

## **SYLLABUS: Advanced Neurophysiological Psychology**

Psychology 410, Winter 2017; Parkmill 183

Course meets M/W/F, January 9 – March 22, 12:45 – 1:50pm

**Instructor:** Bill Griesar, Ph.D., [griesar@pdx.edu](mailto:griesar@pdx.edu) \*\* DO NOT USE d2l address

**Teaching Assistant:** Jacob Schoen, [jschoen@pdx.edu](mailto:jschoen@pdx.edu)

**Office hours:** On review days and by arrangement (and *any time* by e-mail!)

**Book:** *Phantoms in the Brain*, by V.S. Ramachandran (REQUIRED) (but cheap!)

**Objectives:** The primary objectives of this course are:

- (1) To teach you to gather, evaluate and present scientific information; and
- (2) **For PSU undergraduates:** to offer you a better understanding of the nervous system through discussion and presentation of current topics in neuroscience research, a visit to the Oregon National Primate Research Center, and exposure to graduate students involved in original research
- (3) **For OHSU/WSU graduate students:** to provide you with the opportunity to organize and present current topics in neuroscience research, and gain experience teaching and assessing undergraduate students

The course begins with a review of key topics in physiological psychology, including neurons, synapses, neural networks, gross anatomy, the neocortex, some specific cognitive networks, and various imaging and other techniques.

We then focus on a book by neurologist V.S. Ramachandran (“Phantoms in the Brain”), and examine case studies of patients experiencing a host of neurological disorders, from phantom limb pain to anosognosia, temporal lobe epilepsy and hemispatial neglect. Undergraduate students will research and prepare presentations on individual chapters for delivery in class.

We will then concentrate on TWO research topics: **TBA**. Our visiting neuroscience graduate students will choose one review article for each topic, and research and prepare introductory presentations for delivery as class lectures. Our

graduate students will lead seminars to discuss current research on the topic, and will develop assessments (quizzes, short assignments), and (with supervision) help grade these assessments.

PSU undergraduate students will read the review article/chapters chosen by each graduate student, and write summaries of the additional articles they post, and be prepared to discuss article aims, methods, findings and conclusions in class.

*Further instructions will come from our graduates later in the course.*

This term we also have the unique opportunity to visit the Oregon National Primate Research Center, to meet with scientists and tour the facility itself!

**Grades:** Grades are based on a point system: 90 points or higher = A, 80 – 89 points = B, 70 - 79 = C, and 60 - 69 = D. An A or B is an ABOVE AVERAGE grade, a C is AVERAGE, and a D is BELOW AVERAGE. Available course points (which will total 105) are accumulated in the following ways:

1. **Basic brain review exam (20):** From material covered in lectures.
2. **Ramachandran questions and participation (15):** You should post (on d2l) *at least one* question about the book chapters, along with researched answers, to the relevant discussion forum no later than *24 hours before class*. You will receive points for these question(s) and for class participation each day. *Attendance required*. LATE POSTS RECEIVE NO CREDIT.
3. **Ramachandran presentations (20):** Students will form six groups, and each group will orally present a series of chapters from the book (15 points per student). Students will also prepare an online youtube video presentation that will be posted to the course website (5 points)
4. **Ramachandran exam (15):** From material covered in the Ramachandran book.
5. **Graduate topic assignment One (7.5):** PLEASE CHECK the course d2l site for more instruction on required assignments AS THE TERM PROGRESSES...
6. **Grad Topic One exam (7.5):** From material covered in lectures and discussion.
7. **Graduate topic assignment Two (7.5):** PLEASE CHECK the course d2l site for more instruction on required assignments AS THE TERM PROGRESSES...
8. **Grad Topic Two exam (7.5):** From material covered in lectures and discussion.

<b>ASSIGNMENT</b>	<b>POINTS</b>	<b>DUE DATE(S)</b>
Basic brain review exam	20	February 1
Rama. questions / participation	15	Feb 6 – Feb 20
Rama. chapter presentation	20	Feb 6 – Feb 20
Ramachandran exam	15	Feb 22
Topic One Assignment (Topic)	7.5	See d2l for details*
Topic One exam	7.5	See d2l for details*
Topic Two Assignment (Topic)	7.5	See d2l for details*
Topic Two exam	7.5	See d2l for details*
	+ 5 points extra credit (for being you ☺)	
<b>TOTAL COURSE POINTS</b>	<b>105</b>	<b>* Grad students will assign</b>

## CLASSES:

### PSU students only

#### *Basic brain review*

- 1. Introduction (1/9):** introductions, course information, syllabus and course expectations, on-line databases, library resources at PSU and elsewhere
  - *READ "Cellular Foundations of Neuropharmacology," by Floyd Bloom et al*
- 2. Neurons, Glia and Synapses (1/11):** neuron (and glial) structure / function, electrical properties of neurons, resting potential and action potentials, role of myelin; chemical transmission, neurotransmitters, network architecture
- 3. Neurons, Glia and Synapses (1/13):** More on these topics...

**\*\* NO CLASS ON MONDAY, JANUARY 16<sup>th</sup>**

**\*\* Happy Martin Luther King Junior Day!**



- 4. Gross CNS review (1/18):** Anatomical directional terms, planes of sections, meninges, lobes, sulci, gyri, fissures, diencephalon, brainstem, cerebellum...
  - *READ "A Brief History of Human Brain Mapping," by Marcus Raichle*
- 5. Gross CNS review (1/20):** continued

- READ "The columnar organization of the neocortex," by V. B. Mountcastle
  - READ "Evolution of the neocortex Biology," by Pasko Rakic
  - READ "The neocortical column," by Javier DeFelipe et al
6. **The Cortex** (1/23): basic structure and function (lobes, sulci, gyri), sensory vs. association, Brodmann areas, motor/somatosensory gyri, language areas, etc.
    - READ "The brain's default network," by R.L. Buckner, et al
    - READ additional articles on course d2l website
  7. **Gross CNS** (1/25): BRAIN VIEWING (TBD)
  8. **Network example** (1/27): Distributed networks underlie complex cognition
  9. **Basic brain review EXAM** (2/1)

**PSU students only**

*Phantoms in the Brain*

Students divided into six groups: Each group presents one set of chapters...

*(Use overheads, handouts, and draw on related research articles from PubMed...)*

*SNOW: Class on 2/3 cancelled!*

10. **Chapters 1, 2** (2/6): student presentations and discussion
  11. **Chapters 3, 4** (2/8): student presentations and discussion
  12. **\*\* PRIMATE CENTER TOUR!** (2/10): 1:00pm – 3:30pm @ ONPRC
  13. **Chapters 5, 6** (2/13): student presentations and discussion
- NO CLASS ON WEDNESDAY (2/15)*
14. **Chapters 7, 8** (2/17): student presentations and discussion
  15. **Chapter 9, 10** (2/20): student presentations and discussion
  16. **Chapters 11, 12** (2/22): student presentations and discussion

**\*\*\* TAKE HOME Ramachandran EXAM !**

**PSU and OHSU students**

*TOPIC ONE: Learning and memory*

**OHSU POST DOC DR. BINYAM NARDOS (with MARC RUDOLPH)**

The sessions will provide an overview of cognitive processes related to learning and memory, and the underlying functional neuroanatomy. Lectures will include discussions of different types of memory drawn from the field of cognitive psychology and will be linked to neuropsychological and neuroimaging-based approaches to identifying the brain systems underlying these cognitive processes. In addition to discussing the functional neuroanatomy of memory systems, a systems-neuroscience level overview will be provided highlighting related brain systems, such as attention and task-control systems, that work in concert with brain regions more directly involved in memory encoding and retrieval. Finally, students will gain insight into how behavioral experiments are designed to target the brain-correlates of a specific cognitive process while controlling for the effects of another.

**NOTE: The following class dates and assignments may change, depending on what our graduate teaching participant prepares. Please check the D2L course website for explicit instructions on assignments, etc.**

17. **Topic One (2/24):** *Graduate student presentation:*
18. **Topic One (2/27):** *Graduate student presentation:*
19. **Topic One (3/1):** latest research articles and discussion
20. **Topic One (3/3):** latest research articles and discussion
21. **TOPIC TWO EXAM (3/6):** prepared / assessed by grad student

## *TOPIC TWO: Stress and cognition*

### **OHSU GRAD STUDENT EILEEN RUTH TORRES**

Public speaking, final exams, illness— there are plenty of things in our daily lives that stress us out. While the peripheral response— such as increased heart rate and sweaty palms—can be easy to imagine, what exactly is occurring in our brains? This unit will cover how stressful situations elicit a neural response and how this can impede our ability to learn and recall information. Specifically, we will explore how the brain's primary stress response system, the hypothalamic-pituitary-adrenal axis, bidirectionally interacts with the hippocampus, a key brain region for learning and memory. Students will be expected to participate in discussions and activities relating to current research in the field.

**NOTE: The following class dates and assignments may change, depending on what our graduate teaching participant prepares. Please check the D2L course website for explicit instructions on assignments, etc.**

22. **Topic Two (3/8):** *Graduate student presentation:*
23. **Topic Two (3/10):** *Graduate student presentation:*
24. **Topic Two (3/13):** latest research articles and discussion

25. **Topic Two** (3/15): latest research articles and discussion
26. **TOPIC TWO EXAM** (3/17): prepared/assessed by grad student
27. **GRADUATE STUDENT INFORMATION PANEL** (3/22): Final exam week. Undergraduates, please bring (and post) questions about graduate school, research opportunities, application procedures, grants, etc...!
- \*\*\* **MONDAY, MARCH 20, 2017, 12:30 – 2:20pm** \*\*\*

**For OHSU students:** To participate, you must have successfully completed your qualifying exam, and have explicit approval of your dissertation advisor in Behavioral Neuroscience. If selected, you will need to enroll in BEHN 650 (Teaching Practicum)...

**ABOUT EXCUSES:** Life has ups and downs, and everyone struggles sometimes with family, work, and other personal concerns and commitments. **However, unless there is a serious, unexpected, sudden, documented, and significant emergency, please do not petition for special treatment regarding deadlines for projects, quizzes, or exams.**

**I am required to treat all students fairly, so each of you must think ahead and plan for when assignments are due. Everyone is subject to the same course expectations.**

Note that sometimes, for a myriad of reasons, life intervenes to create ongoing difficulties with class attendance, and meeting academic requirements. *In these cases, it's often best to withdraw from the course, and perhaps re-enroll at a less stressful time...*