

BIOLOGY 481/681 -- PRINCIPLES OF EVOLUTION
COURSE SYLLABUS – Fall 2009

This course will focus on both the pattern and process of evolution. It will consider explanations for patterns of diversity and for the apparent "good fit" of organisms to the environment. Topics covered include phylogenetic classification, the processes of evolutionary change, concepts of fitness and adaptation, speciation, and macroevolutionary pattern.

Lectures: TR 9:45-11:15, Elvey Aud

Labs W 2:15 – 5:15, BUNN 409
R 2:00 – 5:00, BUNN 409

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T.A.s:

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Textbook: Futuyma, D.J. 2005. *Evolution*, 2nd Edition, Sinauer Associates.

Prerequisites: BIOL 271, BIOL 362, STAT 200

Course Goals

Biol 481 is the 'capstone' course for UAF biology majors, and Biol 681 provides a foundation in evolutionary theory for graduate studies. The biological disciplines are unified by underlying evolutionary processes. This course presents an overview of the field of evolutionary biology. It will draw on the information you have gained in other courses and should also assist you in finding links between seemingly disparate fields of biology. You may find the study of evolution to be more conceptual than some of your earlier biology courses. This is both the nature of the discipline and also the nature of more advanced learning in any field – the material turns from concrete facts to more abstract concepts. Therefore another goal of this course is to expose UAF biology students to a more advanced level of study and prepare them to go on in biology-related fields.

Student Learning Goals

The successful student will complete this course with a variety of new knowledge and skills. I always stress that at the very least, everyone should come away understanding the four forces of microevolution and how they interact to bring about evolutionary change or to perpetuate stasis. In addition, students should gain an understanding of the manner in which organisms are phylogenetically classified, the major modes of speciation, patterns of macroevolution and the importance of evolutionary thinking in other fields of biology (including medicine and agriculture).

Expectations of Students

In addition to completing all graded work, you are expected to:

- Attend lectures and labs.
- Arrive on time and wait until the end of lecture/lab to depart.
- Pay attention and think about the material.
- Ask questions.
- Let the professor/TA know when a concept or assignment is not clear.
- Read lab materials carefully *prior* to lab.
- Turn all work in on time
- Take all exams as scheduled.

COURSE MECHANICS

Grading

Breakdown:

Exam 1	10%	Quizzes	10%
Exam 2	10%	Lab Readings Assignments	5%
Exam 3	10%	Lab Participation	14%
Final Exam	15%	Homework	20%
		Short Essays (3)	6%
		Lab Attendance *	

*Your final course grade will be adjusted based on your lab attendance. Three unexcused absences will equal a drop of one letter grade (i.e., B becomes C). Arriving late or leaving before the lab is over will also contribute to your attendance grade. Two unexcused late arrivals and/or early departures will equal one absence (i.e., six late arrivals will result in the drop of one letter grade)

Overall course grades will be assigned on the following scale:

<u>Numerical Score</u>	<u>Grade</u>
90.0-100%	A
80.0-89.9	B
70.0-79.9	C
60.0-69.9	D
below 60	F

Blackboard Site

This course has a Blackboard site. Your grades will be recorded on this site and we encourage you to check that all grades are entered here and in agreement with those on your returned work. Copies of the course syllabus, lecture and lab schedules, old exams, and exam keys will also be posted on this site.

Exams

Exams will consist primarily of short essay questions but will also include short answer or longer essay questions and quantitative problems. They will cover lecture material, assigned readings (text and journal articles), and lab material. The final exam will be cumulative.

Quizzes

Quizzes will take place in lab and will cover material from the previous week's lectures. The purpose of the quizzes is to get you to look over your lecture notes on a regular basis and to clear up things you don't understand in a timely manner. At the beginning of each lab section, you will have a chance to ask questions about lecture material. The quiz will directly follow this question and answer period. There will be 12 quizzes during the semester. The two lowest grades will be dropped and each of the 10 remaining quizzes is worth one percentage point of your course grade for a total of 10% of your grade.

Lab Reading Assignments

For most labs you will be asked to read one or more journal articles. You will also have a short written assignment on the article(s) due at the beginning of lab. These readings will serve multiple purposes: they will provide examples of concepts/patterns we cover in lecture; they will demonstrate how evolutionary biology is practiced; sometimes they will provide background information directly relevant to the lab activity. Each assignment is worth 0.5% of your course grade. No late assignments will be accepted.

Lab Participation

You will be graded on your lab participation each week. Points for lab participation vary depending on the lab activity (see lab schedule).

Homework

Some labs will include or lead to graded homework assignments. Points for these assignments will be itemized on the lab schedule.

Short Essays

During the semester you will be asked to write 3 short essays. These will usually be a single question designed to encourage you to think about the lecture and lab material and explore concepts. You can talk to your classmates or others about these assignments but the work you turn in should be your own. This means that anything you write is written in your own words and any figures are made by you. Each of these will be worth 2% your course grade.

Course Policies

Lectures and Readings

I do not teach directly from the text and purposely use many examples that are not covered in the text. I think that you will find that attending lectures is important and hopefully also interesting. I encourage you to use the text to help solidify the topics covered in lectures and labs. If you must arrive late to a lecture please be courteous and sit towards the back of the lecture hall.

Exam Re-grades

Written requests for re-grades, justifying why the grade was incorrect, must be submitted within one week of the return of an exam.

Late Assignments

Late assignments will **not** be accepted unless the student has received written approval from the course instructor.

Students with Disabilities

Any student needing accommodation of a disability should provide me with a letter from the Office of Disability Services. The Office of Disability Services also requires students contact them at least 3 days in advance of any exam for which they need special arrangements.

UAF Student Code of Conduct

Cheating, plagiarism and fabrication of data are unacceptable practices both in this course and in science more generally. All of your work should be your own and only your own unless it is explicitly assigned and completed as a group. Cheating, plagiarism or data fabrication will result in a course grade of F and possible referral to the University Disciplinary and Honor Code Committee. Also see pp.47-48 of the 2009-2010 UAF Catalog to review the UAF Student Code of Conduct or <http://www.uaf.edu/catalog/current/academics/regs3.html>. If you have any doubt about whether a particular action constitutes cheating, plagiarism or fabrication of data, please seek clarification from your TA or the course instructor.

Class Schedule

<u>Date</u>	<u>Lecture Topic</u>	<u>Reading in <i>Evolution</i>, 2nd Ed.</u>
Sept. 8	Introduction	C1:ALL
PATTERNS OF EVOLUTION		
Sept. 10	Phylogenetics I	C2:17-22; C3:48-56
Sept.15	Phylogenetics II	C2:22-33, 37-42; C3:46-48
Sept. 17	Gene Trees & Molecular Clocks	C2:33-37; C3:67-69; C19:543-545
Sept. 22	Historical Biogeography	C6:ALL; Fig 5.17(pp 110-111); Fig. 5.31(p 127)
Sept. 24	Human Evolution	C4:88-91
Sept. 29	EXAM 1	
Oct. 1	Evidence and Inference	Box 3A(pp 50-51); C23:ALL
MICROEVOLUTIONARY PROCESSES		
Oct. 6	Characterizing Variation and Hardy-Weinberg	C9:ALL
Oct. 8	Natural Selection Overview	C12:303-325
Oct. 13	Population Genetics	C12:303-325
Oct. 15	Quantitative Genetics	C13:337-343, 345-351, 357-362
Oct. 20	More Popn and/or Quant Genetics	
Oct. 22	Adaptation and Constraint	C3:61-63; C11:279-290, 294-300; C13:362-365
Oct. 27	EXAM 2	
Oct. 29	Mutation & Gene Flow	C8:ALL; C9:244-246
Oct. 30	<i>deadline for student initiated withdrawals</i>	
Nov. 3	Genetic Drift & Small Populations	C9:225-227, 229; C10:ALL C10:272-274, 322-324, 313-315; C13:351, 362-365
Nov. 5	Integration of Evolutionary Forces	
Nov. 10	Evolution of Reproductive Systems	C15:388-393
Nov. 12	Sexual Selection	C15:397-409
Nov. 17	Levels of Selection & Kin Selection	C16:420-430
SPECIES, SPECIATION, and MACROEVOLUTION		
Nov. 19	Species Definitions	C17:ALL
Nov. 24	EXAM 3	
Nov. 26	<i>Thanksgiving Break</i>	
Dec. 1	Speciation I	C18:ALL
Dec. 3	Speciation II	C18:ALL
Dec. 8	Macroevolution & Extinction	C4:91-98; C7:ALL; C11:293; C22:ALL
Dec. 10	Micro- & Macro-Evolution	
Dec. 17	8:00-10:00	

LAB SCHEDULE

<u>Dates</u>	<u>Quiz*</u>	<u>Reading**</u>	<u>Activity</u>	<u>Points</u>	
				<u>Lab Participation</u>	<u>Homework</u>
Sept. 9-10	No	No	Introductions, lab logistics, general discussion of evolution.	0.5	--
Sept. 16-17	Yes	Phylogenetics	Toucan Phylogenetics	0.5	4
Sept. 23-24	Yes	Historical Biogeography	Historical Biogeography Exercise	2	--
Sept. 30 - Oct. 1	Yes	Human Evolution	Human Evolution Discussion	2	--
Oct. 7-8	Yes	None	Hardy-Weinberg	0.5	2
Oct. 14-15	Yes	Microevolution	Population Genetics Problem Set	0.5	4
Oct. 21-22	Yes	Natural Selection	Quantitative Genetics Problem Set	0.5	4
Oct. 28-29	Yes	None	Local Adaptation in Alaska Wolves Exercise	0.5	2
Nov. 4-5	Yes	Genetic Drift	Genetic Drift Exercise	0.5	2
Nov. 11-12	Yes	TBA	Butterfly Quantitative Genetics	0.5	2
Nov. 18-19	Yes	Evolution of Reproductive Systems	Evolution of Reproductive Systems Discussion	2	--
Nov. 25-26	No	None	NO LAB -- Thanksgiving Recess	--	--
Dec. 2-3	Yes	Speciation	Discussion	2	--
Dec. 9-10	Yes	Macroevolution	Macroevolution Discussion	2	--

* each quiz is worth 1% of your course grade. The 2 lowest quiz scores are dropped.

** the short written assignment associated with these readings are each worth 0.5% of your course grade.