

INSECT BIOLOGY, EBIO 4660/5660
Fall, 2017

WHO ARE WE?

Professor: Deane Bowers

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Office: Ramaley N295

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Office Hours: Wednesday 2 – 4; or by appointment, Ramaley N295

Teaching Assistant and co-lecturer: Toby Hammer

E-mail: tobin.hammer@colorado.edu

Office Hours: Fridays 2 – 3:30 or by appointment, Ramaley N1B76

Course Meets: Ramaley N1B31

MWF 1:00PM-1:50PM

Lab Meets: RAMY N1B76

Mon 9 – 11:50 or 2 PM- 4:50PM

Textbook: There is no textbook for this class. You will be reading some book chapters or portions of chapters, as well as papers from the primary literature.

Recommended book (not required): Gullan, P.J. and Cranston. 2010 or 2014. The Insects: An Outline of Entomology, 4th edition or 5th edition. Blackwell Publishing. United Kingdom.

This book is very helpful and a great reference; but it is not required. We have put copies on reserve in the library.

Lab Manual: Robinson, Nufio, Bowers, Barton. 2015. Insect Biology: A Lab Manual. Purchase from us (\$25.00). This

Additional readings: BOOKS THAT MIGHT BE HELPFUL.

D.J. Borror and R.E. White. 1970. A Field Guide to the Insects. Houghton Mifflin Co., Boston, Massachusetts

McGavin, G.C. 2001. Essential Entomology: An Order-by-Order Introduction. Oxford University Press, New York

Course Objectives: The goals of this course are to develop your understanding, enthusiasm about, and enjoyment of insect biology. Throughout the semester, we will examine insect morphology, physiology and development in order to develop a context for understanding insect ecology, behavior and evolution. The course will foster better appreciation of the importance of insects in research, current issues and human society. Students will apply their understanding of insect biology to issues facing the world today. The laboratory will focus on learning insect identification; techniques for collecting, mounting and labeling insects; insect morphology and evolutionary relationships. The laboratory will also provide an opportunity for students to understand insect structure and function in the context of the evolutionary history of insects.

Course Requirements and Grading: Attendance is expected at lectures. Students will be responsible for all information presented (e.g., lecture materials, assignments, announcements etc.) regardless of attendance. Laboratory attendance and attendance at all exams is mandatory. If a valid, verifiable excuse for missing an exam is presented, the student will be allowed to take the exam at an assigned time and date. **IF YOU MISS A LECTURE, YOU MUST RELY ON YOUR PEERS TO GET COPIES OF NOTES FOR THE MISSED LECTURES, WE DO NOT GIVE OUT COPIES OF OUR NOTES OR POWERPOINT PRESENTATIONS.** There will be handouts available at each lecture that will outline the main points of that day's lecture. These will also be posted on D2L. White background = Deane lectures, Gray background = Tim lectures.

Grades will be based on the following: The lecture portion of the course is worth 70% of your grade. You will have 2 midterms and a final, and a set of 4 writing assignments (see below) for the lecture portion of the grade. The lab will be worth 30% of your grade.

The midterms and final will be a combination of a) showing you understand terms and concepts and providing examples, and b) both short and long essay questions, in which you will be expected not only to know the answers to the questions posed, but also to communicate that knowledge in a clear and concise fashion (i.e., writing skills will be an important part of the course). Each midterm exam will cover only the portion of the course since the previous exam. The final will mostly focus on the material following the last exam but about 25% of the questions will focus on prior materials. The exams will focus on lecture materials, with some questions taken from the assigned readings.

LECTURE part of course—Grading

Undergraduates

Midterm I (23%)
Midterm II (23%)
Final (31%)
Writing assignments (23%)

Graduate Students

Graduate students: Will be required to write an additional 10 page review on an insect related topic of your choice. During the course, I will ask for your topic. Be sure I approve your topic before you begin.

Midterm I (20%)
Midterm II (20%)
Final (25%)
Writing assignments (20%)
Final paper (15%)

LAB part of course—Grading (see lab manual)

- Lab Exam I (25%)
- Lab Exam II (25%)
- Collection (35%)
- Lab manual exercises (15%)

Information on specific assignments for lecture (lab information covered in lab):

Extra Readings: Throughout the course we will assign papers to supplement the materials that we cover in the lectures; most of the time these papers will be reviews on a particular topic. However, unless otherwise told, you will not have to write reviews on these papers but expect to see questions about the papers on the exams.

Lecture writing assignments (23% of grade): During the course, you will have 4 different writing assignments:

- 1) Write a 2 – 3 page review of a scientific journal article (3%). We will provide a set of 3 or 4 papers from which you can choose. Students will have a full week to turn in their review. If we assign a paper on a Monday, its review will be due the following Monday. For every day it is late, we will reduce the total points one can get from the paper by 20%.
- 2) Take a scientific paper and write a “news release” about the paper for the public (3%). For this assignment, you will choose a scientific paper from a set of papers that we will give you and write a summary of the paper written for the public. Maximum length 300 words.
- 3) *New Order Project* (9%): For this you will design a new order of insects. See the description on handout.
- 4) Bee declines case study (8%). For this project you will divide up into groups and address several issues about the current information on the declines of pollinators, specifically bees. There are many aspects and perspectives to this issue and in this project you will examine different aspects of the issue and put together a short presentation for the class. You will be using information from many different parts of the class for this project. Details will be provided later.

We will provide details of these assignments and the rubrics by which they are graded.

Tips for doing well in this class: Come to class prepared; take good notes; do assigned readings; come to lab prepared and fill in lab notebook; work with your peers; take advantage of office hours for help.

EXTRA CREDIT OPPORTUNITIES

- 1) “Flash Talk Friday” (extra credit of up to 10 points possible, added to exam score). Most Fridays (see schedule) we will take the last 10 minutes or so of the class to present optional (and hopefully really fun!) flash talks. Flash talks are 2 – 3 minutes in length and should be about something interesting related to entomology. This can be a summary of an article, a specimen and something about its biology, a quick overview of insects in pop culture, etc. It should include a visual and a 2 – 3 sentence abstract that can be a slide or something you hand to us before your talk. We will pass around a sign-up sheet. Details of this assignment will be posted on D2L.

2) Seminar essay. You may earn up to 5 bonus points on your final exam score with a seminar summary. Attend a seminar that deals with something entomological; we will provide some suggestions but you are welcome to propose one. If you propose one, you must check with us first. We will post a list on D2L. Details of this assignment will be posted on D2L.

ADDITIONAL IMPORTANT INFORMATION

POLICIES: Campus policies will be respected and enforced and students are expected to be aware of these policies as described below.

Honor Code

All students enrolled in a University of Colorado Boulder course are responsible for knowing and adhering to the [academic integrity policy](#) of the institution. Violations of the policy may include: plagiarism, cheating, fabrication, lying, bribery, threat, unauthorized access, clicker fraud, resubmission, and aiding academic dishonesty. All incidents of academic misconduct will be reported to the Honor Code Council (honor@colorado.edu; 303-735-2273). Students who are found responsible for violating the academic integrity policy will be subject to nonacademic sanctions from the Honor Code Council as well as academic sanctions from the faculty member. Additional information regarding the academic integrity policy can be found at <http://honorcode.colorado.edu>.

Policy on Disabilities

If you qualify for accommodations because of a disability, please submit to your professor a letter from Disability Services in a timely manner (for exam accommodations provide your letter at least one week prior to the exam) so that your needs can be addressed. Disability Services determines accommodations based on documented disabilities. Contact Disability Services at 303-492-8671 or by email at dsinfo@colorado.edu. If you have a temporary medical condition or injury, see [Temporary Injuries guidelines](#) under the Quick Links at the [Disability Services website](#) and discuss your needs with us.

Policy Religious observance

Campus policy regarding religious observances requires that faculty make every effort to deal reasonably and fairly with all students who, because of religious obligations, have conflicts with scheduled exams, assignments or required attendance. If you see any conflicts with this class schedule, please see us at the beginning of the semester to make arrangements.

See the [campus policy regarding religious observances](#) for full details.

Policy on Classroom Behavior

Students and faculty each have responsibility for maintaining an appropriate learning environment. Cell phone use is not permitted during class period (and please turn them off during class). Laptops/tablets must be used only for classroom-related activities (e.g. notetaking). Students using laptops or tablets for other purposes will be asked to leave class. Students are expected to participate in all in-class activities and refrain from engaging in behaviors that detract from the learning of other students (e.g., talking while the instructor or TA is talking).

We as instructors will treat all students with understanding and respect. Those who fail to adhere to such behavioral standards may be subject to discipline. Professional courtesy and sensitivity are

especially important with respect to individuals and topics dealing with differences of race, color, culture, religion, creed, politics, veteran's status, sexual orientation, gender, gender identity and gender expression, age, disability, and nationalities. Class rosters are provided to the instructor with the student's legal name. We will gladly honor your request to address you by an alternate name or gender pronoun. Please advise us of this preference early in the semester so that I may make appropriate changes to my records. For more information, see the [Classroom and Course-Related Behavior policy](#) which describes examples of unacceptable classroom behavior and the student honor code.

Policy on Discrimination and Harrassment

The University of Colorado Boulder (CU Boulder) is committed to maintaining a positive learning, working, and living environment. CU Boulder will not tolerate acts of sexual misconduct, discrimination, harassment or related retaliation against or by any employee or student. CU's Sexual Misconduct Policy prohibits sexual assault, sexual exploitation, sexual harassment, intimate partner abuse (dating or domestic violence), stalking or related retaliation. CU Boulder's Discrimination and Harassment Policy prohibits discrimination, harassment or related retaliation based on race, color, national origin, sex, pregnancy, age, disability, creed, religion, sexual orientation, gender identity, gender expression, veteran status, political affiliation or political philosophy. Individuals who believe they have been subject to misconduct under either policy should contact the Office of Institutional Equity and Compliance (OIEC) at 303-492-2127. Information about the OIEC, the above referenced policies, and the campus resources available to assist individuals regarding sexual misconduct, discrimination, harassment or related retaliation can be found at the [OIEC website](#).

Email

We consider emails exchanged between us and students to be professional correspondence and should be conducted in that manner. Here are a few tips on how to send a professional email:

- 1) salutation: Dear Professor Bowers, Dr. Bowers, or Deane; or Dear Mr. Hammer or Toby.
- 2) use complete sentences, correct spelling, and appropriate capitalization and punctuation.
- 3) please sign your name. It isn't always apparent from an email address from whom the message came.

Our response: We will try to respond within 24 hours or by the next business day if the email is sent over the weekend.

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Lecture Schedule

Date	Lec #	Topic	G & C Chapter 4 th ed.	G & C Chapter 5 th ed.	Assignments
M Aug 28	1	Introduction to the Course			
W Aug 30	2	Insects as Arthropods & Body Plan	7 (7.2, box 7.2)	7 (7.2), 8 (8.1)	
F Sep. 1	3	Insect Diversity	7 (Box 7.1) 1 (1.8)	1 (1.3)	
M Sep. 4		Holiday (Go Collecting!)			
W Sep. 6	4	How to read a scientific paper, projects (new order & case study)			
F Sep. 8	5	External Anatomy: Insect Cuticle I	2 (2.1, 2.2)	2 (2.1, 2.2)	Flash Talks
M Sep. 11	6	External Anatomy: Insect Cuticle II	2 (2.1, 2.2)	2 (2.1, 2.2)	
W Sep. 13	7	Physiology: Circulation & Respiration	3 (3.4, 3.5)	3 (3.4, 3.5)	
F Sep. 15	8	Physiology: Digestion	3 (3.6)	3 (3.6)	Flash Talks
M Sep. 18	9	Physiology: Excretion & Water Balance	3 (3.7)	3 (3.7)	
W Sep. 20	10	Physiology: Molting Process I	3 (3.3)	3 (3.3)	
F Sep. 22	11	Physiology: Molting Process II	6 (6.1-6.3)	6 (6.1-6.3)	Paper 1 due, Flash Talks
M Sep. 25	12	Locomotion & Flight I.	3 (3.1)	3 (3.1)	
W Sep. 27	13	Locomotion & Flight II.	3 (3.1), 8 (8.4)	3 (3.1), 8 (8.4)	
F Sep. 29		EXAM 1			
M Oct. 2	14	Sensory systems I: Mechanoreception & Chemoreception	4 (4.1, 4.3)	4 (4.1, 4.3)	
W Oct. 4	15	Sensory systems II. Photoreception	4 (4.4)	4 (4.4)	
F Oct. 6	16	Reproduction I. Morphology/Development	3 (3.8), 5	3 (3.8), 5	Flash Talks
M Oct. 9	17	Reproduction II. Behavior	5	5	
W Oct. 11	18	Communication			
F Oct. 13	19	Social Insects I			Flash Talks
M Oct. 16	20	Social Insects II (Guest lecturer Beth Conrey)			Lab exam 1
W Oct. 18	21	Insect-Plant Antagonisms I. Phytophagous Insects	11	11	
F Oct. 20	22	Insect-Plant Antagonisms II. Plant Defenses and Insect Offenses A	11	11	Flash Talks
M Oct. 23	23	Insect-Plant Antagonisms III. Plant Defenses and Insect Offenses B	11	11	
W Oct. 25	24	Insect-Plant Mutualisms I. Pollination A – Adrian Carper guest lecturer	11	11	
F Oct. 27	25	Insect-Plant Mutualisms: II. Pollination B	11	11	Paper 2 due Flash Talks

M	Oct. 30	26	Insect Defenses I	14	14	
W	Nov. 1	27	Insect Defenses II	14	14	
F	Nov. 3		EXAM 2			
M	Nov. 6	28	Insect-Microbe Symbioses			
W	Nov. 8	29	Insects as vectors—Val McKenzie guest lecturer	15(15.3-15.5)	15(15.1-15.3)	
F	Nov. 10	30	Mutualisms & Coevolution	11	11	Flash Talks
M	Nov. 13	31	Insects as Parasitoids	15	13	
W	Nov. 15	32	Insects as Predators and Parasites (Travis?)	15	13	
F	Nov. 17	33	Dispersal, Diapause and Migration	1 (1.8)	1 (1.7), 17	Flash Talks
M – F,	Nov. 20-24		Fall Break—ENJOY!			
M	Nov. 27	34	Insect Conservation	1 (1.5, 1.6)	1 (1.5, 1.8)	
W	Nov. 29	35	Insects and Humans I	1 (1.5, 1.6)	1 (1.5, 1.8)	
F	Dec. 1	36	Insects and Humans II	1 (1.5, 1.6)	1 (1.5, 1.8)	New Order due Flash Talks
M	Dec. 4	37	Pest Management and Biocontrol I	16	16	Collection due
W	Dec. 6	38	Pest Management and Biocontrol II	16	16	
F	Dec. 8		Bee Project			
M	Dec. 11		Bee Project			Lab exam 2
W	Dec. 13		Bee Project			
F	Dec. 15		Reading Day (Review)			Bee write-up due

Final Exam: Monday, December 18, 1:30 – 4:00 PM

Color Key to lecturers:

Green = Toby Hammer

White = Deane Bowers or guest lecturers