

ENTO 4330 Medical & Veterinary Entomology

I. General Information

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Semester: Spring 2012

Credits: Lec /Lab 4.0

Class Hrs: Lec/Lab: MW 2:00-4:50

Room: N210

II. Course Description

(Catalog Description) Natural history and taxonomy of arthropods of medical (including forensic) and veterinary importance in temperate, tropical, and subtropical regions of the world with emphasis on the role arthropods play as vectors and transmitters of disease. The laboratory involves techniques of collection and taxonomic identification, dissections, and field experiments on carrion-arthropod succession to demonstrate the utility of arthropods in medicolegal investigations. Satisfies the departmental diversity requirement. This course is acceptable for section 1.c requirement for the major. (Formerly ENTO 3330.) Prerequisite: BIOL 1050 and BIOL 1150 or equivalents. (Lecture, 3 hours; laboratory, 3 hours; field trips and experiments) (Spring of alternate years).

III. Learning Objectives

1. The student will become conversant in the terminology, biology and natural disease cycles of arthropod-transmitted diseases, and phylogenetic relationships (through tree thinking) of insects and other arthropods of medical, veterinary, and forensic importance;
2. The student will recognize scientific and common names for arthropods, pathogens transmitted by those arthropods, and the names of the resulting disease in humans and other animals;
3. The student will become familiar with the direct injury that arthropods cause, including but not limited to phobias, psychoses, annoyance, allergies, toxins, venoms, and myiasis;
4. Through the sister discipline of veterinary entomology, the student will learn how arthropods cause injury to domestic animals, particularly livestock and pets, by feeding or invasion, exsanguination, introduction of venom or saliva, and by transferring disease organisms from infected animals or contaminated sites;
5. The student will become familiar with evidence recovery techniques from a model corpse and learn how forensic entomologists use arthropod developmental and successional timetables to estimate time-of-death from human remains for law enforcement;
6. The student will review the primary literature (i.e., journal & secondary sources) to critically evaluate current topics in M/V/F entomology and become conversant on these topics through oral (PowerPoint) presentations;
7. The student will gain knowledge on the factors that cause disease outbreaks, methods for reducing their spread, and resulting geopolitical and socioeconomic pressures public health professionals face when confronting arthropod-borne diseases.

IV. Course Requirements

The course grade for the 4-credit component of this course will be determined by the combined grades from laboratory and lecture work. The grade distribution will be approximately 60% lecture and 40% laboratory. It is your responsibility to know your current grade average in the class at any one time.

This is a senior-level class; as such it is your responsibility to keep abreast with exam dates, course materials, assignments and updates. **Graduate and postbaccalaureate students are expected to perform at a higher level than undergraduates (see handout); subsequently (and according to university policies), these students will receive additional assignments.** Allow at least 2 weeks for exams, lab exercises, and homework to be graded and returned. Missed exams must be made up within one calendar week of the exam date and require prior approval from me. It is your responsibility to contact me in the event you miss an exam and to provide relevant documentation (e.g., letter from a physician) documenting your absence. The final decision to offer makeup exams rests with me. **Homework and lab assignments will each have a due date and will lose 20% of their value for each calendar day they are late.**

Even in small classes it is essential that students respect the rights of others. **Talking, whispering and giggling during lectures is rude, disruptive, and unprofessional for your classmates and instructor.** If this becomes a problem, I will ask you to leave; repeat offenders will be turned over to the appropriate student disciplinary committee. As per university regulations, students with excessive absences or tardiness will be dropped from the class. **Turn off all cell phones at or before arriving to class.**

Executive Order 1037 (effective August 2009) allows students to only repeat a course twice and in which they have earned less than a C grade. Students are only allowed to replace the first 16 units they repeat; those reaching the 16 unit limit may repeat an additional 12 units, but the resulting grade is averaged with all other grades. Students repeating this class will not be allowed to choose the same project as they worked on previously.

V. Required Texts/i>clicker (To be purchased/rented before 2nd class day)

(1) ***Medical and Veterinary Entomology, 2nd ed.*** by Mullen & Durden. Academic Press. Chapters for this text (e.g., MD1, MD2) are indicated in the schedule.

(2) ***Entomology & Death, 2nd ed.*** by Haskell and Williams. Forensic Entomology Partners. Chapters for this text (e.g., HW1, HW2) are indicated in the schedule.

(3) ***i>clicker*** (rental/used/new available). Numerous pedagogical studies have shown that i>clickers improve student retention and learning. You are required to purchase an i>clicker remote to receive in-class participation and performance points. In order to receive this credit, you must register your i>clicker remote online at www.iclicker.com/registration. Complete the fields: first name, last name, student ID, remote ID. Your i>clicker will be used every class day and you are responsible for bringing it. You will be allowed to miss 10% of the responses (i.e., 3-4 classes) before being penalized; the remaining responses will contribute 5% of your total grade. The i>clicker may also be used for peer teaching, provoking discussions, and to gauge student comprehension of difficult topics. Using another student's i>clicker or using multiple remotes is considered cheating and will be dealt with swiftly and severely according to the California Code of Regulations (see below).

I will also assign/pass out primary literature on medical/forensic/veterinary entomology (journals/book chapters/review papers), web site information (see also below), and will show videos on an occasional basis (in lab) that I will expect you to know for exams.

(4) Lab will rely mostly on **handouts**; these will be provided one week (or less) before the next lab meeting. Use of cameras/phones to photograph live, pinned, or microscopic specimens for use on exams is forbidden and considered cheating; such misconduct will be dealt with swiftly and severely according to the California Code of Regulations (see below). Your project presentation will be performed orally on *PowerPoint* slides, citing the most recent scientific findings (see below).

VI. Grading Procedure

Two semester exams (**February 29** and **April 18**) will be 125 point mixed format (short answer/essay, matching, some multiple choice, long essay). Questions for the exams will come from the lecture notes, textbooks, videos, and handouts. Lab practicals will be fill-in-the-blank questions taken from slides, specimens, field materials, and demonstrations. The final exam (**May 18**) will be comprehensive (250 pts) over all the class (lecture) material. **No extra credit will be offered beyond the points shown below.**

Your active participation in lectures and labs are expected. I expect you to WORK COLLABORATIVELY on group lab and field exercises, but WORK INDEPENDENTLY on written exams and homework assignments. On the group (forensic) activity, students will use a scoring rubric to evaluate each other's participation in the project (= peer review); group and peer grades will be combined to produce each student's final grade on the project.

Cheating in any form is inappropriate conduct and will be dealt with swiftly and severely according to Sections 41301 through 41304 of Title 5 of the California Code of Regulations which includes expulsion, suspension and probation.

Lecture Exams (2 @ 125 points each)	250
Comprehensive Final (1 @ 250 points)	250
Lab Practical (2 @ 100 points each)	200
Project (PowerPoint Presentation) on Selected Topic	200
i>clicker questions	50
homework, participation, attendance	50
Total	1000

A = 900-1000, B = 800-899, C = 700-799, D = 600-699, F < 600 points. No +/- grading will be applied to your final grade.

Homework/lab assignments will be passed out in lab and will be due at the next lab meeting (1 week later, no exceptions). Your project presentation will come from a list of topics I provide and will take no more than 18 minutes of class time. Your performance will be evaluated using a standardized grading sheet (and peer grade in the case of the group forensic project). **In the event you miss (or are unready to present) your scheduled talk, you will receive an automatic '0' for the 200-point assignment. E-MAIL ME YOUR .ppt FILE (NOT .pptx) OR PROVIDE ME WITH A CD/MEMORY CARD OF YOUR TALK BEFORE LAB STARTS AND BE READY TO TEACH THE CLASS!!**

VII. Recording Policy:

Audio or video recording of classes (tape and digital format) or use of cameras/phones to photograph live, pinned, or microscopic specimens for use on exams is not permitted. An exception is made for students registered with Disability Resource Services, who are approved for this accommodation. In such exceptions, DRS students will be asked to sign a “Recording Agreement” which disallows them from sharing recordings with other individuals unless approved by the DRS program.

Important Dates to Remember:

January 26	First Class Day
February 22	Census Date (Last Day to Add or Drop)
February 29	Lecture Exam 1
March 12	1 st Lab Practical
March 30	Cesar Chavez Day, No Class
April 9-13	Spring Break, No Classes
April 18	Lecture Exam 2
April 16, 18, 23	Oral Presentations
May 2	2 nd Lab Practical
May 14	Last Day of Classes
May 16	Reading Day
May 18	Comprehensive Lecture Final (2:00 – 4:00)

LECTURE OUTLINE & READING ASSIGNMENTS*

Topic(s)	Chap(s) or Exam Date
1. Introduction to M/V/F Entomology <ul style="list-style-type: none"> a. Introduction to Course b. Short History of M/V/F Entomology c. Arthropod Classes & Orders, Tree-Thinking d. Direct Injury by Arthropods e. Venomous Arthropods f. Vector-Borne Diseases g. Host-Parasite Interactions h. Entomophobia i. Forensic Entomology 	MD1, HW1, Handouts
2. Overview of Parasitic Arthropods <ul style="list-style-type: none"> a. Origin & Evolution of the Blood-Feeding Habit b. Morphological Adaptations 	Handouts, MD2, 22-26
3. Epidemiology of Arthropod-Borne Diseases <ul style="list-style-type: none"> a. Short History of Vector-Borne Disease Discovery/Control b. Transmission Cycles: Terminology, Components c. Transmission Cycles: Modes & Examples d. Vector Incrimination & Infection Rates e. Surveillance 	MD3, Handouts

- f. Emerging Vector-Borne Diseases
4. Forensic (=Medicocriminal) Entomology MD4; HW1, 3, 8-11
- a. Scope, Historical Background, Professional Status
 - b. The Corpse-Frequenting Fauna, Ecological Succession
 - c. Time, Manner, and Cause of Death
 - d. Laboratory Procedures, Climate Data, Analysis
 - e. Case Records, Reporting, Court Testifying
5. Diptera (Flies) of M/V/F Importance MD10, 18, 19; Handouts
1st Exam (February 29)
- a. Taxonomy & Morphology
 - b. Life History, Behavior and Ecology
 - c. Public Health, Veterinary Importance, Prevention & Control
 - d. Forensically-Important Flies (Calyptrate flies)
 - e. Myiasis-Causing Flies and Maggot Therapy
 - f. Louse flies, keds, and related flies (Hippoboscoidea)
6. Hemiptera (True Bugs) of M/V Importance MD7, Handouts
- a. Kissing Bugs (Reduviidae), Bedbugs (Cimicidae)
 - b. Life History, Behavior and Ecology
 - c. Public Health, Veterinary Importance, Prevention & Control
7. Phthiraptera (Lice) of M/V Importance MD6, Handouts
2nd Exam (April 18)
- a. Chewing (Mallophaga), Sucking Lice (Anoplura)
 - b. Life History, Behavior and Ecology
 - c. Public Health, Veterinary Importance, Prevention & Control
8. Siphonaptera (Fleas) of M/V Importance MD9, Handouts
- a. Human, Rat, and Sand Fleas (Pulicidae, Tungidae)
 - b. Fleas of Poultry (Ceratophyllidae)
 - c. Life History, Behavior and Ecology
 - d. Public Health, Veterinary Importance, Prevention & Control
9. **Comprehensive Lecture Final (May 18, starting time: 2 pm)**

*Reading assignments listed on the course outline above are from Mullen & Durden (MD) and Haskell & Williams (HW). Topic content and dates of coverage in the syllabus may be changed due to extenuating circumstances.

LAB SCHEDULE*

Week Beginning	Topic(s)	Chapters in Text(s) or Test
January 30	Introduction, (a), Lab Safety, Topic Assignments, Microscope Assignment & Review, Tree Thinking Quiz	MD1, 2; Handouts
February 6	Taxonomy Exercise, Arthropod Body Plans & Phylogeny, Collecting Methods, (b)	HW4-7, Handouts
February 13	Non-Insect Arthropods (ticks, mites, spiders, scorpions), (c), (d), Insect Mouthparts	MD2, 22-26; Handouts
February 20	Forensically-Important Insects, (e), Mock Cases, (f)	HW2, MD4; Handouts
February 27	Blood-Sucking Flies I: Psychodidae, Ceratopogonidae, Simuliidae	MD10-13, Handouts
March 5	Blood-Sucking Flies II: Tabanidae, Muscidae, Glossinidae, Review for 1 st Lab Practical (W)	MD8, 15-17; Handout
March 12	1st Lab Practical (M) , (g), Mosquitoes I	MD14, Handout
March 19	Mosquitoes II, Myiasis-Causing Flies	MD14, 18; Handouts
March 26	Hemiptera (true bugs), Phthiraptera (lice)	MD6, 7; Handouts
April 2	Siphonaptera (fleas), (h)	MD9, Handouts
April 16	Student Presentations (M & W)	
April 23	Student Presentations (M) , Miscellaneous insects (beetles, moths, wasps, bees, ants), (i)	MD8, 20, 21; Handouts
April 30	Review for Lab Practical (M), 2nd Lab Practical (W)	

*Reading assignments listed on the course outline above are for Mullen & Durden (MD) and Haskell & Williams (HW). Topic content and dates of coverage in the syllabus may be changed due to extenuating circumstances.

List of Scientific Videos (shown during lab time)

The following videos are listed in chronological order in the lab syllabus. Some will have Q/A sheets for you to complete (*); these make good study guides for lecture exams.

- a) Rats, Bats and Bugs (Bugs only portion) (50 min)
- b) Collection and Preservation of Insect Evidence from Crime Scenes (20 min)
- c) Deadly Bugs (50 min)*
- d) Ticks: The Real Vampires (50 min)*
- e) Creatures in Crime (50 min)*
- f) The Autopsy (30 min)
- g) Mosquito Control and Biology (30 min)*
- h) Scourge of the Black Death (50 min)
- i) Leeches, Maggots, and Bees (50 min)*

Useful Web/Internet Sites on M/V/F Entomology Topics:

<http://lamarck.unl.edu/hwml/pdf-files/cdc-keys.html> (CDC Pictorial Keys)
<http://www.who.int/tdr/media/image.html> (Image Library, World Health Organization)
<http://www.cdc.gov/ncidod/dvbid/arbobr.htm> (Div. of Vector-Borne Diseases, CDC)
<http://www.nafea.net/> (North American Forensic Entomology Association)
<http://www.eafe.org/> (European Association of Forensic Entomology)
http://www.ent.iastate.edu/List/medical_entomology.html (Iowa State ME index)
<http://biotherapy.md.huji.ac.il/> (International Biotherapy Society)

Refereed Journals on M/V/F Entomology Topics:

<http://www.annualreviews.org/loi/ento> (Annual Reviews, publishes the *Annual Review of Entomology*, as well as other review articles)
<http://www.entsoc.org/> (Entomological Society of America, publishes the *Journal of Medical Entomology* and other entomology journals)
<http://www.esc-sec.ca/> (Entomological Society of Canada, publishes the *Canadian Entomologist*)
<http://www.royensoc.co.uk/> (Royal Entomological Society of London, publishes *Medical and Veterinary Entomology* and other UK entomology journals)
<http://www.aafs.org/> (American Academy of Forensic Sciences, publishes the *Journal of Forensic Science*)
http://www.elsevier.com/wps/find/journaleditorialboard.cws_home/505512/editorialboard
 (publishes *Forensic Science International*)
<http://www.sove.org/Home.html> (Society of Vector Ecology, publishes the *Journal of Vector Ecology*)
http://www.liebertpub.com/publication.aspx?pub_id=67 (Society for Zoonotic Ecology and Epidemiology, publishes *Vector-Borne and Zoonotic Diseases*)
<http://www.mosquito.org/> (American Mosquito Control Association, publishes the *Journal of the American Mosquito Control Association*)
<http://www.anmedent.com/> (publishes the *Annals of Medical Entomology*)