Graduate Course Offerings 2020-2021

All courses are 1 credit unless otherwise noted; PBS graduate students must enroll in a total of 3 credits per term including at least one credit of research.

FALL 2020

PSYC 100. Proseminar (all faculty)
An introduction to the research program of PBS Faculty. Taken by students in their first year.

PSYC 174. Computational Neuroscience: Brain Engineering (Granger)
Brain circuits are circuits. Just as we can write down what an iphone or a computer does, so we can derive candidate operations and algorithms that brain circuits may be carrying out. Evidence suggests that brains are non-standard engineering devices: they have unusually low-precision synaptic connections, operating at speeds that are ridiculously slower than electronic circuits; yet brains are so good at some tasks, from face and voice recognition to language understanding, that the field of computer science now often imitates brains in order to rival their performance. We will read papers relevant to disparate approaches to brain modeling and discuss predominantly brain circuit approaches. The aim of the course will be to enhance understanding of the current literature and enable critical readings of it. Qualified undergraduates may take the course by permission of instructor.

PSYC 700. Grad Student Ethics Course (Clark)
Required course for all Cognitive Neuroscience and Psychological & Brain Sciences graduate students. Generally, consists of five two hour sessions as well as additional reading and preparation.
WINTER 2021

PSYC 110. Measurement and Statistics I (Wolford)
First section of Graduate level statistics. Taken by students in their first or second year.

PSYC 164. Computational Methods (Haxby)
This course will review current computational methods for understanding how information is coded in neural activity and how to decode patterns of neural activity to reveal the information that is being represented and processed. The course will cover topics such as multivariate pattern classification, representational similarity analysis, forward encoding models, and using hyper alignment to build common models of representational and connectivity spaces. The course will concentrate on applications to human functional neuroimaging data, but application to other methods of measuring neural activity in humans and animals will also be covered.

PSYC 175. Current Topics in Behavioral Neuroscience (van der Meer)
Examining what changes in behavior result from alterations to structures in the brain continues to be a foundational approach in neuroscience. The last decade has seen an unprecedented increase in the specificity of such interventions; yet, these technological advances have placed in sharp focus the difficulties inherent in interpreting the resulting behavioral effects. This course provides training in the design and interpretation of contemporary behavioral neuroscience experiments. Topics include multiple parallel systems, compensation, learning vs. performance, on-target vs. off-target effects, averaging across trials and/or subjects, single vs. multiple tasks, and functional localization vs. distribution, with particular focus on how these perennial issues relate to current and emerging experimental tools.
SPRING 2021

PSYC 111. Measurement and Statistics II (Wolford)
Second term of Graduate level statistics. Typically taken by PBS students in their first or second year.

PSYC 128. Cognitive neuroscience (Tse)
Psych 128 will comprise the Cognitive Neuroscience core for PBS graduate students, though advanced undergraduates and graduate students in other departments may, with the permission of the professor, also take this course. This course will focus on providing an overview of the big questions and topics that drive the field of Cognitive Neuroscience, with a particular emphasis on the neural activity and neural circuits that underlie major functional systems such as attention, emotion, cognition, and perception. As such, the course will not focus on standard data collection methods such as fMRI or EEG, and will also not focus on data analysis methods. We will work our way through the latest edition of Gazzaniga's book "Cognitive Neuroscience: The Biology of the Mind (Fifth Edition)" chapter by chapter. This will provide a framework for discussion and expansion into related articles. Participating students will be expected to present chapters, and to participate in extensive discussions of ideas about the neural basis of mind in all its aspects.

PEMM 115. Fundamental Neuroscience (PEMM faculty)
The PEMM 115 course provides graduate students with a rigorous exploration of fundamental neuroscience spanning from neurochemistry and molecular mechanisms, to systems neuroscience and pathological disease states. The course is designed to provide first-year neuroscience students with foundational knowledge upon which they will build as they pursue their own individualized research directions within the PEMM neuroscience theme. Specific topics covered include neural development, circuit formation and anatomy, neurophysiology and signaling, sensory and motor systems, neurogenetics, and pathology.

PEMM 115 is a two-credit course and will fulfill the requirement previously fulfilled by PSYC 126/127 for PBS students in the behavioral neuroscience research group and/or those students completing a Cognitive Neuroscience Ph.D. Tentative class schedule is MWF, 8:00-10:00am, and the course begins after the end of the winter term but prior to the regular start of the spring term.
RESEARCH AND TEACHING COURSES

These courses are offered every term.

**PSYC 115. Supervised Teaching (1 credit)**: Taken while performing a TA.

**PSYC 117. Specialist Requirement (1 credit)**: Taken while doing specialist reading and written exam, usually not awarded a grade until completed (so ‘ON’ appears in the grade column until exam is completed and graded).

**PSYC 118. Research Presentation (1 credit)**: Taken in the spring term of the second year while completing the second-year research presentation.

**PSYC 168. Experiential Learning**
The goal of this course is to provide students with practical training through a full-time internship outside of Dartmouth College. This real-world, hands-on experience will expose students to diverse career opportunities during graduate school and give students a chance to engage with a field of interest, related to their doctoral research, prior to completion of their PhD.

For this course, the student will propose and arrange a paid or unpaid internship in an existing enterprise (industry, government, or other) in consultation with their Thesis Advisor (primary mentor) and the PBS Graduate Committee. This process should happen in advance of the term of enrollment. Course enrollment is concurrent with the internship and should be for a period of one term. At the end of the internship, the student will make an oral presentation to the PBS community (faculty, post-doctoral fellows, graduate students, and others who may be interested) that addresses the nature of the enterprise they were engaged in, the problem they were assigned, and the results and impact of their project. The purpose of the presentation is to share lessons learned from the internship experience with the PBS community. The presentation will be accompanied by a short but complete written report. Neither the presentation nor report should contain confidential information of the enterprise. This course is considered a methods course, carries one credit, and can fulfill one of the elective course requirements for the PhD degree. Students may enroll in the course no more than once. Students holding F-1 sponsorship should consult with the Office of Visa and Immigration Services (OVIS). Students engaged in paid internships will not receive a graduate student stipend during the term of the internship.

Prerequisites: This course is generally open to students in their second-fourth year in the program (i.e. after completion of their first three terms and prior to proposing their dissertation). Instructor permission is required and will be granted once the PBS Graduate Committee approves of the student’s internship proposal.

**PSYC 188 (1 credit), 288 (2 credits), 388 (3 credits). Graduate Research**: All active students must take at least one research credit every term.
HOW TO CHOOSE THE CORRECT NUMBER OF RESEARCH COURSE CREDITS

Remember that you must be enrolled for 3 total credits per term to be considered ‘active’. If you are not sure about courses, check with Julia Abraham.

If you are enrolling in full time research (i.e. not taking any seminars, teaching assistantships, or specialist reading courses), enroll in PSYC 388 (3 credits). If you are enrolling in 1 seminar course as well as conducting research, enroll in PSYC 288 (2 credits). If you are enrolling in 2 courses as well as doing research, enroll in PSYC 188 (1 credit). You should be enrolled in at least 1 credit of research every term.

Example 1: you are a first year student taking the proseminar and doing research: you will sign up for PSYC 100 and PSYC 288.

Example 2: you are TA’ing a course, taking a Special Topics Seminar, and doing research: you will sign up for PSYC 115, PSYC 179, and PSYC 188.

Example 3: you are taking no courses, you are not TA’ing, and you are not working on your specialist requirement; you are only participating in research for the term: you will sign up only for PSYC 388.
COURSES OFFERED BY OTHER DEPARTMENTS AND PROGRAMS

The following is list of courses that have been offered in the past by other departments or programs and are already approved for PBS graduate curriculum credit. Please refer to the current ORC to find out if/when they are being offered. If there is a course other than those listed below which you would like to take for PBS grad program credit, contact the Chair of the Graduate Committee to request approval before taking the course.

PEMM 124. Ethical Conduct of Research
There will be approximately four one-and-a-half hour small group discussion sessions and four one hour lectures with the times to be arranged. Topics will include: mentoring, data collection, academic integrity, ethical use of human subjects and laboratory animals, authorship, sponsored research and intellectual property.

PEMM 131. Current Approaches in Experimental Therapeutics
This course will present a survey of current methods and approaches in pharmacologic, molecular and experimental therapeutic research. Topics will include pharmacogenomics, pharmacokinetics, functional genomics, in vivo imaging, global gene expression, proteomics, gene targeting, gene therapy and drug screening and delivery. The class will be in lecture format with student discussion and participation. The class will meet for 3 hours each week.

PEMM 211. Neurobiology of Disease
This course will introduce students to the cellular and molecular processes that are pathologically altered in a variety of neurological diseases. Students will also learn by reading and presenting seminal papers on neurological disease topics how neuroscientists research the causes and potential treatments of the disease. The course will be team taught by experts from the neuroscience faculty who will give a one hour didactic lecture in the first session of the week. Then, in a 2 hour session later in that week, students will present and critique scientific papers on the topic chosen by the faculty for that week.

PEMM 271. Advanced Biomedical Sciences
This course emphasizes the integration of molecular, cellular, and systems level information and the experimental approaches used to understand physiology and pathophysiology. It is designed to provide graduate students with a more sophisticated understanding of the major systems of an organism and how they act and interact in order for an individual to adapt and survive in the face of changing environmental resources and challenges. The course is organized into week-long, “stand alone” modules that cover integrative, translational topics in immunology, cardiovascular physiology, endocrinology, and neurobiology (eg. influenza, congestive heart failure, sleep disorders, drug addiction, space physiology). Course meetings are a mixture of lectures and in-class discussions led by the participating faculty, as well as laboratory exercises and demonstrations, including human brain dissections, visits to clinical laboratories and diagnostic centers, and “hands on” opportunities with state-of-the-art electrophysiological and cardiovascular techniques. Course activities are supplemented by primary research articles, reviews, and other on-line materials.