Attention!

This is a *representative* syllabus.

The syllabus for the course when you enroll may be **different**.

Use the syllabus provided **by your instructor** for the most up-to-date information. Please refer to your instructor for more information for the specific requirements for a given quarter.

NEUROSC 3010
INTRODUCTION TO NEUROPHYSIOLOGY 3 credit hours

Class Schedule: 80 minute class meets twice a week

INSTRUCTORS:

Dr. Georgia Bishop
292-8363
3187W Graves Hall I
Bishop.9@osu.edu

TEXT: Neuroscience Third Edition. Purves et al. Sinauer Associates, Inc.

This textbook is required

Additional Texts: From Neuron to Brain, Nicholls et al., Sinauer Associates, Inc.

Website: carmen.osu.edu

LECTURES:

The material presented in the lectures will cover the most important parts of the reading assignments, therefore class attendance is essential.

ACADEMIC INTEGRITY (ACADEMIC MISCONDUCT)
Academic integrity is essential to maintaining an environment that fosters excellence in teaching, research, and other educational and scholarly activities. Thus, The Ohio State University and the Committee on Academic Misconduct (COAM) expect that all students have read and understand the University's Code of Student Conduct, and that all students will complete all academic and scholarly assignments with fairness and honesty. Students must recognize that failure to follow the rules and guidelines established in the University's Code of Student Conduct and this syllabus may constitute "Academic Misconduct." The Ohio State University's Code of Student Conduct (Section 3335-23-04) defines academic misconduct as: "Any activity that tends to compromise the academic integrity of the university, or subvert the educational process." Examples of academic misconduct include (but are not limited to) plagiarism, collusion (unauthorized collaboration), copying the work of another student, and possession of unauthorized materials during an examination. Ignorance of the University's Code of Student Conduct is never considered an "excuse" for academic misconduct, so I recommend that you review the Code of Student Conduct and, specifically, the sections dealing with academic misconduct. If I suspect that a student has committed academic misconduct in this course, I am obligated by University Rules to report my suspicions to the Committee on Academic Misconduct. If COAM determines that you have violated the University's Code of Student Conduct (i.e., committed academic misconduct), the sanctions for the misconduct could include suspension or dismissal from the University and a failing grade in this course. If you have any questions about the above policy, please contact me. Other sources of information on academic misconduct (integrity) include: COAM's web page (<http://oaa.osu.edu/coam/home.html>) "Eight Cardinal Rules of Academic Integrity" (<http://www.northwestern.edu/uacc/8cards.html>)

EXAMS AND GRADING:

2 quizzes (25 points each) and a final exam (100 points) will be given in this course. The final grade will be based on 150 points, Tests will be composed of short answer questions.

Grade	Total points	%
A	135-150	90-100
B	120-134	80-89
C	105-119	70-79
D	90-104	60-69
E	<90	<60

OFFICE HOURS: At specific times (TBA) as well as by appointment.

ACCOMODATIONS FOR DISABLED STUDENTS: Everything possible will be done to make every reasonable program or facility adjustment to assure success for each student.

COURSE DESCRIPTION:

This course is designed for biology majors or non-majors with a basic knowledge of biology. This course will serve as an introduction to basic principles of neurophysiology. It will begin with lectures covering basic properties of ion channels, mechanisms of action potential generation and propagation, and principles of synaptic transmission. In the last part of the course, the basic concepts will be incorporated into a discussion of neurophysiological mechanisms of specific systems such as the motor, sensory, and autonomic nervous systems. Disease states which involve changes in neurophysiological properties (e.g., demyelinating diseases, channelopathies) of neurons and their processes will be included in the last part of the course.

SCHEDULE

WEEK 1:
Lecture 1: Introduction. Methods for obtaining physiological data – Extracellular recording, intracellular recording, patch clamp. In vivo and in vitro models.

Lecture 2: General Overview: Electric Potential across nerve cell membrane.

WEEK 2:
Lecture 1: Diversity of ion channels and role of Na^+/K^+ pump

Lecture 2: Ionic basis of resting membrane potential

WEEK 3:
Lecture 1: Voltage Dependent Membrane Permeability

Lecture 2: Action potential generation: Ionic basis

WEEK 4:
Lecture 1: Action Potential propagation

Lecture 2: Role of Refractory Period and Myelination in action potential propagation

WEEK 5:
Lecture 1: Quiz 1

Lecture 2: Types of Channels: Voltage gated, Ligand gated, Stretch & Heat Activated

WEEK 6:
Lecture 1: Transmitters: Properties, transport, release

Lecture 2: Neurotransmitter receptors

WEEK 7:
Lecture 1: Synaptic transmission: Excitatory and inhibitory transmission, properties of synaptic potentials Ionotropic vs metabotropic transmission

Lecture 2: Summation of synaptic potentials

WEEK 8:
Lecture 1: Intracellular signal transduction and synaptic plasticity

Lecture 2: Electrical Synapses (Gap Junctions)

WEEK 9:
Lecture 1: Quiz 2

Lecture 2: Systems lecture – LTP in learning and memory

WEEK 10:
Lecture 1: Systems lecture – LTD in motor coordination

Lecture 2: Systems lecture – Physiology of motor system

WEEK 11:
Lecture 1: Systems lecture – Sensory Physiology

Lecture 2: Physiology of Glia

WEEK 12:
Lecture 1: GABA as an excitatory transmitter

Lecture 2: Neurophysiology related to Disease – Channelopathies (e.g., calcium-sensitive potassium channelopathy in epilepsy)

WEEK 13:
Lecture 1: Neurophysiology related to Disease – Dopaminergic system in Parkinson's disease

Lecture 2: Neurophysiology related to Disease – Cholinergic modulation of cortical function

WEEK 14
Lecture 1: Neurophysiology related to Disease – Demyelinating diseases (e.g., multiple sclerosis)

Lecture 2: Neurophysiology related to Disease – Physiology of Pain

WEEK 15: Final Exam