

Syllabus for Introduction to Neuroscience (Honors- NROSCI 1003)

This HONORS course provides an introduction to the structure and function of the nervous system. The course is comprised of four sections: 1) The molecular and cellular physiology of neurons, 2) Sensory systems, 3) Somatic and Visceral motor systems, 4) Complex Brain Functions (Emotions, Memory, Language, Disease). This course will also integrate weekly, in depth discussions of journal articles that correspond to Nobel Prize winning neuroscience research.

Time: Tuesday, Thursday & Friday 11:00-12:15 pm

Location: Crawford 241

Course Textbook: Neuroscience 5th Edition, 2012, Editors: Purves et al.

Required: Scientific calculator with *logarithmic* function

(NO graphing, phone or programmable calculators will be allowed for exams)

Instructor: Dr. Oswald, amoswald@pitt.edu

Office: A458 Langley, Mailbox: A210 Langley

Office Hours: Thursday 10:00 am -11:00 am, or by appointment

Teaching Assistants UTA: Samantha Golden, Julia Strother, Wyatt Laskey

Weekly Assignments: Each Monday a reading assignment and three associated questions will be posted on CourseWeb. Answers are due before class on the day the reading assignment is discussed.

Assignments are worth 10% of final grade.

Weekly Quizzes: Quizzes will be every Tuesday in the first 15 min of class (No quiz during exam weeks). Each quiz will be worth 5 points. The quizzes will be on the material from lectures of the preceding week. Quizzes are *optional* but may be applied toward grade (see grading below).

Grading: Grades will be determined based on the four in-class exams during the semester (**90%** of grade, see weighting below). There are **no make-up exams**. If the cumulative grade of your quizzes is greater than one of your exams, your quiz grade can be used to replace that one exam. Weekly assignments are worth **10%**.

Exam 1- January 29, 2016 (25%)

Exam 2- March 1, 2016 (25%)

Exam 3- March 29, 2016 (20%)

Exam 4- April 21, 2016 (20%)

Materials: All material presented in lectures, assigned reading and review questions is subject to examination. Weekly review questions will be available. These are NOT graded and answers are NOT posted. Textbook chapters are provided as *suggested readings*. *Information contained in the textbook readings that is not presented in lecture will not be on the exams.*

Course Outline:

Week 1: Jan 7, 8, 2016

1. Neuroscience, the Nervous System, Cellular properties of Neurons
2. Nobel Prize 1906: *Camillo Golgi & Santiago Ramón y Cajal*- Structure of the nervous system
3. Gradients and Resting Potential (Chapter 2, pages 29-37)

Week 2: Jan 12, 14, 15, 2016

4. Pumps and channels (Chapter 4)
5. Action Potential (Chapter 2, pages 37-40, Chapter 3, pages 41-51), Nobel Prize 1963: *Alan Hodgkin & Andrew Huxley*- Excitable Membranes
6. Nobel Prize 2003: *Roderick MacKinnon*- Structure of Ion channels

Week 3: Jan 19, 21, 22, 2016

7. Synaptic Transmission 1- Neurotransmitters
8. Synaptic Transmission 2- Calcium and Release
9. Nobel Prize 2013: *Thomas C. Südhof*- Vesicle Fusion

Week 4: Jan 26, 28, 29, 2016

10. Synaptic Transmission 3- Postsynaptic Responses
11. Nobel Prize 1991: *Erwin Neher & Bert Sakmann*: Functions of single ion channels
12. **Exam 1- Friday January 29, 2016**

Week 5: Feb 2, 4, 5, 2016

13. Vision 1: Eye, Rods and Cones, Retina (Chapter 11)
14. Vision 2: Central pathways and coding (Chapter 12)
15. Nobel Prize 1981: *David Hubel and Torsten Wiesel*- Information processing in Vision

Week 6: Feb 9, 11, 12, 2016

16. Auditory system (Chapter 13)
17. Vestibular system (Chapter 14)
18. Nobel Prize 1961: *Georg von Békésy*- Mechanisms of Cochlear Function

Week 7: Feb 16, 18, 19, 2016

19. Somatosensory system & Pain (Chapter 9, 10)
20. Sensory Motor Integration (Chapter 20)
21. Nobel Prize 1944: *Joseph Erlanger & Herbert Gasser*- Differentiated functions of nerve fibers.

Week 8: Feb 23, 25, 26, 2016

22. Chemical Senses (Chapter 15)
23. Nobel Prize 2004: *Richard Axel & Linda Buck*- Genetic organization of the olfactory system
24. Review Class

Week 9: March 1, 3, 4, 2016

25. **Exam 2: Tuesday, March 1, 2016**
26. Motor Systems 1: Descending control and Spinal Cord
27. ****No class Friday March 4****

*****Spring Break March 6-13, 2016*****

Week 11: March 15, 17, 18, 2016

- 28. Motor Systems 2: Neuromuscular Junction, Reflexes
- 29. Basal Ganglia (Chapter 18)
- 30. Nobel Prize 1970: *Sir Bernard Katz* "Quantal Theory"

Week 12: March 22, 24, 25, 2016

- 31. Cerebellum (Chapter 19)
- 32. Visceral Motor System (Chapter 21)
- 33. *Review class*

Week 13: March 29, 31 & April 1, 2016

- 34. Exam 3: Tuesday March 29, 2016**
- 35. Associative Cortex, Learning and Memory (Chapter 26, 31)
- 36. Nobel Prize 2014: *John O'Keefe, May-Britt Moser, Edvard Moser*- GPS of the brain

Week 14: April 5, 7, 8, 2016

- 37. Limbic System and Emotion (Chapter 29)
- 38. Language (Chapter 27)
- 39. Nobel Prize 1981: *Roger Sperry*- Functional specialization of the cerebral hemispheres

Week 15: April 12, 14, 15, 2016

- 40. Neurodegenerative Diseases
- 41. Neuropsychiatric Disorders and Addiction
- 42. Nobel Prize 1949: *Egas Moniz*: Therapeutic value of leucotomy in certain psychoses

Week 16: April 19, 21, 22, 2016

- 43. Review class
- 44. Exam 4: Thursday April 21, 2016**
- 45. *****No class Friday April 22*****

*Syllabus topics and order are subject to change as the course evolves.