enrolled in the class. The collector's name must be included on the label. 	
16 representative orders with 15 specimens identified to family (all 15 families should be different – for example, you should not have two Libellulidae as part of your 15) using the textbook keys. When keying out the family names, you should identify at least two of your specimens from each of five of the following orders (10 total). The additional five identifications are your choice. Two families from five of the following: Odonata, Hemiptera, Coleoptera, Diptera, Hymenoptera, Blattodea, Orthoptera, Lepidoptera. These family names should be included on your collection index. The family label should be added to your pinned specimens.	
4 Lepidopterans properly spread - – All legs must be spread.	
10 insects mounted on points	
5 non-insect arthropods identified to order (these specimens may be pinned) *these do not count towards your adult insects	
Collection index	

ENY3005L/5006L Course Outline

Lab	Points	Activity	Complete by: 11:55PM
<ul style="list-style-type: none"> Order Collection Equipment Take the Syllabus Quiz Lab 0 - Collection and Curation 	10	Get started on your collection and take the syllabus quiz	1/15 Wednesday
Lab 1 & 2 - Insect Internal and External Morphology	--	Interactive self quizzes (un-graded)	1/22 Wednesday
Lab 3 -Using a Key	15	Create a Key Worksheet	1/29 Wednesday
Mini-collection Photos	15	Collect, identify and curate 10 insects. Take several photos and submit them for evaluation.	2/5 Wednesday
Lab 4 – Insect Behavior/Vision	30	Experimental Design Outline	2/12 Wednesday
Lab 5 – Pest Management Part 1	15	Worksheet Conduct Experiment	2/19 Wednesday
Lab 5 – Pest Management Part 2	15	Lab Report – Introduction and References	2/26 Wednesday
SPRING BREAK			
Lab 5 – Pest Management Part 3	15	Lab Report – Materials & Methods and Results	3/11 Wednesday
Lab 5 – Pest Management Part 4	15	Lab Report – Discussion & References	3/18 Wednesday
Lab 5- Final Lab Report	20	Final Lab Report	3/25 Wednesday
Lab 6 – Social Insects	15	Worksheet	4/1 Wednesday
Lab 7 - Soil Arthropods	15	Worksheet	4/8 Wednesday
Lab 8– Forensic Entomology	20	Evidence Reports	4/15 Wednesday
Final Collection Due	100	Turn in properly curated collection – see syllabus details	Postmarked by 4/15 or delivered by 4/17
Lab Final Exam (Online)	100	Exam	4/22 Wednesday

EVALUATION (400 possible points)

Syllabus Quiz	10
Lab 3 Worksheet	15
Lab 4 Worksheet	30
Lab 5 Worksheet	15
Lab 5 Report	65
Lab 6 Worksheet	15
Lab 7 Worksheet	15
Lab 8 Evidence Report	20
Photo Mini-Collection	15
Lab Final	100
Collection	100

FINAL GRADING

Scale: Percentage

(0.5 and above will be rounded up)

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

Please visit <http://www.registrar.ufl.edu/catalog/policies/regulationgrades.html> for the UF policy on grading.

Text and Supply information

The lecture textbook will be used for some lab assignments. An optional book that will be helpful for this lab is the Photographic Atlas of Entomology and Guide to Insect Identification by J. L. Castner. This book is about \$35 and has nice photographs that will help you in identification of your collection specimens.

Collecting Kit

Each student is *required* to make an insect collection that will be mailed or hand delivered to the instructors for grading. You may purchase a kit of collecting supplies or follow the collection and curation lab instructions on how to make a net and kill jar. Either way, you will need to submit a properly curated insect collection. Here are some purchasing options for collecting kits. Feel free to shop around on your own. Just be sure to make your purchase within the first week of class so you can begin collecting.



The source most entomologists use for their collecting supplies is <http://www.bioquip.com>. The Student Insect Collecting Kit #1138 is \$47.17 and has a net, jar, pinning block, pins, spreading board, box, etc. This is a nice kit, but has a small box for the collection. You will likely need an additional box to house your collection, especially if you collect large dragonflies or butterflies. The equipment in this kit is a higher quality than some of the other options. (Please use the order names taught in the class. The booklet in this kit has older names.)

Entomology collecting kit # EL201 is available from

<https://www.educationalscience.com/index.php/entomology-kits.html>

The kit is approximately \$59.99 + \$12.99 shipping and taxes according to your geographical area. The kit includes all of your basic collecting equipment (net, jar, pinning block, pins, foam spreading board, and cardboard collection box). It takes about three business days for the kit to arrive, so please order it before you get to the collection and curation lab. This kit is the most popular with students, but the box is only for temporary storage of your specimens.



Other Lab Purchases for the Lab Report Experiments

The Pest Management lab requires items (i.e. live insects, household cleaner, cups with lids, paper towels), so be sure to make a list of needed items for both labs. It is very important to watch the weather and make sure that you have proper conditions when running the experiments. Also, this experimental lab will take some time to set up and perform. It is important to read it ahead of time and watch the lab module so you have time to properly set up the experiment. There are some supplies (above) you will need to purchase, so keep that in mind. You may need an extra couple of days to work out some details, so don't wait until the last minute. You have been allotted several weeks for this lab. You will need that long to complete the experiment, find your references, and write all sections of the report. You will have an opportunity to make any corrections suggested by the TA and submit a final draft.

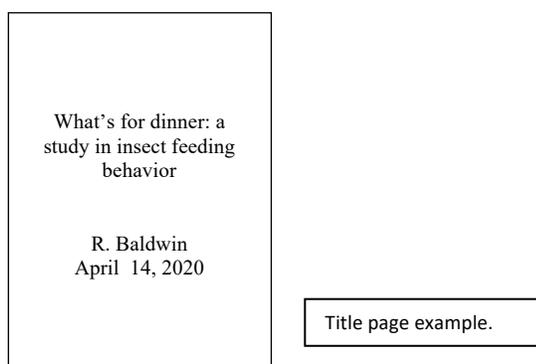
Exam

The lab exam will consist of fill in the blank, matching, short answer, and identification. It will be online through Canvas, open from 8:00am-11:59pm (EST). The exam will be worth 100 points. If you are unable to take the exam on the posted date and time, please contact your instructor to make other arrangements.

Lab Report

There is one lab report that must be completed. It should be posted to eLearning by the due date to avoid a late penalty (5 points per day). Please contact the TA if you cannot meet the deadline. Each report should be typed using Times New Roman font with 12-point type. The report should be double-spaced and pages should be numbered, except page 1. Be sure to perform spell check on your report and proofread it for any errors. **Plagiarism will result in significant point deductions from your lab report grade. This includes incorrectly paraphrased passages, incorrectly formatted in-text citations, and incorrectly formatted references sections.**

The title page should contain your name, the title of the lab, and the date of the lab. The lab report should also be free of any typos and spelling errors. If you post the report as an attachment, please begin the file name with your last name then the title with no spaces (i.e. Baldwinvisionreport). The report must be submitted as .doc or .docx format. If you do not have MS word, contact the TA to make other arrangements (Canvas only accepts some document formats).



Each report should contain the following sections: title page, abstract, introduction, materials and methods, results (graphs), discussion and references.

Abstract	<p>This is a brief (1 paragraph) overview of the entire paper.</p> <p>Basically the abstract consists of 1-3 introductory sentences, a sentence stating your objective, 1-2 sentences discussing your materials and methods, 1-2 sentences stating results, and 1-2 conclusion sentences. Although this is one of the first sections in your lab report, it is easiest to write this section last, after all of the other sections have been completed.</p> <p>Feel free to pick up a science journal at a nearby library or online source and see how this is written.</p>
Introduction	<p>Give some background information about the topic and lab activity. What was the lab set up to teach and why? What research has been done in this field?</p> <p>This section should provide a good rationale for why your study was important and introduce what you plan to do. This portion of the paper is where you provide relevant background information on the subject and provide important concepts for the reader to understand your experiments and analysis. <u>You need ample references for this section.</u> Visit http://guides.uflib.ufl.edu/distancelearners for e-resources.</p> <p>At the end of this section, you must clearly state your objectives and hypothesis.</p>

Materials and Methods	<p>A detailed description of the equipment and procedures used to conduct this lab.</p> <p>I should be able to replicate your experiment from the information you give me here. This is not a shopping list of what you used. It must be written in complete sentences (paragraph format) and not in first person.</p> <p>Example: INCORRECT- I poured one tablespoon of dishwashing liquid into the handheld spray bottle. CORRECT - One tablespoon of dishwashing liquid was added to a handheld sprayer. You have completed the experiment at this point, so should report in past tense.</p>
Results	<p>A detailed report of what you discovered as a result of this lab.</p> <p>Here, you describe <i>what</i> happened, <u>not</u> <i>how</i> or <i>why</i> (don't interpret the information). You do not explain what the results mean, just what they are. Any graphs or tables should be included here. Failure to include the appropriate table and graphs will result in a poor grade on this section. Each chart, table, graph, etc. requires a title and a caption that explains it. If you have, for example, two tables separated by a graph, you have Table 1, then Figure 1, then Table 2. You must also clearly label x and y axes.</p>
Discussion	<p>Here is where you explain and analyze the results. Do your results support or fail to support your hypothesis? How did your treatments affect your dependent variable? Are there any special circumstances that affected the experiment? Did you have to modify anything? Do you have any missing data? What did you learn from this experiment? What are the possible implications of your results? These types of questions should be answered in the discussion section.</p> <p>This section is not merely a brief repeat of the Results section. Here, you explain how and why (or why not) the results you obtained actually occurred and how this related to your hypothesis. This is the section where you <i>must</i> think critically and analyze, providing explanations for what you observed and measured. Failure to do it thoroughly will result in a poor grade on the lab report.</p>
References	<p>Include an alphabetical list of your references using the ESA style guide, http://entsoc.org/pubs/publish/style/#References_Cited. ESA is the Entomological Society of America.</p> <p>In this section, provide the complete literature citation (author(s), date, title, journal, volume, pages) for all works you cited within the paper. Here, you are to provide a MINIMUM of five (5) references that pertain to the subject of your lab report. These can be books or journal articles. For this report, they can NOT be newspaper articles, popular press magazines, extension publications, or web URLs. I suggest looking at the reference section of a scientific paper for some guidelines. <i>Just as a reminder: in the text portion (introduction or discussion) of the report, you would place your reference in parentheses like this (Amrine and Noel 2006). If more than two authors are in the citation, then (Baldwin et. al 2020).</i></p> <p>Some sites to search for scientific journal articles online are: Web of Science: http://apps.webofknowledge.com/WOS_GeneralSearch_input.do?SID=4DH</p>

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 requesting classroom accommodation must first register with the Dean of Students Office. The Dean of Students Office will provide documentation to the student who must then provide this documentation to the Instructor when requesting accommodation. 0001 Reid Hall, 352-392-8565, www.dso.ufl.edu/drc/

Distance Education - 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 <http://distance.ufl.edu/student-complaints> for more details.