Behavioral Biology Program

The David S. Olton Behavioral Biology Program seeks to establish a greater understanding of the relations of brain and behavior through an interdisciplinary program of study. Students in the Behavioral Biology Program examine the complex interplay between environment and behavior, and the processes and mechanisms that underlie behavior. One goal of the program is for students to learn how to integrate scientific discoveries from the wide array of scientific fields of inquiry that contribute to the study of behavioral biology, from molecular biology to sociology.

The interdisciplinary characteristics of the Behavioral Biology Program provide an excellent preparation for post-graduate work. For those interested in the health professions, behavioral biology can be integrated into a premedical curriculum that will provide a broad, humanistic perspective. For those who wish to pursue scientific careers in psychopharmacology, behavioral neuroscience, and physiological psychology, the program provides excellent preparation. Students interested in the fields of organismal or integrative biology should also consider this major.

Many students ask about the similarities and differences between the behavioral biology major and the neuroscience major. Both of these programs are interdepartmental, and a majority of professors teach courses that are listed for both majors. Behavioral Biology majors can explore many aspects of the biology of behavior, including the neural mechanisms of behavior (which obviously overlaps with the neuroscience major), but also biomechanical, evolutionary, ecological, and social aspects of behavior. The behavioral biology major also has fairly liberal course requirements which provide students with an opportunity to explore more choices in their liberal arts education. Students majoring in neuroscience focus directly on the brain and on neural function/mechanisms. Generally speaking, the Systems Neuroscience concentration in the neuroscience major has the most overlap with behavioral biology.

The core program of the behavioral biology major provides breadth and background in five fundamental areas:

1. physics, chemistry, mathematics
2. biology
3. psychology, anthropology, sociology
4. neuroscience
5. history of science

The exact courses to be taken are determined by the student in conjunction with the faculty advisor. Only courses that fulfill the lower-level distribution requirements (15 Humanities and Social and Behavioral Sciences credits) may be used to fulfill the requirements of a second major or minor. Behavioral biology majors wishing to pursue a second major or a minor must first obtain the approval of the program director.

Hopkins undergraduates may enter the Behavioral Biology Program at any time, provided all requirements can be completed before graduation. Additional information regarding the Behavioral Biology Program is available through Hope Stein at hope.stein@jhu.edu or 410-516-6196.

Please consult our website for the most recent updates: http://krieger.jhu.edu/behavioralbiology/courses/

Math/Science Requirements for the B.A. Degree

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>AS.030.101</td>
<td>Introductory Chemistry I</td>
<td>4</td>
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<tr>
<td>&amp; AS.030.105</td>
<td>Introductory Chemistry Lab I</td>
<td></td>
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<tr>
<td>AS.030.102</td>
<td>Introductory Chemistry II</td>
<td>3</td>
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<tr>
<td>AS.171.101</td>
<td>General Physics: Physical Science Major I</td>
<td>5</td>
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<tr>
<td>&amp; AS.173.111</td>
<td>General Physics Laboratory I</td>
<td></td>
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<tr>
<td>or AS.171.103</td>
<td>General Physics I for Biological Science Majors</td>
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<tr>
<td>&amp; AS.173.111</td>
<td>General Physics Laboratory I</td>
<td></td>
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<tr>
<td>AS.171.102</td>
<td>General Physics: Physical Science Majors II</td>
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<tr>
<td>&amp; AS.173.112</td>
<td>General Physics Laboratory II</td>
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<tr>
<td>or AS.171.104</td>
<td>General Physics/Biology Majors II</td>
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<tr>
<td>&amp; AS.173.112</td>
<td>General Physics Laboratory II</td>
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<tr>
<td>AS.110.106</td>
<td>Calculus I</td>
<td>4</td>
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<tr>
<td>or AS.110.108</td>
<td>Calculus I</td>
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<tr>
<td>AS.110.107</td>
<td>Calculus II (For Biological and Social Science)</td>
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<tr>
<td>or AS.110.109</td>
<td>Calculus II (For Physical Sciences and Engineering)</td>
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<tr>
<td>AS.020.151</td>
<td>General Biology I</td>
<td>5</td>
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<tr>
<td>&amp; AS.020.153</td>
<td>General Biology Laboratory I</td>
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<tr>
<td>AS.020.152</td>
<td>General Biology II</td>
<td>5</td>
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<tr>
<td>&amp; AS.020.154</td>
<td>General Biology Lab II</td>
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<tr>
<td>EN.550.111</td>
<td>Statistical Analysis I</td>
<td>4</td>
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<tr>
<td>EN.550.112</td>
<td>Statistical Analysis II</td>
<td>4</td>
</tr>
<tr>
<td>AS.290.490</td>
<td>Senior Seminar: Behavioral Biology (capstone course)</td>
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Core Classes

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<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>AS.290.101</td>
<td>Human Origins</td>
<td>3</td>
</tr>
<tr>
<td>AS.200.141</td>
<td>Foundations of Brain, Behavior and Cognition</td>
<td>3</td>
</tr>
<tr>
<td>AS.200.208</td>
<td>Animal Behavior</td>
<td>3</td>
</tr>
<tr>
<td>AS.080.250</td>
<td>Neuroscience Laboratory</td>
<td>3</td>
</tr>
<tr>
<td>Advanced bio-behavioral science courses in two areas (9 credits). Consult major checklist and website for current information. Intermediate/Advanced Social/Developmental/Cognitive Sciences Eighteen credits in humanities and social science courses. Twelve credits of humanities, social, quantitative and/or engineering courses (twelve Quantitative Studies or Engineering credits taken for departmental requirements may be used to fulfill the distribution requirement). Behavioral Biology Research-while not required by the major, it is highly recommended. Additional University requirements-please consult your academic advisor.* Students may substitute EN.550.211 Probability and Statistics for the Life Sciences or EN.550.311 Probability and Statistics for the Biological Sciences and Engineering for EN.550.111 and EN.550.112.</td>
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Total Credits 101
For current faculty and contact information go to http://krieger.jhu.edu/behavioralbiology/faculty_directory/

**Faculty**

**Director**
Peter Holland
Professor Psychological and Brain Sciences.

**Professor**
Gregory Ball
Psychological and Brain Sciences.

**Teaching Professor**
Linda Gorman
Psychological and Brain Sciences.

**Lecturers**
Chris Kraft
Johns Hopkins Center for Marital and Sexual Health, Sexual Behaviors Consultation Unit, Johns Hopkins Medical Institutions.

Farrah Madison
Behavioral Biology Program.

For current course information and registration go to https://isis.jhu.edu/classes/

**Courses**

**AS.290.101. Human Origins. 3 Credits.**
This course examines the origins of human structure, function and behavior from an evolutionary perspective. It includes study of the evolution, behavior and behavioral ecology of nonhuman primates, hominid evolution (including the paleontological and archaeological records), and the origins of human cognition, social behavior and culture. Cross-listed with Psychological and Brain Sciences
Instructor(s): P. Holland
Area: Natural Sciences, Social and Behavioral Sciences.

**AS.290.303. Brain, Communication & Evolution. 3 Credits.**
The study of animal communication involves the study of neural and hormonal mechanisms mediating the production of communication signals and the evolutionary function of the different signals animals produce to communicate with one another. In this course, information from both of these approaches to the study of behavior will be integrated to provide a comprehensive examination of the causes and functions of different animal communication systems. Topics will include both a consideration of the mechanisms of signal production and of signal perception. The course will review the basic features of communication and features of signaling systems. We will also discuss neural and endocrine functioning and the fundamentals of evolutionary theory relevant to the study of animal communication. Finally, this course will include a field component where students will quantify different aspects of communicative behaviors including song, mating, and parental behavior in several species.
Prerequisites: AS.200.141 OR AS.200.208 OR AS.080.305
Instructor(s): F. Madison.

**AS.290.402. Human Sexual Orientation. 3 Credits.**
This course will examine the historical and current theories of sexual orientation and sexual variation development by examining the biological, psychological and social contributing factors that influence the development of sexual orientations and variations along with treatment and modification of problematic sexual behaviors. Limited to Juniors and Seniors with PBS, Neuroscience, Public Health, Behavioral Biology, and Biology majors, or Juniors and Seniors with PBS or Women’s Studies minors.
Instructor(s): C. Kraft
Area: Social and Behavioral Sciences
Writing Intensive.

**AS.290.490. Senior Seminar: Behavioral Biology. 1 Credit.**
Great ideas in Behavioral Biology. Discussion of classic and cutting edge articles in the original literature. Student presentations and reaction papers. Capstone course for senior Behavioral Biology majors.
Instructor(s): P. Holland
Area: Social and Behavioral Sciences.

**AS.290.501. Research-Freshmen. 3 Credits.**
Instructor(s): G. Ball; P. Holland.

**AS.290.502. Research-Freshmen. 0 - 3 Credit.**
Instructor(s): F. Madison; G. Ball; L. Gorman; P. Holland.

**AS.290.503. Research - Sophomores. 3 Credits.**
Instructor(s): G. Ball; L. Gorman; P. Holland.

**AS.290.504. Research-Sophomores. 0 - 3 Credit.**
Instructor(s): F. Madison; G. Ball; L. Gorman; P. Holland.

**AS.290.505. Research - Juniors. 3 Credits.**
Instructor(s): G. Ball; L. Gorman; P. Holland.

**AS.290.506. Research-Juniors. 0 - 3 Credit.**
Instructor(s): F. Madison; G. Ball; L. Gorman; P. Holland.

**AS.290.507. Research - Seniors. 3 Credits.**
Instructor(s): G. Ball; L. Gorman; P. Holland.

**AS.290.508. Research-Seniors. 0 - 3 Credit.**
Instructor(s): F. Madison; G. Ball; L. Gorman; P. Holland.

**AS.290.519. Independent Study. 3 Credits.**
Instructor(s): G. Ball.

**AS.290.520. Independent Study. 0 - 3 Credit.**
Instructor(s): G. Ball; P. Holland.
AS.290.594. Behavioral Biology Internship. 1 Credit.
Instructor(s): P. Holland.

AS.290.597. Research-Summer. 3 Credits.
Instructor(s): E. Fortune; G. Ball; L. Gorman; P. Holland.

Cross Listed Courses

Biology

AS.020.152. General Biology II. 4 Credits.
This course builds on the concepts presented and discussed in General Biology I. The primary foci of this course will be on the diversity of life and on the anatomy, physiology, and evolution of plants and animals. There will be a special emphasis on human biology. The workshops that were introduced in AS.020.151 General Biology I will include the use of simulation software, a critique of the primary literature, and an exploration of current trends in medicine. Recommended Course Background: AS.020.151. Section 01: Not open to Freshmen. Section 02: Open to Freshmen only. Instructor(s): C. Roberson; R. McCarty; R. Pearlman; R. Shingles. Area: Natural Sciences.

AS.020.153. General Biology Laboratory I. 1 Credit.
Student must have enrolled in AS.020.151 either this term or in past terms. Students who have credit for AP Biology but take General Biology Lab I will lose all eight credits of AP Biology credit. This course reinforces the topics covered in AS.020.151. Laboratory exercises explore subjects ranging from forest ecology to molecular biology to animal behavior. Students participate in a semester-long project, identifying bacteria using DNA sequencing. Cross-listed with Behavioral Biology.
Prerequisites: AS.020.151
Instructor(s): R. Pearlman. Area: Natural Sciences.

AS.080.306. Brain Injury & Recovery. 3 Credits.
This course investigates numerous types of brain injuries and explores the responses of the nervous system to these injuries. The course’s primary focus is the cellular and molecular mechanisms of brain injury and the recovery of function. Discussions of traumatic brain injury, stroke, spinal cord, and tumors, using historical and recent journal articles, will facilitate students’ understanding of the current state of the brain injury field. Cross-listed with Psychological and Brain Sciences and Behavioral Biology.
Prerequisites: AS.080.305 AND AS.080.306 OR AS.020.312 AND AS.020.306 OR AS.200.141 AND AS.200.376
Area: Natural Sciences Writing Intensive.

AS.200.141. Foundations of Brain, Behavior and Cognition. 3 Credits.
Formerly listed as Introduction to Physiopsychology. A survey of neuropsychology relating the organization of behavior to the integrative action of the nervous system. Cross-listed with Behavioral Biology and Neuroscience.
Instructor(s): L. Gorman. Area: Natural Sciences, Social and Behavioral Sciences.

AS.200.208. Animal Behavior. 3 Credits.
Examines basic principles of animal behavior (orientation, migration, communication, reproduction, parent-offspring relations, ontogeny of behavior and social organization). Evolution and adaptive significance of behavior will be emphasized.
Instructor(s): F. Madison; G. Ball. Area: Natural Sciences, Social and Behavioral Sciences.

AS.200.328. Theory & Methods in Clinical Psychology. 3 Credits.
A critical examination of the methods of observation, description, reasoning, inference, measurement and intervention that underlie the clinical practice of psychology and psychiatry. Cross listed with Behavioral Biology. Junior and senior Psychology, Behavioral Biology and Cognitive Science majors only OR instructor approval.
Instructor(s): D. Edwin. Area: Social and Behavioral Sciences Writing Intensive.

AS.200.343. Motivation. 3 Credits.
Current biological, behavioral, and cognitive research and theory concerning the motivation of behavior are examined. Both human and non-human animal research is reviewed. Topics include the role of genetics, arousal, biological regulatory systems, incentives, expectancies, attributions, social processes and self-actualization in the general of behavior. Recommended Course Background: AS.200.101 and AS.200.146 or instructor permission.

AS.200.344. Behavioral Endocrinology. 3 Credits.
An examination of the effects of hormones on behavior in non-human and human animals. Topics will include the effects of hormones on sexual differentiation, reproductive behavior, parental behavior, homeostasis and biological rhythms, regulation of body weight, learning and memory. Cross-listed with Behavioral Biology and Neuroscience.
Prerequisites: Prereqs: ( AS.200.141 OR AS.080.305 ) OR (AS.020.151 AND AS.020.152) OR ( AS.020.305 AND AS.020.306 ) or instructor's permission.
Instructor(s): F. Madison; G. Ball. Area: Natural Sciences, Social and Behavioral Sciences.

AS.200.355. Psych of Decision Making. 3 Credits.
This course will apply insights from cognitive psychology decision-making research to the stock market. The course investigates whether investors can beat the market benchmarks by exploiting marketplace investor sentiment. Juniors and seniors only. Recommended Course Background: six credits of Psychology course work.
Area: Social and Behavioral Sciences.

AS.200.370. Functional Human Neuroanatomy. 3 Credits.
Cross-listed with Behavioral Biology and Neuroscience.
Instructor(s): S. Courtney-Faruque. Area: Natural Sciences, Social and Behavioral Sciences.

AS.200.386. Animal Cognition. 3 Credits.
Examine relations between brain, mind, and behavior in nonhuman animals, focusing on topics such as learning, memory, attention, decision-making, navigation, communication, and awareness. We will take a variety of approaches, including behavioral, computational, evolutionary, neurobiological, and psychological perspectives.
Prerequisites: (AS.200.141 OR AS.200.208 OR AS.290.101) OR permission of instructor.
Instructor(s): P. Holland. Area: Social and Behavioral Sciences.

AS.200.311. Evolutionary Psychology. 3 Credits.
Investigates empirical studies of human behavior and mind using an evolutionary perspective. Cross-listed with Behavioral Biology and Social and Behavioral Sciences.
Instructor(s): P. Holland. Area: Social and Behavioral Sciences.

AS.200.321. Psychology of Social Behavior. 3 Credits.
Investigation of social processes and group phenomena, with an emphasis on intergroup relations. Formerly listed as Introduction to Experimental Social Psychology.

AS.200.322. Psychological and Brain Sciences. 3 Credits.

AS.200.330. Psychological and Brain Sciences. 3 Credits.

AS.200.331. Psychological Reasoning. 3 Credits.
A critical examination of the methods of observation, description, reasoning, inference, measurement and intervention that underlie the clinical practice of psychology and psychiatry. Cross listed with Behavioral Biology. Junior and senior Psychology, Behavioral Biology and Cognitive Science majors only OR instructor approval.
Instructor(s): D. Edwin. Area: Social and Behavioral Sciences Writing Intensive.

AS.200.333. Social Psychology. 3 Credits.
Investigation of social processes and group phenomena, with an emphasis on intergroup relations. Formerly listed as Introduction to Experimental Social Psychology.

AS.200.341. Cognitive Psychology. 3 Credits.
Examines cognitive processes: perception, action, reasoning, memory, and learning focusing on topics such as visual perception, attention, decision-making, and memory. Cross-listed with Behavioral Biology and Social and Behavioral Sciences.
Instructor(s): P. Holland. Area: Social and Behavioral Sciences.

AS.200.342. Cognition Lab. 1 Credit.