



## **MSCI-372P, Behavioral Ecology**

Department of Mathematics and Science, School of Liberal Arts and Sciences

### **Course Description:**

Behavioral ecologists look at the responses of animals to their environment from an evolutionary perspective: they ask the questions “how did this behavior evolve?” and “how does this behavior contribute to survival and reproduction?”. In this course we will consider a wide variety of behaviors (group formation & social behavior, predator-prey interactions, foraging decisions, mate choice, parental care, life history strategies, territoriality, altruism) as the product of evolution. After becoming familiar with the methods and techniques of behavioral ecology, students will complete their own scientific and creative inquiry into animal behavior.

Upon completion, this course is worth three (3) credits.

**Meeting Time:** Tuesdays, 9:30 am to 12:20 pm, Engineering 274

**Instructor:** Dr. Christopher Jensen  
Assistant Professor, Department of Math and Science  
*Office:* ARC Lower Level, Room G-49  
*Email:* [cjensen@pratt.edu](mailto:cjensen@pratt.edu)  
*Phone:* 718-636-3572, x3572 from the BK campus

**Office Hours:** Mondays 12:30 to 2:30 pm, Tuesdays 12:30 to 1:30 pm *or by appointment*

### **Course Goals:**

- To appreciate the interplay of genes, the developmental process, the nervous system, and the environment that produces behaviors.
- To understand animal behaviors as adaptations that maximize the probability that an individual will survive and reproduce.
- To apply Tinbergen’s “four questions” to a variety of different behaviors.
- To discover the role that behavioral flexibility plays in maximizing individual fitness.
- To investigate hypothesis testing and experimental design in behavioral ecology.
- To use our understanding of behavioral ecology to answer new questions.

**Learning Objectives:** Successful completion of *Behavioral Ecology* will allow you to...

- Form hypotheses about how and why organisms display particular behaviors.
- Assess the influence of genetics and environment in the development and expression of behavior.
- Make predictions about behavior based on information about an individual’s environment.
- Depict the sensory world of a particular animal and explain how that sensory world shapes its behavior.
- Connect the outcomes of particular behaviors with survival and reproduction.
- Use the findings of behavioral ecology to better understand patterns of human behavior.
- Describe the experimental approaches and techniques used to study behavior.
- Ask a behavioral ecology question and answer that question by designing and performing a controlled experiment.

## Assessment Criteria:

Below is a summary of how you will be graded in this course. All grades will be posted on the *LMS*, so please take advantage of the fact that you can always know how you are doing in the course.

| Contribution to Grade | Category                | Description   |
|-----------------------|-------------------------|---|
| <b>10%</b>            | <i>Reading Response</i> | During each week of class that we have assigned readings, I will post a series of questions on the <i>LMS</i> . These questions will help guide your reading and get you thinking about key issues that will be discussed in class. To receive credit, you must provide answers by 10:00 pm on the day before class. Unlike other assignments, no late reading responses will be accepted.                          |
| <b>10%</b>            | <i>Participation</i>    | We'll be discussing course readings in light of our own particular concerns. I'll have questions for you; I will expect you to have questions for me. Come to class having read and thought about assigned readings, ready to actively engage in dialogue. To receive participation credit you need to present in class; to receive full participation credit you need to be actively engaged in class discussions. |
| <b>10%</b>            | <i>Assignments</i>      | You will complete assignments during class and as homework. Some of these assignments will be done individually, others will require group cooperation. I will be grading each assignment based on its clarity of thought, level of insight, and contribution to class dialogue.  |
| <b>50%</b>            | <i>Research Project</i> | The major focus of this class is the completion of a scientific research project in the field of behavioral ecology. Each student will identify a question, plan and execute an experiment to test that question, and present the results of that experiment to the class. Two separate weeks have been set aside to help students prepare and analyze their experiments.   |
| <b>20%</b>            | <i>Final Exam</i>       | This class ends with a cumulative final. The final will be in an "open notes/open book" format and will focus on broad concepts of behavioral ecology rather than the memorization of biological facts. Sample questions will be provided at the end of the semester.   |



***Under no circumstances will personalized extra-credit work be provided for students who have missed classes or failed to submit work on time***



### ***Lateness and Absence:***

*Of Students:* I expect you to arrive to class on time. Lateness and absence can adversely affect your participation and assignments grades.

*Of Assignments:* Late assignments will be penalized by 10% per day. Reading responses cannot be submitted for credit after the stated deadline.

*Excuses:* There are very few legitimate reasons to miss all or part of a class session or for submitting assignments after the stated deadlines. In order for an absence or lateness to be excused, you must provide formal documentation stating which classes/deadlines were affected and explaining the reason behind the absence; all documentation will be subject to strict verification. Valid excuses include family emergencies and chronic personal health issues. The following reasons do not excuse lateness or absence: routine (i.e. non-chronic) illness, oversleeping, excessive work load in other classes, inability to use the *Learning Management System*, or "forgetting".

## Weekly Units:

| Week | Date       | Major Topic(s)                                | Key Questions  | Readings  |
|------|------------|---|--|---|
| 1    | Aug. 29th  | <b>Introduction to Behavioral Ecology</b>     | <p>What is behavior?</p> <p>What kinds of questions do behavioral ecologists ask?</p> <p>How are experiments used to answer questions about behavior?</p> <p>Why study behavioral ecology?</p>   | Chapter 1 of <b>Essential Animal Behavior</b>   |
|      | Sept. 5th  | <b>No Class, Labor Day</b>                    |  |   |
| 2    | Sept. 12th | <b>The Nervous System</b>                     | <p>How does the nervous system act to control behavior?</p> <p>What are some ways that the nervous system can provide information about the environment?</p> <p>How does the interaction between the nervous system and environmental cues produce behavior?</p> | Chapter 2 of <b>Essential Animal Behavior</b><br><i>Radiolab</i> "Animal Minds"<br><i>Scientific American Mind</i> "One World, Many Minds"<br>ONE CHOICE READING (see the LMS)  |
| 3    | Sept. 19th | <b>Behavioral Motivation and Organization</b> | <p>What factors motivate behavior?</p> <p>How do biological clocks act to organize behavior?</p> <p>How do environmental cues affect the organization of behavior?</p>   | Chapter 3 of <b>Essential Animal Behavior</b><br><i>Scientific American Mind</i> "Do Animals Have Feelings?"<br><i>Science</i> "Migrating Songbirds Recalibrate Their Magnetic Compass Daily from Twilight Cues"                |
| 4    | Sept. 26th | <b>The Development of Behavior</b>            | <p>What role do genes play in determining behavior?</p> <p>How do internal and external environments interact with genes to create behavior?</p> <p>How are innate and learned behaviors different?</p>  | Chapter 4 of <b>Essential Animal Behavior</b><br><i>Scientific American Mind</i> "A Revealing Reflection" & "Programmed for Speech"   |
| 5    | Oct. 3rd   | <b>Communication and Social Behavior</b>      | <p>How do animals share information?</p> <p>What determines the kind of communication that can occur between individuals?</p> <p>How does communication increase fitness?</p>  | Chapter 5 of <b>Essential Animal Behavior</b><br><i>Behavioral Ecology</i> "Quorum sensing... in the ant..."<br><i>National Geographic</i> "Family Ties: The Elephants of Samburu"<br><i>PLoS Biology</i> "Wild Baboon Culture" |
| 6    | Oct. 10th  | <b>Foraging Behavior</b>                      | <p>What decisions do foraging animals make?</p> <p>How do foraging animals maximize their food intake while minimizing other risks and costs?</p> <p>How are models used to predict foraging behavior?</p>   | Chapter 6 of <b>Essential Animal Behavior</b><br><i>Biology Letters</i> "Performance of Human Groups in Social Foraging"  |

| Week | Date      | Major Topic(s)                        | Key Questions   | Readings  |
|------|-----------|---------------------------------------|---|---|
| 7    | Oct. 17th | <b>Predator-Prey Behaviors</b>        | <p>What behaviors help prey avoid being predated?</p> <p>What behaviors help predators catch prey?</p> <p>How have prey and predator behaviors interacted throughout their evolution?</p>         | <p>Chapter 7 of <b>Essential Animal Behavior</b></p> <p><i>Animal Behaviour</i> "The development of alarm call behaviour in mammals and birds"</p> <p><i>Scientific American</i> "Natural-Born Killer"</p>  |
| 8    | Oct. 24th | <b>Research Plan Presentations</b>    | <p>What kinds of questions about behavior can we answer using local resources?</p> <p>How do we design a controlled behavioral ecology experiment?</p>  | <i>Student Research Plans (see the LMS)</i>   |
| 9    | Oct. 31st | <b>Reproductive Behavior</b>          | <p>How do male and female mating strategies differ?</p> <p>How do individuals choose their mates?</p> <p>How does the environment influence the mating system of a particular species?</p>        | <p>Chapter 8 of <b>Essential Animal Behavior</b></p> <p><i>Encyclopedia of Life Science</i> "Post-fertilization Reproductive Strategies"</p>  |
| 10   | Nov. 7th  | <b>Cooperation and Altruism</b>       | <p>Why is cooperative behavior an "evolutionary challenge"?</p> <p>What behavioral adaptations allow for cooperation?</p> <p>How do we determine whether behaviors are selfish or altruistic?</p> | <p><i>Scientific American</i> "How Animals Do Business"</p> <p><i>Science</i> "On the origin of cooperation"</p> <p><i>The Chronicle of Higher Education</i> "Moral in Tooth and Claw"</p>  |
| 11   | Nov. 14th | <b>Research Data Workshop</b>         | <p>How is data from behavioral ecology experiments analyzed?</p> <p>What are the best means of displaying experimental results?</p>   |   |
| 12   | Nov. 21st | <b>Research Project Work Week</b>     |   |   |
| 13   | Nov. 28th | <b>Human Behavior</b>                 | <p>In what ways can we apply the findings of behavioral ecologists to human behavior?</p> <p>Do human behavioral responses depend on environmental cues?</p>                                      | <p><i>Daniel Dennett TED Talk</i> "Cute, sexy, sweet, funny"</p> <p><i>Fresh Air</i> "Why Some Things Feel So Good"</p> <p><i>Scientific American</i> "Darwinism and the Roots of Machismo"</p> <p><i>Science</i> "Public Information: From Nosy Neighbors to Cultural Evolution"</p> |
| 14   | Dec. 5th  | <b>Research Project Presentations</b> |   | <i>Student Research Project Summaries (see the LMS)</i>   |
| 15   | Dec. 12th | <b>FINAL EXAM</b>                     |   |   |

| <b>Important Dates</b>            |  |
|-----------------------------------|--|
| Event                             | Date   |
| <i>Research Project assigned</i>  | Week 02                                      |
| <i>Research Proposal due</i>      | Monday, <b>October 3rd @ 11:59 pm EST</b>    |
| <i>Draft Research Plan due</i>    | Monday, <b>October 17th @ 11:59 pm EST</b>   |
| <i>Final Research Plan due</i>    | Thursday, <b>October 27th @ 11:59 pm EST</b> |
| <i>Raw Research Data due</i>      | Friday, <b>November 11th @ 11:59 pm EST</b>  |
| <i>Analyzed Research Data due</i> | Friday, <b>November 18th @ 11:59 pm EST</b>  |
| <i>Research Project due</i>       | Monday, <b>November 28th @ 11:59 pm EST</b>  |
| <i>Final Exam</i>                 | Monday, <b>December 12th</b>                 |

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### **Learning Management System (LMS):**

During the course of the semester, we will make extensive use of Pratt's *Learning Management System (LMS)*. I recommend that you use the *Firefox* browser to access the *LMS* via this page: <http://lms.pratt.edu/> (I discourage you from using the *my.pratt.edu* entrance point, as it is not always working). Use your ONEKEY username and password to log in. I expect you to check the *LMS* several times a week for announcements, reading assignments, and updates to your class grade (note that you can also set the *LMS* to send you email messages every time our class page is updated). I will be using the *LMS* to send email announcements throughout the semester, so please make sure that you check the email address listed under your *LMS* profile regularly. "I forgot to check my Pratt email" is a valiant but invalid excuse.

I try to make the assignments, announcements, and other documents I post on the *LMS* as universally-readable as possible. The only proprietary program you will need to have loaded onto your computer is *Acrobat Reader*, which can be downloaded here: <http://www.adobe.com/products/acrobat/readstep2.html>. I strongly recommend that you use *Acrobat Reader*, rather than another program, to read all of the PDF's provided in this class.

**\*Important\*:** If you should have any problems with the *LMS*, immediately contact me via email or phone, or visit the **Help Desk** in the basement of the Engineering Building (they can also be contacted at x3765 or [helpdesk@pratt.edu](mailto:helpdesk@pratt.edu)). In order for me to verify claims of *LMS* outages, I must hear from you when the *LMS* problem occurs, not hours or days later.

### **Reduced-Paper-Use Classroom:**

Whenever possible, we will reduce the amount of paper that this course consumes. All of your out-of-class assignments, including the two-dimensional components of your two projects, must be submitted electronically via the *LMS*. Your work will be graded and returned electronically. Please do your best to reduce the amount of printing that you do for the course.

## **Readings:**

You will be assigned a series of reading materials from popular science periodicals, books, and the scientific literature. Your main textbook is required and will be:

Scott, Graham (2005). *Essential Animal Behavior*. Blackwell Publishing.  
(ISBN: 978-0-632-05799-3)

This book is required and can be purchased from the PrattStore. All other readings will be posted on the LMS. You are encouraged to save paper by viewing these readings electronically (as opposed to printing them out).

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## **Classroom Civility and Academic Honesty:**

I expect you to maintain the civility and integrity of our course in and out of the classroom. In class, this means arriving on time, turning off cell phones and refraining from sending text messages, maintaining focus on class discussion, respecting the right of others to speak, and leaving the classroom in good condition (among other things). Out of class, this means properly citing all work that is not your own.

Any disruptive, disrespectful, or dishonest behavior will be promptly reported to the appropriate campus authority. Students must adhere to all Institute-wide policies (listed in the *Bulletin* under "Community Standards") which include policies on attendance, academic integrity, plagiarism, computer, and network use. Please see <http://www.pratt.edu/policies> (click on *Judicial Procedures*) for policies and procedures for handling academic conduct issues.

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## **Research Project Work Week:**

During Week 12, our class will not meet. This week off from regular class meetings is intended to provide you with additional time to work on your *Final Project*.

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## **Help with Writing:**

The major project in this class will require you to produce written work. All students can benefit from feedback on their writing. I am happy to read and respond to rough drafts of either assignment, provided they are emailed to me no later than 5 days before the day the paper is due.

Pratt's *Writing and Tutorial Center* can also help you produce the best project possible. The center is located on the 1<sup>st</sup> Floor of North Hall (it has all the great fish tanks... you can't miss it!). Call them at (718) 636-3459 or send an email to [wtc@pratt.edu](mailto:wtc@pratt.edu) to make an appointment.

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## **Rights of Students with Disabilities:**

Any student eligible for and requesting academic accommodations due to a disability is requested to provide a letter of accommodation from *Disability Services* within the first few weeks of the semester. Please contact Mai McDonald, Disability Services Coordinator, in the *Office of the Vice President for Student Affairs*, Main Building, Lower Level: 718-636-3711. See [http://www.pratt.edu/student\\_life/student\\_services/disability\\_services/](http://www.pratt.edu/student_life/student_services/disability_services/) for more information.