

BIOL 3800 - ECOLOGY AND EVOLUTION SYLLABUS - FALL 2019

Lectures: SH 343; TR 1:40pm-2:55pm

INSTRUCTORS: Drs. Eric Wood and Valerie Wong

Dr. Wood will teach course until October 1st - Dr. Wong will teach remainder

CONTACT INFORMATION: ericmwood@calstatela.edu; vwong19@calstatela.edu

DR. WOOD'S RESEARCH AND LAB INFORMATION: www.ericmwood.org

LECTURE TIMES: Tuesdays and Thursdays, 1:40pm - 2:55pm; **LOCATION:** SH 343

OFFICE HOURS: T 3-4; Location – La Kretz Hall, 312 (Wood)
Tu/Th 9:15-10:15am KH A2036 (Wong)

COURSE WEBSITE: The course site on Canvas will be your resource for acquiring information and required materials for this course. In addition to books and readings, we will also post homework assignments, quizzes, and the schedule of lectures (in the syllabus) and due dates will also be displayed. Any changes to the syllabus/schedule will be posted on Canvas and announced to the class. It is the student's responsibility to keep up with the course and any changes.

COURSE OVERVIEW: This course concerns processes and patterns that occur either within populations (*a collection of organisms sharing a defined area*), among populations (*communities*), or individual species. This course will begin by providing an overview of the study of interactions of species with their environment, which is the study of **ecology**. The second portion of this class will be an overview of the study of genetic change in populations over time, which is broadly the study of **evolution**. The two fields of ecology and evolution are inherently coupled to each other, but evolution can be understood as the byproduct of ecological interactions playing out over time (selection), plus some quirks of reproduction that affect changes in gene frequencies over time (genetic drift).

Ecology (first six weeks) – Dr. Wood

Ecology is about studying interactions. These include interactions between organisms and their environment, interactions among individuals within a population, and interactions among species. These interactions form the basis for understanding critical ecological concepts ranging from the distribution of biodiversity across habitats to the functioning of ecosystems. The study of ecology occurs at multiple scales: for example, a population of a single species, populations of two closely interacting species, a community that contains

many species, or an entire ecosystem that includes multiple distinct communities.

The ecology portion of the course will begin by covering the **physical environment**, which considers climates and broad descriptions of aquatic and terrestrial habitats. Then, the course builds from small to large. We will first overview **the organism** and adaptations that species have evolved to thrive in their particular environment. Next, we will cover **populations** and factors that limit and contribute to population growth. Then, we will discuss **communities** (i.e., including both population dynamics and community-level interactions) before finishing with **landscape ecology**, and **conservation**.

Evolution (remainder of course) – Dr. Wong

The second half of this course provides an in-depth examination of evolution, the unifying principle of modern biology. The first section centers on **microevolution**, the processes that determine how the genetic composition of populations change over time. We begin with a general discussion of natural selection as an observable process, and continue by considering the forces that promote evolutionary change (mutation, selection, migration and drift) by taking a population out of Hardy-Weinberg equilibrium. The second section of the evolution portion of the course will consider the **evolution of sex**, and conflict between the sexes; we will also examine how social interactions result from kin selection. Further, we will discuss quantitative genetics and how the evolution of complex traits is studied in the genomics era. The third section will focus on **macroevolution**, the genesis of new species and lineages. We examine mechanisms of speciation, drawing on the primary literature, contrasting models that rely primarily on genetic drift and time with recent work that emphasizes the potential role of natural and sexual selection. Lecture will emphasize the primary scientific literature, encouraging students to consider how evolutionary theory guides scientific inquiry, and cultivate an understanding of modern methods used to study the origins and diversity of life on earth.

Require Textbook (Ecology)

Ecology 4th Edition (Cain et al. – See additional details on Canvas)

Recommended Textbook (Evolution)

Freeman and Heron *Evolutionary Analysis, 5th ed.* (earlier editions are very similar, but chapter numbers may not match up)

ISBN-13: 978-0321616678

ISBN-10: 0321616677

Course Learning Objectives: By completing the course, students will:

1. Demonstrate an understanding of the fundamental concepts of ecology, including evolutionary, population, community, and ecosystems scales.
2. Demonstrate an understanding of the application of ecological and conservation science to society and everyday life, specifically the interaction between human populations and ecological systems.
3. Identify and understand the significance of connections between organismal, evolutionary, ecological, and ecosystem-level processes.
4. Critically analyze ecological methods, studies and data they contain, including the strengths and weaknesses of observational versus experimental methods, and the role and interpretation of models in ecology.
5. Explain how different types of mutation occur & affect genetic variation in a population
6. Define the assumptions of Hardy-Weinberg equilibrium; use allele and genotype frequencies to assess whether a population is deviating from neutral expectations
7. Identify the major factors that maintain or diminish genetic variation in populations; the consequences of reduced genetic variation; and the role of inbreeding
8. Be able to explain the pioneering work of Darwin and Wallace in evolution & biogeography; know the four principles of natural selection, and how the Modern Synthesis fused genetics with Darwinian “descent with modification”
9. Distinguish the features of asexual vs. sexual reproduction, and explain the effects of linkage disequilibrium (what creates it and what destroys it)
10. Be able to critically evaluate evidence supporting female choice vs. run-away selection theories of sexual selection on male display traits
11. Demonstrate an understanding of quantitative traits, and how they are affected by selection; know how to measure heritability from trait data
12. Demonstrate an understanding of allopatric versus ecological speciation, and the role of assortative mating and habitat choice in ecological speciation.
13. Demonstrate an understanding of the mechanisms underlying pre-zygotic vs. post-zygotic reproductive isolation; be able to explain the roles of natural vs. sexual selection during secondary contact, and adaptive radiations

Course Information and Policies

ATTENDANCE:

Attendance is *necessary but not sufficient* to succeed in this course. Not coming to class reflects in every other part of your grade. Chronic *tardiness* disrupts the class and may result in academic underperformance. Students are responsible for all material presented in class, including announcements about changes in course procedures. Students are responsible for acquiring missed material, and not all work may be made up.

- **Excused absences:** If you must miss class, it is your responsibility to notify us as possible, preferably before class. Excused absences include, but are not limited to: death or serious health issue of a close relation, religious reason, jury duty, university activity (e.g. – research conference, required field trip, artistic or athletic event), or school-sponsored event (e.g. sporting event). Your instructor must be notified about an **anticipated absence** (religious reason, government obligation such as jury duty, University activity) at least one week in advance in writing via Canvas or from your CSULA e-mail. For an unanticipated absence, you must provide documentation (e.g. – doctor’s note) in writing in Canvas or from your CSULA e-mail.

ASSESSMENT

Ecology portion (Wood)	% of grade
Attendance and Participation	6
Homework (on Canvas – seven assignments, see last page of syllabus)	10
Quizzes (on Canvas)	10
Exam 1	12
Exam 2	12
Ecology Subtotal	50%
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Evolution portion (Wong)	
In-class assignments (requires attendance and participation)	6
Homework (on Canvas)	10
Quizzes (on Canvas)	10
Exam 3	12
Exam 4	12
Evolution subtotal	50%

LETTER GRADES: The overall grades in BIOL 3800 will be based on a scale that leads to the following distributions of grades. A > 94%; A- = 90-93.9%; B+ = 87-89.9%; B = 83-86.9%; B- = 80-82.9%; C+ = 77-79.9%; C = 72-76.9%; C- = 70-71.9%; D+ = 67-69.9%; D = 63-66.9%; D- = 60-62.9%; F < 60%. We do not curve individual assignments. However, if necessary, we may adjust the final grade scale at the end of the semester.

GRADE ADJUSTMENTS: We do not curve individual assignments. However, if necessary, we may adjust the final grade scale at the end of the semester. Grades will only be changed if due to mathematical error. To maintain fairness, other factors such as time to graduation, major, or desire for a higher score cannot be considered.

EXAMS AND FINAL: There will be four exams. The fourth exam (the final) ***will not*** be cumulative.

WEEKLY ASSIGNMENTS: Each week, you will have a short assignment on Canvas for assigned materials. The assignment will be composed of multiple choice and T/F question, and will be based on a video or reading (see schedule below). Assignments will be made available on a Monday of each week, and close on a Friday by 11:59pm.

WEEKLY LECTURE QUIZZES: Following each lecture, you will be given questions on Canvas to test your understanding of material covered during lecture. Quizzes will be up by 6p on the day of a lecture, and be available for a 24 hr period.

COURSE CANVAS SITE: Each student is expected to have access to the MyCalStateLA campus portal. Class materials will be made available on the course Moodle site, accessible through the MyCalStateLA portal. Email correspondence with instructors must occur through your Cal State LA account – we cannot reply to emails received from accounts administered outside Cal State LA.

STUDENT SERVICES: The **Americans with Disabilities Act (ADA)** is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. The university provides reasonable accommodations to students with documented physical and learning disabilities. The Office for Students with Disabilities (OSD), located in Student Affairs Room 115 coordinates all documentation of disabilities (323-343-3140) <http://www.calstatela.edu/univ/osd/>.

UNIVERSITY INCOMPLETE GRADE POLICY: In the 2018-2019 University Catalog under Procedures and Regulations, the following wording is associated with the assignment of an incomplete: I, IC (Incomplete) An Incomplete grade is an interim grade designed for students who are passing but who, through extenuating circumstances, have not been able to complete part of the work of the course. An Incomplete grade is assigned at the discretion of the faculty member only when significant elements of the course requirements have not been met. An Incomplete will not be assigned when it is necessary for the student to attend a major portion of the class when it is next offered. Written documentation will be required to verify extenuating circumstances.

POLICY ON UNIVERSITY WITHDRAWAL FROM THE COURSE:

From the University Catalog under Procedures and Regulations:

'Students may add and drop classes without restriction or record through the first 15% of an instructional period. Drops occurring after the first 15% of an instructional period and prior to the last 20% of an instruction period are considered withdrawals and shall be recorded with a grade of "W" on the student's permanent record transcript. Withdrawals are permitted only for serious and compelling reasons. The student must complete a drop request form, state the reason for withdrawal, and obtain the signatures of the course instructor and the department/division chair or school director. Records of such approvals shall be maintained in accordance with campus record retention policy. Undergraduate students may withdraw from no more than 18 semester-units (27 quarter-units) attempted at Cal State Los Angeles.

Withdrawals shall not be permitted during the final 20% of instructional period except where the cause of withdrawal is due to circumstances clearly beyond the student's control (e.g. serious illness, accident, job transfer, military deployment, etc.) and the assignment of an incomplete is not practicable.

Add and drop activity occurring on or after the first day of instruction may incur late payment fees and refund limitations as specified by the office of student financial services and the center for student financial aid and scholarships.'

After the "no-record drop" deadline (see above), students may withdraw with a W grade from any course, BUT only for serious and compelling reasons. Written documentation will be required to verify extenuating circumstances, and only Dr. Wood will sign add and drop forms for both lecture and lab (though, see clause stating Department Chair may sign in my place under 'Procedures'). Do not bring drop forms to class time since I will not sign them until after I verify your reasons and justification for dropping the class after the "no-record drop" deadline. To drop the course after the "no-record drop" deadline, you will need to see me during office hours or leave the detailed materials with office staff in BIOS 143. Since there are enrollment restrictions on all courses, you need to decide in week one whether or not you plan to complete the course since you will be preventing someone else from adding the course. Students who do not attend the first lab during week one will be dropped from the course regardless of the reason.

DROP POLICY: The drop policy established by the university will be strictly followed (see above for timeline). After the no record drop deadline, students may drop a course only for "serious and compelling reasons". Failing a course is not an acceptable reason for withdrawal. Acceptable documentation is required verifying the reason for the withdrawal.

CREDIT BY EXAM: Credit by Exam is not offered for this course.

MISSED EXAMS: Make-up exams will not be offered for any exams. Students who miss an exam will receive a zero for the entire test unless they provide documentation for one of two acceptable excuses:

- Incapacitating illness or accident--requires a note from student's physician (not a family member) or from a professional health service provider.
- Death or serious illness of an immediate family member— please come see Drs. Wood or Wong if this is the case.
- School-related functions (e.g. sporting events, etc.)

LATE ASSIGNMENTS: Assignments will **NOT** be accepted late.

ACADEMIC INTEGRITY: The central rule of academic honesty is that you must do your own work. Some of the activities in BIOL 1200 involve group activities and you are welcome to discuss any of the materials in the text, lectures, or on-line materials with the instructors and other students, ***but you must work independently on all of the following:***

- Lab write-ups
- Lab reports
- Online Quizzes
- Exams

Independent work means that each student must generate their own answers to all written questions. If you violate this, myself and your TA will bring to your attention and you will be disciplined accordingly.

Students are expected to read and abide by the University's Academic Honesty Policy (<http://www.calstatela.edu/academic/senate/handbook/>). Students who violate this policy will be subject to disciplinary action and may receive a failing grade for a single violation.

CLASSROOM CONDUCT: All cellphones, pagers and other electronic communication devices must be *turned off* during lecture and lab. During exams you will not be allowed to leave the classroom for any reason. You are allowed to use a laptop or tablet during lecture and lab, but you must be using it to take notes or participate in class activities.

EXAMS: There will be four exams in the course. Exams will reflect material covered in lectures and assigned readings. Exams will be composed of multiple choice, true/false, calculations, and short-answer essay questions; Drs. Wood and Wong will provide further details before each exam. The final is not cumulative. Make-up exams will be given only for absences with valid, documented excuses.

EXAM PREPARATION: This is a challenging course, so you should review material early and often. Prioritization of the material should be straightforward: if we emphasize it in lecture, it is covered on the slides and in your reading, and is part of discussion, it is a major concept that is fair game for an exam.

ATTENDANCE AND PARTICIPATION, during each class, we will hold discussion or exercises on various topics. The assignments fall under the participation portion of your grade (12% of final grade).

MENTAL AND PHYSICAL HEALTH: College can be extremely stressful, with both academic and personal challenges. Diminished mental and physical health, including significant stress, mood changes, excessive anxiety, or problems with eating or sleeping can interfere with academic performance. The source of symptoms may be strictly related to your coursework; if so, please speak with me. However, problems with personal matters can also contribute to decreased academic performance. Please remember that help is always available. Cal State LA provides resources for Counseling and Psychological Services (<https://www.calstatela.edu/mindmatters>) to support the academic success of students.

SOME GUIDELINES AND TIPS ON HOW YOU CAN SUCCEED IN THIS COURSE

1. Attend class regularly
2. Complete all assignments and quizzes
3. Read the textbook and take notes while reading
4. Ask questions and participate in lecture discussions
5. Keep your notes in an organized system
6. Plan on spending **two to three hours** working on the course outside of the classroom for every hour that is spent in the classroom as a minimum.
7. Come to office hours when you have questions



“There are some who can live without wild things and some who cannot.”

— *Aldo Leopold*

COURSE SCHEDULE - BIOL 3800 /ECOLOGY AND EVOLUTION/ FALL 2019

Note that dates, topics and activities may change. Any changes to the schedule will be announced in class and posted online on the class Moodle site; it is the responsibility of the student to remain informed of any announced schedule changes.

	Week	Day/Date	Lecture Topic	Assigned Reading
Part 1	1	T - 8/20	The Web of Life	Ch 1 - Cain et al.
<i>Organisms and their Environment</i>		R - 8/22	The Physical Environment	Ch 2 - Cain et al.
	2	T - 8/27	The Biosphere	Ch 3 - Cain et al.
Part 2		R - 8/29	Coping with Environmental Variation: Temp, Water, and Energy	Chs 4 & 5 - Cain et al.
<i>Adaptations and Evolution</i>	3	T - 9/3	Evolution and Ecology	Ch 6 - Cain et al.
		R - 9/5	Life History & Behavior	Ch 7 and 8 - Cain et al.
	4	T - 9/10	Exam 1 (Parts 1 – 2)	
Part 3		R - 9/12	Population Distribution and Abundance	Ch 9 - Cain et al.
<i>Population, Species Interactions, and Communities</i>	5	T - 9/17	Population Growth and Regulation	Ch 10 - Cain et al.
		R - 9/19	Species Interactions 1	Chs 12-15. - Cain et al.
	6	T - 9/24	Species Interactions 2	Chs 12-15. - Cain et al.
		R - 9/26	Communities	Chs 16-17 - Cain et al.
Part 4	7	T - 10/1	Landscape Dynamics and Landscape Ecology	Ch 24 - Cain et al.
<i>Landscapes & Conservation</i>		R - 10/3	Biological Diversity and Conservation	Ch 23 - Cain et al.
	8	T - 10/8	Exam 2 (Parts 3 – 4)	
Part 5		R - 10/10	Darwin, Wallace, and descent with modification	Ch. 2-3
<i>Microevolution</i>	9	T - 10/15	Alleles, mutation, and genetic variation	Ch. 5
		R - 10/17	Population genetics: Hardy-Weinberg equilibrium	Ch. 6
	10	T - 10/22	Selection on alleles and genotypes	Ch. 7
		R - 10/24	Mutation and migration	Ch. 7
	11	T - 10/29	Genetic drift and loss of heterozygosity	Ch. 7
		R - 10/31	Non-random mating: Inbreeding and selfing	Ch. 8
	12	T - 11/5	Exam 3 (Part 5)	
Part 6		R - 11/7	Sex and recombination	Ch. 11
<i>Sex and complex traits</i>	13	T - 11/12	Sexual selection	Ch. 11
		R - 11/14	Conflict among sexes	Ch. 11
	14	T - 11/19	Kin selection	Ch. 12
		R - 11/21	Quantitative traits	Ch. 9
		T - 11/26	No class (Thanksgiving holiday)	

		R - 11/28	No class (Thanksgiving holiday)	
Part 7	15	T - 12/3	Speciation and reproductive isolation I	Ch. 16
<i>Macroevolution</i>		R - 12/5	Speciation and reproductive isolation II	Ch. 16
	16	R - 12/12	Exam 4 (Parts 6-7) - 12/12/19, 12-2:00PM	

HOMEWORK ASSIGNMENT SCHEDULE - BIOL 3800 / ECOLOGY / FALL 2019

All homework assignments are completed on Canvas, and are due by 11:59p on the due date. For each assignment, you will need to watch the videos (or complete the interactive assignments – which I will provide instructions on), and complete the assignment (multiple choice and T/F questions) on Canvas.

Week	Lecture Topic	Video theme	Link	Assignment	Due Date
Week 1	The Web of Life	Why is biodiversity so important?	https://www.youtube.com/watch?v=GK_vRtHJZu4	Hmwrk #1	F - 8/23
Week 2	The Biosphere and Adaptations	Ecosystems - The Biosphere	https://www.youtube.com/watch?v=GCse8sNbLXw	Hmwrk #2	F - 8/30
	(Two videos)	Natural Selection and Adaptions	https://www.biointeractive.org/classroom-resources/making-fittest-natural-selection-and-adaptation	Hmwrk #2	F - 8/30
Week 3	Ecology and Evolution	Beak of the Finch	http://www.hhmi.org/biointeractive/origin-species-beak-finch	Hmwrk #3	F - 9/6
Week 4	Populations and Population Dynamics	Populations Ecology	https://www.youtube.com/watch?v=PQ-CQ3CQE3g	Hmwrk #4	F - 9/13
Week 5	Species Interactions	Species Interactions	https://www.youtube.com/watch?v=YyT--fATbJU	Hmwrk #5	F - 9/20
Week 6	Community Dynamics: Disturbance and succession	Exploring Trophic Cascades	http://www.hhmi.org/biointeractive/some-animals-are-more-equal-others-keystone-species-and-trophic-cascades	Hmwrk #6	F - 9/27
Week 7	Landscape Dynamics and Landscape Ecology	Landscape Ecology	https://www.youtube.com/watch?v=30I6cTHhjVg	Hmwrk #7	F - 10/4