BIOL 4680 Ecology

I. General Information

Professor: Dr. Kenneth Schoenly
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Semester: Spring 2017
Credits: Lec/Lab 4
Class: Lec MWF 1:00-1:50 (N210)
Lab Fri 2:00-4:50 (N210)

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. **I will assume you have read the associated material listed in the syllabus prior to coming to class and lab and may ask questions from this material.**

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.

The rigors of this course **demand punctuality and regular attendance, and commitment and concentration** to the course readings, lectures, and lab activities. 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.** Your required textbook presents a broad view of ecology, not just as a collection of facts, but as an ongoing research effort. This text will constitute the largest fraction of the lecture material; the remainder will come from journal papers, video questions, and web sites. Written exams, i>clicker questions, PowerPoint presentations, homework, and lab reports will require students to demonstrate clear communication skills, neatness, critical thinking, problem-solving (verbal and mathematical), and biological knowledge about ecological concepts. **To succeed in this course, students must have a broad knowledge of organismal biology, taxonomy, habitats, and basic mathematics.**

Allow at least 2 weeks for exams, lab exercises, presentations, and homework to be graded and returned. It is your responsibility to contact me in the event you miss an assignment (within 24 hrs) documenting your absence (e.g., doctor's note, jury summons, funeral notice); **otherwise, an unexcused absence for a gradable event will result in no score**. Makeup exams, if approved by me, must be made up before the test day or within two days of the exam. Assigned homework, lab reports and the PowerPoint presentation (see VIII below) will **have a no-exceptions due date and time.**

For your convenience, the syllabus and handouts for this class will be posted online using Blackboard. Find the Spring 2017 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. **Students repeating this class will present different journal papers and lab reports than they submitted previously.**

V. Personal Responsibility

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 disciplinary action. **At the start of class, turn off cell phones. Check your university email daily for updates of information items.** Starting an email with "Hey" or no salutation is an inappropriate way to begin a professional conversation. Use email correspondence as an opportunity to practice your professional skills.

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.

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

(1) ***Ecology: Concepts and Applications, 7th ed.*** by Molles (chapters shown in schedule below). Companion website: http://highered.mheducation.com/sites/0073532495/information_center_view0/index.html

(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 **https://www1.iclicker.com/register-clicker**. Complete the fields: first name, last name, student ID, remote ID, etc. Bring your i>clicker to every class and lab meeting. 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 for lab work and exams.**

VII. Grading Procedure

Two semester Friday exams (**March 3 and April 28)** 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 24: 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.**

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, worksheets, punctuality, attendance, conduct)	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.

Your active participation in lectures and labs are expected, including outdoor labs. Work COLLABORATIVELY on group lab activities, but INDEPENDENTLY on exams and oral presentations. On lab reports, you will use a scoring rubric to anonymously evaluate each other's contribution (i.e., anonymous peer review) that will factor into your final lab grade (a practice recommended by students in previous semesters).

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 will be tested on the procedures, computational steps, and outcomes of every lab. **Lab reports are due 2 weeks after they are assigned.**

VIII. Presentations

The date of your PowerPoint presentation is based on the random number you draw (see lab schedule below). For reasons of fairness and efficiency, everyone will submit their .ppt or .pptx file to me on the same day (to be announced in lab). Your presentation grade will be based on your verbal performance and the 1-page synthesis (sample forthcoming) 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 rubric 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. On the date the .ppt or .pptx file is due, you can email it or bring it to me on a thumb drive so I can load and check it on my laptop.**

IX. 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.

X. Some Important Dates:

January 26: First class day
February 22: Census date: Last day to add/drop
March 3 (F): Exam 1
March 20-24: Spring Break (No Classes)
March 31: Cesar Chavez Day (No Class)
April 22 (Sat): Earth Day!
April 28 (F): Exam 2
May 12 (F): Warrior Day (No lecture or lab class)
May 17: Last day of classes
May 24 (W): Final Exam (start time: 11:15)

IX. Tips for Success:

This class has a reputation for being demanding and time consuming. If you are not prepared to dedicate the time and effort needed for this course, you should reconsider your enrollment. However, if you heed the following advice, the class can be made easier, and more enjoyable:

- Be punctual and attend every class meeting
- Review math and general biology notes to refresh memory
- Review upcoming material ahead of lecture
- Earn praise from your group members by making substantive contributions to lab reports
- Take good notes & revisit/rewrite often (1:3 rule), carefully ponder each i>clicker question
- Seek help from university tutors (Library, CVMSA "Commons")
- Ensure neatness & legibility on exams, lab reports, & worksheets; make sure you turn them in on time
- Review terminology and concepts using the book's index, glossary, and end-of-chapter summaries
- In browser, bookmark companion website; visit often
- If you need clarification or have questions, come to my office hours

Punctuality and regular attendance, correct spelling and grammar, and good penmanship are all necessary for succeeding in a professional career. Consequently, poor spelling, grammar or penmanship will result in lost points on exams and homework; illegible answers on exams and late homework will receive no credit (i.e., if I can't read it, it's wrong).

X. Implied Contract:

This syllabus serves as a contract between you and the instructors. Your continued enrollment in this class denotes your understanding of and agreement with the material in the syllabus. You are expected to retain this syllabus and keep it in your notebook or textbook to refer to during the semester.

LECTURE OUTLINE AND READING ASSIGNMENTS*

Week Beginning	Lecture Topic	Reading(s) or Exam
Friday, Jan 27	Syllabus Highlights, Introduction, Ecology & Evolution	Ch 1
Monday, Jan 30	Geographical Ecology, Global Patterns of Biological Diversity	Ch 22, 23
Monday, Feb 6	Some Population Genetics, Life on Land	Ch 2, 4
Monday, Feb 13	Life on Land (cont'd), Life in Water	Ch 2, 3
Monday, Feb 20	Life in Water	Ch 3
Monday, Feb 27	Population Ecology: Temperature & Water Relations, Review for Exam 1	Ch 5, 6 **March 3**
Monday, March 6	Population Ecology: Energy and Nutrients	Ch 7
Monday, March 13	Populations: Distribution and Abundance	Ch 9
Monday, March 20	Spring Break, no classes	
Monday, March 27	Population Dynamics, Intra- and Inter-Specific Competition, Cesar Chavez (F, no class)	Ch 10, 13
Monday, April 3	Competition (cont'd), Predation & Herbivory	Ch 13, 14
Monday, April 10	Predation & Herbivory	Ch 14, 15
Monday, April 17	Parasitism, Disease & Mutualism, Earth Day Video: "*Rachel Carson's Silent Spring*" (F)	Ch 14, 15 video
Monday, April 24	Parasitism, Disease & Mutualism (cont'd), Review for Exam 2	Ch 14, 15 **April 28**
Monday, May 1	Species Interactions & Community Structure	Ch 17
Monday, May 8 (M, W only)	Community Structure (cont'd), Succession & Stability, Warrior Day (F) (no lecture class)	Ch 17, 20
Monday, May 15 (M, W only)	Succession & Stability (cont'd), Review for Final	Ch 20
Wednesday, May 24	**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/. Includes practice quizzes, flashcards, etc. 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.

Randomized Control Trial (YouTube video, 1:23 min): https://www.youtube.com/watch?v=Cn2iuaQa_44

LAB SCHEDULE

Lab Meeting	Topic(s)	Points
January 27	Introduction, Lab Safety, Group & Paper Assignments, Peer Review, EXCEL Hints & Tips, Whirl-Pak Bags, Introduction to Quadrat Sampling (map exercise, worksheet)	
	Bring soil sample to next lab, Read for next 2 labs: S.H. Hurlbert. 1984. *Ecol. Monogr*. 54: 187-211, and your group paper	
February 3	Soil Lab (setup), Microclimate, Experimental Design Exercise I	
February 10	Soil Analysis, Climate Diagram Exercise (worksheet), Exp. Design Exercise II, Grading & Format for PowerPoint Presentations	
February 17	*Parametric Statistics, Confidence Intervals	50¶
February 24	Duckweed Population Growth (Day 0) Format for Lab Reports, Peer Grading Presentations #1, #2, #3, #4	150¶
March 3	*Duckweed Population Growth (Day 7), Exponential, Geometric, Logistic Growth (lab lecture) Presentations #5, #6, #7, #8	
March 10	Duckweed Population Growth (Day 14, clean up), *Mark-Release-Recapture (isopod set up) Presentations #9, #10	200
March 17	*Measuring H_2O Quality (3-4 day trial) Mark-Release-Recapture Methods (1st of 3 estimates) Presentations #11, #12	100
March 24	Spring Break, no lab	
March 31	Cesar Chavez Day, no lab	
April 7	Mark-Release-Recapture Methods (2nd of 3 estimates) Presentations #13, #14, #15, #16	
April 14	Mark-Release-Recapture Methods (final estimate, cleanup) Presentations #17, #18, #19, #20	
April 21	Life Tables, Survivorship Curves, *Cemetery Demography (worksheet) Presentations #21 , #22	100
April 28	*Foraging & Flocking Behavior (Outdoor Lab) (worksheet)	200
May 5	Submit Last Lab Reports, Catch-up lab Presentations #23, #24	
May 12	Warrior Day, no lab	

*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.