

BIOL 5530 - Insect Systematics and Evolution - Fall 2018

Lectures: WF 1230-1320 h, **Lab:** Friday 1430-1720 h (Lectures and lab in BNR 230)

Instructors:

Dr. Carol D. von Dohlen

carol.vondohlen@usu.edu

BNR 237 (office) and BNR 020 (lab)

797-2549 (lab)

Office hours: W 1330-1430 h

TA: George Waldren

george.waldren@aggiemail.usu.edu

BNR 240

797-0358 (lab)

Office hours: **W 1400-1500 h**

Prerequisite: BIOL 1610/1620 or permission of the instructor; BIOL 3050 helpful

Text: Cranshaw, W. and R. Redak. 2013. *Bugs Rule! An Introduction to the World of Insects*. Princeton University Press

Other useful resources:

- Triplehorn, C.A. and N. F. Johnson. 2004. *Borrer and DeLong's Introduction to the Study of Insects*, 7th Ed. Thomson Learning
- Marshall, S.A. 2006. *Insects - Their Natural History and Diversity*. Firefly Books
- Grimaldi, D. and M.S. Engel. 2005. *Evolution of the Insects*. Cambridge University Press
- Gullan, P.J. and P.S. Cranston. 2010. *The Insects. An Outline of Entomology*. 4th Ed. Wiley-Blackwell
- Rasnitsyn, A.P., and D.L.J. Quicke. 2002. *History of Insects*. Kluwer Academic
- Arnett, R.H. Jr. 2000. *American Insects. A Handbook of the Insects of America North of Mexico*. 2nd Ed. CRC Press
- CSIRO. 1991. *The Insects of Australia; A textbook for students and research workers*. Cornell University Press

Objectives:

1. Gain an appreciation and understanding of insect diversity
2. Gain factual knowledge about the biology and evolution of insects
3. Learn to identify insect orders and common families
4. Learn how systematists discover species, reconstruct phylogeny, and organize insect diversity
5. Gain an understanding of the central role of systematics in comparative biology

<u>Grading</u>	<u>Undergraduates</u>	<u>Graduate students</u>
Lab quizzes	5 %	5 %
Exam I	15 %	15 %
Exam II	10 %	10 %
Exam III	15 %	15 %
Final Exam	25 %	20%
Bibliography/paper	5%	10%
<u>Collection</u>	<u>25 %</u>	<u>25%</u>
	100 %	100%

Course Management:

This course is managed through Canvas. Lecture notes, lab materials, and other instructions will be loaded into the relevant course modules.

Lectures:

Lectures will cover systematics of Hexapoda, including the most current research on phylogeny (relationships), basic biology, ecology, and morphology of orders and families, and important evolutionary innovations. Lecture material is backed up by reading from the text. We will load supplementary reading in the weekly modules on Canvas periodically.

Labs:

Labs will cover more details on groups you are required to know, including morphological characters important for identification. After the introductory lab lecture, much of the lab time will be spent on your own, learning insect identifications and working on your collection. It will be up to you to decide how much time you need. We will make every effort to have the laboratory and teaching collection available for study outside of class time. Each lab will begin with a short quiz on the taxa you learned the week before. ***There are no make-up labs or quizzes.***

Collection:

A collection of insects is required for the course (**adult** representatives of **60 families/orders**). The insects must be labeled, identified to order and family (for some groups only order), and properly curated. **Graduate students** are required to include an **additional 5 specimens identified to species**; these must be focused at some taxonomic level and **not** in the insect order of your graduate research project. *See more detailed instructions in the Collection Module.*

Exams and Quizzes:

Exams will include material from the lectures or practical identifications based on the labs, or both (see schedule). Quizzes at the beginning of each lab are intended to help you keep up with learning insect identification. Exam 1 and the written part of the Final Exam will be administered through Canvas.

Spelling and grammar will count. Spelling is critical in the field of systematics! *Misspelled terms and names will not get full credit.* You will also get only partial credit for unintelligible grammar.

Missed exams earn a zero score. There will be no early, make-up, or late exams given. Documented emergencies will be considered for an incomplete (see below).

Bibliography/article summary (undergrads) & term paper (grads):

Undergraduate students will complete a **bibliography** on the systematics of the insect group of your choice. This should be up to ~30 references (e.g., journal articles, book chapters) concerning the systematics of a selected insect group. In addition, you will choose **one** of the journal articles and write a **short summary** of the paper (not a repeat of the abstract!). We can assist in selecting topics. A preliminary list of references is due partway through the semester, and the final bibliography/summary is due two weeks before the end of classes (see schedule next page for dates). *See further instructions in the Bibliography Module.*

Graduate students will write a **short term paper** (maximum 10 pages double-spaced) concerning the systematics of any insect group. **This group must be in a different order than the subject(s) of your graduate research** (unless you have community ecology project including many different orders). See instructions above for formatting the references for this paper.

Final Grades:

A	92-100 %	C	72-77 %
A-	90-91 %	C-	70-71 %
B+	88-89 %	D+	68-69 %
B	82-87 %	D	62-67 %
B-	80-81 %	D-	60-61 %
C+	78-79 %	F	below 60 %

University Policies:

Incompletes - requests for an I grade:

- *must be made in writing no later than the last day of finals*
- *must include full documentation of the reason for the missed work*
- *will only be honored if you are passing the class at the time of the request*
- *must comply with USU regulations as stated in the catalog*

Students with disabilities:

If a student has a disability that will likely require some accommodation by the instructor, the student must contact the instructor and document the disability through the Disability Resource Center. In cooperation with the DRC, course material may be provided in an alternative format (e.g., large print, audio, diskette, or Braille) upon request.

Course fee:

This course requires a special fee (in addition to tuition fees) for purchase of insect collecting nets and other collecting supplies (jars, vials, alcohol, forceps, aspirators, glassine envelopes), materials for insect collections (boxes, pins, spreading boards, etc.), repair and purchase of microscopes and light sources, photocopying, van rental. Approximate fee breakdown is 50% collecting equipment/microscopes, 30% collection materials, 10% field trips, 10% disposable lab supplies.

NOTE: The last day to add/drop this class is 15 September. Attending this class beyond that date without being officially registered will not be approved by the Dean's Office.

Probable Class Schedule - 2018

Date	Lecture	Lab / Assignment	Text ch./Reading
Aug 29 W	Introduction and Tour of Insects		1
Aug 31 F	They Taste Just Like Shrimp! Insects and the Tree of Life	Local collecting trip	6 (5 – optional)
Sept 5 W	Extraordinary Exoskeletons – External Structure I		2, 4 (pp. 58-61)
Sept 7 F	External Structure II	Local collecting trip	G & C Ch. 2
Sept 12 W	External Structure III		
Sept 14 F	Old White Guys and Dusty Cabinets? - Classification, Systematics, & Phylogenetics	USU Museum; insect orders; pinning methods (<i>Quiz - structure</i>)	1
Sept 19 W	Oldies but Goodies - Wingless hexapods		7
Sept 21 F	Into the Air: Evolution of wings & Flight; Palaeoptera	Wingless hexapods, Palaeoptera (<i>Quiz - orders</i>)	8; G&C excerpt
Sept 26 W	New Wings! Jumpers & Strollers - Neoptera and Polyneoptera		11
Sept 28 F	Polyneoptera cont.	Polyneoptera (<i>Quiz</i>)	9, 10; G&C excerpt
Oct 3 W	<i>Exam I (lecture material)</i>		
Oct 5 F	We Suck (and Chew) – Intro to Paraneoptera	Paraneoptera I&II (<i>Quiz</i>)	12, 13
Oct 10 W	A Liquid Diet - Paraneoptera cont.	<i>Topic of biblio/paper due</i>	13
Oct 12 F	Miraculous Metamorphosis – Intro to Holometabola	Coleoptera I (<i>Quiz</i>)	4 (pp. 61-70); 14
Oct 17 W	Armored Insects – Intro to Coleoptera; Polyphaga		14
Oct 19 F	<i>Fall Break</i>	<i>Fall Break</i>	<i>Fall Break</i>
Oct 24 W	Coleoptera cont.; Strepsiptera		14
Oct 26 F	Insect Industry – Hymenoptera	Coleoptera II (<i>Quiz</i>)	15
Oct 31 W	<i>Exam II - lab practical on material through Coleoptera I lab</i>		
Nov 2 F	Hymenoptera cont.	Hymenoptera I, Strepsiptera (<i>Quiz</i>)	15
Nov 7 W	Neuropteroid Lab	<i>First draft due for bibliography/paper</i>	18
Nov 9 F	Two-Winged Wonders and Nasty Gnats - Diptera	Hymenoptera II (<i>Quiz</i>)	18
Nov 14 W	Diptera cont., Siphonaptera, Mecoptera –We also Suck (& Hang)		18

Nov 16 F	Exam III (lecture material through Neuropteroids)	Diptera I (Quiz)	
Nov 21-23	Thanksgiving Break	TG Break	TG Break
Nov 27 W	Scales 'R Us - Lepidoptera		16
Nov 29 F	Insect Defenses, Chemical Ecology & Communication	Diptera II, Mecoptera, Siphonaptera (Quiz)	TBA
Dec 5 W	Parental Care	Final bibliography/ term paper due	TBA
Dec 7 F	Why are insects so diverse?	Lepidoptera, Trichoptera (Quiz)	TBA
Dec 12 W	Final exam 1230-1420 h (lecture material and practical)		
Dec 13 Th	Collections due at 1700 h		

G&C = Gullan & Cranston. 2010. The Insects. An Outline of Entomology. 4th Edition.