BIOL 4680 Ecology

I. General Information

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Semester: Spring 2016
Credits: Lec/Lab 4
Class: Lec MWF 1:00-1:50 (N210)
Lab Fri 2:00-4:50 (N210)

IMPORTANT NOTE: The California Faculty Association is in the midst of a difficult dispute with management. It is possible that the faculty union will call a strike or other work stoppage this term. I will inform the class as soon as possible of any disruption to our class meeting schedule.

II. Course Description

(Catalog Description): Basic interrelationships of plants and animals within their physical environments. Satisfies the ecology elective for the major. Prerequisites: BIOL 1050, BIOL 1150; and either MATH 1600, MATH 1410, or MATH 1910, or equivalent. (Lecture, 3 hours; laboratory, 3 hours; field trips) (Fall, Spring).

Ecology is an experimental, observational, mathematical and correlative science. Interactions between organisms and their environment are at the heart of ecology and are crucial to understanding the evolution of life. Ecologists draw upon every field of biology to study organisms, including evolution, molecular biology, physiology, behavior 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.** To understand current trends and future directions, we will also critique published studies to see how their methods and findings contribute lasting impacts on the discipline.

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: the textbook (and its website resources) and the primary literature (journal papers). The peer-reviewed literature highlights the cumulative, decentralized, self-correcting, and hypothesis-driven features of how scientific knowledge is acquired. It is also important that you understand how specific concepts, hypotheses, and theories of ecology are applied to the real world and how experiments, observations, and mathematical models are used to test them.

Students who are physically present, but inattentive (including, but not limited to, sleeping, excessive conversation, texting, emailing, web-surfing, being disruptive, arriving late, leaving early, etc.) may be asked to leave. Repeat offenders will be turned over to the Dean of Students. Unexcused absences for gradable events will result in no score, but in the event of a documented compelling circumstance, an attempt will be made to work out the conflict prior to the absence.

III. Specific Learning 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 central and 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 experimental designs & understand their assumptions, strengths, limitations and applications.

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

5. The student will critique a peer-reviewed article in an ecological journal to refine critical thinking and oral communication skills; Better appreciate the peer-reviewed literature in science and its cumulative, decentralized, self-correcting, and hypothesis-driven features

6. The student will gain appreciation for the necessity that natural history provides to scientific understanding of ecological relationships and to the role humans play in altering natural processes, habitats, and biodiversity.

IV. Course Requirements

The course grade for the 4-credit course will be determined from the combined grades from lecture (60%) and the laboratory (40%). It is your responsibility to know where you stand in the class at any one time.

This is a senior-level class; as such you are expected to attend regularly and on time for a comprehensive understanding of course materials and to receive updates on exams and assignments. As per university regulations, students with do not attend the first class (without 24-hr prior or subsequent notice) will be dropped. **Graduate and post-baccalaureate students who are enrolled for graduate credit are expected to perform at a higher level than undergraduates (see handout); subsequently (and according to university policies), graduate and post-bac students will receive additional assignments.** Allow at least 2 weeks for exams, lab exercises, and homework to be graded and returned. It is your responsibility to contact me in the event you miss an exam (within 24 hrs) and provide me relevant documentation (e.g., letter from a physician) documenting your absence. Makeups require a clear and compelling reason and, if approved by me, must be made up before the test day or within two days of the exam. **Except for PowerPoint presentations (see VII below), lab assignments each have a due date and time and will lose 30% of their value for each time/day they are late.**

Behavior that interferes with the instructor's ability to teach or the ability of students to benefit from instruction will not be tolerated. Examples include: audible ring tones, repeated late arrivals or early departures, irrelevant conversation, and inappropriate use of phones or computers. Inappropriate behavior will be dealt with as severely as university regulations allow. Behavior that is not consistent with the Student Conduct Code – including any form of academic dishonesty (see below) – will result in immediate expulsion from the course, a failing grade, and a referral to the Office of Student Judicial Affairs.

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 present different journal papers and lab reports than they submitted previously.**

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

(1) ***Ecology: Concepts and Applications, 6th or 7th ed.*** by Molles (chapters shown in schedule below).

(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 or rent 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 **http://iclicker.com/registration**. Find the tab or box to register your clicker and complete the fields: first name, last name, student ID, remote ID. Your i>clicker will be used every class day (including labs) (worth 5% of your total grade). Using another student's i>clicker or using multiple i>clickers is a form of cheating and will be dealt with swiftly and severely according to the California Code of Regulations (see below).

(3) The laboratory 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* (i.e., *Ecology*, *Ecological Applications*), accessible by JSTOR (e-journal archive) – see last two pages. **Bring calculator & i>clicker to lab every week.**

VI. Grading Procedure

Two semester Friday exams (**March 4 and April 29)** will be mixed format (short answer/essay, matching, graph interpretation, fill-in-the-blanks). Questions for the exams will come from the lecture notes and handouts, textbook readings, videos, assigned websites, lab handouts & reports, and student presentations. The final exam (**May 25: starting time 11:15 am**) 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 points earned on exams, lab exercises, oral presentation, etc.**

Your active participation in lectures and labs are expected, including field trips. You will WORK COLLABORATIVELY on group lab and field exercises, but INDEPENDENTLY on individual lab assignments, written exams and oral presentations. For group work, students will use a scoring rubric to anonymously evaluate each other's contribution to lab reports (i.e., peer review) and will be part of the individual's final grade on lab reports (a practice recommended by students in previous semesters).

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.

Except for two lab reports which are mandatory (see lab schedule below), you have the choice of which and how many group lab reports to turn in to reach the 400-point total; 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 @ 100 points each)	200 (20%)
Comprehensive Final (1 @ 200 points)	200 (20%)
PowerPoint Presentation	100 (10%)
Lab Reports	400 (40%)
i>clicker Questions	50 (5%)
Misc. (homework, participation, conduct, attendance)	50 (5%)
Total	1000 points

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

VII. Presentations

The date of each student's (PowerPoint) presentation is listed by number chosen at random (see lab schedule below). 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 in lab, present your critique taking no more than 20 minutes (including 2-5 minutes for questions). I will use a standardized grading sheet to grade your verbal and written delivery. **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 OR BRING A CD/FLASH CARD TO MY OFFICE CONTAINING YOUR .ppt or .pptx file AT/BEFORE NOON ON TUESDAY, THE DAY BEFORE YOUR PRESENTATION (on Wednesday) SO I CAN LOAD AND CHECK IT ON MY LAPTOP.**

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 and report your misconduct to the Dean of Students. **Turn off all cell phones 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 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.

Important Dates to Remember:

January 28	First class day
February 24	Census date: last day to add/drop
March 4 (F)	**Exam 1**
March 28-April 1	Spring Break (No Classes)
March 31	Cesar Chavez Day (No Class)
April 22 (F)	Earth Day!
April 29 (F)	**Exam 2**
May 13	Warrior Day (No F lecture or lab)
May 18	Last day of classes (catch-up and review day)
May 25 (W)	**Comprehensive final (starting time: 11:15)**

LECTURE OUTLINE AND READING ASSIGNMENTS*

Week Beginning	Lecture Topic	Reading(s) or Exam
Friday, Jan 29	Syllabus Review, Introduction, Ecology & Evolution	Ch 1
Monday, Feb 1	Geographical Ecology, Global Patterns of Biological Diversity	Ch 22, 23
Monday, Feb 8	Some Population Genetics, Life on Land	Ch 2, 4
Monday, Feb 15	Life on Land (cont'd), Life in Water	Ch 2, 3
Monday, Feb 22	Life in Water	Ch 3
Monday, Feb 29	Population Ecology: Temperature & Water Relations, Review for Exam 1	Ch 5, 6 **March 4**
Monday, March 7	Population Ecology: Energy and Nutrients	Ch 7
Monday, March 14	Populations: Distribution and Abundance	Ch 9
Monday, March 21	Population Dynamics, Intra- and Inter-Specific Competition	Ch 10, 13
Monday, March 28	Spring Break, no classes	
Monday, April 4	Competition (cont'd), Predation & Herbivory	Ch 13, 14
Monday, April 11	Predation & Herbivory	Ch 14, 15
Monday, April 18	Parasitism, Disease & Mutualism, Earth Day Video: "*Carson's Silent Spring*" (F)	Ch 14, 15
Monday, April 25	Parasitism, Disease & Mutualism (cont'd), Review for Exam 2	Ch 14, 15 **April 29**
Monday, May 2	Species Interactions & Community Structure	Ch 17
Monday, May 9	Community Structure (cont'd), Succession & Stability	Ch 17, 20
Monday, May 16	Succession & Stability	Ch 20
Wednesday, May 25	**Comprehensive Final (starting time 11:15)**	

*Reading assignments listed on the course outline above are for *Ecology: Concepts and Applications, 6th ed.* & *7th ed*. 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, 6th edition:
http://highered.mcgraw-hill.com/sites/0073532495/information_center_view0/.
This site has weblinks, practice quizzes, flashcards, and other resources for each chapter

"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.
Includes 3 video clips: Parts I, II, Chris Jordan

LAB SCHEDULE

Lab Meeting	Topic(s)	Points
January 29	Introduction, Lab Safety, Paper & Group Assignments, Peer Review, Graph Interpretation, EXCEL Hints & Tips **Bring soil sample to next lab, Read for next 2 labs: S.H. Hurlbert. 1984. *Ecol. Monogr*. 54: 187-211**	
February 5	Soil Lab (setup), Microclimate, Experimental Design Ex. I	
February 12	Soil Analysis, Climate Diagram Exercise, Exp. Design Ex. II, Grading & Format for PowerPoint Presentations	
February 19	*Parametric Statistics, Confidence Intervals	50¶
February 26	Duckweed Population Growth (Day 0) Format for Lab Reports, Peer Grading Presentations #1, #2, #3, #4	150¶
March 4	*Duckweed Population Growth (Day 7), Exponential, Geometric, Logistic Growth (lab lecture) Presentations #5, #6, #7, #8	
March 11	Duckweed Population Growth (Day 14, clean up), *Mark-Release-Recapture (isopod set up) Presentations #9, #10	200
March 18	*Measuring H_2O Quality (3-4 day trial) Mark-Release-Recapture Methods (1^{st} of 3 estimates) Presentations #11, #12	100
March 25	Mark-Release-Recapture Methods (2^{nd} of 3 estimates) Presentations #13, #14, #15, #16	
April 1	Spring Break, no lab	
April 8	Mark-Release-Recapture Methods (final estimate, cleanup) *Sampling Techniques for 2-D Habitats Presentations #17, #18	200
April 15	Life Tables, Survivorship Curves, *Cemetery Demography Presentations #19, #20, #21	100
April 22	*Foraging & Flocking Behavior (Outdoor Lab)	200
April 29	Submit Last Lab Reports Presentations #22, #23, #24	
May 6	Return last lab reports, Catch-up lab, Review for Lecture Final	

*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).

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. Davidson, C. et al. 2001. Declines of the California red-legged frog: climate, UV-B, habitat, and pesticides hypotheses. *Ecological Applications* 11: 464-479.

4. Wimp, G.M. et al. 2010. Increased primary production shifts the structure and composition of a terrestrial arthropod community. *Ecology* 91: 3303-3311.

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

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

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

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

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

10. 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.

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

12. Weider, L.J. 1993. Niche breadth and life-history variation in a hybrid *Daphnia* complex. *Ecology* 74: 935-943.

13. Rode, K.D. et al. 2010. Reduced body size and cub recruitment in polar bears associated with sea ice decline. *Ecological Applications* 20: 768-782.

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. Wilson, S.D. and Tilman, D. 1993. Plant competition and resource availability in response to disturbance and fertilization. *Ecology* 74: 599-611.

16. Grosholz, E.D. 1992. Interactions of intraspecific, interspecific, and apparent competition with host-pathogen population dynamics. *Ecology* 73: 507-514.

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. Farina, J.M. et al. 2009. Can conservation biologists rely on established community structure rules to manage novel systems? … Not in salt marshes. *Ecological Applications* 19: 413-422.

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.