

## **CAMB/INSC 597 – Neural Development, Regeneration and Repair**

Tuesday and Friday 10:15 – 11:45

**Mandatory Organizational Meeting: Tuesday January 20<sup>th</sup>,  
Class Location: Steller-Chance Labs (SCL) 204, (except 4/23 SCL104)**

Course Directors:

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Additional Instructors:

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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.

**Spring 2025 Topics:** Neural Diversity; Wiring in the Olfactory System; Synaptogenesis; Axon Degeneration and Regeneration; Dendrite Morphogenesis and Self Avoidance; Development of the sleep circuit; Glia in neurodevelopment and function; Organoid models.

**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 (preferred) at the class.** We use these write-ups to 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, suggestions, and feedback. B) One 2-page research proposal, 30%. The proposal will be on a topic of your choice that is covered in the course. There will be one course section dedicated to discussing the proposal assignment. You will then turn in a draft of the proposal on by **April 12<sup>th</sup>** and then a final revised proposal based on faculty feedback will be due on **May 10<sup>th</sup>**.

**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 (Spring 2025)**

Date	Topic	Faculty	Second Faculty
Tue 1/20	ORGANIZATIONAL MEETING Introduction to Olfactory Wiring	Greg Bashaw Yuanquan Song	All faculty
Tue 1/27 Fri 1/30 Tue 2/3	Olfactory Wiring	Jonathan Raper	Greg Bashaw
Fri 2/6 Tue 2/10 Fri 2/13	Neural Diversity: Spatial, Temporal and Target Influence on Neural identity	Greg Bashaw	Yuanquan Song
Tue 2/17 Fri 2/20 Tue 2/24	Axon Degeneration and Regeneration	Yuanquan Song	Greg Bashaw

Tue 3/3	Synaptogenesis	Michael Hart	Yuanquan Song
Fri 3/6	Proposal Writing	Greg Bashaw Yuanquan Song	
Tue 3/10 Fri 3/13	Synaptogenesis	Michael Hart	Yuanquan Song
Tue 3/17 Fri 3/20 Tue 3/24	Development of the sleep circuit	Matthew Kayser	Greg Bashaw
Fri 3/27 Tue 3/31 Fri 4/3	Glia in neurodevelopment and function	Mariko Bennett	Yuanquan Song
Tue 4/7 Fri 4/10 Tue 4/14	Dendrite Morphogenesis and Self Avoidance	Greg Bashaw	Yuanquan Song
Tue 4/21 <b>Thu 4/23</b> Tue 4/28	Organoids	Isaac Chen	Greg Bashaw
<b>Written proposal draft due 4/12, critiques back by 4/26</b> <b>Final revised proposal due 5/10</b>			Greg Bashaw Yuanquan Song