UNIVERSITY OF CALIFORNIA, MERCED
BIO/ESS 148: Fundamentals of Ecology – Syllabus
Fall 2018

Lecture time: Tuesdays and Thursdays, 9:00-10:15 am

Lecture location: GRAN 135

Discussion section times and locations:
Section BIO-148-02D: Fridays, 1:30-2:20 pm, GLCR, Rm. 120
Section BIO-148-03D: Fridays, 2:30-3:20 pm, GLCR, Rm. 120
Section BIO-148-04D: Fridays, 4:30-5:20 pm, CLSSRM, Rm. 260

Instructor: Justin D. Yeakel (jyeakel@ucmerced.edu)
Science and Engineering 1, Rm. 288
Office hours: Tuesdays and Thursdays: 10:30 – 11:30 am, or by appointment

Teaching Asst: Irina Barros (ibarros@ucmerced.edu)
Office hours: Mondays 11:00-12:00 @ AOA 166; Wednesdays 2:00-3:00 @ COB1 315

Course Website: http://jdyeakel.github.io/teaching/ecology

I. **Course Description:** This course fulfills an upper division requirement for the Ecology and Evolutionary Biology (EEB) emphasis track of the Biological Sciences Major, as well an upper division requirement for the Earth Systems Science Major. This course provides an introduction to ecology - the scientific study of how organisms interact with each other and their physical environment. *Prerequisite: BIO 001 or BIO 005 or ESS 001 or ESS 005 or consent of instructor. Normal Letter Grade only.*

II. **Course Goals and Outcomes:**

- ***Course Goals:***
  - Learn key concepts and major topics in ecology, including: how organisms interact with their environment; the dynamics and regulation of populations; the various types and character of the interactions among organisms; the nature, geography, and biodiversity of communities; the structure and function of ecosystems; and applied and large-scale ecological topics, such as conservation biology, landscape ecology and ecosystem management, and global change
  - Understand the linkages between ecology and the other subfields of the biological sciences and earth systems science
  - Understand the fundamentals of the methods used in ecological research
  - Appreciation for the positive and negative impacts of humans on ecological systems
  - Be able to communicate ecological knowledge to other scientists and laypersons, and apply basic concepts to comprehend and evaluate science in the popular press and in the primary scientific literature

- ***Learning Outcomes:*** At the end of the course, students should be able to:
  - Explain the fundamental ecological principles that pertain to individual organisms, to populations, to communities, to ecosystems, to landscapes, and to the globe (see table below)
  - Develop a broad appreciation of the linkages among ecology, evolution, and earth systems science.
  - Describe and understand the various techniques used in ecology, from computation to

experimental, and how these techniques are coupled with the scientific method to address ecological questions
    - Comprehend the practical applications of ecological principles in human society and the potential impacts of humans on ecological systems
    - Critically evaluate the scientific literature as well as the popular press, and take ownership of the course material to improve their functioning in society
- *See the table below for more detailed learning outcomes*.

III. **Format and Procedures:**

This course is structured as follows: two 75-minute lecture sessions and one 50-minute discussion section per week. Discussion sections will provide students an opportunity to discuss in more detail scientific findings from peer-reviewed publications. *Your participation in discussion section is graded* (see Grading below).

We will also spend a Saturday morning in March exploring the Vernal Pools ecosystem just off campus to apply some of our newly gained ecological knowledge to the field. All students are required to attend and participate. Field observations from the Vernal Pools will be used to write a Field Report towards the end of the semester.

IV. **Course Requirements & Grading Procedures:**

- ***Class Attendance and Participation Policy***:
    - Attendance and participation in the discussion section is required and will be a component of the student's course grade.

- ***Required and Supplemental Readings***:
    - **Required Textbook**: W.D. Bowman, S.D. Hacker, and Cain, M.L. 2017. Ecology, 4th Edition. Sinauer Associates, Inc., Publishers. Sunderland, MA.
    - Readings will also be assigned for the Discussion section and instead of the book for some lectures. These are ***required*** and will be provided on the course website.
    - Note: other editions (1st, 2nd, 3rd) of this textbook may be used but are not recommended.
    - **Companion Website**: http://sites.sinauer.com/ecology4e/index.html
    - This companion site is designed to help students using the Bowman et al. *Ecology*, 4th Edition textbook to master important concepts in ecology. It provides resources for reviewing each chapter, learning key terminology, working with data from actual experiments, and using simulations to explore model systems. The site also includes self-study quizzes to gauge your comprehension of each chapter.

- ***Course Assignments and Projects:***
    - *Late assignments (e.g., homework) will not be accepted.*
    - **Homework:** Throughout the semester, homework assignments will be assigned and turned in during the Discussion Section consisting of exercises provided by the Teaching Assistant/Instructor.

    - **Quizzes:** Quizzes will be given periodically during the lecture period. They will not necessarily be announced.

    - **Exams:** There will be 3 "midterm" exams during the semester and 1 comprehensive final. *There will be no make-up exams or early exams.* If you are sick during an exam, please bring a note from your doctor verifying your illness. Your grade for the missed exam will be based on your average score from the other exams. You cannot miss more than one exam for an excused illness and taking the final is mandatory in order to pass the course.

- ***Grading***: Your final grade will be based on the following: class/section participation: 5%, homework: 20%, quizzes: 10%, midterms: 45% (three, 15% each), and comprehensive final exam: 20%.
    - Grades will be given using the approximate framework: A: 90 - 100%, B: 80 - 90%, C: 70 - 80%, D: 60 - 70%, F: < 60%. This framework is subject to change given the distribution of the final grades.

. **Academic Integrity:**

Academic integrity is the foundation of an academic community and without it none of the educational or research goals of the university can be achieved. All members of the university community are responsible for its academic integrity. Existing policies forbid cheating on examinations, plagiarism and other forms of academic dishonesty.

- Each student in this course is expected to abide by the University of California, Merced's Academic Honesty Policy (http://studentlife.ucmerced.edu/what-we-do/student-judicial-affairs/academicy-honesty-policy).
- Any work submitted by a student in this course for academic credit will be the student's own work.
- You are encouraged to study together and to discuss information and concepts covered in lecture and the sections with other students. You can give "consulting" help to or receive "consulting" help from such students. However, this permissible cooperation should never involve one student having possession of a copy of all or part of work done by someone else, in the form of an e mail, an e mail attachment file, a diskette, or a hard copy. Should copying occur, both the student who copied work from another student and the student who gave material to be copied will both automatically receive a zero for the assignment. Penalty for violation of this Policy can also be extended to include failure of the course and University disciplinary action.
- During examinations, you must do your own work. Talking or discussion is not permitted during the examinations, nor may you compare papers, copy from others, or collaborate in any way. Any collaborative behavior during the examinations will result in failure of the exam, and may lead to failure of the course and University disciplinary action.
- Examples of academic dishonesty include:
    - receiving or providing unauthorized assistance on examinations
    - using unauthorized materials during an examination
    - plagiarism - using materials from sources without citations
    - altering an exam and submitting it for re-grading
    - fabricating data or references
    - using false excuses to obtain extensions of time or to skip coursework
- The ultimate success of a code of academic conduct depends largely on the degree to which the students fulfill their responsibilities towards academic integrity. These responsibilities include:
    - Be honest at all times.
    - Act fairly toward others. For example, do not disrupt or seek an unfair advantage over others by cheating, or by talking or allowing eyes to wander during exams.
    - Take group as well as individual responsibility for honorable behavior. Collectively, as well as individually, make every effort to prevent and avoid academic misconduct, and report acts of misconduct which you witness.
    - Do not submit the same work in more than one class. Unless otherwise specified by the instructor, all work submitted to fulfill course requirements must be work done by the student specifically for that course. This means that work submitted for one course cannot be used to satisfy requirements of another course unless the student obtains permission from the instructor.
    - Unless permitted by the instructor, do not work with others on graded coursework, including in class and take-home tests, papers, or homework assignments. When an instructor specifically informs students that they may collaborate on work required for a course, the extent of the collaboration must not exceed the limits set by the instructor.
    - Know what plagiarism is and take steps to avoid it. When using the words or ideas of

another, even if paraphrased in your own words, you must cite your source. Students who are confused about whether a particular act constitutes plagiarism should consult the instructor who gave the assignment.

- Know the rules --- ignorance is no defense. Those who violate campus rules regarding academic misconduct are subject to disciplinary sanctions, including suspension and dismissal.

Accommodations for Students with Disabilities: The University of California Merced is committed to ensuring equal academic opportunities and inclusion for students with disabilities based on the principles of independent living, accessible universal design and diversity. I am available to discuss appropriate academic accommodations that may be required for student with disabilities. Requests for academic accommodations are to be made during the first three weeks of the semester, except for unusual circumstances. Students are encouraged to register with Disability Services Center to verify their eligibility for appropriate accommodations.

The instructor will make every effort to accommodate all students who, because of religious obligations, have conflicts with scheduled exams, assignments, or required attendance. Please speak with the instructor during the first week of class regarding any potential academic adjustments or accommodations that may arise due to religious beliefs during this term.

Tentative Weekly Schedule: Please note that the Instructor reserves the right to change the schedule. You will be advised in advance of any changes.

Wk.	Weekly Topic & Learning Goals	Key Learning Outcomes	Required Readings	Assessments
1	23 Aug: The Web of Life and Course Logistics	Describe the general types of questions ecologists ask & the approaches used to address them	Bowman et al. Ch. 1	
	Discussion: None			
2	28 Aug: Ecological Scales I	Cells to communities	Bowman et al. Salmon case study, pgs 22-23 & 46-47; *Analyzing Data 2.1* pg 37	
	30 Aug: Ecological Scales II	Thinking like a mountain		
	Discussion: Scale		Leopold A. Excerpts from: *A Sand County Almanac* (link)	
3	04 Sept: The Biosphere	Distinguish among the major Earth's biomes	Bowman et al. Ch. 3	
	06 Sept: Energy in the Web of Life	Variation in temperature and water	Bowman et al. Ch. 4	
	Discussion:		Lopez, B. *The Naturalist* (link)	**Homework 1 due**
4	11 Sept: Energy in the Web of Life II	Variation in energy	Bowman et al. Ch. 5	
	13 Sept: Allometry	Allometry and Macroecology		
	Discussion: Macroecology		West & Brown. *Life's Universal Scaling Laws* (link)	**Homework 2 due**
5	18 Sept: Evolution	Compare the different mechanisms for evolution & explain how evolution is interconnected with ecology	Bowman et al. Ch. 6	
	20 Sept: Life history tradeoffs	Describe some of the tradeoffs in life history traits & how life history patterns vary within & among species	Bowman et al. Ch. 7	Material from weeks 1-5
	Discussion: Life history		Kochin et al. *Parasite Evolution and Life History* (link)	**Homework 3 due**
6	25 Sept: **Exam 1**			Material from weeks 1-5
	27 Sept: Behavioral Ecology I	Optimal foraging theory, marginal value theorem, parental investment, mating	Bowman et al. Ch. 8	
	Discussion: Game Theory		Game Theory handout (link)	**Homework 4 due**

Wk.	Weekly Topic & Learning Goals	Key Learning Outcomes	Required Readings	Assessments
7	02 Oct: Behavioral Ecology II		TBD	
	04 Oct: Maximizing fitness	Determining behaviors and life history through fitness maximization		
	Discussion: Behavioral Ecology		TBD	**Homework 5 due**
8	09 Oct: Population Growth & Regulation	Density dependence and basic population dynamics	Bowman et al. Ch. 10	
	11 Oct: Population Growth & Regulation (cont.)	Life tables and population viability analysis		
	Discussion: Populations		Packer et al. *Ecological change, group territoriality, and population dynamics in Serengeti lions.* (link)	**Homework 6 due**
9	16 Oct: Population Dynamics	Summarize the different patterns of population growth & the factors that define these patterns	Bowman et al. Ch. 11	
	18 Oct: Competition		Bowman et al. Ch. 14	
	Discussion: Competition		Dominy et al. *Frankenstein and the horrors of competitive exclusion* (link)	**Homework 7 due**
10	23 Oct: **Exam 2**			Material from weeks 6-10
	25 Oct: Predation & Herbivory: GUEST LECTURE	Explain how predation & herbivory shape populations & describe some of the adaptations organisms have made to acquire food and avoid being eaten	Bowman et al. Ch. 12	
	Discussion: Species Interactions & Review		Ripple et al. *What is a Trophic Cascade?* (link)	**Homework 8 due**
11	30 Oct: Parasitism	Describe some of the adaptations parasites and their hosts have evolved & describe how understanding host-pathogen dynamics can help control diseases	Bowman et al. Ch. 13	
	01 Nov: Mutualism & Commensalism	Describe the different types of species interactions & how positive interactions affect communities	Bowman et al. Ch. 15	
	Discussion: Trophic and non-trophic interactions		TBD	**Homework 9 due**

Wk.	Weekly Topic & Learning Goals	Key Learning Outcomes	Required Readings	Assessments
12	06 Nov: Ecological networks	The structure and function of ecological interaction networks	TBD	
	08 Nov: The Nature of Communities	Describe the nature of communities and how to describe their structure	Bowman et al. Ch. 16	
	Discussion: Networks		TBD	**Homework 10 due**
13	13 Nov: Change in Communities	Describe succession and the factors that cause communities to change	Bowman et al. Ch. 17	
	15 Nov: Biogeography	Explain the patterns of species diversity & distribution at different spatial scales	Bowman et al. Ch. 18	
	Discussion: Island biogeography theory		TBD	**Homework 11 due**
14	20 Nov: **Exam III**		Hanski. *Metapopulation Dynamics.* (link)	
	22 Nov	No Class: Thanksgiving Break		
	Discussion: None	No Discussion: Thanksgiving Break		
15	27 Nov: Metapopulations	Metapopulations and the rescue effect	TBD	
	29 Nov: Species Diversity in Communities		Bowman et al. Ch. 19	
	Discussion: Metapopulations		TBD	
16	04 Dec: GUEST LECTURE		Bowman Ch. 21	
	06 Dec: Food webs through time and the effects of humans			
	Discussion: Review		Review	**Homework 12 due**
17	**Final Exam: Thursday, Dec 11, 3:00-6:00 PM, GRAN 135**			Comprehensive