

Bio 130: Animal Behavior

I. Instructor:

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IV. The Course:

Why does an animal perform a given behavior? In this course, we will explore the many approaches used to answer this question. You will learn a logical framework within which all aspects of animal behavior can be examined. Because this course has the potential to change the way you look at nature, I hope you find it to be one of the most important classes of your academic career. The course is designed for undergraduate and graduate students who want to better understand the evolution, adaptive significance, and mechanisms of animal behavior.

V. Prerequisites: Bio 13, Bio 14, or permission of the instructor.

VI. Attendance:

Class attendance is *critical* to your success in this course. Please arrive on time and prepared. Read over each assignment carefully and note any questions you may have about the material. I encourage class participation and look forward to your questions. If you need to miss a class for a college-accepted reason, speak to me about it in advance.

No makeup exams will be scheduled without an official written excuse, signed by the appropriate authority (coach, Dean, doctor, etc.). All excuses, except those related to illness, must be presented at least 1 week *prior* to the scheduled exam. All make-up exams must be taken as soon as possible, and the level of difficulty for these exams will reflect the additional time allocated for studying.

All electronic equipment (e.g., cellular phones, etc.) must be turned to silent during class.

VII. Readings:

Textbook: Alcock, J. (2009). *Animal behavior: An evolutionary approach*, 9th Edition. Sinauer Associates, Inc., Southerland, Mass.

Additional Readings: Additional readings will be available on the course web site.

VIII. Grading:

3 Exams (25, 30, & 35%, respectively): Format -- T/F, multiple choice, and short answer.

3 Written assignments (3.3% each): 2 T/F, 2 multiple choice, and 1 short answer questions **with well-reasoned answers** (5 total questions per assignment). These assignments must be completed on the provided template and emailed to the teaching assistants 1 week prior to the exam (Friday by 5PM). I **WILL** use some of the best questions on the exam. Assignments will be graded as complete, incomplete, and not submitted; you will not receive comments on these assignments.

This class will have 29 lectures and 8 in-class movies. Movies are designed to emphasize lecture material and bring the subject 'to life'. This course will have 3 50-min exams. Exam 1 will cover **weeks 1-4**, Exam 2 will cover **weeks 5-9**, and Exam 3 will cover **weeks 11-15**. (Week 10 is spring break.) There will be no traditional final exam. All exams will occur during class periods. Exams taken in pencil will not be eligible for re-grades.

IX. Course Homepage:

The course has a web page on which all relevant information can be found (<http://trunk.tufts.edu/>). The staff will hold virtual review sessions on-line via the discussion board prior to each exam.

X. Lecture Schedule:

Week	Day	Topic	Readings
<i>Background Information</i>			
1	Th (01/19)	<u>Introduction</u> : Course Overview; Course Goals; History of Animal Behavior	
	F (01/20)	<u>Background Information (1)</u> : Evolution & Natural Selection; Fitness & Adaptation; Levels & Units of Selection.	Chapter 1; Reading (1)
2	Tu (01/24)	<u>Background Information (2)</u> : Scientific Method; Levels of Analysis.	Chapter 2; Reading (8)
	Th (01/26)	<u>Movie</u> : Evolution – <i>Great Transformations</i>	
<i>Proximate Causes of Behavior</i>			
	F (01/27)	<u>Behavioral Genetics (1)</u> : Nature vs. Nurture; Reaction Norms; Relationship Between Genes and Behavior	Chapter 3
3	Tu (01/31)	<u>Behavioral Genetics (2)</u> : Experimental Methods and Results; Evolution of Behavior	Chapter 3
	Th (02/02)	<u>Ontogeny of Behavior</u> : Development of behavior in honey bees; Critical Periods; Learning; Bird Song; Evolution of Behavioral Plasticity.	Chapter 3
	F (02/03)	<u>Movie</u> : Trials of Life – <i>Growing Up</i>	
4	Tu (02/07)	<u>Hormones</u> : The Endocrine System; Hormonal Influences; Methods of Studying Hormone-Behavior Systems; Organizational and Activational Effects; Sex Differences and Sexual Behavior	Chapter 5
<i>Ultimate Causes of Behavior (focus on individuals)</i>			
	Th (02/09)	<u>Habitat Selection</u> : Natal Philopatry and Dispersal; Territoriality	Chapter 8
	F (02/10)	<u>Orientation & Migration</u> : Definitions; Short and Long Distance Migration; Cues (<i>NT</i>)	Chapter 8
5	Tu (02/14)	<u>Movie</u> : Trials of Life – <i>Finding the Way</i>	
	Th (02/16)	<u>Anti-Predator Behavior</u> : Crypsis & Mimicry; Polymorphism; Deception Mechanisms; Fighting; Vigilance; Communal Defense	Chapter 6

	F (02/17)	Exam 1 (Weeks 1-4 plus 2/16)	
6	Tu (02/21)	<u>Foraging</u> : Feeding Behavior; Optimality Models; Optimal Foraging	Chapter 7
	Th (02/23)	<u>No Class</u> : Tufts Monday	
	F (02/24)	<u>Sex</u> : The Evolution of Sex	Reading (7)
7	Tu (02/28)	<u>Movie</u> : Evolution – <i>Why Sex</i>	
	Th (03/01)	<u>Sexual Selection (1)</u> : Alternative Phenotypes	Reading (3)
	F (03/02)	<u>Sexual Selection (2)</u> : Intrasexual Competition	Chapter 10
8	Tu (03/06)	<u>Sexual Selection (3)</u> : Intersexual Competition; Mate Choice; Cryptic Mate Choice	Chapter 10
	Th (03/08)	<u>Movie</u> : Trials of Life – <i>Courting</i>	
	F (03/09)	<u>Mating Systems</u> : Classifications; Evolution of Mating Systems; Mating Systems and Their Ecological Correlates	Chapter 11
9	Tu (03/13)	<u>Parental Care</u> : Parental Care; Conflicts of Interest; Evolution of Favoritism	Chapter 12
Ultimate Causes of Behavior (focus on group living animals)			
	Th (03/15)	<u>Group Living</u> : Costs and Benefits; Dominance; Territoriality	Chapter 13
	F (03/16)	<u>Movie</u> : Trials of Life – <i>Living Together</i>	
10 Spring Break (03/17-03/25)			
11	Tu (03/27)	<u>Cooperation & Altruism</u> : Kinship and Reciprocity; Kin Selection	Chapter 13
	Th (03/29)	<u>Kin Recognition</u> : Mechanism; Example, The Recognition System of Paper Wasps	Readings (5 & 9)
	F (03/30)	Exam 2: (Weeks 5-9)	
12	Tu (04/03)	<u>Communication (1)</u> : Definition; Channels; Functions; Signals vs. Cues	Chapter 9
	Th (04/05)	<u>Communication (2)</u> : Principals of Communication; Evolution of Honesty	Chapter 9
	F (04/06)	<u>Eusociality</u> : The Evolution of Eusociality; Reproductive Skew Models	Chapter 13, Reading (6)
13	Tu (04/10)	<u>Cooperation & Conflict</u> : Game Theory	Chapter 13
	Th (04/12)	<u>Animal Cognition</u> : Animal Minds (BS)	

	F (04/13)	<u>Movie</u> : Triumph of Life – <i>Brain Power</i>	Reading (4)
<i>Ultimate Causes of Behavior (focus on humans)</i>			
14	Tu (04/17)	<u>Darwinian Medicine (1)</u> : Definition; Applications	Reading (2)
	Th (04/19)	<u>Darwinian Medicine (2)</u> : Examples	
	F (04/20)	<u>Human Sociobiology (1)</u> : Adaptationist Approach; Mating Systems	Chapter 14
15	Tu (04/24)	<u>Human Sociobiology (2)</u> : Examples	
	Th (04/26)	<u>Movie</u> : Evolution – <i>The Mind’s Big Bang</i>	
	F (04/27)	<i>Exam 3: (Weeks 11-15)</i>	

X. Additional References:

1. Dawkins R. (1982) Replicators and vehicles. pp. 45-64 in *Current problems in sociobiology*, (Kings College Sociobiology Group, ed.). Cambridge Univ. Press
2. Eskenazi BE, Wilson-Rich NS & Starks, PT. (2007) A Darwinian Approach to Huntington’s Disease: Subtle Health Benefits of a Neurological Disorder. *Journal of Medical Hypotheses* 69: 1183-1189
3. Gross MR. (1996) Alternative reproductive strategies and tactics: diversity within sexes. *Trends Ecol & Evol.* 11: 92-98.
4. Neese RM & Williams GC. (1994) Signs and symptoms of infectious diseases. In *Why we get sick*. Random House, New York.
5. Pfennig DW & Sherman PW. (1995) Kin recognition. *Scientific American.* 272: 67-73.
6. Reeve HK, Starks PT, Peters JM & Nonacs P. (2000) Genetic support for the evolutionary theory of reproductive transactions in social wasps. *Proceedings of the Royal Society of London, Series B.* 267:75-79.
7. Ridley M. (1993) The Enigma. In *The red queen*. Macmillan, New York.
8. Sherman PW. (1988) The levels of analysis. *Anim. Behav.* 36: 616-619.
9. Liebert AE & Starks PT (2004) The action component of recognition systems: a focus on the response. *Annales Zoologici Fennici.* 41: 747-764.

Course # _____ Course Title _____

Instructor _____

This course fulfills the following expectations for educational outcomes for biology majors

1. Core Competencies

Be able to generate and to analyze data, to organize it for presentation, and to draw appropriate conclusions based on trends and/or supported by statistics, and to formulate new questions based on findings

Be able to find and understand primary literature pertinent to a given topic in biological sciences, to examine and interpret data presented in figures and tables, and to evaluate conclusions based on the data presented

Be able to understand techniques and methods described in current literature, or to investigate such methods through scholarly publications

Be able to perform standard laboratory techniques accurately and safely

Be able to access and utilize pertinent large databases

Be able to report experimental results in a standard written format and to write coherently and persuasively about conclusions from such results and their significance

Be able to communicate scientific results verbally, and to support their significance and relation to the current framework of understanding

Understand how to pursue scientific inquiry through formulating hypotheses, designing controlled experiments or studies, gathering or generating data, and analyzing and evaluating results

Be able to make connections between concepts in biology and the foundations of physical sciences and computational methods

Be mindful of ethical considerations and societal outcomes in research and in technological advancement

2. Knowledge base

An understanding of the major paradigms in biology, including evolution, cell theory, genetic inheritance, the central dogma, integration of living systems, and energy flow through ecosystems

An understanding of the relationship between genotype and phenotype

An understanding of the information flow between DNA, RNA, and proteins, and a basic knowledge of the processes that govern cellular function and division.

Familiarity with the processes through which evolution occurs, and an understanding that selection acts on multiple stages in the life cycle

An understanding of the dynamic nature of organismal development from inception through growth and differentiation, aging and death

Appreciation of the morphological, physiological, ecological, and behavioral diversity of life, and the importance of that diversity

Recognition that biological processes are based on chemical and physical principles, and that biology informs medicine, community health, food production, and environmental policy