

INSC/CAMB 597 – Neural Development, Regeneration and Repair

Wednesday and Friday 10:15 – 11:45.

Mandatory Organizational Meeting: September 14,

Class Location: Richard C108 (facial mask is required for in-person classes)

Course Directors:

Wenqin Luo (luow@penncare.upenn.edu)

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Additional Instructors:

Frederick Bennett (frederick.bennett@penncare.upenn.edu)

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Jennifer Orthmann-Murphy (jennifer.orthmann-murphy@penncare.upenn.edu)

Bushra Raj (bushra.raj@penncare.upenn.edu)

Yuanquan Song (songy2@email.chop.edu)

Katherine Uyhazi (katherine.uyhazi@penncare.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 2022 Topics: Development of neurons, Axon guidance and midline crossing, Synapse Formation; Development and regeneration of glia cells; Axon Degeneration and Regeneration; Regeneration of retina neurons.

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 (**exception: the two student presentation sessions will be 2 hours**). 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 first develop a hypothesis and present it to receive feedback from the peers and course directors. The student will then write the proposal, and the course directors will given written feedback. 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 2022)

Date	Topic	Faculty	Second Faculty
Wed 9/14	ORGANIZATIONAL MEETING Introduction to first paper	Wenqin Luo	All faculty

Fri 9/16 Wed 9/21 Fri 9/23	Development and regeneration of glia cells	Jennifer Orthmann-Murphy & Frederick Bennett	Wenqin Luo
Wed 9/28 Fri 9/30 Wed 10/5	Development of cortical neurons	Bushra Raj	Jon Raper
Fri 10/7	Proposal Writing	Wenqin Luo/Jon Raper	
We 10/12 Fri 10/14 Wed 10/19	Regeneration the nervous system	Yuanquan Song	Jon Raper
Fri 10/21 Wed 10/26 Fri 10/28	Development of neurons in <i>C. elegans</i>	Michael Hart	Wenqin Luo
Wed 11/2 Fri 11/4 Wed 11/9	SYNAPTIC DEVELOPMENT and Regeneration	Marc Fuccillo	Jon Raper
Wed 11/16	Regeneration of Retina neurons	Katherine Uyhazi	Wenqin Luo
Fri 11/18	Student miniproposal presentation (#1)	Wenqin Luo/Jon Raper	
Wed 11/30	Regeneration of Retina neurons	Katherine Uyhazi	Jon Raper
Fri 12/2	Student miniproposal presentation (#2)	Wenqin Luo/Jon Raper	
Written proposal due 12/12, critiques back by 12/22			Wenqin Luo/Jon Raper