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 semester.

NEUROSC 5640: Neuronal Signal Transduction

3 semester hours

Semester: Fall

Class Schedule: 90 minute lectures: meets three times a week

Instructor: Dr. Karl Obrietan

Phone: 292-4432
Office: 4036 Graves Hall
Email: Obrietan.1@osu.edu

Required Text: Cell Signaling Third Addition. John Hancock. Oxford Press

Additional reading material will be drawn from recent review articles.

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.

Exams and Grading: 3 Exams (50 points each).

Tests will be based on short answer questions and multiple choice questions.

Grading will be 'curved', with the best grade receiving an 'A', and serving as the top of the curve (i.e., 100%). From the top of the curve, grades will be based on the following percentiles:

93 - 100 (A)
90 - 92.9 (A-)
87 - 89.9 (B+)
83 - 86.9 (B)
80 - 82.9 (B-)
77 - 79.9 (C+)
73 - 76.9 (C)
70 - 72.9 (C-)
67 - 69.9 (D+)
60 - 66.9 (D)
Below 60 (E)

Hence, it is conceivable for all students to receive an 'A' grade.

Prerequisites: NEUROSC 3000 and 3050

Office Hours: To be determined.

Accommodation for disabled students: Any student who feels s/he may need an accommodation based on the impact of a disability should contact me privately to discuss your specific needs.

Course description: This course will focus on the fundamental intracellular signaling events and transcriptional control mechanisms that shape CNS physiology and pathophysiology. Cellular signaling pathways will be functionality and mechanistically deconstructed and then placed within a relevant context (e.g., learning and memory, circadian timing, stroke, Alzheimer's disease). Similar approaches will be used to describe the basic molecular mechanisms that regulate transcriptional and translational control mechanisms in the nervous system. This course is designed for students with a background in cellular and molecular neurobiology. By the end of the course students will have a deep understanding of the cellular signaling networks upon which CNS functionality is based.

Lecture Topics:

Week 1

Lecture day 1: An overview of cell signaling

Lecture day 2: Kinases and phosphatases: classifications and basic functional features

Lecture day 3: Ionotropic receptors and metabotropic receptors

Week 2

Lecture day 4: Calcium signaling and CaMK pathways

Lecture day 5: cAMP-PKA, cGMP-PKG, NOS pathways

Lecture 6: Test #1

Week 3

Lecture day 7: RAS and ERK/MAPK signaling

Lecture day 8: CREB and the CRE-transcriptional pathway

Lecture day 9: Learning and memory: cAMP, Ca^{2+}, MAPK and CREB

Week 4

Lecture day 10: Cell death signaling: apoptotic, necrotic and autophagic pathways

Lecture day 11: Neuroprotective signaling and transcriptional pathways: NRF-2, Sirtuins, NF-kB, AKT signaling

Lecture day 12: MAPK signaling, neuroprotection and cell death.

Week 5

Lecture day 13: Test #2

Lecture day 14: Synaptic activity and gene transcription I

Lecture day 15: Synaptic activity and gene transcription II

Week 6

Lecture day 16: Inducible translation control: PI3K, mTor, MNK signaling

Lecture day 17: Chromatin structure and dynamic epigenetic regulatory mechanisms I

Lecture day 18: Chromatin structure and dynamic epigenetic regulatory mechanisms II

Week 7

Lecture 19: Non-coding RNA expression and function

Lecture 20: Kinase signaling at the synapse: scaffolding proteins, translation control and activity-dependent structural plasticity

Lecture day 21: Test #3

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>).