General Entomology
Bio 367/567 – Fall 2012

Instructor: Dr. Jamee Hubbard
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Office Hours: Tuesday & Thursday 10:00-11:00am in TNR 339, Friday 10:30-11:30 in Knutzen Hall lobby, and by appointment

Required Textbook: Gullan, P. J. and P. S. Cranston. 2005. *The Insects: An Outline of Entomology*. Blackwell Publishing, Malden, MA. Bookstore Rental.

Suggested Books: Peterson's Field Guides: Insects, Kaufman Field Guide to Insects of North America

Course learning outcomes: By the end of this course, you will have a broad knowledge of insect biology, including anatomy, physiology, behavior, and ecological niches of some insects that you will commonly encounter. You will also have the ability to identify several common insect orders and many families within those orders, either by site identification, by using key characteristics, or by utilizing a dichotomous key. Furthermore, you will have more experience presenting information about a biological organism to your peers by presenting on an entomological topic of your choice.

Exams and Assignments, Points, Tentative Dates[a] (Projected Points =1050)

Lecture Exam I[b]	75 (+/-)	Wed. Oct. 3
Lecture Exam II	75 (+/-)	Wed. Oct. 31
Lecture Exam III	75 (+/-)	Wed. Nov. 28
Final Lecture Exam[c]	125 (+/-)	Thu Dec. 20, 10:15am-12:15pm
Lab Quizzes (25pts x 8)	200	See lab schedule for quiz dates
Final Lab Exam	100	Thu. Dec. 6
Collection Check	50	Tue. Nov. 6
Final Collection [d]	300	Thu. Nov.29, 5:00pm
Insect Presentation [e]	50	TBD

[a] Quizzes and Assignments can be added at any time at my discretion.

[b] All lecture exams can have a combination of multiple choice, true/false, short answer, and essay. Lab exams typically are short answer but can also have any of the aforementioned combination.

[c] Final exam is comprehensive; study your old exams; exam will include some new stuff AND will include student presenations. If you have an A- or higher by Dec. 18 at 5pm and are satisfied with that grade, you may opt out of the final exam. Here's the kicker, though, if you know before the end of the course that you will be making an A- or higher, you must still attend the lectures and labs or you will automatically be required to take the final exam.

[d] ALL LAB QUIZZES ARE COMPREHENSIVE

[e] You will lose significant points towards your own presentation if you miss a fellow classmate's presentation without discussing your absence with me first.

Grades: A=93-100%, A-=90- 92%, B+=87-89%, B=83-86%, B-=80-82%, C+=77-79%, C=73-76%, C-=70-72%, D+=67-69%, D=60-66%, F=< 60%

Attendance:

- Attendance for lecture and lab is mandatory, and past experience has shown there is a strong positive correlation between the amount of time a student spends in class and her/his final grade.
- Absences for exams, quizzes, and other assignments will be evaluated by me on an individual basis. I put a great deal of thought and time into preparing them, and I do not have the time to give multiple make-up exams and quizzes, so please make a serious effort not to miss exams and quizzes, and *I urge you to discuss it with me ahead of time if you know you will have to miss one.*
- Absences due to religious beliefs will be accommodated according to UWSP 22.03 in the university handbook, providing the student notifies the instructor within the first three weeks of the beginning of class regarding the specific dates she/he will be absent. And sorry, *hunting is not considered a religious belief.*

Students with Disabilities: Students with disabilities are welcome and encouraged in this class. You should contact the Office of Disability Services during the first two weeks of the semester if you wish to request specific accommodations. Also, if you have a medical problem (for example, serious migraine headaches that require medical attention) that may cause you to miss class or exams often, then please contact the Office of Disability Services so your professors can be notified appropriately of accommodations that should be made for you. Office of Disability Services Contact Information: 715-346-3365, 609 Learning Resources Building (the library).

Students' Rights and Responsibilities & Academic Misconduct: You can find out about your rights and responsibilities as a UWSP community member at http://www.uwsp.edu/stuaffairs/Documents/RightsRespons/SRR-2010/rightsChap14.pdf. Any form of cheating, plagiarism, or any misrepresentation of your work will result in a grade of zero (0) points for that test, quiz, or other assignment. In addition, if a person is knowingly assisting someone in cheating, that person will also get a grade of zero (0) points for that test, quiz, or other assignment. You can find out more about academic misconduct on pages 4-9 of the above Community Bill of Rights and Responsibilities electronic link.

I typically do not give extra credit assignments: ***I would rather that any extra time you may have to do extra credit assignments be put toward your best effort on the scheduled assignments, exams, and quizzes.*** If you are not doing as well as you would like, do not hesitate to come talk to me. Stop by during office hours, call me, or email me, and I will work with you in any way I can to help you get a better grade *on future course work*.

Class Conduct: I expect good conduct and a high level of respect in the classroom, between you and your peers and between you and me. If there is any misconduct in the lecture or lab, five points will be deducted from your grade for each offense. Misconduct can include, but may not be limited to: texting, answering or making phone calls, talking while I'm lecturing, repeatedly entering the classroom late (unless I have been notified), and lack of participation in group exercises. You might even expect me to give a pop quiz to the class anytime a phone goes off in class or I catch someone texting in class.

Devices NOT allowed to be used in class: Cell phones (have it off your body so you are not distracted by texts or calls), laptops (unless you have permission through Disability Services).

Devices ALLOWED to be used in class: Audio recording devices (not cell phones), *simple* calculators that do not store text are allowed for exams, word-to-word language translator or paperback translator if English is not your first language (*however, if the device gives definitions, it will not be allowed for exams; clear with me first, please).*

Tentative **Lecture Topics**

Introduction

- Introduction to Entomology, Classification, Collections
- Careers in Entomology

Biology

- Internal Anatomy & Physiology
- Insect Development (Life History, Molting) & Exoskeleton
- Surviving Extremes
- Sensory Organs
- Communication in Insects
- Mating & Reproduction
- Insect Defenses

Ecology

- Insect-Plant Interactions
- Predation & Parasitism
- Insects of Medical & Veterinary Importance
- Life & Challenges for Aquatic Insects
- Sociality in Insects

***Tentative* Lab Schedule – Please note that it is *expected* that you will be studying for lab quizzes, working on your collection, or working on your presentation during any free lab time.**

9/4/12	Plan carpooling to South Jordan Park Equipment Checkout Collect around campus, weather permitting
9/6/12	South Jordan Park collecting, weather permitting – meet there
9/11/12	Research/collecting field trip to Schmeekle OR pinning and preserving
9/13/12	Store insects collected over summer, set up hydration chambers Internal Anatomy Lab, External Anatomy lecture/lab
9/18/12	External anatomy lecture/lab Curation: preserving, pinning, organizing collections
9/20/12	Preserving, pinning, organizing collections Using the dichotomous key
9/25/12	Taxonomy: Orders Collembola, Archaeognatha, and Zygentoma
9/27/12	**Lab Quiz 1**: external anatomy, curating Taxonomy: Orders Ephemeroptera, Odonata, Plecoptera, and Isoptera
10/02/12	Taxonomy: Orders Blattodea, Mantodea, Phasmatodea, and Orthoptera
10/04/12	**Lab Quiz 2:** comprehensive through Isoptera Taxonomy: Orders Dermaptera, Psocoptera, Pthiraptera, and Thysanoptera
10/09/12	Taxonomy: Order Hemiptera: Suborders Auchenorrhyncha and Sternorrhyncha
10/11/12	**Lab Quiz 3:** comprehensive through Thysanoptera Taxonomy: Order Hemiptera: Suborder Heteroptera
10/16/12	Taxonomy: Orders Neuroptera, Mecoptera, Siphonaptera, Trichoptera
10/18/12	**Lab Quiz 4:** comprehensive through Sternorrhyncha Taxonomy: Order Coleoptera I
10/23/12	Taxonomy: Order Coleoptera II
10/25/12	**Lab Quiz 5:** comprehensive through Coleoptera I Taxonomy: Order Diptera
10/30/12	Taxonomy: Order Lepidoptera
11/01/12	**Lab Quiz 6:** comprehensive through Diptera Taxonomy: Order Hymenoptera

11/06/12	Collection work day ***Collection Check* – have <u>25 specimens</u> preserved and organized in box correctly, complete with collection and identification labels for each specimen**
11/08/12	**Lab Quiz 7:** comprehensive through Lepidoptera Student Presentations (2)
11/13/12	Student Presentations (4)
11/15/12	**Lab Quiz 8:** comprehensive through Hymenoptera Student Presentations (2)
11/20/12	Student Presentations (2)
11/22/12	THANKSGIVING BREAK - NO LAB
11/27/12	Student Presentations (4)
11/29/12	Collection work day ***Collections Due at 5:00pm***
12/04/12	Student Presentations (2) Review/study for lab final
12/06/12	***Comprehensive Lab Final***
12/11/12	Student Presentations (4)
12/13/12	Student Presentations (4)

Student Presentations

Student Learning Outcomes:

- Students will broaden their understanding of insect biology and, in turn, further their appreciation for the impact insects have on specific human endeavors. Students will also gain more experience presenting on their scientific knowledge to a peer group.

Task Assignment:

- Students will choose a topic from the list of current entomology topics or insect-human interactions and prepare a 15-25 minute PowerPoint presentation that is based on relevant literature findings. Use of props, the board, group activities, or other presentation tools (e.g., food made from insects) is *encouraged* in order to enhance interest in the presentation and subject identification. **At least one *peer-reviewed journal article* is to be included among your references, but at least five relevant references should be used for your presentation.**

- ***Students will also prepare ten (10) thoughtful test questions*** that will test student knowledge of your topic. Some of your questions will be used (with possible modification by the instructor) on the lecture exams.

- You must schedule a time to meet with me **at least one week prior to your presentation to discuss your ideas and images for your presentation**. Ideally, I would like you to have at least some of your PowerPoint or other presentation materials prepared for the meeting. **You must also present your journal article to me at this point**.

General Presentation Structure

- **Introduction:** Introduce the central topic in an engaging way. Hook the audience right away!

- **Body:** Develop the central topic in a sequence of ideas with supporting detail in each paragraph. Present your evidence in a compelling manner which sustains the audiences' interest throughout the presentation. The body should begin with background information and then continue to historical and current research or activities within the subject.

- **Conclusion:** Restate the thesis of the presentation, emphasizing the importance of the topic.

- **References:** References need to be cited in small print at the bottom of slides that contain newly discussed information. Photo credit must also be given for each photo with a caption in small print below the photo (such as – Photo: URL, or Photo: someone's name). See me if you have questions about how to cite or give photo credit.

Considerations when you begin organizing your presentation

- **Introduction**
  - How does your topic impact human society or the environment?
  - How does this affect us and why should we care?
- **Body**
  - What types of "products" or "problems" are related to your topic?
  - How has science used your topic?
  - What evidence do you have to support your claims?
  - The reader should gain some important insights on your subject.
- **Conclusion**
  - What are your overall impressions of this topic?
  - What do you want to be the "take home" message of your subject?

Grading Rubric for Presentations

The "A" Presentation (45-50 points): An exceptional presentation! The central idea of the presentation is clearly communicated and strongly developed. Main issues are summarized and explained. The presentation is engaging and thought provoking. The organization of the presentation is logical: ideas within the topic transition well, with one idea developing from the previous one or the connection between ideas is evident. Ideas are supported using evidence appropriately, efficiently, and convincingly. The conclusion is engaging. The presentation is almost entirely free of spelling, punctuation, and grammatical errors. The PowerPoint presentation is nicely organized (e.g., bullet points not too wordy and nicely spaced) and mostly free of errors (e.g., text boxes overlapping pictures). All cited works are done in correct format (I will talk about this and we will also discuss during your presentation preview appointment).

The "B" Presentation (40-44.9 points): A high-quality presentation. The central idea of the presentation is stated but not well developed. Ideas progress logically but some links may be faulty; however, each idea still relates to the paper's central subject. Evidence is offered to support claims but connections are weak between evidence and main ideas. The conclusion restates the central idea. The presentation may contain a few errors, but does not hinder the audience's understanding. There are some cited works within the presentation. The bibliography is done in the correct format.

The "C" Presentation (35 to 39.9 points): A run of the mill presentation. The central idea is presented but in generalized terms. Ideas are arranged randomly. Transitions are used but not in a logical way. Ideas within the subject are generalized and lack coherence. Support for ideas are generalized or based on unreliable evidence. The presentation contains several mechanical errors but does not impact overall understanding. Few cited works are used but they are done in the correct format.

The "D" Presentation (30 to 34.9 points): A below par presentation. The presentation does not have a centralized idea. The organization is random with inappropriate transitions between ideas. Ideas may be too general to be effective, or may not relate to the topic of the presentation. The presentation contains numerous grammatical errors that inhibit the audience's ability to understand important concepts and connections. Cited works are absent in the body of the presentation. Only 3 suitable references are given.

The "F" Presentation (0 to 29.9 points): A not up to scratch presentation. The presentation does not have a centralized idea. There is no organization, transitions, or coherence to the presentation. There is no supporting evidence for the presentation. The presentation is vague and contains so many mechanical errors that the audience has trouble comprehending. Citations are absent.

Topics (first come first serve basis) – choose one or *we can discuss another topic of interest to you*

- Colony Collapse Disorder (CCD) in honey bees
- Rare and endangered Wisconsin insects
- History and current state of Emerald ash borer
- Current state of malaria and malaria management/prevention
- Insects as vectors of plant disease in Wisconsin
- Insects used by the military (as weapons, as "friendly forces," and so on; see: bomb-sniffing wasps)
- Genetically and physically modified insects for insect control
- Regulating pesticides
- Unique/alternative pesticides (like fungi, nematodes, viruses, genetically modified plants)
- Insect commodities
- Insects as food (make sure you bring enough for everybody!)
- Physics of insect flight
- Insect-*inspired* machinery or products (not made from insects)
- Insects and hotels/dormitories (like bedbugs)
- Forensic entomology
- Insects as bioindicators
- Insects as biocontrols for invasive plants (big local topic right now)
- Insects in religion
- Ants and fungal relationships
- Insects as medicines
- Insects as vectors of human disease
- Prehistoric insects
- Insects in modern art
- Insects in poetry
- Insects in children's literature
- Insects in film
- Insects in music
- Insects in advertising (think Orkin commercials)

THE INSECT COLLECTION

Criteria:

- You must turn in a list of specimens along with your collection. The list should be in taxonomic order and contain the lowest taxonomic information from your label. This will serve as my check sheet while grading.

- The collection must be in taxonomic order, **according to the order in which Orders and Families are presented in *Borror and Delong's Introduction to the Study of Insects, 7th Edition* (found in cabinet in lab)**. Vials can be placed within the regular collection or turned in a as a separate collection (either within the same case or in a separate box), but *if this is done, a label must be placed within the regular collection as a placeholder for where the vial would have gone in the taxonomic group.*

- Your collection must contain a combination of Orders, Suborders, Families, and "species," which we will characterize as specimens within the same family that look significantly different from each other. See me if you are unsure whether two or more specimens are significantly different (grasshoppers, for example). The collection is worth 300 points in total and will be tallied according to the point distribution listed under the "Scoring" section.

- The total collection must contain at least 10 different orders

- You may turn in **Families** and **Orders** that are not cover in class as long as they are properly identified. Additional Suborders and Superfamilies or other classifications *not covered in class* will *not* be counted in the final scoring. **Every insect in your collection must have at least Order level designation or it will not be counted.**

- No more than 25 points of your collection can be specimens collected before May 2012.

- No more than 30 points of your collection can be immatures or non-insect arthropods, and they must be correctly identified to Order, Suborder, or Family for immature insects or Class or Order for non-insect arthropods. See *Borror and Delong's Introduction to the Study of Insects, 7th Edition* for these classifications.

- No more than 30 specimens in your collection can be collected by a classmate (due to trading).

- You *must* collect at least 5 *different* examples of insect feeding or damage. (Examples include, but are not limited to: wood alteration/destruction, leaf chewing, leaf mining, leaf stippling, leaf galls, clothes moth damage, stored food damage). The evidence must be obviously insect-induced, **it must be clearly labeled as to what specific type of feeding or damage it is, and a collection label must be included with the specimen**. I also want you to speculate as to what order of insect did the feeding or damage. Try to turn at least 3 of the 5 in with your midterm collection.

- In addition to the above criteria, your collections **must contain representatives from 20 of the following 27 ecological categories (this page *and* the following page)**. Specimens you select from your collection to fulfill those categories should be marked with a separate "ecology" label (I will provide) on the pin or on/with the vial. *Only select one specimen per ecology label*. If your label goes on a pinned specimen, mount it flush with the bottom of the insect box at a 90 degree angle to the other labels; if it goes with alcohol specimen, pin it to the box below the vial or tape it to the vial; **please do not put it inside the vial with the rest of the labels**.

Category	Code for label	Example
Leaf feeding (chewing)	LEAF CHEWING	Grasshopper
Plant sucking	PLANT SUCKING	Aphid
Feeds on vertebrates	VERT. PARASITE	Mosquito
Predator of other insects	INSECT PREDATOR	Dragonfly, lady bird beetles
Parasite on other insects	INSECT PARASITE	Ichneumonid wasp
Aquatic as adults	AQUATIC ADULT	Water boatman
Litter inhabitant	LITTER	Ground beetle
Rotten wood inhabitant	WOOD	Termite, bess beetle
Household pest	HOUSEHOLD	House fly, cockroach
Nocturnally active	NOCTURNAL	Moth

Social insect	SOCIAL	Paper wasp, ant, honeybee
Sound producer	ACOUSTIC	Cricket
Pollinator	POLLINATOR	Honey bee
Aposematic coloration	WARNING COLOR	Yellow jacket
Camouflage coloration	CRYPTIC COLOR	Katydid
Casemaking insect	CASE MAKER	Caddisfly larva
Stem borer	BORER	Corn borer
Soil burrower	SOIL	Solitary beetle, digger wasps
Seed feeder	SEED	Flour beetle
Leaf roller	LEAF ROLLER	Maple leafroller
Aquatic nymph	AQUATIC NYMPH	Mayfly nymph
Batesian mimic	MIMIC	Hover fly
Chemical defenses	CHEM. DEFENSE	Stink bug
Gall inhabitant	GALL	Oak gall wasp
Agricultural pest	AGRIC. PEST	Potato beetle, soybean aphid
Leaf miner	LEAF MINER	Locust leaf miner
Dung or carrion feeder	SAPROPHYTE	Dung beetle, carrion beetle

Scoring:
The collection is worth 300 points. The points for each category are as follows:

Collection Category	Points
Each correctly identified Order	5
Each correctly identified Family or Superfamily (those covered in class)	2
Each correctly identified Superfamily *covered in class*	2
Each correctly identified Suborder *covered in class*	1
Each correctly identified non-insect arthropod Class*	5
Each correctly identified non-insect arthropod Order*	5
Each "species" (insect or non-insect)♂, *if* you have correct Order level	0.5
Each feeding/damage example (minimum 5 required)	5
Properly labeled, organized, and mounted collection	40
Each Order missing from the total 10 required	-10
Each ecological category missing from the total 20 required	-5
Each missing feeding/damage example missing from 5 required	-5

*See criteria above for regulations on non-insect arthropods
♂**Organism does not need to be identified to species**; this only means that it shall be significantly morphologically different than other organisms in the collection. If you are not sure if it is a different species, please ask!

As an example, if a student turns in 120 "species" within 45 families, 3 suborders, and 14 orders, and if all 20 ecological categories and 5 feeding categories have been fulfilled, the specimens are correctly identified, and the collection is in good condition and properly organized, the total points will be 288, and that student will earn a 96% on the collection. **Please note that if you make the correct taxonomic identifications, you will get the specified points, but <u>if you misidentify a specimen, you simply will not get the points for that taxonomic level (i.e., Family and/or Super- or Subfamily);</u> in other words, you do not get points taken off for misidentification. Therefore, as long as you have the correct Order, if you misidentify a few things but have a sufficient number of specimens, you have the potential to get at least 100% on the collection.**

<u>The collection you submit for your grade becomes the property of UWSP. In most cases, most of it will be returned to you; however, the instructor reserves the right to retain specimens for the UWSP insect collection.</u>

Rules for Organizing Your Collection:

- Insect labels should be hand-written with alcohol-proof pen *or* printed with a *laser printer* onto heavyweight paper (provided by instructor). I would be glad to print your labels for you if you do not have access to a laser printer. ***You must not use an inkjet printer*.**
- Organize your location and identification labels according to the picture in the *Guide to Curating Insects* handout*,* adjusting them to the correct position relative to the insect.
- Use the provided pinning block to correctly space your specimen and location and identification labels.
- Use insect pins to pin insects (not sewing pins or any other types of pins). Insect pins are supplied by the instructor.
- Insects will be organized into the glass-top insect boxes for final presentation to instructor, but **these boxes stay in the lab**.
- Insects and other arthropods should be organized in taxonomic order, according to the book *Borror and Delong's Introduction to the Study of Insects* by Johnson and Triplehorn (provided for in-class use). I prefer for the Orders to be organized in rows, running left to right, not top to bottom.
- Place a heading label flush to the bottom of the insect box to indicate a new order, and place all insects within that order below or to the right of the label.
- The left side of ***all*** labels should be facing the top of the box, therefore the heads of your insects will be facing the top, with the exception of point mounted and minute pin mounted insects (be careful to place point-mounted insects in the correct position on the label – see the guide).
- All labels for alcohol specimens should go in the vial, preferably back-to-back so that it is easy to read both labels. If more than two labels, allow your location and identification labels to face outward (back-to-back) and the others in-between those two labels. Eco labels do not go in the vials because they are on colored paper and the color will leach into the alcohol.
- Stabilized vials with insect pins (pin beneath the cap on either side) or some other method or placed within a separate box inside the insect box. If you place your vials somewhere else, please place a taxonomic label in the space where the liquid preserved insect would be if it had been included in the regular collection.
- For alcohol-preserved specimens, all different morphotypes must be placed in separate vials.
- If you have more than one morphotype ("species") of the same family, group them together but *do not place in same vial* if they are alcohol-preserved. You must label everything, even if it is just another "species" of a certain family (this does not mean you have to know the species name, it just means you need to have location and taxonomic labels on them, with at least Order level).
- A list of your specimens, in order that they are placed in your collection, will be turned in with your final collection. This will serve as a check list for me as I am grading and a check list for you to ensure you have turned in all the points required for the collection.