Topics in Neurobiology and Behavior: Plasticity of the Nervous System
Spring 2016, Mondays 2:10-4pm
200 C Schermerhorn
Instructor: Tina Kao, PhD
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Office hours: Monday 1pm-2pm, 4pm-5pm

Course Overview: This seminar provides an overview of the mechanisms and behaviors associated with neural plasticity. Students will obtain a basic working knowledge of the different types of neural plasticity, and how these affect cognition and behaviors. Topics will vary weekly, and different scientific literature from different journal articles that are associated with the weekly topics will be interpreted and discussed. The topics to be addressed range from developmental, to structural, functional, and to injury and activity induced plasticity. The journal articles will encompass data collected from both human and non-human models. Upon successful completion of this seminar, students will be better able to evaluate and critique scientific literature. In addition, this course will prepare students to approach scientific questions with vigor and validity, and therefore, be better at objective, critical and analytical thinking.

Course Prerequisite: PSYC W1001 and/or PSYC W1010 is required, plus permission of the instructor.

Course Format: Basic background concepts of the very diverse fields of plasticity of the nervous system will be presented, and serve as the core knowledge associated with the weekly topics. For the weekly topics, reading assignments will consist of scientific literature from journals relevant for Psychology and Neuroscience. Readings will be made available through CourseWorks. Most of the classes will consist of an lecture overview of the relevant topic followed by presentations and discussions of the readings. A final paper will be required. This paper will be written similar to that of a scientific review article. Based on students’ interests, students can choose their own topic for the final paper. A brief presentation by each student on their final paper will be required.

Course Requirements: See below

Weekly readings/and submission of comments/questions/thoughts (25%) - each student is expected to read the assigned scientific articles for every class. By 5pm the day before each class, each student is expected to post substantial comment(s), question(s), or thought(s) on the research article to be discussed during class the following day. Your postings will be made, and available to view, on the course’s Discussion Board of CourseWorks.

Presentation of assigned research article (25%) – each week, at least 1 student will present on one assigned article. The presentation should consist of the use of slides, and the student presenting will lead the discussion of the scientific paper. Based on current enrollment, which may change, each student will give one presentation on an assigned research article.
**Review Paper (30%)** – A final review paper is required. This paper can consist of any topic of your choosing that we have discussed during the semester. Students will have gained familiarity of review articles throughout the course, because many of the assigned readings will consist of review articles along with scientific research articles. You are expected to inform the professor of the topic you plan on writing about, and your review paper will be submitted at the beginning of class on April 25. Papers are expected to be between 8 – 12 pages.

**Presentation of review papers (10%)** – each student will be expected to give a brief presentation on their review paper. The presentation should consist of the use of slides, and consist of “summarizing” the topic you have chosen for your review paper.

**Class participation (10%)** – students are expected to attend every class session and participate in discussions.

**Course Schedule:** See below

*Please note that readings and topics may be subject to change based on student enrollment and preferences. In addition, January 18th is a holiday so the university was closed and no classes were held.*

**Week 1 (January 25): Introduction and Overview**

**Week 2 (February 1): Cortical Maps**

Presenter: Professor Kao

- Dynamic Reorganization of Digit Representations in Somatosensory Cortex of Nonhuman Primates after Spinal Cord Injury
- Cortical Maps

**Week 3 (February 8): Compensation Properties of the Brain**

Student Presenter

- Compensatory plasticity: time matters
- Occipital cortical thickness predicts performance on pitch and musical tasks in blind individuals

**Week 4 (February 15): Behavioral Implications of Brain Injury**

Student Presenter

- Compensatory Versus Noncompensatory Shoulder Movements Used for Reaching in Stroke
- Rehabilitation And Plasticity Following Stroke: Insights from Rodent Models

**Week 5 (February 22): Dynamic Properties of Myelin**

Student Presenter

- A Critical Period for Social Experience–Dependent Oligodendrocyte Maturation and Myelination
- Myelin plasticity in the central nervous system

**Week 6 (February 29): Neurogenesis and Synaptic Plasticity**

Student Presenter
• Adult Neurogenesis and Dendritic Remodeling in Hippocampal Plasticity: Which One Is More Important?
• Long-term exercise is needed to enhance synaptic plasticity in the hippocampus

Week 7 (March 7): Prenatal Toxins on Postnatal Behaviors
Student Presenter
• Life-long consequences of juvenile exposure to psychotropic drugs on brain and behavior
• School-Aged Outcomes following Prenatal Methamphetamine Exposure: 7.5-Year Follow-Up from the Infant Development, Environment, and Lifestyle Study

Week 8 (March 14): SPRING BREAK

Preliminary topics for classes after Spring Break include addiction, language, music, learning and memory, mental disorders.

Week 9 (March 21):

Week 10 (March 28):

Week 11 (April 4):

Week 12 (April 11):

Week 13 (April 18):

Week 14 (April 25): Review Paper due at the beginning of class

Week 15 (May 2): Student Presentations on Review Papers