

# BIOL 3680 Ecology

## I. General Information

Professor: Dr. Kenneth Schoenly  
 Office: N271, 667-3949  
 Off. Hrs: MW 9:00-10:30 (or by appointment)  
 Email: [kschoenly@csustan.edu](mailto:kschoenly@csustan.edu)

Semester: Spring 2020  
 Credits: Lec/Lab 4  
 Class: Lec MWF 1:00-1:50 (N210)  
 Lab Wed 2:00-4:50 (N210)

## II. Required Text/i>clicker/Calculator (acquire before 3<sup>rd</sup> class day)

- (1) *Ecology: Concepts and Applications, 8<sup>th</sup> ed.* by Molles (chapters shown in schedule below). Companion website: [http://highered.mheducation.com/sites/1259880052/student\\_view0/index.html](http://highered.mheducation.com/sites/1259880052/student_view0/index.html)
- (2) *i>clicker* (new/used/rental remotes 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 your remote every day (lecture & lab) and come to class on time. Register your remote online at <https://www.iclicker.com/remote-registration-form-for-classic> and complete **all** the fields. If you are late and miss the 1<sup>st</sup> question, you will forfeit points for that lecture. 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) *Calculator*. For in-class and lab use, doing homework, and for exams.
- (4) The laboratory will rely mostly on handouts; these will be provided one week (or less) before the next lab meeting. Labs are experiment-based, quantitative reasoning exercises, requiring students to work in groups for data gathering, analyzing results, and report writing. Lab periods will also include 1-4 student presentations (see lab schedule), formatted in *PowerPoint*, representing a summary and critique of a *journal paper* from the primary literature (i.e., *Ecology, Ecological Applications*).

## III. 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 a mathematical, experimental, observational, 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 summarize and 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.**

#### IV. Student Learning Goals:

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 summarize and critique a peer-reviewed article in an ecological journal to refine critical thinking and oral communication skills; 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.

#### V. 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 who 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 reports, 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 or assignment (within 24 hrs) documenting your absence (e.g., doctor's note, jury summons, funeral notice). Assigned homework, lab reports and the PowerPoint presentation **have a no-exceptions due date and time.**

**An unexcused absence for a gradable event will result in no score; however, in the event of a documented compelling circumstance, an attempt will be made to work out the conflict**

For your convenience, the syllabus and select handouts for this class will be posted online using Blackboard. Find the Spring 2020 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.**

## VI. 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.**

## VII. Grading Procedure

Two semester Friday exams (**March 6 and May 1**) 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 22: 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 @ 150 points each)	300 (30%)
Comprehensive Final (1 @ 250 points)	250 (25%)
Lab Reports	300 (30%)
Homework, worksheets	100 (10%)
i>clicker Questions (engagement, attendance, punctuality)	50 (5%)
<b>Total</b>	<b>1000 points</b>

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. 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.

### Some Important Dates:

January 27: First class day	April 22 (W): Earth Day!
February 21: Census date: Last day to add/drop	<b>May 1 (F): Exam 2</b>
<b>March 6 (F): Exam 1</b>	May 8 (F): Warrior Day (No lecture)
March 23-27: Spring Break (No Classes)	May 15: Last day of classes
March 31: Cesar Chavez Day (No Classes)	<b>May 22 (W): Final Exam (start time: 11:15)</b>

### XI. 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 lab partners by making substantive contributions to group (i.e., lab reports, fieldwork)
- Take (write) complete 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 meet deadlines
- Review terminology and concepts using the book’s index, glossary, and end-of-chapter summaries
- In browser, bookmark companion website; visit often
- If, after reviewing your notes and text, you need clarification or have questions, come to my office hours (MW 9:00-10:30).

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).

### XII. 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
Monday, Jan 27	Syllabus Highlights, Introduction, Ecology & Evolution	Ch 1
Monday, Feb 3	Patterns of Biological Diversity, Geographic & Global Ecology	Ch 16, 22, 23
Monday, Feb 10	Some Population Genetics, Life on Land	Ch 2, 4
Monday, Feb 17	Life on Land (cont'd), Life in Water	Ch 2, 3
Monday, Feb 24	Life in Water	Ch 3
Monday, March 2	Population Ecology: Temperature & Water Relations, <i>Review for Exam 1</i>	Ch 5, 6 <b>March 6</b>
Monday, March 9	Population Ecology: Energy & Nutrient Relations	Ch 7
Monday, March 16	Population Distribution & Abundance	Ch 9
Monday, March 23	Spring Break, No Classes	
Monday, March 30	Population Dynamics, Intra- & Interspecific Competition)	Ch 10, 13
Monday, April 6	Competition (cont'd), Predation & Herbivory	Ch 13, 14
Monday, April 13	Predation & Herbivory (cont'd)	Ch 14
Monday, April 20	Parasitism & Disease, Mutualism, Earth Day Video: <i>"Rachel Carson"</i> (F)	Ch 14, 15 <b>video</b>
Monday, April 27	Parasitism & Disease, Mutualism (cont'd), <i>Review for Exam 2</i>	Ch 14, 15 <b>May 1</b>
Monday, May 4	Species Interactions & Community Structure, Warrior Day (F, no class)	Ch 17
Monday, May 11	Community Structure (cont'd), Succession & Stability	Ch 17, 20
Friday, May 22	<b>Comprehensive Final (starting time 11:15)</b>	<b>Final</b>

\*Reading assignments listed on the course outline above are for *Ecology: Concepts and Applications*, 8<sup>th</sup> ed. Topic content and dates of coverage in the syllabus may be changed due to extenuating circumstances.

### Useful & Informative Web Links:

"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.

Pseudorandom number generator: <https://www.random.org/>

Randomized Control Trial (YouTube video, 1:23 min): [https://www.youtube.com/watch?v=Cn2iuaQa\\_44](https://www.youtube.com/watch?v=Cn2iuaQa_44)

## LAB SCHEDULE\*

Lab Meeting	Topic(s)	Points
January 29	Introduction, Lab Safety, Group Assignments & Lab Reports, Peer Review, EXCEL Hints & Tips, Sampling & Experimental Design 1 (lab lecture, map exercise [quadrat shape & size], worksheet)  <b>Bring book, calculator &amp; i&gt;clicker to all labs</b>	
February 5	Sampling & Experimental Design 2 (lab lecture, map exercise [4 sampling designs], article assignment, group activity, handout)  <b>Be read to present your group's report (exp. design critique) at next lab!</b>	
February 12	Sampling & Experimental Design 3 (group activity, worksheet, presentations), pass out Whirl-Pak Bags (soil sample)  <b>Collect &amp; bring soil sample to next lab. Read Ch 2 (climate diagrams) before next lab; bring book</b>	
February 19	Soil Analysis 1 (setup, soil components, microclimates), Climate Diagrams (group activity, graph & worksheet)  <b>Be ready to present your group's report (climate diagram) at next lab</b>	
February 26	Soil Analysis 2 (soil chemistry, ecology & cleanup), presentations (climate diagram)	
March 4	Format for Lab Reports, Peer Grading, Parametric Statistics (t-test Homework), *Duckweed Population Growth (setup, Day 0)	50¶ 150¶
March 11	*Duckweed Population Growth (Day 7), Geometric & Exponential Growth (lab lecture, part 1), Scientific Graphs & Tables	
March 18	*Duckweed Population Growth (Day 14, clean up), Logistic Growth (lab lecture, part 2), Confidence Intervals	
March 23-27	<b>Spring Break, No Lab</b>	
April 1	*Mark-Release-Recapture (isopod set up), MRR Methods (lab lecture)	100**
April 8	Mark-Release-Recapture Methods (1 <sup>st</sup> of 3 estimates), *Life Tables, Survivorship Curves & Cemetery Demography (worksheet)	100**
April 15	Mark-Release Recapture Methods (2 <sup>nd</sup> of 3 estimates), Measuring H <sub>2</sub> O Quality (3-4 day trial, make observations)	
April 22	Mark-Release Recapture Methods (3 <sup>rd</sup> of 3 estimates, analysis & cleanup), Measuring H <sub>2</sub> O Quality (analysis) (worksheet)	
April 29	*Foraging & Flocking Behavior (Outdoor Lab)	100**
May 6	Foraging & Flocking Behavior, part 2 (analysis, worksheet)	
May 13	Make up Lab, Final Lab Reports Due	

\*Lab grade is based on 400 points (3 lab reports, completed worksheets, homework).

¶Mandatory lab report (everyone is required to complete and turn in).

\*\*Lab report with accompanying points (each group chooses 1 of the 3 options).