

Behavioral Neuroscience PhD Program Overview

Goals and Description of the Program

The goal of the Behavioral Neuroscience Program is to provide the student with both a broad and deep knowledge of the physiological and biological factors that control and affect behavior. Through a close and personalized student mentor relationship, we try to instill in the student an appreciation for programmatic, problem-oriented research. We seek to produce sophisticated, versatile teacher/scientists. The Behavioral Neuroscience Program provides training toward the PhD for approximately 20 students at a time. Faculty in the area represent a wide range of interests in Behavioral Neuroscience, making our program a particularly rich and diverse intellectual environment. A number of adjunct faculty add to this intellectual breadth by participating in some program activities and serving on some student committees.

Although there are no special requirements for admission to the program, preference will be given to students with a master's or bachelor's degree in psychology or neuroscience, who have been involved in research and who have course background in physiology or neuroscience.

Specific Goals and Objectives for PhD Students in Behavioral Neuroscience

Goal 1: Students will acquire and demonstrate broad knowledge of psychology, and demonstrate ability to integrate these areas with behavior neuroscience.

Goal 2: Students will acquire broad and in-depth knowledge of the literature and sub-disciplines within Behavioral Neuroscience.

Goal 3: Students will acquire knowledge and technical proficiency of methods used to answer behavioral neuroscience research questions.

Goal 4: Students will acquire the necessary skills and knowledge to design, execute and analyze meaningful experiments as part of focused program of research.

Goal 5: Students will acquire the necessary skills and knowledge to effectively communicate results of their research in written and oral form.

Goal 6: Students will acquire the necessary skills and knowledge to be effective college-level instructors.

Goal 7: Students will exhibit competence in statistical methods.

Relationship With Behavioral Neuroscience Faculty

Our program uses a mentorship model to train students. Students are accepted into the program with an identified faculty advisor. Continuation of the relationship with that mentor is arranged by mutual consent, in the sense that both the student and the faculty member must agree that the relationship will be mutually productive. Students are required to have a major advisor at all times, and to work closely with the mentor in developing their professional training. They are expected to meet regularly with him or her to discuss progress, problems and educational plans. In addition, students are required to submit annual Progress Reports to the Area Head, which are then discussed by all area faculty at the yearly graduate student evaluation meeting. Although no formal basis for lab rotation training exists, students are encouraged to develop intellectual and collaborative relationships with other faculty members, as well as with students from other laboratories in the Behavioral Neuroscience Program.

Teaching Responsibilities

All state-funded students in the Psychology Department are required to serve as a teaching assistant (TA) in each of their first 6 semesters (subject to change), as well as to proctor exams each semester for various departmental faculty. The Behavioral Neuroscience Program strongly recommends that one of the TA requirements be for assistance with PSY351 (Biopsychology). If a formal TA position for PSY351 is not available, students (whether state-funded or not) are expected to volunteer their time as a TA for this course in preparation for later teaching requirements.

Requirements for the PhD Degree

1. ***Coursework:*** A minimum of 72 credit hours, including departmental breadth requirements, core behavioral neuroscience coursework, and electives.

Departmental breadth requirements

- a. Statistics (PSY 607 Regression and PSY 608 ANOVA)
- b. One distribution course in each of the 3 following areas:
 1. Clinical Psychology
 2. Cognitive Psychology
 3. Social Psychology (note, for students interested in the basic research regarding prejudice and discrimination, PSY860 is recommended to fulfill the Social Psychology distribution requirement)

Core behavioral neuroscience coursework:

- a. PSY 513 (Biological Bases of Behavior)
This course serves as a basic introductory course to bring our area students up to the same minimum degree of knowledge prior to (and is a prerequisite for) more

advanced coursework (all other BN courses except PSY634 and PSY744). BN students are expected to take this course during their first Fall semester, and pass with a grade of B or better.

b. Neuroanatomy (self-paced learning)

An electronic learning module has been established to provide basic neuroanatomical knowledge for students in the area. This learning module must be completed before the start of the second year of study. A faculty member, currently Prof. Daniels, will coordinate distribution of the module and will be available to answer questions about the module (and material within). Students are required to notify the neuroanatomy coordinator when they have completed the module.

Area electives:

Students are expected to take as many of these as offered starting in their second semester. The prerequisite for electives is earning a B- or better in PSY 513

Biological Bases of Behavior:

- PSY 629 (Neural Mechanisms of Behavior)
- PSY 634 (Animal Behavior)
- PSY 714 (Recovery of Function after CNS Damage)
- PSY 868 (Behavior Genetics)
- PSY 744 (Biological Rhythms in Behavior)
- PSY 749 (Biopsychology of Stress)
- PSY 757 (Neurochemistry)
- PSY 813 (Hormones and Behavior)
- PSY 814 (Limbic System of the Brain)
- PSY 877 (Psychopharmacology)
- PSY 815 (Experimental Models of Psychological Disorders)

The area also offers occasional specialized courses relevant to a variety of topics in the neuroscience field. These include graduate seminars in the following areas:

- Computational Neuroscience
- Molecular Neuroscience
- Psychobiology of Addiction
- Psychobiology of Motivation
- Topics in Neuroethology
- Theories of Learning Pain & Analgesia
- Biopsychology of Ingestion
- Homeostasis and Behavior

In addition to the courses listed, occasionally students participate in the two-semester Interdisciplinary Introduction to Neuroscience course taught by a team of faculty derived from a variety of departments. Students also may wish to obtain specialized training through enrollment in graduate level courses offered by other

departments (e.g., Biomedical Science, Pharmacology, Biology, Physiology, Anatomy, Communicative Disorders and Sciences).

2. ***Behavioral Neuroscience Colloquia.*** Attendance at weekly brown bag meetings where students and faculty present and discuss their research, or contemporary research articles within the behavioral neuroscience field. After the first year, each PhD student is required to present in our brown bag meeting once per year. In addition to presentations by members and visitors on relevant experimental and theoretical issues, there are two sessions each academic year devoted to ethics (e.g., academic ethics, scientific and research ethics, ethics of animal use).
3. ***Preliminary Exam.*** By the end of their third semester, students are expected to form a preliminary exam committee consisting of their primary mentor and three faculty members, two of which must be from the Behavioral Neuroscience Area. Then, during the students' fourth semester, they are expected to prepare for and take preliminary exams. Students will take a 3-credit course (PSY774: Seminar in Behavioral Neuroscience), which, upon passing, will meet the requirements for the preliminary exam. Students should register for the section listed under their mentor's name. The format of the course will be independent study, with written three exams (one every two weeks for the first half of the course) and a grant proposal in the student's area of expertise (to be completed during the second half of the course). The final exam will consist of the oral defense of the students' exam answers and research proposal. Beyond this description, the precise format is ultimately at the discretion of the committee. Three outcomes are possible: (a) the student passes; (b) the student fails but can retake prelims during the following semester; or (c) the student fails and is not offered an opportunity to retake prelims (the student is dismissed from the program and may qualify for a Master's degree). Students are ***highly recommended*** to submit their final proposal as an application to a major funding agency (NRSA, NSF, etc.).
4. ***Dissertation Proposal and Thesis.*** The student will generate and defend a dissertation proposal, and ultimately complete and defend the dissertation. The PhD committee will consist of a minimum of two full-time faculty members from the Behavioral Neuroscience area, and two other Psychology faculty, one of whom must be from another area of Psychology. Students may have as many additional members on their committee as seems appropriate to that student/mentor combination. Committee composition should be cleared, in advance, with the Area Head.

Dissertation Proposal Defense: The student will defend his or her dissertation proposal by the end of the first month of the student's sixth semester (in most cases this will be February 28). The proposal defense is designed to allow the committee members to provide conceptual and practical input into the design and theoretical nature of the proposed experiments.

Dissertation Thesis Defense: At least two weeks before the oral defense, students must file their intention-to-defend form with the Department so that a room may be scheduled. They must have gotten approval for the defense from all

the committee members, after the members have read the penultimate draft. The defense includes an open format (attendance by other students and faculty is encouraged), and a private format during which committee members probe more detailed portions of the dissertation. If approved, the penultimate draft will be converted to the final draft, incorporating the comments of the committee members.

Progress Through the Program

The program is designed with a five-year time frame in mind, but students may require more time to finish the program requirements.

Year 1: Students begin conducting research in the laboratory of their mentor and start taking required courses. Biological Bases of Behavior (PSY 513) is a prerequisite for most area electives, and is therefore completed in the first semester in the program. Students also are expected to take statistics courses and other available distribution courses and electives in the first year.

Year 2: Students continue to develop their research programs, and often complete most or all of the required coursework by the end of the second year. The students must have assembled a preliminary exam committee by the end of the fall semester (third semester overall), and have scheduled the oral component of the preliminary exam for the end of the spring semester (fourth semester overall).

Year 3: The third year is also a time of more intense focus on the dissertation proposal. Students should assemble a dissertation committee at the beginning of the fall semester (fifth semester overall), and schedule their proposal defense for the end of the semester. As such, the student will be able to begin work on their dissertation experiments beginning in the sixth semester. Submission of an NRSA or other mentored training grant at this point is highly recommended.

Year 4 and beyond: The student should have begun work on their dissertation project, with the goal of having completed the project by the end of the 5th year.

Evaluation Process:

Whereas progress through the program is primarily evaluated by each student's mentor, the Behavioral Neuroscience area also provides input into the overall record of each student through the following mechanisms:

Annual Progress Reports - each Spring, students will receive a request for a summary of the progress they have made toward the degree during the past calendar year. This report will become a part of their permanent record, and will be available for perusal by all faculty members in the area.

Evaluation Meeting and Notification Letter - At the end of the Spring semester the area faculty will meet to evaluate the performance of each graduate student in the program. The students will be evaluated based upon comments made by their mentor regarding their performance in the lab, grades received for courses they

completed during that year, and the content of their Progress Report. Areas in need of improvement will be identified at this time. The overall conclusions of the evaluation will be communicated to the student in a letter shortly after the evaluation meeting, and a copy will also be sent to the mentor. This evaluation will also become a part of the student's permanent record.

Second Mentor Program:

This program involves each student meeting with another faculty member who is not their mentor biannually, to talk about how the student's relationship with their primary mentor is going, how their research projects are going, career-related topics, etc. It is not required to participate, and the meetings can be short or as long as they need to be. The idea is to expose the students to other perspectives on scientific research and careers that they might not be exposed to by interacting with Behavioral Neuroscience faculty.

Selecting a Second Mentor.

For students with primary mentors that are core BNS faculty, the second mentor could be selected from any other department, a faculty member at another University is also a possibility. Students with primary mentors that are adjunct faculty (like folks at the CRIA), this second mentor should be chosen from the core Behavioral Neuroscience faculty, so that the student has a mentor familiar with BNS requirements. The student will choose the second mentor themselves or, if they prefer, be assigned one by the Area Head. In either case the Area Head would reach out to the second mentor to make sure that they agree to participate in the program.