BioS 489 Cellular Neurobiology Laboratory Fall 2017 CRN 32398
Course Syllabus

Instructors:
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Teaching Assistant:
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Office Hours: Wednesday, 5-6pm SELE 4068E

Laboratory Times: Monday and Wednesday, 2-5pm SELE 4068E

Course Description: The brain is composed of neuronal networks that communicate via synaptic transmission, which is the basis for all behavior and cognitive functions. This course will introduce key concepts in neurotransmission and provide hands-on experiments to understand the underlying molecular mechanisms. Students will use state-of-the art optogenetic techniques, live imaging, and whole animal behavioral experiments to probe this fascinating process. Through the analysis of wildtype and mutant animals, as well as affects of pharmacological agents, students will learn the critical importance of various synaptic proteins in proper synaptic function.

Office Hours: Dr. Gong or Dr. Martin will have office hours Monday right after class in SELE 4068E or by appointment.

Attendance: Attendance is REQUIRED at all lab classes and scheduled exams, except in cases of documented illness, mandatory religious obligations, or official University activities. To be excused from attending an exam, an official medical certificate or an affidavit is required.

Academic Dishonesty Policy: Any student caught copying others' work on an assignment or exam or cheating in any other way will receive a zero for that assignment or exam and will be referred to the Student Judicial Affairs Committee, the Department Chair and/or Dean. Be sure to give proper attribution when using others' work in laboratory assignments.

Students with disabilities: Students with disabilities who require accommodations for access and participation in this course must be registered with the Office of Disability Services (ODS); they can be reached at 312-413-2103 (voice) or 312-413-0123 (TTY).
Grading:
Quizzes = 15% of Total
Participation = 10% of Total
In-class Laboratory Write Ups = 15% of Total
Lab Reports (4) = 40% of Total
Final Presentation = 20% of Total

***NO MAKE-UP LAB REPORTS OR MAKE-UP QUIZZES ALLOWED FOR ANY REASON***

Schedule:

Week 1 (Aug 28th and 30th)
Mon: Overview of class syllabus, lab report template
Lecture - Synaptic transmission
No lab

Wed: Lecture and lab on NIH ImageJ

Week 2 (Sept 4th and 6th)
Mon: Labor Day, No Class

Wed: Quiz on materials from the previous week
Lecture - pHluorin application
Lab – Practice identifying distribution of synaptophysin within presynaptic terminals

Week 3 (Sept 11th and 13th)
Mon: Quiz on materials from the previous week
Lab – pHluorin experiments before and after application of bafilomycin, a vesicular proton pump inhibitor, and dynasore, a dynamin GTPase inhibitor, & data analysis

Week 4 (Sept 18th and 20th)
Mon: Quiz on materials from the previous week, Lab Report 1 Due
Lab – pHluorin imaging in wildtype and Synaptotagmin 1 Knockout neurons (+/+ and -/-) and analysis

Week 5 (Sept 25th and 27th)
Mon: Review Lab Report 1
Lab - pHluorin experiments with calcium channel blockers, after extracellular solution with 0 Ca²⁺ and data analysis

Wed:
Lab - pHluorin experiments with varying stimulation protocols in cell cultures and data analysis
Week 6 (Oct 2nd and 4th)
Mon: Quiz on materials from previous week, Lab Report 2 Due
Lecture - Introduction to C. elegans: Locomotion as a proxy for synaptic transmission
Lab – Worm handling

Wed:
Lab – C. elegans locomotion assays in wildtype and mutant worms, data analysis

Week 7 (Oct 9th and 11th)
Mon: Review of Lab Report 2
Lecture – Acetylcholine synthesis and degradation pathway
Lab – Dylox experiments on wildtype and mutant worms

Wed:
Lab – Dylox experiments on wildtype and mutant worms

Week 8 (Oct 16th and 18th)
Mon: Quiz on materials from the previous week
Lecture – Acetylcholine receptor function in C. elegans
Lab – Acetylcholine agonist experiments with wildtype and mutant worms

Wed:
Lab – Acetylcholine receptor imaging with control and mutants, data analysis

Week 9 (Oct 23rd and 25th)
Mon: Quiz on materials from the previous week, Lab Report 3 Due
Lecture – Optogenetics and use of channelrhodopsin
Lab - worm locomotion with channelrhodopsin with different stimulation protocols

Wed:
Lab - worm locomotion with channelrhodopsin in mutant backgrounds with different mutants, data analysis

Week 10 (Oct 30th and Nov 1st)
Mon: Review Lab Report 3
Lecture – Role of calcium in synaptic signaling and calcium imaging
Lab – Calcium imaging of wildtype worms with/without stimulation

Wed: Calcium imaging of wildtype and mutant worms, data analysis
Week 11 (Nov 6th and 8th)
Mon: Quiz on materials from the previous week
Lecture – Calcium homeostasis
Lab – Calcium imaging of wildtype worms and mutants

Wed: Calcium imaging and data analysis

Weeks 12-13 (Nov 13th and 15th & Nov 20th and 22nd)
Mon: Lab Report 4 Due

During these weeks students will independently collect and analyze data needed for their final presentations and work on putting the presentations together

Week 14 (Nov 27th and 29th)
Final Presentations

Week 15 (Dec 4th and 6th)
Final Presentations

NOTE: We reserve the right to make changes in this syllabus. Any changes will be announced in lecture or posted on the Blackboard website.