Cellular and Molecular Neuroscience

Instructor : Dr. Maegan Weltzin, 907-474-6527, mmweltzin@alaska.edu
Department of Chemistry and Biochemistry
Murie 113E

Lecture: MWF 11:45 am ±

1-3 M Murie 113E or arrange via phone/email

Textbook s

9781605353807

3rd Edition, 2014); Academic Press John H. Byrne, Ruth Heidelberger, M. Neal Waxham, ISBN-13: 978-0123971791 or ISBN-10: 0123971799

Additional Reading: Scientific research articles and review articles (PDF via Blackboard)
Handouts provided in class

Course Description (modified from catalogue)
Neuroscience is a complex discipline integrating concepts of chemistry, physics, biochemistry, cell biology, pharmacology, physiology, anatomy, and psychology. The goal of this course is to provide both undergraduate and graduate students a comprehensive foundation of the cellular and molecular concepts governing the function and communication of the developing and adult nervous system ultimately forming complex behaviors such as learning and memory. Topics addressed will include membrane excitability, ion channel function, G-protein signaling, synaptic transmission, development of the nervous system and innervation patterns. Fundamentals of the functional properties of neurons will provide the background for discussions of small neuronal circuits that regulate behavior, the cellular/molecular basis of learning and memory, and pharmacological approaches for the treatment of neuronal pathologies.

Course Goals:

- x Acquire the foundation of the cellular and molecular concepts governing neuronal communication
- x Understand how cellular and molecular concepts integrate into complex behaviors
- x Appreciate parallels between development and plasticity of neuronal interconnectivity
- x Acquire the ability to critically evaluate scientific research articles in (l)5(ul)tp< moleculaɪtnter x

ISBN:

Learning Outcomes:

- To understand membrane potential and excitability
- To understand neuronal action potentials
- To understand synaptic transmission
- To understand structure/function aspects of voltage and ligand-gated ion channels
- To understand G-protein signaling
- To understand early brain development (gastrulation, neurulation)
- To understand cellular adhesion and neuronal process outgrowth
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End of Semester Presentations: Students will receive adequate preparation time for all oral assignments including research article discussions and end-of-semester presentation. Scoring of presentations will be performed using a rubric (posted on blackboard). Undergraduate students will work and present in small groups, while graduate students will present independently. Presentations should be about 15-20 min in length.

End of Semester Review Paper: Each graduate student will write a review paper on a contemporary topic in cellular, molecular, or developmental neuroscience to provide additional knowledge to topics previously addressed in the course. The topic can be the same as your end of semester presentation. Scoring rubric will be posted on blackboard.

Portfolio: Essential topics addressed over the course of the semester will be summarized as short essays guided by specific questions end of chapter questions. Generally assignments are due one-week after the date they were assigned or as specified by the instructor.

Late assignments: Are not accepted. Students are given at least one week to complete assignments.

Grading:

Evaluation Type	Undergraduates	Graduates