

NEUROBIOLOGY

Biology 570
Spring 2009

Dr. Greg Harris
Office: LS311
Hrs. Tu 3:00-5:00
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Tu Thu 11:00-12:15 a.m., LS248

Required text: Kandel, Schwartz & Jessell, *Principles of Neural Science*, 4th edition

Course grade will be based on three exams of equal weight.

Course Schedule:

| <u>Date</u> | <u>Topic</u> | <u>Reading (K.S &J)</u> |
|-------------|--|-----------------------------|
| Jan 22 | Introduction-Cellular anatomy of the neuron; neuronal signaling | Chs. 1,2 |
| 27 | Neuronal excitability: resting membrane potentials Passive membrane properties of neurons | Chs. 6,7,8 |
| 29 | Neuronal excitability: action potential I | Ch. 9 |
| Feb 03 | Neuronal excitability: action potential II | |
| 05 | Synaptic Transmission - neuromuscular junction | Chs 10, 11 |
| 10 | Central synaptic transmission | Chs 12 |
| 12 | Neurotransmitters and receptors | Chs 12, 15 |
| 17 | Neurotransmitters – Second messengers | Ch 13 |
| 19 | Transmitter release mechanisms | Ch. 14 |
| 24 | Discussion/Review | |
| 26 | Exam I | |
| Mar 03 | Organization of the CNS | Ch 17, 18 |
| 05 | Coding of sensory information | Chs 21 |
| 10 | Somatosensory system I | Chs 22-24 |
| 12 | Somatosensory system II | |
| 17 | Visual system I | Chs 25-29 |
| 19 | Visual system II | |
| 24 | Visual system III | |
| 26 | Auditory system | Ch 30, 31 |

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|-------|-----------|---|-------------|-----------|
| April | 07 | Vestibular system | | Ch 40 |
| | 09 | Review/Discussion | | |
| | 14 | Exam II | | |
| | 16 | Gustation/Olfaction | | Ch 32 |
| | 21 | Learning and memory I | | Ch 62, 63 |
| | 23 | Learning and memory II | | |
| | 28 | Disorders of the nervous system - student presentations | | |
| | 30 | Disorders of the nervous system - student presentations | | |
| May | 05 | Disorders of the nervous system - student presentations | | |
| | 07 | Disorders of the nervous system - student presentations | | |
| | 12 | Discussion/Review | | |
| May | 21 | FINAL EXAM | 10:30-12:30 | |

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Topics for student presentations:

myasthenia gravis
amyotrophic lateral sclerosis
multiple sclerosis
Parkinson's disease
Huntington's disease
Alzheimer's disease
epilepsy
depression
schizophrenia
attention deficit hyperactivity disorder
eating disorders
addiction

Student Presentation Guidelines:

Student presentations will be made during the weeks of April 28 and May 5. Each group of 6-7 students will be responsible for a 20 minute presentation of their assigned topic. Each of the assigned topics is a specific or general neurological disorder. The goal of the presentations

will be to convey to the class our current understanding of the neurobiological basis of the disease. It is suggested that the presentations will include:

- A description of the disorder, who it affects, its symptoms and outcomes
- The portions of the nervous system that are affected
- The cellular and molecular basis for the disorder (what is known)
- What treatments are available to patients
- What pieces are missing from the puzzle
- Any new hypotheses that you may wish to propose about the disorder

The presentations must be made using power point and each member of the group is expected to present a portion of the presentation. The 20-minute time limit will be strictly enforced. Obviously, given such a brief time period, it important that you present the most salient features of your research into the disease.

The presentations will not be graded, however each group will be required to submit three multiple-choice questions that may be used on the final exam. It is important that you clearly and carefully cover the points addressed in your exam questions.

At the end of each presentation there will be a couple of minutes for questions.

Learning Outcomes: This course is designed to provide students with an overview of the very large field of Neurobiology. The initial focus of the course will center on the electrical properties of neurons and the function of synapses. These topics convey the essential molecular and cellular building blocks that give rise to the function of the brain and the emergence of the mind. The second section of the course will focus on understanding sensory systems and how they aid in forming our perception of the world. In the third section, our current knowledge of the processes of learning and memory will be examined. Finally, students will be required to use the knowledge gained from this course in classroom group presentations dealing with disorders of the nervous system. It is anticipated that students will gain sufficient proficiency in using these neurobiological principles that they will be able to clearly follow ongoing scientific pursuits aimed at understanding how the brain functions and how the mind works.