California State University, Fullerton
Department of Biological Science
Biology 467 Entomology
Spring 2004

Meeting Place & Time: MH 217, MW 1-4:50

Instructor: Sean Walker
Office: MH 389, Lab MH 342
Office Hours: TR 2:00-4:00 PM, M 9:00-10:00 AM & by appointment
Phone: (Office) 278-3610, (Lab) 278-8204
Email: swalker@fullerton.edu
Web-Site: http://biology.fullerton.edu/swalker
Course Web Site: The course web-site will be on blackboard. You should be able to access it through http://my.fullerton.edu and follow the links to blackboard then to Biol 467.

Course Description and Objectives
Biology 467 is an introduction to the biology of insects and other terrestrial arthropods. We will explore the taxonomy, evolution, anatomy, physiology, life-history, behavior and ecology of terrestrial arthropods. In this course you will be required to go into the field. You ***will*** get dirty, you ***will*** be exposed to both the hazards and beauty of nature, and hopefully you ***will*** have fun!

In this course, students will:

1. explore the basis of terrestrial arthropod diversity (i.e., Why are these animals so successful?)
2. become familiar with the basic morphology and physiology of select arthropod taxa
3. be introduced to the evolution, ecology, life-history, and behavior of select arthropod taxa
4. observe, record, and analyze data then communicate the results in a scientific paper
5. learn to identify major insect orders and some families by sight or with a key
6. be able to properly prepare and preserve most terrestrial arthropods
7. be exposed to various techniques for collecting and assessing terrestrial arthropod biodiversity
8. become familiar with local insect species
9. develop and practice critical thinking skills.

Required Texts
Gullan, P.J. & P. S. Cranston. 2000. The insects: An outline of entomology, 2nd ed. Blackwell Science, Inc., Malden, MA. ISBN: 0-632-05343-7
Borror, D. J. & R. E. White. 1998. A field guide to insects of America north of Mexico. Houghton Mifflin Company, Boston, MA. ISBN:0-395-91170-2

Supplemental Texts & Field Guides (**NOT REQUIRED!** However, if you're really, really into entomology these may be useful references).

Arnett, R.H., Jr. 2000. American Insects: A handbook of the insects of America north of Mexico, second edition. CRC Press, Boca Raton, FL. ISBN: 0-8493-0212-9.

Castner, J.L. 2000. Photographic Atlas of Entomology and Guide to Insect Identification. Feline Press, Gainesville, FL. ISBN: 0-9625150-4-3.

Daly, H.V., J.T. Doyen, Purcell, A.H., III. 1998. Introduction to Insect Biology and Diversity, second edition. Oxford University Press, NY. ISBN: 0-19-510033-6.

Hogue, C.L. 1993. Insects of the Los Angeles Basin, Second Edition. Natural History Museum of Los Angeles County, L.A., CA. ISBN: 0938644297 (paper), 0938644327 (hard).

Powell, J.A. & C.L. Hogue. 1989. California Insects. California Natural History Guides: 44. University of California Press, Berkeley, CA. ISBN: 0520037820.

Grading

Final course grades will be determined by the following point totals: A (≥900 points); B (≥800 points); C (≥700 points); D (≥600 points); F (<600 points). It is exceptionally unlikely but I do reserve the right to modify the distribution of grades based on overall student performance. Any modification of grades will be made in the students favor (e.g. grades will go up not down). A breakdown of the total number of points each assignment is worth and the percentage of the final grade each assignment makes up is below.

Assignment	Total Points	Percentage of Grade
Exams (2)	300	30%
Insect Collection	200	20%
Lab Practical (1)	150	15%
Natural History Project	150	15%
Article Summaries (3)	100	10%
Tucker Biodiversity Project	50	5%
Movie Assignment	30	3%
Pre & Post Assessment	20	2%
TOTAL	**1000**	**100**

Assignments/Exams

Email Assignment

It is critical that I know the e-mail address that you actually use. This will facilitate rapid communication between myself and the class. In addition, there are two questions I'd like you to answer when you send me the email.

1) What is your best guess of the total number of insect species on earth?
2) What is a question or topic about arthropod biology you'd like to see addressed in this course?
3) If you were an insect, what would you be?

This must be turned in by the end of the first week of class or I will put dermestids in your insect collection.

Exams & Lab Practical (45%)

We will have two exams and one lab practical each worth 15% of your final grade. The first exam will cover material from approximately the first half of the course and will be given on March 22, 2004. The second exam will be given during the final exam period (May 28, 2004) and will not be cumulative. The exams will likely contain a combination of fill in the blank and matching, short essays, and longer essays that require integration and analysis of the material. The lab practical will occur on March 10, 2004 and cover the first five weeks of material covered in lab.

Insect Collection (20%)

An insect/arthropod collection is a required project in this course. The collection grade will be based on the diversity of insects present, the number of correct identifications, quality/correctness in the curation of the specimens(e.g. labeling etc.), and the appearance of the collection. There will be an additional handout that describes this assignment in detail.

Natural History Project (15%)

Over the course of the semester, you will be responsible for observing a terrestrial arthropod in its natural habitat and reporting on your observations in both a written and verbal report. More details are available in the handout that describes this assignment.

Article Summaries (10%)

You will be responsible for writing a one page summary for three different papers from the primary literature that were published in the last 2 years dealing with terrestrial arthropods. The objective of this assignment is for you to 1) gain an appreciation of the diversity of research done in arthropod biology, 2) critically read and evaluate primary literature and, 3) search and use databases to locate primary literature on a specific topic. Details are in the handout for the assignment.

Tucker Wildlife Sanctuary Arthropod Biodiversity Assessment (5%)

As a class we are going to plan and carry out a rapid assessment of arthropod biodiversity at Tucker Wildlife Sanctuary. The specimens that are collected at Tucker can be used in your insect collection but you must curate and identify to family 10 additional specimens that will likely be used for educational purposes at the sanctuary. You will be evaluated based on your participation in the discussion and planning sessions in lab, your participation in the field, and the 10 specimens you turn in.

Movie Assignment (3%)

Terrestrial arthropods often make the news and are often the unwitting stars of some really great movies. The basic idea of this assignment is to critique the behavior, ecology, and/or morphology of a terrestrial arthropod in a movie and, using current research, determine if the movie got it right. The arthropod should have a fairly large role in the picture (i.e., it shows up for longer than 2 seconds on the screen). You might

ask questions like does the animal behave in a manner consistent with what has been observed in the literature, or does the movie represent a range extension for an arthropod species that previously did not occur in the area where the movie occurred? Your report should be typed and no longer than 2 pages. You should have at least three references and one of these three must be from the primary literature. **REFERENCES FROM THE INTERNET ARE NOT ACCEPTABLE.** PLEASE NOTE: SPIDER'S DON'T GROW TO BE 1 M LONG WILL NOT BE ACCEPTED. You should delve into the behavior and ecology of the organism and use recent scientific literature to support or refute the starring role of said arthropod. This is due by 5 pm on May 12, 2004.

Course Policies

Prerequisites

Enrollment in Biol 467 requires completion of the Biology lower division core (Biol 171, 172, 273, & 274) or completion of Biol 241 & 261.

Attendance

Students are expected to attend and participate in lectures, laboratories and mandatory field trips. If you miss class YOU ARE RESPONSIBLE for obtaining the information from classmates NOT from the graduate assistant or instructor.

Exam, Lab and Assignment Make Up Policy

If you cannot take a test at the scheduled time, you should contact Dr. Walker as soon as possible with appropriate documentation verifying the circumstances. **PLEASE NOTE** make ups will only be given in the case of documented emergencies or unavoidable conflicts (these must be approved by Dr. Walker in advance). Please note, it is **YOUR RESPONSIBILITY** to contact Dr. Walker regarding make up assignments, labs, or exams.

Late Assignments

Late work will have 10% of the maximum points for that assignment deducted per day that it is late (weekends count). If there are exceptional circumstances the assignment may be given full credit.

Academic Integrity

I take all issues regarding academic honesty very seriously. **ALL WORK HANDED IN SHOULD BE YOUR OWN**. Incidents of cheating, turning in work that is not your own or is cited improperly (plagiarism) will result in a zero grade for the first incident and a zero grade for the course on the second incident. If plagiarism is suspected you may be asked to submit an electronic version of the assignment in question for checking with one of the available anti-plagiarism software packages. All incidences of academic dishonesty will be reported to the Associate Dean of Student Affairs.

Withdrawl from courses: CSUF policy regarding withdrawal from classes (UPS 300.016) will be followed. After the first two weeks of the semester, students may be granted withdrawal ONLY by presenting compelling evidence outlining a physical, medical, or emotional condition that prevents completion of the course. **POOR**

ACADEMIC PERFORMANCE IS NOT EVIDENCE OF A SERIOUS REASON FOR WITHDRAWAL. Students unable to produce official documentation will be required to take the grade they have earned in the class. Please refer to the course schedule for information on the last day to withdraw with a W grade. Important dates concerning registration or drops are on the inside cover of the CSUF Spring 2004 Class Schedule or at:
http://www.fullerton.edu/admissions/policy_and_deadline_information_.htm.

VERY IMPORTANT DATES IN THIS COURSE

Due Dates
February 25,2004 First Article Summary Due
March 10, Lab Practical
March 17, 2004 Second Article Summary Due
March 24, Exam I
May 5, 2004 Third Article Summary Due
May 12, 2004 Movie Assignment Due
May 17, 2004 Natural History Project Due
May 21, 2004 Insect Collections due by 9 pm
May 28, 2004 Final Exam (NOT CUMULATIVE)

In Class Field Trips

March 17, 2004- Tucker Wildlife Sanctuary
April 19 & 21, 2004- Tucker Wildlife Sanctuary
TBA-Aquatic Insect Field trip to Starr Rand Audubon Sanctuary

Outside of Class Field Trips

March 6, 2004 Location TBA
March 27, 2004 Location TBA
April 9-11 Optional Field Trip to the Desert Studies Center, Zzyzx Ca.

Arthropod Horror Film Festival Dates (to assist in your movie assignment) Movies will be shown in MH 217 and will start at 7 pm unless otherwise noted

February 13, 2004 Arthropod Film Festival pt I. Movie TBA or Student's Choice
March 19, 2004 Exam Review and Arthropod Film Festival pt II. Movie TBA or Student's Choice
May 7, 2004 Arthropod Film Festival pt III. Movie Eight-Legged Freaks!
May 21,2004 Arthropod Film Festival pt IV. Movie Arachnophobia or Student's Choice

TENTATIVE LECTURE AND LAB SCHEDULE

Week	Date	Lecture/Discussion Topic	Reading	Lab	Reading
Week 1	Feb 02	Introduction to the Course Logistics, Collections etc.		Intro-Assessment	
	Feb 04	Panarthropoda	Brusca & Brusca Ch. 15	Lab Check In ***Microcosmos***	
Week 2	Feb 09	Panarthropoda continued	Brusca & Brusca Ch. 15	Collecting Techniques/CSU Fullerton Insect Diversity (can anyone collect more than Sean?)** **Black Lighting if Warm	Ch. 16 G& C pp. 4-22 B & W
	Feb 11	Introduction to Insect Ecology/Evolution & CLASS DISCUSSION: How many species of insects are there?	G & C Ch 1 Erwin, 1986 Gaston, 1991	Curation of Terrestrial Arthropods	Ch. 16 G& C pp. 4-22 B & W
	Feb 13	**Insect Film Festival Pt 1- Movie TBA 7 p.m. MH 217**			
Week 3	**Feb 16**	**NO CLASS-Presidents Day**			
	Feb 18	Insect Morphology & Physiology I	G & C Ch 2	External Anatomy & Mouthparts + Introduction to the Insect Orders I	G & C pp. 15-43 B & W pp. 29-37
Week 4	Feb 23	Insect Morphology & Physiology II	G & C Ch 3	Introduction to the Insect Orders II	
	Feb 25	Sensory Systems & Behavior	G & C Ch 4	Insect Orders III	
Week 5	March 01	Insect Reproduction	G & C Ch 5	Internal Anatomy I	G & C Ch 3
	March 03	Insect Development & Life History	G & C Ch 6	Internal Anatomy II/WORK DAY	G & C Ch 3
	March 06	**Field Trip-Location TBA**			

Week 6	March 08	Insect Development & Life History cont.	G & C Ch 6	STUDY/ WORK DAY	
	March 10	**LAB PRACTICAL *Covers Material from the first 5 weeks of Lab**			
Week 7** end material for first exam	March 15	Evolutionary Systematics and Insect Evolution pt I	G & C Ch 7	Biodiversity Assessment at Tucker: Discussion-How do we rapidly assess Arthropod Diversity	Longcore, 2003; Burger et al., 2003
	March 17	**NO LECTURE-Field Trip-Collecting/Scouting out Tucker Wildlife Refuge**			
	March 19	**Exam Review & Arthropod Film Festival pt 2: Movie TBA Exam Review Starts @ 5pm, Arthropod Movie After**			
Week 8	March 22	Evolutionary Systematics and Insect Evolution pt II	G&C Ch 7	Using and Constructing Dichotomous Keys	
	March 24	Exam I		Collection Work Day	
	March 27	**Field Trip (Location TBA)**			
Week 9	**March 29-April 02**	**NO CLASS-SPRING BREAK**			
Week 10	April 5	Insects & Plants	G&C Ch 10	Cricket Behavior pt I	
	April 7	Insects & Plants	G&C Ch 10	Cricket Behavior pt II Analysis & Work Day	
	April 9-11	***OPTIONAL FIELD TRIP- Desert Studies Center, Zzyzx CA- Arthropods of the Eastern Mojave***			
Week 11	April 12	Insect Societies	G&C Ch 11	Group Discussion/Work Day on RBA /Collection	
	April 14	Predation & Parasitism	G & C Ch 12	Group Discussion/Work Day on RBA /Collection	
Week 12	April 19	NO LECTURE-COLLECTING @ TUCKER WILDLIFE REFUGE			
	April 19	**Monday PM. Night Collecting at Tucker**			
	April 21	NO LECTURE-COLLECTING @ TUCKER WILDLIFE REFUGE			
	April 21	**Wednesday PM Night Collecting @ Tucker**			
Week 13	April 26	Insect Defences	G & C Ch 13	Work on Collection/Sort Samples from Tucker	
	April 28	An Introduction to Arachnids & Spiders	Foelix Ch 1 & 2	Arachnid and Spider Identification	

Week 14	May 03	Spider Silk & Silk Lab (TBA)-Guest Lecturer Dr. Merri Lynn Casem			
	May 05	Spider Behavior & Ecology	Foelix Ch 9	Work on Collection/Sort Samples from Tucker	
	May 7	**Arthropod Film Festival Pt 3: Eight Legged Freaks 7 pm MH 217**			
Week 15	May 10	Forensic Entomology-Guest Lecture David Faulkner		Work on Collection/Sort Samples from Tucker	
	May 12	Medical and Veterinary Entomology	G&C Ch 14	Work on Collection/Insects for Food	DeFoliart, 1999
Week 16	May 17	Pest Management	G&C Ch 15	Work on Collection/Natural History Symposium	
	May 19	Post-Assessment		Work on Collection/ Natural History Symposium	
	May 21	**Insect Collections Due by 9pm** **Arthropod Film Festival Pt 4: Arachnophobia or Student's Choice**			
FINAL EXAM	May 28	Final Exam 2:30-4:20			

Readings

Brusca, R. C. and G. J. Brusca. Chapter 15 (The Emergence of the Arthropods: Onychoperorans, Tardigrades, Trilobites, and the Arthropod Bauplan) in Invertebrates, 2nd ed. Sinauer Associates, Inc. Sunderland, MA. Pp. 461-510.

Burger, J. C., R. A. Redak, E. B. Allen, J. T. Rotenberry and M. F. Allen. 2003. Restoring arthropod communities in coastal sage scrub. Conservation Biology 17:460-467. (PDF)

DeFoliart, G. R. 1999. Insects as food: Why the western attitude is important. Ann. Rev. Entomol. 44:21-50. (PDF)

Erwin, T. L. 1986. The tropical forest canopy, the heart of biotic diversity. In: Biodiversity, E. O. Wilson, ed. National Academy Press. Washington, DC. Pp123-129.

Foelix, R. F. 1996. Biology of Spiders 2nd ed. Oxford University Press, New York, New York.

Longcore, T. 2003. Terrestrial arthropods as indicators of ecological restoration success in coastal sage scrub (California, U.S.A). Restoration Ecology 11: 397-409.

Gaston, K J. 1991. The magnitude of global insect species richness. Conservation Biology 5:283-296. (PDF)

CLASSROOM SAFETY BRIEFING

- In the event of an emergency such as earthquake or fire:
  - Take all your personal belongings and leave the classroom (or lab). Use the stairways located at the east, west, or center of the building.
  - Do not use the elevator. They may not be working once the alarm sounds.
  - Go to the lawn area towards Nutwood Avenue. Stay with class members for further instruction.
  - For additional information on exits, fire alarms and telephones, **Building Evacuation Maps** are located near each elevator.
  - Anyone who may have difficulty evacuating the building, please see me after class.
- Dial 911 on any campus phone, pay phone, or blue emergency phones to connect directly to University Police. Dialing 911 on your cell phone will connect with the Highway Patrol. Tell CHP dispatcher that CSUF Police are the responding agency. Stay on the line until asked to hang up.
- If you want to bring visitors to the classroom, you must obtain permission from the instructor in advance and must sign a volunteer form.
- Visitors to the lab must obtain permission from the Chair and must sign a volunteer form.
- There is no smoking within 20 feet of every campus building. This includes the MH balcony.
- **FOR LAB CLASSES:** Specific hazards or risks in the lab will be discussed prior to each experiment. If you have any questions about the safety of an experiment, please contact me or the lab instructor.
  - If there is a spill of a hazardous chemical, notify your TA immediately.
  - Report all injuries to me or the TA immediately.
  - All students must read and sign the departmental, "Laboratory safety procedures" form at the beginning of each semester.
- **FOR CLASSES WITH FIELD TRIPS:**
  - Make sure you submit an Academic Field Trip Waiver and sign the Participant List for each field trip.
  - Students must comply with all State laws regarding possession, sale and use of alcohol or controlled substances while participating in CSUF related activities.

IF YOU ARE A SENIOR BIOLOGICAL SCIENCE MAJOR WHO IS PLANNING TO GRADUATE IN JUNE, AUGUST, or DECEMBER 2004/January 2005: You are required to take the Major Fields Test in Biology in order to graduate. There is no cost to you to take the exam, which is paid for by the Department of Biological Science. The exam will be offered on Thursday March 18 from 4 to 7 pm and Friday March 19 from 1 to 4 pm so please save one of these dates. You will receive the details about signing up for the exam shortly.