Behavioral Ecology BZ 535

Course Description and Objective: Evolutionary & theoretical perspectives in animal behavior using examples from model empirical systems; emphasis on decision rules and social behavior. Behavioral Ecology concerns the adaptive value of behavior - how behavior contributes to survival and reproductive success in the context of an organism’s ecology. The objective of this course is to learn the theory underlying the subject, the way in which these theories are tested and become acquainted with classic and contemporary research in the field. The main goal is to develop your ability to critically analyze the current behavioral thinking and to engage in scientific debate. In this class, we do not focus on any specific animal group and its behavior. Instead, we take a behavioral principle and look at it using examples from one or multiple groups that are appropriate models for the idea. In other words, we take a question-based approach and not an animal-based approach. The class assumes a basic knowledge of ecology, evolution and quantitative skills. I will present each topic with an introductory lecture and then we will read and discuss some primary literature that directly deals with the idea.

Instructor: Dhruba Naug (Biology 336, email: Canvas, Phone: 491 2651)

Meeting Time and Place: 0930-1045 TR, Yates 306

Office Hours: By appointment

Reading: For reviewing the broad ideas, you can refer to “An introduction to Behavioural Ecology” (4th edition) by Davis, Krebs, and West. However, we will also go over topics not covered in this book and we will rely a lot on primary literature (made available on Canvas). We will read at least 1 paper each week and you must read the paper before coming to the class to have a productive discussion.

Points, Grading and Evaluation format:
8 homeworks x 5 points = 40 points (08/30, 09/13, 09/27, 10/11, 10/25 11/8, 11/15, 11/29)
Final exam = 40 points (8-10 questions) Dec. 13, 6:20-8:20p
Presentation = 10 points
Participation = 10 points
Total= 100 points
A - 90-100%, B - 80-89%, C – 70-79%, F – below 60%. If the situation demands, + or – might be added to the letter grades at the end of the semester.

Homework (Numerical problems, paper summaries, sample questions):
Numerical problems will require knowledge of basic math and calculations using standard software. The 300 word paper summaries/critiques will be graded upon your ability to discuss the broad topic the paper addresses, the specifics of the study in terms of its methods, results and interpretation, and your own take on how well the study meets its goal in contributing to the broad topic in question. The sample questions are meant to give you a feel for the final exam and you should treat them as mini take-home exams. You have to demonstrate your understanding of the general topic and good writing skills for all homeworks. The writing should be scientifically literate, concise and articulate the major points well. The homeworks will be extensively discussed in the class before submission. I will allow re-dos of the homeworks if necessary, in which case your final score on the assignment will be an average of your first and second scores. The re-dos are meant to show what is being expected of you and so that we are the same page by the time of the final exam. There are no partial points, if your answer fails to address the main
point or gets it wrong, you will score a zero on that question. Writing tips and examples of good writings are available on Canvas.

Some general guidelines about how to answer a question:
1. When you're writing a response, it should be specific to the information you're being given/shown. Don't bring in extraneous stuff or write everything you know about the topic.

2. You need to bring in specific ideas in behavioral ecology rather than being overly general, you're talking to another behavioral ecologist, not to the general public. You're writing should demonstrate that you're aware of some of the key ideas in behavioral ecology. Using subject specific jargon (and then explaining them) says a lot about your awareness rather than saying something general and beating around the bush. Reading the papers is one way you should develop the skill for how you write about key concepts.

3. Don't describe a graph, interpret it. This means talking about the general pattern and the broad idea it's showing, not what happens at each point on the x- or y-axis (unless it's super-relevant to a big point).

**Homework is due within 1 week of being assigned. Late or over-the-word-limit submissions will not be graded.**

The final exam will focus on your ability to analyze and interpret a set of data or observations, your quantitative skills and your writing skills.

**Presentation**
You will pick one of the papers assigned for the class at least 1 week in advance of your presentation date. If you want to select a paper by yourself, it has to be approved by me. The presentations will span a maximum of 20 minutes (15 minutes + 5 minutes for discussion).

**Tentative Course Topics & Weekly Schedule**

**Week 1-2: The Behavioral Ecology Approach**
History, Selection & Fitness, Plasticity, Research Methods, Adaptation, Phenotypic Gambit, Model Systems, Unification and Pluralism.

**Week 2-3: Economics and Decision Making**
Costs and Benefits, Tradeoffs, Optimality, Currency, Information and Sampling, Choice Rules, Foraging Theory, Risk, Cognition, Social learning

**Week 4: Competition**
Game Theory, Ideal Free Distribution and its variants, Resource Defence, Producers and Scroungers, Alternative Mating Strategies, Animal Personalities

**Week 5: Group Living**
Costs and Benefits, Per Capita Benefits, Central Limit Theorem, Group Size and Skew, Self-Organization, Group Decision Making
Week 6-9 Social Behavior
Altruism, Kin Selection and Inclusive Fitness, Hamilton’s Rule, Kin Recognition and Kin Discrimination, Spite, Cooperation, Types of Benefits, Reciprocity, Enforcement, Manipulation, Eusociality, Haplodiploidy, Conflicts over Sex Ratios, Enforcement and Policing.

Week 10-12: Sexual Selection, Sexual Conflict, Parental Care, Sex Allocation
Parental Investment and Sexual Competition, Female Choice, Sperm Competition, Extra-Pair Matings, Parental Care, Parental Investment, Sibling Rivalry, Fisher’s Theory

Week 13: Evolutionary Arms Races
Red Queen, Crypticity, Aposematism, Mimicry

Week 14: Communication and Signals
Signals and Cues, Ecological Constraints, Evolution of a Signal, Reliability, Handicaps, Honesty and Deception, Neural Networks and Sensory Bias, Language

Week 15: Summing Up
Behavioral Ecology and Conservation, Human Behavioral Ecology