

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 Cellular and Molecular Physiology of Neurons, 2) Sensory Systems, 3) Somatic and Visceral Motor Systems, 4) Complex Brain Functions (Emotions, Memory, Language). 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 or 6th Edition, Editors: Purves et al.

Required: Scientific calculator capable of logarithmic (\log , \ln) functions
(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: TBD

Teaching Assistants: TBD

Weekly Assignments: Weekly journal articles and associated assignments will be posted on CourseWeb. Assignments will be due and discussed in class on Fridays unless otherwise indicated in the syllabus. *Material covered in journal articles and assignments comprise 5% of each exam.*

Weekly Quizzes: Quizzes will be every Tuesday in the first 15 min of class. There are 10 quizzes total. Each quiz will be worth 5-10 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 exams during the semester. 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.

Exam 1- Tuesday, February, 4, 2020 (25%)

Exam 2- Tuesday, March 3, 2020 (25%)

Exam 3- Tuesday, March 31, 2020 (25%)

Exam 4- Friday, April 17, 2020 (25%)

Materials: All material presented in lectures, assigned reading and review questions is subject to examination. Weekly review questions are provided but 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, 9, 10

1. Neuroscience, the Nervous System, Cellular properties of Neurons
2. Gradients and Resting Potential (Chapter 2, pages 29-37)

3. Nobel Prize 1906: *Camillo Golgi & Santiago Ramón y Cajal*- Structure of the nervous system

Week 2: Jan 14, 16, 17

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 21, 23, 24

7. Synaptic Transmission 1- Calcium and Release (Chapter 5)
8. Synaptic Transmission 2- Neurotransmitters (Chapter 6)
9. Nobel Prize 2013: *Thomas C. Südhof*- Vesicle Fusion

Week 4: Jan 28, 30, 31

10. Synaptic Transmission 3- Postsynaptic Responses (Chapter 5 & Chapter 6)
11. Nobel Prize 1991: *Erwin Neher & Bert Sakmann*: Functions of single ion channels
12. *Review Class*

Week 5: Feb 4, 6, 7

13. Exam 1- Tuesday February, 4, 2020

14. Somatosensory System & Pain (Chapter 9, 10)
15. Nobel Prize 1944: *Joseph Erlanger & Herbert Gasser*- Differentiated functions of single nerve fibers.

Week 6: Feb 11, 13, 14

16. Vision 1: Eye, Rods and Cones, Retina (Chapter 11)
17. Vision 2: Central pathways and coding (Chapter 12)
18. Nobel Prize 1981: *David Hubel and Torsten Wiesel*- Information processing in the visual system

Week 7: Feb 18, 20, 21

19. Chemical Senses (Chapter 15)
20. Auditory system (Chapter 13)
21. Nobel Prize 2004: *Richard Axel & Linda Buck*- Genetic organization of the olfactory system

Week 8: Feb 25, 27, 28

22. Vestibular system (Chapter 14)
23. *Review Class*
24. ******No Class******

Week 9: March 3, 5, 6

25. Exam 2- Tuesday March 3, 2020

26. Motor Systems 1: Descending control and Spinal Cord (Chapters 16, 17)

27. ****No class****

*******Spring Break March 9-13*******

Week 10: March 17, 19, 20

28. Motor Systems 2: Neuromuscular Junction, Reflexes (Chapters 16, 17)

29. Basal Ganglia

30. Nobel Prize 1970: *Sir Bernard Katz* "Quantal Theory"

Week 11: March 24, 26, 27

1. Cerebellum and Sensory motor integration (Chapter 19,20)

2. Visceral Motor System (Chapter 21)

3. Nobel Prize 1949: *Walter Hess*- The interbrain as a coordinator of the internal organs

Week 12: March 31, Apr 2, 3

1. **Exam 3: Tuesday March 31th, 2019**

2. Associative Cortex, Learning and Memory (Chapter 26, 31)

3. Nobel Prize 1981: *Roger Sperry*- Functional specialization of the cerebral hemispheres

Week 13: April 7, 9, 10

1. Limbic System and Emotion (Chapter 29)

2. Language

3. Neurodegenerative Diseases

Week 14: April 16, 18, 19, 2019

4. Neuropsychiatric Disorders and Addiction

5. Nobel Prize 1949: *Egas Moniz*: Therapeutic value of leucotomy in certain psychoses

6. **Exam 4: Friday April 19, 2019**

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

If you have a disability for which you are or may be requesting an accommodation, you are encouraged to contact both your instructor and the Office of Disability Resources and Services, 140 William Pitt Union, 412-648-7890/412-383-3346 (Fax), as early as possible in the term. Disability Resources and Services will verify your disability and determine reasonable accommodations for this course.

Cheating/plagiarism will not be tolerated. Students suspected of violating the University of Pittsburgh Policy on Academic Integrity, noted below, will be required to participate in the outlined procedural process as initiated by the instructor. A minimum sanction of a zero score for the quiz, exam or paper will be imposed. (For the full Academic Integrity policy, go to www.provost.pitt.edu/info/ai1.html.)

*Each student is issued a University e-mail address (username@pitt.edu) upon admittance. This e-mail address may be used by the University for official communication with students. Students are expected to read e-mail sent to this account on a regular basis. Failure to read and react to University communications in a timely manner does not absolve the student from knowing and complying with the content of the communications. The University provides an e-mail forwarding service that allows students to read their e-mail via other service providers (e.g., Hotmail, AOL, Yahoo). Students that choose to forward their e-mail from their pitt.edu address to another address do so at their own risk. If e-mail is lost as a result of forwarding, it does not absolve the student from responding to official communications sent to their University e-mail address. To forward e-mail sent to your University account, go to <http://accounts.pitt.edu>, log into your account, click on **Edit Forwarding Addresses**, and follow the instructions on the page. Be sure to log out of your account when you have finished. (For the full E-mail Communication Policy, go to www.bc.pitt.edu/policies/policy/09/09-10-01.html.)*