2015-2016 Approved PBS Graduate Course Offerings

(all courses are 1 credit unless otherwise note;

Note that students **must** enroll in a total of **3 credits per term**)

**Fall 2015**

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

**PSYC 110. Measure and Statistics (Wolford)**
First section of Graduate level statistics. Taken by students in their second year.

**PSYC 160. Imaging Methods (Wheatley)**
This course centers on learning fMRI from how to scan subjects to the basics of processing and analyzing neuroimaging data. This course is hands-on and uses AFNI software which is freely available, widely used, and has a large internet community. Although we will only be using AFNI, the steps and best practices we will cover are ubiquitous across neuroimaging platforms. By the end of this course, you will understand the basic steps of doing and analyzing a neuroimaging project.

At the end of the course you will turn in a how-to manual in which you have annotated each of the steps that you learned as well as a term paper on the project you completed written as an empirical article.

**PSYC 164. Computational Methods (Haxby)**
An intensive and practical course for working with fMRI data, using methods that are also relevant for population code data from single units, LFP, EEG, MEG, etc.

**Winter 2016**

**PSYC 111. Measurement and Statistics II (Wolford)**
Second term of Graduate level statistics. Typically taken by PBS students in their second year.
PSYC161. Computer Programming for Brain Scientists (Connolly)

This course is geared toward graduate students without a computer science background to provide them with a basic set of programming tools for conducting psychological research. The course follows a progression that starts by introducing the basics of the Linux command line and shell scripting in Bash and progresses to more complex programming in MATLAB and Python. Projects will include writing programs for presenting experimental stimuli and collecting and analyzing behavioral and neuroimaging data in MATLAB and Python. Success in this course equates to students' developing a diverse set of programming tricks and tools needed to conduct cutting edge neuroscience research.

179. Practical Analysis of Neural Data (van der Meer)

This course provides a hands-on introduction to the analysis of neurophysiology data using MATLAB. Even if you do not expect to have such data of your own, an understanding of neural data analysis is essential to the interpretation of much of the literature in the field.

Using previously recorded data sets containing spiking and/or field potential data, we will make contact with concepts from computer science, signal processing, and statistics. However, rather than providing a thorough theoretical grounding, the focus is on practical experience, along with pointers to more complete treatment. Specific topics covered include data and project management, visualization, Fourier analysis, filtering, time-frequency analysis, undirected and directional connectivity, spike-field relationships, firing rate estimate, encoding and encoding.

Spring 2016

PSYC 122. Affective Neuroscience (Whalen)

This course will explore the very latest approaches and findings in the field of emotion research. By design we will emphasize information from sub-fields that comprise the current zeitgeist of affective neuroscience - these will include fear circuits, reward circuits, regulatory circuits, & social circuits. The emphasis will be on understanding the research strategies that affective neuroscientists use to address the role of emotion in our daily lives - these will include animal models, genetic models and human psychophysiological measurements including brain imaging.

PSYC 171. Brain Evolution (Granger)

For the first 200 million years of mammalian evolution, animals’ brain sizes were relatively predictable from their body size via a straightforward allometric relation. In the past four million years, an evolutionary blink of the eye, primates rapidly evolved brains that are four times larger than previously would have been predicted for their body size. What are the contents of our brains? How do they differ from the brains of other mammals (and non-mammals)? How did they acquire their enormous size? Evolution acts on genes, not on organisms; what are the genetic factors that have been identified in
recent primate brain growth? What mechanisms are at play, including extrinsic factors and evolutionary “pressures”? What criteria must theories of brain evolution conform to, and what data are to be accounted for? What differential predictions arise from various theories and how are they tested? What relationships obtain between anatomical and functional brain characteristics? The class will cover a set of related topics including brain structure, anthropology, evolution, genetics, development, cognition, race, and intelligence.

**Research and Teaching Courses (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)

**PSYC118. Specialist Reading Part 2 (1 credit):** Taken while doing specialist grant proposal and defense, usually not awarded a grade until completed (so ‘ON’ appears in the grade column until exam is completed)

**PSYC188 (1 credit, 288 (2 credits), 388 (3 credits). Supervised Research:** Typically taken by 1st year students conducting research.

**PSYC 189 (1 credit), 289 (2 credits), 389 (3 credits). Independent Research:** Typically taken by 2nd year students conducting research.

**PSYC 190 (1 credit), 290 (2 credits), 390 (3 credits). Pre-dissertation Research:** Sign up for this when conducting research after specialist exam is finished, but before dissertation proposal has been defended.

**PSYC 191 (1 credit), 291 (2 credits), 391 (3 credits). Dissertation Research:** Sign up for this when you are conducting research after your dissertation proposal is approved by committee and presented to area group.

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**HOW TO CHOOSE THE CORRECT NUMBER OF RESEARCH COURSE CREDITS**

First, 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 Nancy Tenney.

So if you are enrolling in full time research (ie, not taking any seminars, teaching assistantships, or specialist reading courses), select the appropriate research course above for 3 credits (ie, a 300 level research course). If you are enrolling in 1 seminar course as well as conducting research, please select the appropriate research course for 2 credits (ie, a 200 level research course). If you are enrolling in 2 courses as well as doing research, please select the appropriate research course for 1 credit (ie, a 100 level research course).
Example 1: you are a first year student and are TAing a course, taking prosem, and doing research: you will sign up for PSYC 100, 115, and 188

Example 2: you are a second year student and are taking a Special Topics Seminar and doing research: you will sign up for PSYC 179 and 289

Example 3: you are a third year student who is done with seminar requirements and TAs, and you are doing research after your finished your specialist requirements: sign up only for PSYC 390

Courses offered by other departments and programs

The following is list of courses that have been offered in the past by other departments/programs and are already approved for PBS graduate curriculum credit. Please note/check the ORC to find out if/when they are being offered. Also, please be on the look out for other courses that might be offered and if you are interested in taking them for PBS grad program credit, contact the Chair of the Graduate Committee to request approval.

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.

PSYC 212, cross-listed with 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.

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).

NEWT 115/PSYC126. Medical Neuroscience

The goal of the Neuroscience Course is to provide the student with the basic science background necessary to understand the clinical signs and symptoms of disorders of the human nervous system. The organization and function of the central and peripheral nervous systems will be presented from a correlated anatomical, physiological, and pharmacological perspective by means of lectures and conferences, and by laboratory exercises that incorporate dissection of the brain. Among the topics covered will be: the embryonic/fetal development of the nervous system; the gross and microscopic organization of the brain and spinal cord; the physiology of the neuron and neural transmission; control of motor and sensory functions; neuroendocrine control; control of involuntary functions; the special senses; the higher mental functions such as memory and language; the maintenance of consciousness and sleep; and the motivation and regulation of emotional states. In addition, the course will include an introduction to modern imaging modalities as they apply to neurological diagnosis and also will consider the interface between the brain and behavior. Swenson, contact Professor Rand Swenson for a detailed course schedule. This course is typically taken by first-year PBS graduate students.

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.