**PSYCGU4482**

**Neural Plasticity**

**Day:**Tuesday   **Time:**2:10pm – 4:00pm **Class Location:**TBD

**Name of Instructor:**Tina Kao, PhD**Email address:**tk2436@columbia.edu

**Office Location:**500 Schermerhorn **Office Hours:**schedule for appointment

**Overview**

This seminar provides an overview of the mechanisms associated with neural plasticity. Students will obtain a basic working knowledge of the different types of neural plasticity, and how these affect cognitions and behaviors. Topics will vary weekly, and original scientific research articles, along with original scientific review articles, will be interpreted and discussed. The topics to be addressed range from structural, functional, injury, experience, and activity induced neural plasticity. The scientific articles will encompass data collected from both human and non-human models.

Upon successful completion of this seminar, students will be better able to:

1. understand the mechanisms of different forms of neural plasticity;
2. evaluate and critique current scientific findings in this dynamic field

Successful completion of this course will also prepare students to approach scientific questions with vigor and validity, and therefore, be better at objective, critical and analytical thinking.

**Prerequisites**

PSYC UN1001 The Science of Psychology, or an equivalent introductory psychology course, plus PSYC UN2430 or PSYC UN2450 or another intermediate-level course in neuroscience, and instructor permission.

**Contributions to Curriculum**

GU4482 is a seminar course open to graduate students, and advanced undergraduate students. This course fulfills the following degree requirements:

* For students pursuing the Psychology major and the Postbaccalaureate Certificate Program in Psychology, this course fulfills the seminar requirement.
* For students pursuing the Psychology major or concentration and the Postbaccalaureate Certificate Program in Psychology, this course fulfills the Group II: Psychobiology & Neuroscience distribution requirement.
* For students pursuing the Neuroscience & Behavior major, the course fulfills the P5 Advanced Psychology Seminar requirement.

**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 Canvas. Most of the classes will consist of a lecture overview during the first half of class time, taught by the professor, followed by presentations and discussions of the assigned readings, led by a student, during the second half of class time. A final paper will be required for each student. This paper will be written similar to that of an original scientific review article. For this paper, students can choose their topic of interest (within neural plasticity).

**Requirements**

**Weekly readings and postings of comments/questions/thoughts on the original research article to be discussed (35%)** - Each student is required to read on a weekly basis, 1) the assigned *original review article*, along with 2) the assigned *original research article*. **By 9:00am (ET) the Monday before each class**, each student, other than the student presenter(s), must post substantial comment(s), question(s), or thought(s) on the original research article to be discussed for the following class.

Your postings are required to critique/address the contents of the actual original research article being assigned for the week - ***do not*only*include the following***: what future works should address about the topic at hand, what other works have addressed about the topic at hand. If I read your posts, and it is clear to me that you have not read the research article to include insightful comments based on the contents of the article itself, points will be deducted.

Your postings will be seen by everyone, and available to view on the course’s Discussions within Canvas. Discussions that are posted after their respective deadline dates/times will result in a reduction of 10% for every 24-hour cycle of lateness.

**Presentation(s) of assigned original research article (25%)** - Each week, a student will present on the assigned original research article (not on the assigned review article). The presentation should consist of using visual aids. Based on the expected enrollment of students, which may change, it is anticipated each student will be required to present on one assigned original research article during the semester.

**Original mini scientific review paper (30%)** – Throughout the course, students will gain increasing familiarity of peer reviewed original review articles, which are not the same as peer reviewed original research articles. Each student will be required to submit a paper written as an "original mini scientific review" paper. Your original mini scientific review paper can consist of any topic of your choosing that we have discussed during the semester. Recommended number of pages for this paper is 8-10. Do not include more than one figure, or modified figure, in your paper. Also, single space is required.

Prior to submitting your original mini scientific review paper, you are required to submit a paragraph/summary describing the topic of choice within neural plasticity that you plan on writing about, along with some citations. Submission of this paragraph/summary will be worth 5% of the 30% of your grade for this paper. Upon instructor approval of your submitted topic, you will then be required to submit a rough draft of your original mini scientific review paper, which will be 10% of the 30% of your final grade for the paper. The submission of your rough draft will allow the instructor to guide you to 1) better convey the content of the topic you chose, and 2) improve on your scientific writing skills.

Submissions after deadline dates/times will result in a reduction of 10% for every 24 hour cycle of lateness.

**Participation (10%)** - Students will be expected to attend every class session, and to complete all the requirements by their respective due dates/times.

**Weekly Schedule\***

\*Note that readings and topics may be subject to change based on student enrollment, and topic preferences. Instructor plans on finalizing the readings/topics by the first week of class.

**September 10: Introduction and Overview**

**September 17: Functional neural plasticity of reorganized cortical maps after spinal cord injury (Presenter: Tina Kao)**

**September 24: Compensatory structural neural plasticity and behavioral abilities in the blind (Presenter: )**

**October 1: Behavioral plasticity associated with musical training (Presenter: )**

**October 8: Functional and structural synaptic plasticity enhanced with exercise (LTP) (Presenter: )**

**October 15: Associative plasticity and induction of LTD (Presenter: )**

**October 22: Classical conditioning and structural neural plasticity of the olfactory system (Presenter: )**

**October 29: Behavioral and structural neural plasticity associated with deep brain stimulation and stress (Presenter: )**

**November 5: Election day (no class, but go vote!)**

**November 12: Physical conditioning on behaviors of sensorimotor gating presumably due to neural plasticity (Presenter: )**

*Paragraph/summary* describing the topic of choice for original mini review paper, along with citations, due by 2:10pm November 12

 **November 19: Neural plasticity associated with expert dance training (Presenter: )**

**November 26: Structural and functional neuroplasticity associated with cognitive behavioral therapy (Presenter: )**

*Rough draft of original mini review paper****due by 2:10pm November 26***

**December 2: Epigenetic neural plasticity and exposure based therapy for PTSD (Presenter: )**

**December 9: Functional neural plasticity of mirror visual feedback (Presenter: )**

**December 13: Original mini-scientific review paper due by 9:00am**