BIOL 4680 Ecology

I. General Information

Professor: Dr. Kenneth Schoenly
Office: N271
Phone: 667-3949
Office Hrs: Tu,Th 8-9, F 9-10 (and by appointment)
Email: kgschoenly@biology.csustan.edu

Semester: Spring 2010
Credits: Lec/Lab 4
Class: Lec Tu,Th 9:40-11:07 (C106)
Lab M 2:30-5:38 (N210)

II. Course Description

(Catalog Description): Basic interrelationships of plants and animals within their physical environments. Satisfies the ecology elective for the major. Co-requisite: BIOL 4682. Prerequisites: BOTY 1050, ZOOL 1050; and statistics or calculus. (Lecture, 3 hours; laboratory, 3 hours; field trips)

Ecology is an experimental, observational, mathematical and correlative science. Interactions between organisms and their environment are crucial to understanding the evolution of life, and the study of these interactions are at the heart of ecology. Ecologists draw upon every field of biology to study organisms, including molecular biology, evolution, physiology, and genetics. One semester is not enough time to explore all aspects of ecology, so **we will explore major concepts, hypotheses, theories and case studies to understand and investigate nature's processes.** In order to understand current trends and future directions, we will also examine classic experiments and their lasting effect on ecology.

An integral goal of this course is your continued development of critical thinking, written and verbal communication, quantitative reasoning, and experimental design skills. Lectures, assignments, and laboratory exercises will guide you in the development of these skills. For lectures, the readings will be drawn from two sources, namely, the textbook (and its website resources) and the primary literature (journal papers). It is important that you understand the concepts and hypotheses, are able to apply them and design experiments to test them, and then assimilate the available background information to apply them in the real world. **I will assume you have read the associated material listed in the schedule prior to coming to class and I may call on you to answer questions and participate in discussions**. See separate laboratory syllabus for laboratory format.

III. Course Objectives

1. The student will become conversant in the terminology, concepts, methods, and major theories of ecology, integrated within the larger discipline of evolutionary biology, the unifying theme of biology.

2. The student will discriminate between patterns, processes & dynamics operating at the population, community & ecosystem levels in terrestrial, freshwater & marine habitats.

3. The student will become familiar with different sampling methods (and other ecostatistical techniques) & understand their assumptions, strengths & limitations.

4. The student will gain knowledge of ecological experiments & the theories & models that unlock understanding & prediction of relationships & interactions between organisms & their environments.

5. The student will use peer-reviewed journal articles to critically evaluate current topics in ecology & refine their communication skills through oral presentation (PowerPoint);

6. The student will gain further appreciation of the necessity that natural history provides to scientific understanding of ecological relationships of living organisms.

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 60% lecture and 40% laboratory. It is your responsibility to know where you stand in the class at any one time.

The rigors of this course **demand regular attendance, commitment and concentration** to the readings and lectures. As such, it is a high-risk course for many students, especially those who cannot devote adequate time to reflect upon course content outside of class time, such as those who: a) have jobs, b) are pledging Greek organizations, c) have health problems or learning disabilities, d) have demanding family commitments, e) party on weeknights, f) belong to sports teams, g) are taking >15 units. The more of these factors that apply to you, the greater at risk you are. You are encouraged to address those factors over which you have control, and do so without delay. Intense effort on your part (e.g., 3 hrs study time for each 1 hr lecture/lab time) may lessen some of these factors.

This is a senior-level class; as such you are expected to attend regularly and on time for a complete understanding of course materials and to receive updates on exams and assignments. **Graduate students who are enrolled in this class are expected to perform at a higher level than undergraduates (see handout); subsequently (and according to university policies), graduate 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 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. **Lab assignments will each have a due date and will lose 20% of their value for each day they are late.**

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. Required Text/i>clicker

Ecology: Concepts and Applications, 5th ed. by Molles (chapters shown in schedule).

(2) **i>*clicker*** (used ones also 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.

(3) Lab will rely mostly on **handouts**; these will be provided one week (or less) before the next lab meeting. Each student will present one *PowerPoint presentation* that will come from reading, critiquing, and summarizing a *journal paper* (from *Ecology*, *Ecological Applications, Biological Conservation,* etc.), accessible by JSTOR (e-journal archive) – see last pages. **Bring a calculator to lab every week.**

VI. Grading Procedure

Two semester exams (**March 18 and April 29)** will be 150 point mixed format (short answer/essay, matching, graph interpretation, fill-in-the-blanks). Questions for the exams will come from the lecture notes, textbook, assigned websites, lab handouts & reports, and student presentations. The final exam (**June 1**) will be comprehensive over the entire class (lecture and lab) material. If you arrive late after other students have turned in their exams, you will be turned away, so leave early on exam days to ensure you will be on time. Traffic and/or car problems are not acceptable excuses for being late. **No extra credit will be offered beyond the points earned on exams, lab exercises, and oral presentation.**

Your active participation in lectures and labs are expected, including field trips. I expect you to WORK COLLABORATIVELY on group lab and field exercises, but WORK INDEPENDENTLY on individual lab assignments, written exams and oral presentations. For group work, students will use a scoring rubric to evaluate each other's contribution to lab reports (= peer evaluation).

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.

In the laboratory, you have the choice of which and how many group lab reports to turn in to reach the 400-point total (only 2 lab reports are mandatory); however, you are responsible for knowing the procedures, computational steps, and outcomes of every lab. **Lab reports are due two weeks after they are assigned.**

Lecture Exams (2 @ 125 points each)	250
Comprehensive Final (1 @ 200 points)	200
PowerPoint Presentation	100
Lab Reports	400
i>clicker Questions	50
Total	1000 points

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

VII. Presentations

The date of each student (PowerPoint) presentation is listed by number in the syllabus (last page). Your presentation grade will be based on your verbal performance and the 1-page synthesis prepared for your classmates that summarizes the major questions/hypotheses, methodology, results, and conclusions of the paper. When I announce your name and paper, present your topic taking no more than 20 minutes (including 2-5 minutes for questions) of lab time. A standardized grading sheet will be used to grade the verbal and written parts of your presentation. **In the event you miss (or are unready to present) your scheduled talk, you will receive an automatic `0' for the 100-point assignment. E-MAIL ME YOUR .ppt FILE (NOT .pptx) AND/OR PROVIDE ME WITH A CD/MEMORY CARD OF YOUR TALK BEFORE LAB STARTS SO YOU ARE READY TO TEACH THE CLASS!!**

Talking, whispering and giggling during lectures is rude and disruptive for your classmates and the instructor. It is expected that students will refrain from these activities while anyone is lecturing at any time during lecture or lab time. If this becomes a problem, I will ask you to leave class for the duration of these activities. **Turn off all cell phones and beepers at or before arriving to class**.

VIII. Recording Policy:

Audio or video recording of classes (tape and digital format) is not permitted under any circumstances. If you do not intend to comply with this policy, please discuss this with the instructor.

IX. Field Trips

The field trip regulations that do not specifically pertain to being in vehicles, pertain to all parts of class (lecture and lab) as well as field trips. These are not limited to, but especially include numbers 4, 7 and 8 of our department's "Field Trip Regulations and Verification Form".

Important Dates to Remember:

February 16	First Day of the Term
February 25	Furlough (no class)
March 15	Last Day to Add or Drop
March 18	Exam 1
March 23	Furlough (no class)
March 31	Cesar Chavez Day (No Class)
April 5-9	Spring Break (No Classes)
April 15	Furlough (no class)
April 22	Earth Day!
April 29	Exam 2
May 14	Warrier Day (No Afternoon Classes)
May 24	Furlough (no lab)
May 31	Memorial Day (Campus Closed)
June 1 (Tuesday)	Comprehensive Final (8:30 – 10:30)

LECTURE OUTLINE AND READING ASSIGNMENTS*

Week Beginning	Lecture Topic	Reading(s) or Exam
Tuesday, Feb 16	Introduction	Ch 1 and 2
Monday, Feb. 22	Life on Land, Life in Water 1; **Furlough (Feb 25)**	Ch 2, 3
Monday, March 1	Life in Water 2	Ch 3
Monday, March 8	Geographical Ecology	Ch 22
Monday, March 15	Population Ecology of Individuals: Temperature & Water Relations	Ch 5, 6 **March 18**
Monday, March 22	Pop. Ecology of Individuals: Energy and Nutrients; **Furlough (Mar 23)**	Ch 7
Monday, March 29	Populations: Distribution and Abundance	Ch 9
Monday, April 5	Spring Break (No Classes)	
Monday, April 12	Populations: Dynamics; **Furlough (Apr 15)**	Ch 10
Monday, April 19	Populations: Growth; Earth Day (April 22) AE video: "*Rachel Carson's Silent Spring*"	Ch 11
Monday, April 26	Community Ecology: Competition	Ch 13 **April 29**
Monday, May 3	Community Ecology: Exploitation (Predation & Herbivory)	Ch 14
Monday, May 10	Community Ecology: Exploitation (Parasitism & Mutualism)	Ch 14, 15
Monday, May 17	Community Ecology: Species Interactions & Succession	Ch 17, 20
Tuesday, June 1	**Comprehensive Final (8:30-10:30 AM)**	

*Reading assignments listed on the course outline above are for *Ecology: Concepts and Applications, 5th edition.* Topic content and dates of coverage in the syllabus may be changed due to extenuating circumstances.

Useful & Informative Web Links:

Student Website for Textbook (strongly recommended): Molles, 5th edition: http://highered.mcgraw-hill.com/sites/0073050822/student_view0/.

"Bill Moyer's Journal" segment (Video & Slide Show) of September 21, 2007 on Rachel Carson's life & legacy: http://www.pbs.org/moyers/journal/09212007/watch.html.

LAB SCHEDULE

Lab Meeting	Topic(s)	Points
February 22	Introduction, Lab Rules, Group Assignments, Peer Review EXCEL Tips/Hints, Graph Interpretation Exercise	
March 1	Analyzing Climate, *Parametric Statistics	50¶
March 8	Duckweed Pop. Growth (Day 0) Exponential & Logistic Population Growth (lab lecture) Presentations #1, #2, #3, #4	150¶
March 15	*Duckweed Population Growth (Day 7), Format for Lab Reports Presentations #5, #6, #7, #8	
March 22	Duckweed Population Growth (Day 14), *Mark-Release-Recapture (isopod set up) Calculating Confidence Intervals Presentations #9, #10	200
March 29	Duckweed Population Growth (Day 21) *Measuring H_2O Quality (3-4 day trial) Mark-Release-Recapture Methods (Day 7) Presentations #11, #12	100
April 5-9	Spring Break, No Classes	
April 12	Mark-Release-Recapture Methods (Day 14) Presentations #13, #14, #15, #16	
April 19	Mark-Release-Recapture Methods (Day 21) *Sampling Techniques for 2-D Habitats Presentations #17, #18	200
April 26	Life Tables, Survivorship Curves, *Cemetery Demography Presentations #19, #20, #21	100
May 3	*Foraging in Predators (Outdoor Lab)	200
May 10	Applied Nutrient Cycling: Field Trip to Turlock Water Treatment Plant	
May 17	Return Last Lab Reports, Final Lab Review for Lecture Final Presentations #22, #23, #24	

*Lab report with accompanying points. The lab grade is based on 400 points; a combination of lab reports equal to 400 possible points must be completed (no exceptions).
¶Required lab report (everyone is required to complete and turn in).

Campus Employee Furloughs – Impact on Classes

This year across this campus and around the CSU system some class days will be cancelled because of furloughs. The budget cuts are the worst in the history of our university system -- $584 million or 20% of our budget. The CSU administration is managing these cuts with huge increases in your student fees (32%), elimination of your some classes, and potential lay-offs of faculty and other university employees. A furlough is mandatory un-paid time off; faculty and staff on each CSU campus are being "furloughed" two days each month.

Furlough days for BIOL 4680, 4682L are listed below. It is important to recognize that these days off are **not** holidays. Instead, they are concrete examples of how massive state budget cuts have consequences for you as students and for me as a faculty member.

Furlough Days: Feb 25 (Th), March 23 (Tu), April 15 (Th), May 24 (M)

In addition to paying higher fees, you will be affected by reduced services and classes. The library may have shorter hours. Many campus support services will be decreased or eliminated. It will be more difficult to get signatures to meet deadlines. Classes you need may have been cut from the class schedule or are full.

Demand that your increased student fees ensure access to quality education and a timely graduation!

Primary Literature for BIOL 4680 (ECOLOGY)

THESE ARTICLES ARE AVAILABLE FOR DOWNLOAD FROM OUR LIBRARY'S ELECTRONIC JOURNAL LIST (JSTOR BIOLOGICAL SCIENCES COLLECTION); WEBLINK IS: http://library.csustan.edu/serialsolutions/onlineJournals/jnlsIndex.html.

1. Schiel, D.R. et al. 2004. Ten years of induced ocean warming causes comprehensive changes in marine benthic communities. *Ecology* 85: 1833-1839.

2. Kelly, D.J. et al. 2003. Effects of solar ultraviolet radiation on stream benthic communities: an intersite comparison. *Ecology* 84: 2724-2740.

3. Hawkins, B.A. et al. 2003. Energy, water and broad-scale geographic patterns of species richness. *Ecology* 84: 3105-3117.

4. Lomolino, M. et al. 1989. Island biogeography of montane forest mammals in the American Southwest. *Ecology* 70: 180-194.

5. Angilletta, M.J., Jr. 2001. Thermal and physiological constraints on energy assimilation in a widespread lizard (*Sceloporus undulatus*). *Ecology* 82: 3044-3056.

6. Crozier, L. 2004. Warmer winters drive butterfly range expansion by increasing survivorship. *Ecology* 85: 231-241.

7. Plath, K. and M. Boersma. 2000. Mineral limitation of zooplankton: stoichiometric constraints and optimal foraging. *Ecology* 82: 1260-1269.

8. Bluthgen, N. and K. Fiedler. 2004. Competition for composition: lessons from nectar-feeding ant communities. *Ecology* 85: 1479-1485.

9. Day, R. et al. 1997. Effects of Exxon Valdez oil spill on habitat use by birds in Prince William Sound, Alaska. *Ecological. Applications* 7: 593-613.

10. Hellgren, E.C. et al. 2000. Variation in tortoise life history: demography of *Gopherus berlandieri*. *Ecology* 81: 1297-1310.

11. Soares, A.M. et al. 1992. Interclonal variation in the performance of *Daphnia magna* Straus in chronic bioassays. *Environmental Toxicology and Chemistry* 11: 1477-1483.

12. Gibbs, H.L. and P.R. Grant. 1987. Ecological consequences of an exceptionally strong El Nino event on Darwin's finches. *Ecology* 68: 1735-1746.

13. Ripple, W.J. and Beschta, R.L. 2007. Restoring Yellowstone's aspen with wolves. *Biological Conservation* 138: 514-519.

14. Burns, C.E. et al. 2005. A prescription for longer life? Bot fly parasitism of the white-footed mouse. *Ecology* 86: 753-761.

15. Byers, J.E. 2000. Competition between two estuarine snails: implications for invasions of exotic species. *Ecology* 81: 1225-1239.

16. Wilson, S.D. and Tilman, D. 2003. Plant competition and resource availability in response to disturbance and fertilization. *Ecology* 75: 438-445.

17. Chalcraft, D.R. and W.J. Resetarits, Jr. 2003. Predator identity and ecological impacts: functional redundancy or functional diversity. *Ecology* 84: 2407-2418.

18. Carlsson, N.O.L. et al. 2004. Invading herbivory: the golden apple snail alters ecosystem functioning in Asian wetlands. *Ecology* 85: 1575-1580.

19. Goheen, J.R. et al. 2004. Net effects of large mammals on *Acacia* seedling survival in an African savanna. *Ecology* 85:1555-1561.

20. Lafferty, K.D. 2004. Fishing for lobsters indirectly increases epidemics in sea urchins. *Ecological Applications* 14: 1566-1573.

21. Huntzinger, M. et al. 2004. Relaxation of induced indirect defenses of acacias following exclusion of mammalian herbivores. *Ecology* 85: 609-614.

22. Howe, H.F. and D. Lane. 2004. Vole-driven succession in experimental wet-prairie restorations. *Ecological Applications* 14: 1295-1305.

23. Snyder, W.E. and D.H. Wise. 2001. Contrasting trophic cascades generated by a community of generalist predators. *Ecology* 82: 1571-1583.

24. Knapp, R.A. et al. 2005. Fauna of Yosemite National Park lakes has low resistance but high resilience to fish introductions. *Ecological Applications* 15: 835-847.