

## Biology 18, Adaptation and the Organism

Spring 2009

### Professors:

Ethan J. Temeles, LSB 225, x8322, ejtemeles@amherst.edu, office hours: Tuesdays 11am-12pm, Thursdays 12-1pm, and by appointment

Jill S. Miller, LSB 224, x2168, jsmiller@amherst.edu, office hours: Tuesdays 9-10am, Thursdays 1-2pm, and by appointment

Julie A. Emerson, LSB 322, x8381, jemerson@amherst.edu, office hours: Wednesdays and Fridays 10-11am, and by appointment

Lecture: MWF 11-11:50am, Mead 115 (Stirn Auditorium)

4th hour: T 1-1:50pm, Mead 115 (Stirn Auditorium)

Laboratory: Life Sciences Building 234, TWThF 2-5pm; Note that lab will meet starting 27 January.

Lecture TAs: Gabi Barmettler (gbarmettler10@amherst.edu); Samantha Ostrowski (sostrowski10@amherst.edu)

Required readings: Sadava, et al., *Life, The Science of Biology*, 8<sup>th</sup> edition. Supplemental readings are available on the e-reserves <<https://www.amherst.edu/academiclife/departments/courses/0809S/BIOL/BIOL-18-0809S/ereserves>>

### Course requirements:

There will be four 50-minute, in-class exams (including the final exam). All exams are non-cumulative and will cover material from lectures, readings, films, and problem sets. Make-up exams will not be given unless there is a legitimate excuse, you let us know prior (the sooner the better) to the scheduled time, and have a letter from the Dean of Students. Three problem sets, designed to help you practice difficult concepts, will also be assigned. Attendance at your scheduled laboratory section is mandatory. There are several required laboratory assignments, including a practical exam. Note that most of the animal diversity labs are dissection based; please contact your lab instructor if you have any questions.

### Grades:

A total of 650 points will come from course work. Each of the four exams is worth 100 points, and the problem sets are worth 50 points total (problem sets 1 and 2 are 15 points, and problem set 3 is worth 20 points). A total of 200 points will come from lab work allocated in the following manner: goldenrod-gall report (45 points), comparative vertebrate morphology worksheet (20 points), phylogeny worksheet (15 points), microbial/fungal diversity worksheet (15 points), plant diversity essay (15 points), and one laboratory practical exam (90 points). Due dates for lab assignments are listed on the course schedule; late assignments will be penalized, with the penalty increasing each day the assignment is late. Please note that students must receive a passing grade in both the lecture and the lab portions of the course to successfully pass Biology 18.

### Intellectual responsibility:

Make certain you are aware of the Amherst College Honor Code <<https://www.amherst.edu/campuslife/deanstudents/code/code>>. Academic dishonesty will not be tolerated. Our view is that it is equally dishonest (not to mention unfair) to allow someone to copy your work, as it is to plagiarize the work of another. For your lab reports you may collaborate with other students and certainly with your lab partner, but these exchanges should be cooperative efforts. That is, your collaboration should be a matter of exchanging ideas and information with others and then writing down *in your own words* what you did, inferred, or concluded. If you do collaborate with others on assignments that are turned in individually, indicate the name of the person(s) with whom you worked. Identical sentences or paraphrased paragraphs will be taken as evidence for copying the work of others and handing it in as your own. For more information on what constitutes plagiarism, consult the following web page <<http://www.amherst.edu/~dos/plagiarism/index.html>>. Violations of the Honor Code will be reported to the Dean of Students; penalties include a failing grade for the assignment or for the course.

Wk	Date		Lecture topics		Readings/Assignments	Lab topics
1	26-Jan	M	Course Mechanics; Organismal & evolutionary biology	JSM	Chapter 1	Lab check-in & safety
	27	T	<i>History of Evolutionary thought</i>	JSM	487-8; Dobzhansky 1973	
	28	W	Systems of Inheritance I	JSM	206-22; Freeman/Herron Ch. 9;	
	30	F	Systems of inheritance II	JSM	<b>Problem set 1</b>	
2	2-Feb	M	Population genetics	JSM	489-93; <b>Problem set 2</b>	Goldenrod-Gall lab 1
	3	T	<i>Review Problem set 1; finish Population genetics</i>	JSM		
	4	W	Mechanisms of evolution I	JSM	494-507	
	6	F	Mechanisms of evolution II	JSM		
3	9	M	Evolution of sex, sex ratios	EJT	501-502	Goldenrod-Gall lab 2 (meet in Webster 102) <b>Lab report due Mon 2/23</b>
	10	T	<i>Darwin: Evolution's Voice</i>			
	11	W	Sexual selection, sexual dimorphism	EJT	498-500, 504, 508-9, 519, H&T 1989	
	13	F	Kin selection	EJT	1159-60, Freeman/Herron Ch. 12	
4	16	M	Speciation	EJT	Chapter 23.2, 23.3, 23.5	Comparative vertebrate morphology <b>Worksheet due next lab</b>
	17	T	<i>Review Problem set 2 &amp; Exam 1</i>			
	18	W	<b>EXAM 1 (10 lectures, through 2/13)</b>			
	20	F	Reconstructing evolution I	JSM	542-551; <b>Problem set 3</b>	
5	23	M	Species concepts & hybridization	JSM		Building phylogenies (meet in Webster 102) <b>Worksheet due next lab</b>
	24	T	<i>Discovering the Tree of Life; Why study the Tree of Life?</i>			
	25	W	Reconstructing evolution II	JSM	551-557	
	27	F	Tree of life and biodiversity	JSM	560-63; Nugent 2002; Doolittle 2000	
6	2-Mar	M	Microbial diversity: evolution of resistance	JSM	Chapter 26	Microbial & fungal diversity <b>Worksheet due next lab</b>
	3	T	<i>Review Problem set 3</i>	JSM		
	4	W	Fungal diversity: mutualists, pathogens, & cycling	JSM	Chapter 30	
	6	F	Parasitism: protozoans and bacteria	EJT	Chapter 26.1-26.4, 27.1-27.3	
7	9	M	Photosynthesis, energy flow, trophic structures	JSM	1185-88; 1209-10	Plant diversity & evolution <b>Essay due next lab</b>
	10	T	<i>Review for Exam 2</i>			
	11	W	<b>EXAM 2 (8 lectures, 2/16 – 3/6)</b>			
	13	F	Plant diversity: how to invade land	JSM	Chapter 28	
8	14-22		SPRING BREAK			
9	23	M	Plant diversity: reproductive innovations	JSM	Chapter 29	Worms: parasitic vs. free-living lifestyles
	24	T	<i>Review plant life cycles</i>	JSM		
	25	W	Organismal interaction	JSM	TBA	
	27	F	Predation: feeding adaptations, digestive symbionts	EJT	676-7, 1021, 1075, 1084-5	
10	30	M	Predation: antipredator adaptations, plant chemical defenses	EJT	Chapter 39.1-39.2	Mollusks
	31	T	<i>Pre-Lab Discussion of Invertebrate Organ Systems</i>	JAE		
	1-Apr	W	Competition: character displacement	EJT	498-9, 1181, 1192-3	
	3	F	Mutualism: pollination and frugivory	EJT	639-644, 1194	
11	6	M	<i>Hotel Heliconia</i>			Arthropods
	7	T	<i>TBA</i>			
	8	W	Review for Exam 3			
	10	F	<b>EXAM 3 (9 lectures, 3/9 – 4/6)</b>			
12	13	M	Reproductive adaptations	EJT	897-8, 903-5, 935-6	Vertebrate organ systems 1
	14	T	<i>Pre-Lab Discussion of Vertebrate Organ Systems</i>	JAE		
	15	W	Hermaphroditism	EJT	904, Warner 1984	
	17	F	Life Histories	EJT		
13	20	M	Senescence	EJT	Freeman/Herron Ch. 13	Vertebrate organ systems 2
	21	T	<i>TBA</i>			
	22	W	Agriculture	EJT	369-371, 836-7, 848	
	24	F	Extinction and Fragmentation	EJT	480-2. 1132, 1229-1232	
14	27	M	Invasive Species	EJT	1166-7, 1180-1, 1233-4, 1239-41	<b>Laboratory practical exam</b> <i>(covers animal diversity and organ systems)</i>
	28	T	<i>TBA</i>			
	29	W	Why care about loss of biodiversity	EJT		
	1-May	F	Angiosperm reproductive diversity	JSM	818-25; 832-35; 745-47	
15	4	M	Mutualism: hummingbirds	EJT	Temeles & Ewald 1999	Plant-pollinator coevolution
	5	T	Floral encounters of a sexual kind			
	6	W	Wrap up, Review session, Course evaluations			
	8	F	<b>EXAM 4 (10 lectures, 4/13 – 5/4)</b>			