University of Southern Maine

Department of Biology
Department of Environmental Science and Policy

BIO335 / ESP350: Entomology / Environmental Entomology

Instructor: Joseph Staples Ph.D.: 105e Bailey Hall, 780-5552, joseph.staples@maine.edu

Volunteer Graduate TA: Megan Greenwood. megan.greenwood@maine.edu

Office Hours: Tuesday 11-12 Weds 9-10

Lecture/Laboratory: Monday 12:30 pm to 3:00 pm.

Location: USM Gorham Campus. Bailey Hall Room 214.

Prerequisites: Introductory level science course or 2 semesters of college.

Blackboard: This course will use to list grades and provide access to additional reading materials as assigned.

To access the course website on Blackboard:
1. Go to: https://bb.courses.maine.edu
2. Click **Login**.
3. Your Blackboard username and password is your University of Maine email username and password
4. Once you are in Blackboard, scroll the list and click on the **BIO335**
5. Contact the HelpDesk at 780-4029 or helpdesk@usm.maine.edu if you are having problems with BlackBoard.

Required texts:

- The Insects: An Outline of Entomology, 5th Edition. (November 2014) P. J. Gullan, P. S. Cranston
  ISBN: 978-1-118-84615-5

- A Field Guide to Insects: America North of Mexico. (Apr 15, 1998) by Donald J. Borror and Richard E. White.

Suggested reference and writing guides:

- Bugs In The System: Insects And Their Impact On Human Affairs (Helix Book)Jun 18, 1996 by May R. Berenbaum. ISBN: 978-0201408249

- Introduction to Insect Biology and Diversity. (Oxford Univ. Press). Authors Daly, H.V., J.T. Doyan, and A.H. Purcel. 1998.

- Entomology and Pest Management (6th Edition). Pedigo, L.P. 2008. Ed. Prentice Hall.

- Borrer and Delong's. An Introduction to the Study of Insects. 6th Edition. Saunders College Publishing.

Course description: This Integrated lecture and laboratory course will cover fundamental topics in entomology. We will also explore how insects influence humanity and their role as biological indicators of overall ecosystem health. Upon completing of this course, students will have acquired basic knowledge and skills in identification and study of insects.

Specific Course Goals: Students should expect to:

1. Identify common external and internal anatomical and physiological features of insects.
2. Distinguish between ametabolous, hemimetabolous, and holometabolous life histories in insects.
3. Using a key, identify insects to family and distinguish insects from other terrestrial arthropods belonging to the Arachnida, Crustacea, and Myriapoda.
4. Explain basic concepts in insect ecology and evolution
5. Summarize insect sensory systems, communication, and behavior.
6. Explain concepts of native, non-native, and invasive species.
7. Summarize integrated pest management (IPM).
8. Interpret historical and contemporary interactions between humans and insects and the subsequent consequences for insect population dynamics and ecology.
9. Assemble an appropriately curated insect collection.

Lecture Format: BIO335 will be composed of an integrated lecture and laboratory format consisting of 2 hrs of lecture and 2 hrs of laboratory each week. Attendance is mandatory.

Fieldwork: We will spend some time collecting insects in the field. Please check the weather and dress accordingly.

Assessment: Each student will be evaluated based on weekly quizzes, two exams, two laboratory practicals, and an insect collection - described below. Note 3% of the final grade will be assessed based on participation and attendance.

Quizzes: Each we will have a quiz of the previous lecture and laboratory topics covered in class.

Exams: Exams will consist of a midterm and a final exam

Lab practicals will consist of curated specimens. Students will be expected to identify the specimen, identify body parts as indicated, identify the life cycle stage, or describe something the insect's natural history or ecology or development.

Insect Collection: Over the semester we will provide instruction on identification of insects and you will be required to assemble a collection of 30 properly curated hexapods.

Table 1: Grading system for BIO350

Assignment and grading category	Points per item	% of course grade
Quizzes (weekly in class) and Homework (HW): *(HW = annotations for peer reviewed published papers as assigned by the instructor).*	10 pts each	20%
Exams (midterm and final)	100%	50%
Insect collection	156 pts	12%
Laboratory Practicals (midterm and final)	100%	15%
Participation and attendance (Three percentage points will be deducted per class for each absence).		3%

Grading: Numerical and letter grade equivalents

Total Point Range (*including final exam*)	Letter grade
90% to 100%	A
87% to 89%	B+
84% to 86%	B
80% to 83%	B-
77% to 79%	C+
74% to 76%	C-
70% to 73%	C-
67% to 69%	D+
64% to 66%	D
60% to 63%	D-
< 60 F	F

Lecture and laboratory schedule (tentative**):**

Week	Date	Topic and Readings to be completed before class	Laboratory topics and other assignments
1	Sep 9	INTRODUCTION (LECTURE AND LAB) (CH-1) THE IMPORTANCE DIVERSITY AND CONSERVATION OF INSECTS *Reading/Annotation:TBA*	(CH-18) METHODS IN ENTOMOLOGY:COLLECTING PRESERVATION, CURATION, AND IDENTIFICATION
2	Sep 16	(CH-7) INSECT SYSTEMATICS: PHYLOGENY AND CLASSIFICATION *Reading/Annotation:TBA*	Field Collection (Terrestrial Insects): USM Fields and Forest Rain Day Topic: External Anatomy
3	Sep 23	(CH-4) SENSORY SYSTEMS AND BEHAVIOUR Overview of Insect Chemical Ecology (Handout) *Reading/Annotation:TBA*	Field Collection (Aquatic Insects): Settling Pond and USM Forest Rain Day Topic: Internal Anatomy
4	Sep 30	(CH-2) EXTERNAL ANATOMY (CH-3) INTERNAL ANATOMY AND PHYSIOLOGY *Reading/Annotation:TBA*	External and Internal Anatomy
5	Oct 7	(CH-5) REPRODUCTION (CH-6) INSECT DEVELOPMENT AND LIFE HISTORIES	Entognatha, Archaeognatha, Zygentoma, Ephemeroptera, Odonata, & Plecoptera
7	Oct 14	No Classes	

Week	Date	Topic and Readings to be completed before class	Laboratory topics and other assignments
8	Oct 21	(CH-8) INSECT EVOLUTION AND BIOGEOGRAPHY *Reading/Annotation:TBA*	Blattodea, Dermaptera, Grylloblattodea, Mantodea, Orthoptera, Phasmatodea)
9	Oct 28	**Exam (Mid-term**)	**Laboratory Practical 1. (all topics and orders covered in lab up to this point)**
10	Nov 4	(CH-9) GROUND-DWELLING INSECTS (CH-10) AQUATIC INSECTS *Reading/Annotation:TBA*	Dermaptera, Embioptera, Zoraptera, Isoptera and open lab review
11	Nov 11	No Classes	
12	Nov 7	(CH-12) INSECT SOCIETIES *Reading/Annotation:TBA*	Hemiptera, Coleoptera, Neuroptera, Megaloptera.
13	Nov 18	(CH-13) INSECT PREDATION AND PARASITISM (CH-14) INSECT DEFENCE *Reading/Annotation:TBA*	Diptera, Mecoptera, & Siphonaptera
14	Nov 25	(CH-11) INSECTS AND PLANTS IPM (handout) (CH-16) PEST MANAGEMENT *Reading/Annotation:TBA*	Lepidoptera, Trichoptera Hymenoptera
15	Dec 2	(CH-15) MEDICAL AND VETERINARY ENTOMOLOGY *Reading/Annotation:TBA*	**Lab practical #2 (all topics and orders covered after the 1st practical).**

Week	Date	Topic and Readings to be completed before class	Laboratory topics and other assignments
16	Dec 9	(CH-17) INSECTS IN A CHANGING WORLD *Reading/Annotation:TBA*	Insect collection due
17	Dec 16	Final Exam (Comprehensive) 1:30 pm – 3:30 pm Bailey 214.	

ADA Statement

The university is committed to providing students with documented disabilities equal access to all university programs and services. If you think you have a disability and would like to request accommodations, you must register with the Disability Services Center. Timely notification is essential. The Disability Services Center can be reached by calling 207-780-4706 or by email at dsc-usm@maine.edu. If you have already received a faculty accommodation letter from the Disability Services Center, please provide me with that information as soon as possible. Please make a private appointment so that we can review your accommodations.

At any point in the semester, if you encounter difficulty with the course or feel that you could be performing at a higher level, consult with me. Students experience difficulty in courses for a variety of reasons. The following are resources on campus for students.

- For writing skills or time management, you can make an appointment to see a student tutor at the Learning Commons located in both the Portland and Gorham libraries. For more information, visit http://www.usm.maine.edu/learningcommons. The Writing Center at LAC is also available to all USM students and is a great option for students living in the greater Lewiston/Auburn area. For more information, please visit http://usm.maine.edu/writingcenter.
- University Health and Counseling Services is a student resource that promotes the health and well-being of the USM community. More information can be found at www.usm.maine.edu/uhcs.

INSECT COLLECTION REQUIREMENTS

Requirement	Maximum points
1. 30 numbered specimens (use catalog or ascension numbers)	30 pts
2. Members from a minimum of 20 different orders (1 pt each)	20 pts
3. Up to 20 specimens identified to genus (1 pt each)	20 pts
4. Up to 10 specimens identified to species (2 pts each)	20 pts
5. An annotated list of specimen numbers with information about the biology of the specimen. Site characteristics (Host plant or other resource and features).	30 pts

Ecological Information (One example of each duplicates are not allowed)

Habitats	**Trophic**	**Natural history groups**
Forest	Herbivore	Cryptic
Grassland (Field or Wetland)	Predator	Aposematic
Agricultural	Parasitoids or Parasites	Chemical Defense
Aquatic	Detritus/Carrion/Microbial	Mimic
Domestic	Pollen/Nectar	Social
Ground/Soil Dwelling		Pest
		Disease vector
12 pts	**10 pts**	**14 pts**

Not allowed in your collection:

1. No non-hexapods.
2. No Large Butterflies (> 4 cm wingspan) (Explicitly no Papilionidae (Swallow Tails), *Danaus plexippus* (The Monarch Butterfly), *Limenitis archippus* (The Viceroy Butterfly).
3. No endangered species: see the following site for a list of species in Maine: http://www.maine.gov/ifw/wildlife/endangered/listed_species_me.htm
4. No more than 7 specimens that are not collected by you (all collectors must be identified).
5. No commercially purchased specimens of any kind.

Type insect data in this table (12 font). Remember genus species names are italicized, species names lower case.												
	Cat or Ascensi	**Order**	**Suborder or common taxonomic division**	**Family**	**Genus**	**Species**	**Native (L) N**	**Habitat**	**Trophic**	**Natural History Group**	**Notes**
	114	Hymenoptera	Symphyta	Pamphiliidae	*Acantholyda*	*erythrocephala*	N	Conifer forest	Herbivore	Invasive pest	Dimorphic Fem vs Male
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