Biol 326 **Animal Behavior** **Fall 2009**

Instructor: Steven Goldsmith; Moody Science 114 or 320A; ext. 2204 or 2342; box 61611
Office Hours: M 9:00am-10:00am, Th 3:00pm-4:30pm; Class meetings: 8:00-8:50 MWF; Lab: 1:30-4:20 M

Course content and objectives: One of the most surprising and fascinating aspects of biology is that animals behave, which is to say that they respond quickly to environmental stimuli in ways that tend to enhance their survival and reproduction. This ability is so commonplace that we humans (as animals that behave) do not usually consider the incredibly complex biochemical, physiological, neurological, and structural machinery that is necessary to accomplish behavior, nor do we usually consider the adaptive significance of behavior. One of your goals for this course is to develop an appreciation for and fascination with animal behavior. We will examine the theoretical explanations for, and qualitative and quantitative data that address animal behavior and its evolution. Students of behavior recognize that the abiotic, biotic, and social environments are the selective forces that have shaped the behavior of all animal species. You will practice asking questions about both mechanistic and evolutionary aspects of behavior, and attempt to devise ways to answer questions about animal behavior with qualitative observations or quantitative data. In this course you will also learn about field biology and natural history, because the field is where many of your important observations of animal behavior will be made, and because naturalists are "pre-adapted" to be students of animal behavior.

Sources of information: Because of the upward-spiraling and ridiculous cost of college textbooks, and because I have become increasingly dissatisfied with the textbook I have been using, I decided to not use a textbook for this course. Instead, I will put copies of two or three textbooks on reserve in Abell library. I will assign readings from the primary or secondary scientific literature, from popular literature (magazines, newspapers), and from sources of your own choosing (mostly electronic). I will ask you to come to class prepared to report to the class on what you have learned from your readings. Thus our class sessions are a crucial source of information. In addition to formal lecture material, much exchange of information will come from informal discussion of specific topics during class meetings, and from discussion of readings, videos, current events, and laboratory experiences. It behooves you to be good primates and participate in this type of communicative social interaction. Also, information about upcoming lab exercises, and about data analyses and lab reports, will be discussed during lecture sessions. The laboratory experiences, described below, are another crucial source of information.

The course web site is another important source of information. The main Animal Behavior page contains links to various ancillary pages, including course policies, laboratory information (with lab handouts), lecture topics (with powerpoints), information about the individual research project, readings and assignments, and other sites of interest to students of animal behavior. I will add additional information and links as the semester progresses. The web site is at http://artemis.austincollege.edu/acad/bio/sgoldsmith/behavior2.html

Examinations: There will be four written exams. The first three are scheduled for **Friday, 25 September**, **Monday, 19 October**, and **Monday, 9 November**. The second and third exams are not cumulative, but I expect you to remember concepts from earlier in the course and to be able to apply them to later material; inability to do so will affect your grade on later exams. The final is partially comprehensive and is scheduled for **3:00 - 5:00 pm on Thursday, 10 December**. The exams will be designed to test simultaneously your knowledge of factual information and your understanding of concepts. The exams will consist of short answer essay questions (about a paragraph in length, for instance explanations of vocabulary or descriptions of processes), and of longer essays (two to four paragraphs in length, for instance applications of behavioral and evolutionary theory to a specific ecological situation, or comparisons of explanatory models). In some cases you will read a paragraph or two that describes behavioral and ecological phenomena, and then answer questions about those phenomena. I might present a data set and ask you to interpret it. I also try to give you choices among at least some of the questions, so that you have more flexibility during the exams.

Exam policies: If you have a conflict with a scheduled exam, please see me before the exam is given; I am usually willing to be flexible within reasonable limits. If you must miss an exam for reasons that are beyond your control (serious illness or injury, emergency within your nuclear family), please contact me **before** the exam is administered (if possible) to discuss options. If you cannot contact me before an exam is administered, contact me as soon as possible afterward – do not let me think you have missed an exam for no good reason. Exams missed for no good reason cannot be made up. Good reasons do not include oversleeping, being unprepared, staying up all night and being exhausted, or any transportation issue.

Attendance policy: I expect you to attend each class meeting, in spite of the fact that they are at 8:00 am. This is for your own benefit; class attendance is an important determinant of overall performance. **I reserve the right to drop students from this course for excessive absences;** I consider more than three absences for which you do not have a reasonable excuse to be excessive. If you miss class and think you have a reasonable excuse, please tell me what it is. The attendance policy for the laboratory is described below.

Academic Integrity: I expect you to read, understand, and abide by the Austin College Academic Integrity Policy as published in the student handbook *Environment*. Many conceptual advances in science are a result of discussion of information and ideas; I encourage such exchange both in class and outside it. Learning about and doing science should be cooperative and not competitive enterprises; you should give credit for ideas or for inspiration where such credit is due. **I expect your own work on all examinations, lab reports, and other written work.** Various forms of cheating, plagiarism, use of downloaded material from the internet, changing answers on exams after they have been graded, and inappropriate "cahooting" on written assignments will not be tolerated, and will result in (at the least) a score of 0 on the exam or assignment in question. Serious or repeated (e.g. twice) violations of academic integrity will result in failure of the course.

Written work: Lab reports and project manuscripts are due electronically, as email attachments of MS Word documents or PDFs (no WordPerfect or TextEdit documents), by 5:00 pm on the due date. Late lab reports and project manuscripts will be penalized 20% of the possible points per day late (including weekend days).

Grading summary:

Midterm exams (80 points each):	240 points
Final exam	90 points
Independent research project	60 points
Laboratory reports (see below)	150 points
Total	540 points

At the end of the course each student will have amassed a proportion of the total points possible. Any adjustments in scores are made at that time; I do not curve individual exams. The proportions will be converted into final letter grades according to the following scheme:

100% - 92.5% = A	87.49% - 82.5% = B	77.49% - 72.5% = C	67.49% - 62.5% = D
92.49% - 90.0% = A-	82.49% - 80.0% = B-	72.49% - 70.0% = C-	62.49% - 60.0% = D-
89.99% - 87.5% = B+	79.99% - 77.5% = C+	69.99% - 67.5% = D+	59.99% - 0% = F

Students taking this course S/D/U must make a grade of at least 70% on each graded assignment to make an S in the course. A course average or any individual piece of graded work with a grade less than 70% but 60% or above will result in a course grade of D. A course average or any individual piece of graded work with a grade less than 60% will result in a course grade of U.

The Austin College bulletin describes grade assignments as follows:

A – Unusual and superior achievement
B – Intelligent, articulate achievement, above-average in fulfilling course requirements
C – Passing work, representing graduation average
D – Passing work below the standard required for graduation
F – Failure without privilege of re-examination

Assignment of letter grades in this course will adhere to these standards.

Laboratory: The laboratory involves a variety of activities that are designed to acquaint you with more practical aspects of the study of animal behavior. The main activity will be a series of field trips, whose purpose will be to make qualitative observations and collect quantitative data on the behavior and ecology of a variety of animal species. The standard operating procedure for field labs will be for us to meet very briefly in MS 323 to collect our gear for the day, then to meet at the vehicle in the parking lot north of Baker Hall. Some labs will be indoors, and will be held in MS 323, unless otherwise noted. We will devote some time in either lecture or laboratory to analysis and interpretation of the data that we collect. You will write a brief report on the theory and questions addressed, the methods used, the results generated, and conclusions drawn, for five of the lab exercises (worth 30 points each).

Laboratory Attendance: It is imperative that all of you participate in all laboratory activities – the laboratories are as important if not more so than the lectures. If you must miss a lab for a valid and foreseeable reason (i.e. conflicting school-related activities, not family-related travel) you must notify me **in advance** of such conflicts, and you are required to write a 3 page summary (double spaced, in 10 or 12 point font, with margins of 2.5 cm) of the concepts and data that were the subject of that day's lab exercise; this summary will NOT substitute for a lab report on a data set that you participate in collecting and analyzing. If you miss a lab for a documented valid reason that is beyond your control (serious illness or injury, emergency in your nuclear family), you must notify me as soon as possible of the situation, and you are required to write a 3 page summary (double spaced, in 10 or 12 point font, with margins of 2.5 cm) of the concepts and data that were the subject of that day's lab exercise; this summary will NOT substitute for a lab report on a data set that you participate in collecting and analyzing.

I do not expect any unexcused (e.g. without valid reasons) absences from lab, but if this situation arises, **the first unexcused absence from lab will result in a penalty equal to the value of one lab report** (30 points), which will be deducted from your final course point total. A second unexcused absence from lab will result in your immediate dismissal from the course. Missing a lab because you overslept, your car wouldn't start, you got stuck in traffic, or other instances of poor planning do not constitute valid reasons. I drive away from the Baker Hall parking lot at 1:30 sharp, and if you are not in the van, you have missed lab. A missed lab for an ostensibly valid reason for which you do not produce a summary (see above) will result in a 30 point penalty; a second such missed lab without summary will result in your immediate dismissal from the course.

Lab reports: The format of the lab reports is described on a separate handout. The brief version is that the lab reports will begin with a brief but informative title, your name, the date of submission, and your campus box number. After that comes the body of the text, which will be an Introduction, a Methods section, the Results, and a Discussion. I will provide input and guidance on what goes into the lab reports; there will be more guidance earlier in the semester than later.

The laboratory activities will not follow the lectures very closely, partly because it is difficult to demonstrate all of the behaviors that we will discuss in lecture, and partly because of constraints on availability of animals to study in the field. Because of this discrepancy, each week I will distribute a description of the laboratory activity for the following week. In some cases, our laboratory activities may be spontaneous, because we find something interesting happening in the field. In these cases we must be prepared to alter our planned activity to fit a new situation (adaptive modification of behavior). Each of you may have ideas about what we should do and how we should do it - I am always open to constructive criticism of my methods and ideas. You should voice your questions and opinions freely.

My plan for our first lab is to begin to develop our skills as observers of animal behavior. This will entail a variety of activities, including such simple things as using binoculars, estimating distances between objects, counting numbers of individuals, and learning about habitat characteristics. We will also practice describing behavioral states, events, and bouts, and learn what to look for while observing behavior. We will practice using two or three different sampling techniques to generate our observations. Our second lab will be a more rigorous set of qualitative and quantitative observations in which we compare microhabitat preferences of a group of phylogenetically closely related species. After that we have a series of lab exercises that examine in some detail a variety of aspects of behavior; what we actually end up doing depends in part on what the local animal species are doing.

Individual Research Project: Each student will design, execute, describe in a manuscript, and present to the class an individual research project. My expectation for these projects is that you formulate a simple, straightforward question (or small set of questions) that can be answered by making qualitative observations or collecting quantitative data. Your project may be observational or experimental, laboratory or field, or some combination of these methods. In general, the individual research project will generate a quantitative data set and a statistical analysis that results in conclusions about a specific question or hypothesis.

Various aspects of the individual research project are described in detail in a series of documents that are linked to the course web page. These documents include a description of the project and manuscript, advice on choosing a topic and executing the project, and advice on the oral presentation. I can provide hard copies of these documents for anyone who needs them.

Biol 326	**Animal Behavior**	**Fall 2009**
Date	Lecture Topic	Assignments
Wed 2 Sept	Introduction; Methods, theoretical and practical	Darwin 1859; Ch. 4
Fri 4 Sept	Historical development of the science of animal behavior	1973 NP P&M
Mon 7 Sept	Methods continued	Anthropomorphism
Wed 9 Sept	Methods continued	variables
Fri 11 Sept	Genetics, heredity, and behavior	family history
Mon 14 Sept	Genetics, heredity, and behavior	
Wed 16 Sept	Basics of vertebrate neurobiology	genetic diseases
Fri 18 Sept	Biological rhythms and biological clocks	an example…
Mon 21 Sept	Biological rhythms and biological clocks	
Wed 23 Sept	Orientation, navigation, and migration	Phillips et al
Fri 25 Sept	**Exam 1** (covers material through 21 Sept)	
Mon 28 Sept	Orientation, navigation, and migration	
Wed 30 Sept	Orientation, navigation, and migration	
Fri 2 Oct	Foraging behavior, population dynamics, and optimality	
Mon 5 Oct	Foraging behavior, population dynamics, and optimality **Individual project proposals due by 5:00 pm**	project proposal
Wed 7 Oct	Foraging behavior, population dynamics, and optimality	
Fri 9 Oct	**Fall Break**	
Mon 12 Oct	Communication	what is…
Wed 14 Oct	Communication	functions…
Fri 16 Oct	Sexual selection, anisogamy, parental investment	a m/p/b difference
Mon 19 Oct	Sexual selection, anisogamy, parental investment **(Exam 2 in lab today)**	
Wed 21 Oct	The evolution of sex	the essence…
Fri 23 Oct	Reproductive competition, mate choice, and mate acquisition	
Mon 26 Oct	Reproductive competition, mate choice, and mate acquisition	
Wed 28 Oct	Mating systems	
Fri 30 Oct	Mating systems	
Mon 2 Nov	Human reproductive behavior and mating systems	Buss
Wed 4 Nov	Human reproductive behavior and mating systems	
Fri 6 Nov	Costs and benefits of living in groups; indirect selection	
Mon 9 Nov	Colonial and communal breeding (**Exam 3 in lab today**)	Cliff Swallows
Wed 11 Nov	Colonial and communal breeding	Scrub Jays
Fri 13 Nov	Sociality and interactions within social groups	family trees
Mon 16 Nov	Human social behavior	
Wed 18 Nov	Human social behavior	
Fri 20 Nov	Human social behavior	
Mon 23 Nov	Eusociality **(Research project data sets due)**	
Wed 25 Nov	Eusociality in Hymenoptera	honeybees

Mon 30 Nov	Eusociality in Hymenoptera; **Research project presentations in lab today**	
Wed 2 Dec	Eusociality in other animals	NMRs
Fri 4 Dec	Eusociality in other animals	
Mon 7 Dec	Review; **Research project presentations in lab today** *****Research project manuscripts due*****	

FINAL EXAM: Thursday, 10 Dec, 3:00-5:00 pm (covers material from 6 Nov through 4 Dec, and is partially comprehensive)

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	Tentative Laboratory Schedule	
Mon 7 Sept	Behavior sampling techniques – Hagerman National Wildlife Refuge	
Mon 14 Sept	Observing the behavior and ecology of birds in the field – Hagerman NWR	
Mon 21 Sept	Basics of Vertebrate Neurobiology	
Mon 28 Sept	Pollinator behavior and ecology – Sneed Environmental Research Area	
Mon 5 Oct	Seed-harvester ant foraging behavior – Sneed Environmental Research Area	
Mon 12 Oct	Human personal space – AC Campus (Process ants from previous week's lab)	
Mon 19 Oct	EXAM 2 (covers material from 21 Sept through 14 Oct)	
Mon 26 Oct	Small mammal behavior and ecology – Sneed ERA	
Mon 2 Nov	Human mate preference – AC Campus	
Mon 9 Nov	EXAM 3 (covers material from 16 Oct through 4 Nov)	
Mon 16 Nov	Waterfowl visual and vocal displays – Hagerman NWR	
Mon 23 Nov	Free day for data analysis and writing individual project manuscripts	
Mon 30 Nov	Individual research project oral reports	
Mon 7 Dec	Individual research project oral reports	

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