

INSC/CAMB 597 – Neural Development, Regeneration and Repair

Wednesday and Friday 10:15 – 11:45.

Mandatory Organizational Meeting: Sep 8,

Class Location: Richard C610 (facial mask is required for in-person classes)

Course Directors:

Wenqin Luo (luow@penncmedicine.upenn.edu)
Jonathan Raper (raperj@penncmedicine.upenn.edu)

Additional Instructors:

Greg Bashaw (gbashaw@penncmedicine.upenn.edu)
Marc Fuccillo (fuccillo@penncmedicine.upenn.edu)
Jennifer Orthmann-Murphy (jennifer.orthmann-murphy@penncmedicine.upenn.edu)
Frederick Bennett (frederick.bennett@penncmedicine.upenn.edu)
Yuanquan Song (songy2@email.chop.edu)
Steward Anderson (sande@penncmedicine.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 2021 Topics: Synapse Formation; Axon guidance and midline crossing, Development and regeneration of glia cells; Axon Degeneration and Regeneration; development and regeneration of interneurons.

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 (**please email your answers to the faculty by 10:00am of the class date or submit a printout at the 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: 70%. During the semester, you may receive informal feedback on your participation by e-mail. Please also feel free to email the faculty for your questions, thoughts, suggestion, and feedbacks. B) One 2-page research type proposals, 30%. The proposal will be on a topic of your choice that has already been discussed in the course. The student will write a first draft, and then update the proposal after receiving the written critiques from the course directors. 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 (Summer 2021)

Date	Topic	Faculty	Second Faculty
Wed 9/8	ORGANIZATIONAL MEETING Introduction to first paper	Wenqin Luo/Greg Bashaw	All faculty
Fri 9/10 Wed 9/15 Fri 9/17	Axon midline crossing	Greg Bashaw	Wenqin Luo
Wed 9/22 Wed 9/29 Fri 10/1	Development and regeneration of interneurons	Steward Anderson	Wenqin Luo
Wed 10/6 Fri 10/8 Wed 10/13	Axon Guidance	Jon Raper	Wenqin Luo
Fri 10/15	Proposal Writing	Wenqin Luo	
Wed 10/20 Fri 10/22 Wed 10/27 Fri 10/29	Regeneration the nervous system	Yuanquan Song	Jon Raper
Wed 11/3 Fri 11/5 Wed 11/10	Development and regeneration of glia cells	Jennifer Orthmann-Murphy & Frederick Bennett	Jon Raper
Fri 11/12 Wed 11/17 Fri 11/19	SYNAPTIC DEVELOPMENT and Regeneration	Marc Fuccillo	Jon Raper
1st draft of written proposal due 12/6, critiques back by Dec 15, and the final proposal due Dec 22			Wenqin Luo/Jon Raper