

DARTMOUTH COLLEGE

Department of Psychological and Brain Sciences

Graduate Course Offerings 2016-2017

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 2016

PSYC 100. Proseminar (all faculty)

An introduction to the research program of PBS Faculty. Taken by students in their first year.

PSYC 110. Measurement and Statistics I (Wolford)

First section of Graduate level statistics. Taken by students in their second year.

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.

PSYC 179: The Social Brain Hypothesis (Haxby)

This seminar will examine the social brain hypothesis, which has two forms. In the first version, the hypothesis proposes that the human brain is a social brain, optimized for processing information that is relevant for social cognition and interaction. The second social brain hypothesis proposes that a specific set of brain structures is “the social brain” that is responsible for social information processing.

WINTER 2017

PSYC 111. Measurement and Statistics II (Wolford)

Second term of Graduate level statistics. Typically taken by PBS students in their second year.

PSYC 121. Perception (Tse)

Our senses are our windows to the world, and the scientific study of the senses is one of the oldest sub-disciplines in experimental psychology. This course introduces students to the fundamental workings of our senses of vision, hearing, touch, taste and smell. The course includes careful consideration of experimental methodology as well as content. Our goals will be to understand how patterns of information are transformed from activations among sensory

neurons to representations of the world and our body in it, all within a fraction of a second. There will be a special emphasis on vision, because this is the best understood of the senses, but audition, touch, smell and taste will also be addressed. The interaction of attention with sensory processing will also be addressed. This course straddles both neuroscience and psychology, and will span all relevant topics between neuronal activity and the world as it is experienced.

SPRING 2017

PSYC 126. Systems/Behavioral Neuroscience (Taube)

The goal of this course is to understand behavior as a product of the brain's neural activity. As we progress through the course you will see that scientists know a great deal about simple processes such as reflexes, sensory sensations, and simple motor movements, but we know much less about higher cognitive processes such as learning, memory, and emotional feelings. But ultimately, even these "higher order processes" must be understood in terms of their underlying neural mechanisms. The course focuses on discussing three major systems within the brain – each of which is important for our underlying behavior. These systems are sensory, motor, and limbic. Some emphasis will be placed on how the brain is organized from an anatomical perspective and the connections between different brain structures. This emphasis will complement the first four laboratories where you will have a hands-on experience in examining a sheep's brain. In the second half of the course you will test animals in a spatial learning task and observe some of the techniques used by neuroscientists to study the brain.

The course is taught in conjunction with Psych 65. In addition to the undergraduate portion described above, the graduate students will meet once per week to discuss the covered topics in further depth. During the first month of the course we will also cover the basis of membrane potentials and synaptic transmission.

Note that PSYC 126 graduate students will attend PSYC 65 in the 10 hour (10:10-11:15am on Monday, Wednesday, and Friday) and an additional meeting once per week.

PSYC 174. Computational Neuroscience (Granger)

Brain circuits are circuits. Just as we can write down what an iPhone or computer does, so we can derive candidate operations and algorithms that brain circuits are carrying operations out. Brains are very 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 engineers have been forced to imitate brains in order to rival their performance. Real scientific comprehension of nature invariably enables us to manipulate, and sometimes improve, the objects of study – from bridges and buildings, to drugs and alloys, to artificial limbs and implants. The brain is no exception: mechanistic understanding of brain will lead to new ways to diagnose, treat, modify, and enhance brains. The course introduces the biological and mathematical elements needed to understand brain computation, from cells and synapses,

to local circuits, to anatomical system designs to long-term potentiation rules, to artificial neural networks, and discusses both the history and the state of the art in our understanding of how brains compute our thoughts.

RESEARCH AND TEACHING COURSES

These courses are offered every term.

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

PSYC 117. Specialist Reading Part 1 (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).

PSYC 118. Specialist Reading Part 2 (1 credit): Taken while doing specialist grant proposal and defense (for students who entered program before 2015), usually not awarded a grade until completed (so 'ON' appears in the grade column until exam is completed).

PSYC 188 (1 credit), 288 (2 credits), 388 (3 credits). Graduate Research: All active students must take at least one research credit.

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 a second year student 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 a third year student who is done with seminar requirements and TAs, and you are doing research after you finished your specialist requirements: 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.

COSC 104. Artificial Intelligence

This course is a graduate-level survey of artificial intelligence. It covers the basic principles underlying artificial intelligence (search methods, knowledge representation and 'expert systems,' planning, learning, etc.) and examples of particular artificial intelligence applications areas (natural language understanding, vision, robotics).

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 129. Molecular Pharmacology

This course aims to provide a solid introduction into modern pharmacology, focusing on more mechanistic aspects of therapeutics. Topics will include: basic concepts in pharmacology, systems-level pharmacology and emerging therapies. The course will meet 4 hours per week.

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.

PEMM 212, Neurobiology of Disease.

The course is an intermediate/advanced course in neuroscience - from the molecular level on up through the cognitive and clinical levels. The course will be taught by medical school faculty and is intended for those students who have completed the medical neuroscience course. Attached is the tentative syllabus. The course involves a combination of lecture/tutorials and reading/discussing journal articles.