

ENTO 3000: Principles of Entomology, Fall 2018

I. General Information:

Professor: Dr. Kenneth Schoenly

Office: N271

Phone: 667-3949

Office Hrs: M,W 9:00-10:30 (and by appointment)

Email: kschoenly@csustan.edu

Credits: Lec/Lab 4

Lecture: Tu,Th 8:00-8:50 (N221)

Lab: TuTh 9:00-11:50 (N210)

II. Student Learning Goals:

1. The student will demonstrate familiarity with all aspects of insect biology, including details of insect products & ecosystem services, evolutionary history, taxonomy, ecology, development and physiology.
2. The student will become proficient in family-level identification of insects to the extent that s/he should be able to 'key out' to order and family any insect presented to her/him from anywhere in the world.
3. The student will demonstrate familiarity with topics originating with or largely unique to entomology, including but not limited to: exoskeleton structure and function, metamorphosis, haplodiploidy, integrated pest management, and insecticidal resistance.
4. Through scientific understanding of evolutionary relationships of extinct and extant insects, completion of a crop food-web project, and preparation of a 40-family insect collection, the student will gain further appreciation of natural history and our regional (Central Valley) biodiversity.

III. Course Description:

(Catalog Description): Classification, control, life history, structure, ecology and basic physiology of insects. Satisfies the departmental diversity requirement. Prerequisites: BIOL 1050 and 1150 (or equivalent introductory series) and CHEM 1100 and CHEM 1110 with grades of C- or higher. (Lecture, 2 hours; laboratory, 6 hours; field trips) (Fall of alternate years).

Entomology is the study of insects, the most diverse class of animals on Earth. Entomologists draw upon every field of biology to understand insects, including evolution, ecology, behavior, anatomy, physiology, biochemistry, genetics, and molecular biology. One semester is not enough time to explore all aspects of entomology, so **we will explore major themes of diversity, life history and development, form & function, behavior, and management.** In order to understand current trends and future directions, we will also examine some classic observations and experiments to see their lasting effect on entomology.

IV. Course Requirements:

The course grade for this upper-division class is four credits determined from the combined grades of lecture and laboratory work. It is your responsibility to know where you stand in the class at any one time. As per university regulations, students who are absent on the first class day will be dropped (unless prior notification was made).

The rigors of this upper-division course **demand punctuality and regular attendance, and commitment and concentration** to the readings, lectures, and laboratory. Success in this course (with a good grade!) is achieved by taking complete and comprehensible notes, being punctual and attending every class, correctly answering i>clicker questions, and keeping abreast of exam dates, other assignments, and updates. **Students must have working knowledge of Linnaean**

taxonomy, phylogenetics (tree-thinking), and biological terminology, as well as have taken laboratory practical exams involving specimen recognition/identification from microscope slides and pinned specimens.

Allow at least 2 weeks for exams, lab exercises, and homework to be graded and returned. Missed exams must be made up within 2 lecture days 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 provide me relevant documentation (e.g., doctor's note, jury summons, funeral notice) documenting your absence. **An unexcused absence for a gradable event will result in no score, but in the event of a documented compelling circumstance, an attempt will be made to work out the conflict.** On the day of the field trip, you should leave promptly at 8:00; if you miss the trip, you will incur a 10% penalty in your final grade.

The syllabus and most handouts for the class will be posted online using Blackboard. Blackboard is accessible using the direct link: <https://www.csustan.edu/blackboard> (Find the Fall 2018 Blackboard courses to access your courses and materials)

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.

V. Personal Responsibility

Behavior that interferes with the instructor's ability to teach or grade, or the ability of students to benefit from instruction, will not be tolerated. Examples include: audible ring tones, outbursts, repeated late arrivals or early departures, excessive or irrelevant conversations, being disruptive and inappropriate use of phones or computers. Behavior that is not consistent with the Student Conduct Code – including any form of academic dishonesty (see below) – will result in a failing grade and a referral to the Office of Student Judicial Affairs. **Please turn off all cell phones at or before arriving to class.**

VI. Required Textbook/Clicker/Other Materials (to be purchased 1st week of class):

1. [Borror and DeLong's Introduction to the Study of Insects](#), 7th edition, by Triplehorn and Johnson. Used copies available at bookstore and through Amazon's used book dealers. Bring to class every class period; you will use the book's taxonomic keys and illustrations for identifying your insects and for lab ID quizzes (no sharing will be allowed). Chapters for the text are listed in the schedule below.
2. ***i>clicker*** (rental/used/new available). Numerous pedagogical studies have shown that *i>clickers* improve student retention and learning. To receive both in-class participation and performance points, you are required to bring an *i>clicker* remote every day. 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. Bring your *i>clicker* to every class meeting and prepare to answer questions from your readings and lecture notes. Performance points are earned if questions are answered correctly. If you are late and miss the 1st question, you will forfeit participation points for that lecture. Using another student's *i>clicker* or using multiple remotes is a form of cheating and will be dealt with swiftly and severely according to the California Code of Regulations (see below).
3. **Handouts**. On an episodic basis, I will also assign primary literature (journals/book chapters), web site information (see also below), and show videos (some with Q/A sheets to answer) that will reinforce

lecture material and help you on exams. Lab will rely mostly on handouts; these will be provided one week (or less) before the next lab meeting.

VII. Grading Procedure:

From the lecture portion, there will be **two midterm exams** (on **Oct 4** and **Nov 15**), a **crop food-web PowerPoint presentation (Oct 25 and 30)**, and a **comprehensive final (Dec 13)**. From the lab, there will be **two practicals (Oct 11, Dec 6)**, **two insect ID quizzes (Sep 27, Oct 18)**, and a **40-family insect collection (due Nov 21)**. Lecture exams will be mixed format (short answer/essay, matching, some multiple choice, long essay). Questions for the exams will come from the lecture notes, textbook, video questions, and primary literature (if assigned). A **mandatory field trip** to Knight's Ferry scheduled for **September 13** requiring your personal transportation (after signing student disclaimer form). Missing this trip will result in a 10% penalty in your final grade. **Use of cameras/phones to photograph live, pinned, or microscopic specimens in lab is forbidden and considered cheating (see recording policy below)**. Lab practicals will be fill-in-the-blank questions taken from slides, specimens, field materials, demonstrations, and websites. I expect you to **WORK INDEPENDENTLY** (without outside assistance) on written exams, homework assignments, the insect collection, and the crop food web.

The final exam will be comprehensive of the entire class (lecture) material. All requests to take exams at other than scheduled times must be in writing to the instructor **at least one week** prior to the scheduled exam date. This policy does not apply to lab practicals, which cannot be rescheduled, due to set up time and room constraints. As above, it is your responsibility to contact me in the event you miss an exam or assignment and to provide me with relevant written information (e.g., doctor's note, jury summons, funeral notice) documenting your absence. The final decision to offer makeup exams rests with me.

Insect Collection: You are required to prepare an insect collection comprising one or more representatives from **40 insect families**. Lab time and one field trip to Knight's Ferry will provide you some (but not all) the time you will need to collect, pin, label and identify insects for your collection. Additional field trips (taken outside lecture/lab time) are strongly encouraged to insure that you have enough specimens to complete your 40-family collection (**5% of your collection grade will be deducted for each missing family!**). Your collection will be graded for completeness, neatness, proper curatorial technique, and accuracy of order- and family-level determinations. **Although limited specimen trading is allowed among your classmates, specimens received from outsiders is a form of academic dishonesty.** Your collection is worth **250 points (1/4 of your total grade)** and is due on/before **Wednesday, Nov 21 at/before 5 PM (no exceptions)**.

"The beginning of wisdom is calling things by their right names." -- Chinese Proverb

Crop Food Web Project: To bolster awareness and appreciation of our region's agrobiodiversity (before it disappears!), you will seek out published information (in the library, authoritative websites, and/or agricultural extension agents) on arthropods associated with a specific crop plant of the Merced-Turlock-Modesto region. Natural history information on the pests, predators, parasitoids, and parasites of your crop will help you construct a reasonable food web of the crop-pest-natural enemy associations (details to follow). **You will deliver a 10-13 min oral presentation on your food web and, afterward, turn in a written (graphical) version of the web containing full taxonomic names and scientific citations of the primary (journals, technical reports) and secondary (text, specialty books) literature.** You will be graded on your

oral delivery, entomological accuracy, completeness, and neatness (grading rubric to follow). The food web project is worth **100 points (10% of your grade)**.

Each homework will have a due date and time and may include a tree-thinking exercise, concept critiques, or math problems. **An unexcused absence for a gradable event will result in no score, but in the event of a documented compelling circumstance, an attempt will be made to work out the conflict.** Otherwise, homework that is turned in after the due date will not be accepted.

Grade Component	Total Possible Points	Weight (%)
2 Unit Lecture Exams	100 each (200 total)	20%
Comprehensive Final	150	15%
2 Lab Practicals	70 each (140 total)	14%
Insect Collection	250	25%
2 ID Quizzes	50 each (100 total)	10%
Crop Food Web	100	10%
i>clicker questions, attendance, punctuality	50	5%
Homework, other assignments	10+	1%+
Total Possible Points	1000	100%

Grades: A = 100-90%, B = 89-80%, C = 79-70%, D = 69-60%, F < 60%, No +/- grading will be applied to your final grade. **No extra credit will be offered beyond the points shown below.**

Recording Policy: Recording of classes or of live, pinned, or microscopic specimens is not permitted. If you do not wish to comply with this policy, please discuss this with the instructor or take another class. 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.

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.

VIII. IMPORTANT DATES TO REMEMBER:

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| AUG 22: Fall classes begin | OCT 30: Food Webs (Written version due) |
| SEP 3: Labor Day (no class) | NOV 12: Veterans Day (no class) |
| SEP 13: Field Trip (Knight’s Ferry, use personal car) | NOV 15: 2 nd Lecture Exam |
| SEP 19: Census Date: Last day to add/drop | NOV 21: Insect Collections due (5 pm) |
| SEP 27: 1 st ID Quiz (Orders) | NOV 22-23: Thanksgiving holiday (no class) |
| OCT 4: 1 st Lecture Exam | DEC 6: 2 nd Lab Practical |
| OCT 10: Columbus Day (no class) | DEC 10: Last Day of Classes |
| OCT 11: 1 st Lab Practical | DEC 11: Reading Day (no classes) |
| OCT 18: 2 nd ID Quiz (Families) | DEC 13: Comprehensive Final, starts 8:30 |
| OCT 25, 30 (if needed): Food Web Presentations | |

LECTURE SCHEDULE*

Topic(s)	Chapters in Text or Exam Date
Introduction, Success & Dominance, Tree-Thinking, Collecting	1, 5 (part), 6, 7, 35
Insect Orders (Entognathous & Apterygote Orders, Ephemeroptera, Odonata)	7-10 (part)
Insect Orders (Remaining Insect Orders)	11-34 (part)
Insect Body I: External Anatomy	2

EXAM 1	October 4
Insect Body II: Development & Reproduction	3
Insect Body III: Digestive, Respiratory, Excretory & Muscular Systems	3
Insect Body IV: Nervous System & Special Senses	3, 4
Insect Communication and Behavior	3, 4
EXAM 2	November 15
IPM: Physical, Cultural & Genetic Controls of Insect Pests	
Chemical Controls: Classes, Modes of Action, Regulations	
FINAL EXAM (Comprehensive, starts 8:30)	December 13

LAB SCHEDULE*

Week	Topic(s), Video(s), Field Trip, Quiz/Practical Dates
Beginning	
Aug 23 (Th)	(a), Insect Products & Services, Lab Safety, Driver Needed
Aug 28	Drawer Assignments & Check-Out, Microscope Review, Cladistics Exercise, (b), Roll Call of Insect Orders I
Sep 4	(c), Roll Call of Insect Orders II, Field Collecting Methods I (Th, BioAg), Practice Pinning
Sep 11	Field Collecting Methods II (Tu), Field Trip – Knight’s Ferry (Th)
Sep 18	Pin Collected Insects, Preparation & Curation Methods, Insect Anatomy I (antennae), (d), Grasshopper Dissection (Th), Insect ID
Sep 25	Insect Anatomy II (mouthparts), (e), 1st ID Quiz (Orders) (Th) , Insect ID & Pinning
Oct 2	(f), Native & Introduced Pollinators (Tu), Insect ID, Review for Practical (Th)
Oct 9	(g), Review for Practical (Tu), 1st Lab Practical (Th) , (h), Insect ID & Pinning
Oct 16	PowerPoint Review (FW Talk) (Tu), Insect ID & Pinning, 2nd ID Quiz (Families) (Th)
Oct 23	Entomophagy, Insect ID and Pinning, Food Web Presentations (Th)
Oct 30	Food Web Presentations (Tu), Food Web Project (written version due Tu) , Aquatic Entomology (Th), Insect ID & Pinning
Nov 5	Aquatic Insect Biomonitoring; (i), Medical Entomology, Insect ID & Pinning
Nov 15 (Th)	Medical Entomology (cont’d), Insect ID & Pinning
Nov 20	(j), Forensic Entomology Insect ID & Pinning, Collections Due Nov. 21 by 5 pm
Nov 27	Catch-up Lab, Review for Practical (Tu, Th), Drawer Contents Check-In
Dec 4	Microscope Clean up, Review for Practical, 2nd Lab Practical (Th)

*The instructor reserves the right to change lecture, lab topics, or textbook readings in extenuating circumstances.

List of Scientific Videos for ENTO 3000 (Shown during lab time)

The following videos are listed in chronological order in the lab syllabus (10-60 min in length). Some will have Q/A sheets for you to complete which make good study guides for lecture exams (indicated by *)

- Rats, Bats and Bugs (Bugs only portion) (50 min)
- Collection and Preservation of Insects (23 min)
- Insects: The Little Things that Run the World (60 min)*
- Dissection and Anatomy of the Grasshopper (10 min)
- How to Use a Dichotomous Key for Identifying Aquatic Insects (24 min)
- Integrated Pest Management in Agriculture (30 min)
- Tales from the Hive (60 min)*
- Silence of the Bees (60 min)
- Deadly Bugs (60 min)*
- Creatures in Crime (60 min)*

Informative and Engaging Web Resources on Entomology

Phylogenetic (Tree Thinking) websites:

Khan Academy: https://www.youtube.com/watch?v=6_XMKmFQ_w8

Schenk: <https://www.youtube.com/watch?v=Y6KBerlGIEY>

Tree of Life Project (Arthropods): <http://tolweb.org/tree?group=Arthropoda&contgroup=Bilateria>

Professional Entomology Organizations:

Entomological Society of America (ESA): <http://www.entsoc.org/>

Entomological Society of Canada: <http://www.esc-sec.ca/>

Sociedad Mexicana de Entomología: <http://www.socmexent.org/>

Royal (British) Entomological Society: <http://www.royensoc.co.uk/>

Australian Entomological Society: <http://www.austentsoc.org.au/>

North American Forensic Entomology Association: <http://www.nafea.net/>

European Forensic Entomology Association: <http://www.eafe.org/>

University, Governmental, NGO and Commercial websites:

Common Names of Insects Database: <https://www.entsoc.org/common-names>

UC-Davis IPM Program: <http://www.ipm.ucdavis.edu/>

University of Florida Book of Insect Records: <http://entnemdept.ufl.edu/walker/ufbir/>

NCSU, General Entomology: <http://www.cals.ncsu.edu/course/ent425/library/tutorials/index.html>

Songs of Insects: <http://www.songsnotinsects.com/>

Singing Insects of North America: <http://entnemdept.ifas.ufl.edu/walker/buzz/>

Food Insects Newsletter: <http://www.hollowtop.com/finl.html/finl.html>

Iowa State University's Tasty Insect Recipes: <http://www.ent.iastate.edu/misc/insectsasfood.html>

World Health Organization Photo Library: https://extranet.who.int/photolibrary/index_eng.htm

CDC Division of Vector-Borne Diseases: <http://www.cdc.gov/ncezid/dvbd/about.html>

Biotherapeutics, Ed. & Research Foundation: <http://www.bterfoundation.org/indexfiles/findinfo.htm>

USDA/Forest Service Insect Images: <http://www.forestryimages.org/>

US-EPA Benthic Macroinvertebrates: <https://www.epa.gov/national-aquatic-resource-surveys/indicators-benthic-macroinvertebrates>

CalPhotos (Invertebrates): http://calphotos.berkeley.edu/browse_imgs/invertebrate-insect.html

Bioquip Products for entomology/botany: <https://www.bioquip.com/>