

INSC/CAMB 597 – Neural Development, Regeneration and Repair

Wednesday and Friday 10:30 – 12:00

Location: Stellar-Chance 104

Mandatory Organizational Meeting: Aug 28, 10:30am
Location: Stellar-Chance 204

Course Directors:

Greg Bashaw (gbashaw@penmedicine.upenn.edu)
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Additional Instructors:

Jonathan Raper (raperj@penmedicine.upenn.edu)
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General Description: The goals of this course are to examine the principles underlying nervous system development and to learn how understanding developmental mechanisms can inform strategies to promote regeneration and repair. **This is not a survey course.** Rather, the course will focus on selected topics, for which we will discuss the genetic, molecular and cellular strategies employed to study these problems in different model organisms. Emphasis is on how to interpret and critically evaluate experimental data.

Fall 2019 Topics: Generation of Neuronal Diversity; Wiring the Olfactory System; Axon Guidance at the Midline; Axon Degeneration and Regeneration; Synapse Formation; Epigenetic mechanisms in neural development and regeneration; Glia and neural repair.

Textbooks: No specific textbooks are required. The following texts are useful resources. *Developmental Biology* by Scott Gilbert; *Development of the Nervous System* by Sanes, Reh, and Harris; and *Molecular and Cellular Approaches to Neural Development* edited by Cowan, Jessell, and Zipursky.

Format: Each class is 1.5 hours in length. During the first hour, an assigned paper will be discussed in detail. During the last 20-30 minutes, faculty will introduce methods, concepts, and background information pertinent to the paper that will be discussed at the following meeting.

While faculty will provide guidance during the discussion, students will be primarily responsible for presenting and discussing the papers. So that every participant can contribute thoughtfully to the discussion, you should come prepared to answer these questions:

- 1) What was the main finding of the paper (2 sentences)?
- 2) What experiment produces the authors' most convincing data?
- 3) What experiment is the least convincing or weakest? Why?
- 4) What hypothesis derived from this paper would you set out to test next, and how (3-4 sentences)?

You will submit written answers to these questions at the beginning of each class- so do not try to read the paper just before class. We use these write-ups to help facilitate discussion.

Grading: A) Participation in paper presentation and discussion: 50%. During the semester, you will receive feedback on your participation by e-mail. B) Two 2-page research type proposals, 25% each. Each proposal will be on a topic of your choice that has already been discussed in the course. Guidelines on the proposal as well as some examples will be posted on the Blackboard

Course Web page: This course will use Penn's Canvas website. Papers, reviews and lecture notes will be posted in the Modules section.

Syllabus: Neural Development, Regeneration and Repair (Fall 2019)

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Date	Topic	Faculty	Second Faculty
Wed 8/28	ORGANIZATIONAL MEETING Introduction to first paper	Greg Bashaw/Yuanquan Song	
Fri 8/30 Wed 9/4 Fri 9/6	GENERATION OF NEURAL DIVERSITY <i>Spatial, Target and Temporal influences on Neuronal Identity</i>	Greg Bashaw	Jennifer Orthmann-Murphy
Fri 9/13 Wed 9/18 Fri 9/20 Wed 9/25	WIRING THE OLFACTORY SYSTEM <i>Axon Targeting in the Olfactory Bulb</i>	Jonathan Raper	Greg Bashaw
Fri 9/27 Wed 10/2 Fri 10/4	AXON GUIDANCE at the CNS Midline	Greg Bashaw	Yuanquan Song
Wed 10/9 Fri 10/11	SYNAPTIC DEVELOPMENT: <i>Relationships between specification, maintenance and plasticity</i>	Marc Fuccillo	Yuanuan Song
Wed 10/16	Proposal Writing	Greg Bashaw/Yuanquan Song	
Fri 10/18 Wed 10/23	SYNAPTIC DEVELOPMENT: <i>Relationships between specification, maintenance and plasticity</i>	Marc Fuccillo	Yuanuan Song
First written proposal due November 1st			
Wed 10/30 Fri 11/1 Wed 11/6	<i>EPIGENETIC MECHANISMS IN NEURON DEVELOPMENT AND REGENERATION</i>	Hongjun Song & Guoli Ming	Greg Bashaw
Fri 11/8 Wed 11/13 Fri 11/15 Wed 11/20	AXON DE- and REGENERATION	Yuanquan Song	Greg Bashaw
Fri 11/22 Wed 11/27	GLIA AND NEURAL REPAIR	Jennifer	Yuanquan Song

Wed 12/4		Orthmann- Murphy	
2nd written proposal due December 15th			