INSC/CAMB 597 – Neural Development, Regeneration and Repair

Wednesday and Friday 11:00 – 12:30
Wednesdays Room 1101, BRB II/III, Fridays Room 1301 BRB II/III

Mandatory Organizational Meeting: September 7, 11:00AM in 1101 BRB II/III

Course Directors:
Greg Bashaw (gbashaw@mail.med.upenn.edu)
Wenqin Luo (luow@mail.med.upenn.edu)

Additional Instructors:
Stewart Anderson (sande@mail.med.upenn.edu)
Jonathan Raper (raperj@mail.med.upenn.edu)
Marc Fuccillo (fuccillo@mail.med.upenn.edu)

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 2016 Topics: Generation of Neuronal Diversity; Specification of Inhibitory Interneurons and Stem Cell replacement strategies; Axon Guidance at the Midline and Regeneration in the Spinal Cord; Wiring the Olfactory System; Synapse Formation; Mechanosensory Circuit Formation and Insights into Pain and Itch.

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 2016)**

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<table>
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<tr>
<th>Date</th>
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| Wed 9/7 11:00 AM | ORGANIZATIONAL MEETING
Introduction to first paper | Greg Bashaw/Wenqin Luo |
| Fri 9/9 | GENERATION OF NEURAL DIVERSITY
Spatial, Target and Temporal influences on Neuronal Identity | Greg Bashaw |
| Wed 9/14 | SPECIFICATION OF INHIBITORY INTERNEURONS and STEM CELL BASED REPAIR | Stewart Anderson |
| Fri 9/16 | WIRING THE Olfactory System
Axon Targeting in the Olfactory Bulb | Jonathan Raper |
| Fri 9/28 | AXON GUIDANCE at the CNS Midline | Greg Bashaw |

**First written proposal due November 1st**

| Fri 10/28 | AXON DE- and REGENERATION | Wenqin Luo |
| Wed 11/2 | | Jonathan Raper |
| Fri 11/4 | | |
| Wed 11/9 | SYNAPTIC DEVELOPMENT:
Relationships between specification, maintenance and plasticity | Marc Fuccillo |
| Fri 11/11 | | |
| Wed 11/16 | | |
| Fri 11/18 | | |
| Wed 11/30 | MECHANOSENSORY CIRCUIT FORMATION
Insights into Pain and Itch | Wenqin Luo |
| Fri 12/2 | | |
| Wed 12/7 | | |
| Fri 12/9 | | |

**2nd written proposal due December 15th**