**Days/Times:** Tuesdays from 10:10am – 12:00pm                  
**Location:** 200C Schermerhorn                           
**Name of Instructor:** Tina Kao, PhD  
**Email of Instructor:** tk2436@columbia.edu        
**Office Hours:** Tuesdays 4:30pm-6:30pm  
**Office Location:** 500 Schermerhorn (if facing the elevators on the 5th floor of SCH, make a left to pass the double doors, keep going down the hall to the last door on your right, my name will be on the door to my office).

**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;  
3.    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 and advanced undergraduate students. This course fulfills the following degree requirements:  
•    For students pursuing a Psychology major and the Postbaccalaureate Certificate Program in Psychology, this course fulfills the seminar requirement.  
•    For students pursuing a Psychology major or concentration and the Postbaccalaureate Certificate Program in Psychology, this course fulfills the Group II: Psychobiology & Neuroscience distribution requirement.  
•    For students pursuing a 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 to 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 like that of an original scientific review article. For this paper, students can choose their topic of interest (within neural plasticity).

**Requirements**  
**- Postings of insightful and thought provoking comments/questions on the original research article to be discussed  in class (36%)**  
On a weekly basis, each student will be required to read 1) the assigned original review article, along with 2) the assigned original research article. By 11:59pm, the Sunday before each class, each student, other than the student presenter(s), must post substantial and thought provoking comment(s), question(s) on the original research article to be discussed for the following class.  
Your posted discussions are required to critique/address the contents of the actual original research article being assigned for the week. Do not only include the following for your posts: 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, points will be deducted.  
Discussions posts will be seen by everyone on Canvas. *Late submissions of any of the discussions will result in a reduction of 25% for every 24-hour cycle of lateness.*

**- Presentation(s) of assigned original research article (25%)**  
Each week, a student will present on their assigned original research article for that week (students do not need to present on the respective assigned review article). Based on the expected enrollment of students, which may change, it is anticipated each student will be required to present one original research article during the semester.

**- Original mini 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 review" paper. Your original mini 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 in your paper. Also, single space is required.  
Prior to submitting your final paper, you will be first required to submit a paragraph/summary describing the topic of choice within neural plasticity that you plan to write 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 can then submit your rough draft of the 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 your scientific writing skills. Your final paper will be worth 15% of your final grade for the paper. *Late submissions of any of the paper requirements will result in a reduction of 10% for every 24-hour cycle of lateness.*

**Participation (9%)**  
Students are 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 second week of class.

**January 21: Introduction and Overview**

[Lecture](https://courseworks2.columbia.edu/courses/214115/files/22998607?wrap=1)

[Actions](https://courseworks2.columbia.edu/courses/214115/assignments/syllabus)

**January 28: Functional neural plasticity of cortical maps and spinal cord injury**  
Presenter: Tina Kao

[Review article](https://courseworks2.columbia.edu/courses/214115/files/22982224?wrap=1)

[Actions](https://courseworks2.columbia.edu/courses/214115/assignments/syllabus)

[Research article](https://courseworks2.columbia.edu/courses/214115/files/22982223?wrap=1)

[Actions](https://courseworks2.columbia.edu/courses/214115/assignments/syllabus)

[Discussion](https://courseworks2.columbia.edu/courses/214115/discussion_topics/1365082)

[Lecture and presentation](https://courseworks2.columbia.edu/courses/214115/files/23068415?wrap=1)

[Actions](https://courseworks2.columbia.edu/courses/214115/assignments/syllabus)

**February 4: Structural neural plasticity and behavioral abilities in the blind**  
Presenter(s): Sofia

[Review article](https://courseworks2.columbia.edu/courses/214115/files/23031721?wrap=1)

[Actions](https://courseworks2.columbia.edu/courses/214115/assignments/syllabus)

[Research article](https://courseworks2.columbia.edu/courses/214115/files/23031720?wrap=1)

[Actions](https://courseworks2.columbia.edu/courses/214115/assignments/syllabus)

[Discussion](https://courseworks2.columbia.edu/courses/214115/discussion_topics/1373720)

**February 11: Functional (behavioral) neural plasticity associated with musical training**  
Presenter(s): Luca

[Review article.pdf](https://courseworks2.columbia.edu/courses/214115/files/23042327?wrap=1)

[Actions](https://courseworks2.columbia.edu/courses/214115/assignments/syllabus)

[Research article\_ Linguistic, perceptual, and cognitive.pdf](https://courseworks2.columbia.edu/courses/214115/files/23042325?wrap=1)

[Actions](https://courseworks2.columbia.edu/courses/214115/assignments/syllabus)

**February 18: Functional and structural synaptic plasticity associated with exercise (LTP)**

Presenter(s): Chloe

[Review article.pdf](https://courseworks2.columbia.edu/courses/214115/files/23042330?wrap=1)

[Actions](https://courseworks2.columbia.edu/courses/214115/assignments/syllabus)

[Research article\_ Long-term exercise.pdf](https://courseworks2.columbia.edu/courses/214115/files/23042331?wrap=1)

[Actions](https://courseworks2.columbia.edu/courses/214115/assignments/syllabus)

**February 25: Functional associative neural plasticity of LTD**  
Presenter(s): William, Claire

[Review\_Spike timing dependent plasticity.pdf](https://courseworks2.columbia.edu/courses/214115/files/23042333?wrap=1)

[Actions](https://courseworks2.columbia.edu/courses/214115/assignments/syllabus)

[Research article\_ Low-intensity repetitive paired associative stimulation.pdf](https://courseworks2.columbia.edu/courses/214115/files/23042332?wrap=1)

[Actions](https://courseworks2.columbia.edu/courses/214115/assignments/syllabus)

**March 4: Classical conditioning and structural neural plasticity of the olfactory system**

Presenter(s): Brea

[Review article 1.pdf](https://courseworks2.columbia.edu/courses/214115/files/23042262?wrap=1)

[Actions](https://courseworks2.columbia.edu/courses/214115/assignments/syllabus)

[Review article 2.pdf](https://courseworks2.columbia.edu/courses/214115/files/23042263?wrap=1)

[Actions](https://courseworks2.columbia.edu/courses/214115/assignments/syllabus)

[Research article.pdf](https://courseworks2.columbia.edu/courses/214115/files/23042261?wrap=1)

[Actions](https://courseworks2.columbia.edu/courses/214115/assignments/syllabus)

[Research article supplementary.pdf](https://courseworks2.columbia.edu/courses/214115/files/23042264?wrap=1)

[Actions](https://courseworks2.columbia.edu/courses/214115/assignments/syllabus)

**March 11: Functional (behavioral) and structural neural plasticity associated with deep brain stimulation and stress**  
Presenter(s): Ye-Ji, Sophia

[Review article\_DBS.pdf](https://courseworks2.columbia.edu/courses/214115/files/23042321?wrap=1)

[Actions](https://courseworks2.columbia.edu/courses/214115/assignments/syllabus)

[Research article\_DBS.pdf](https://courseworks2.columbia.edu/courses/214115/files/23042320?wrap=1)

[Actions](https://courseworks2.columbia.edu/courses/214115/assignments/syllabus)

**March 18: No class - spring recess**

**March 25: Physical conditioning on behaviors of sensorimotor gating and neural plasticity**  
Presenter(s): David

[Review article.pdf](https://courseworks2.columbia.edu/courses/214115/files/23042344?wrap=1)

[Actions](https://courseworks2.columbia.edu/courses/214115/assignments/syllabus)

[Research article\_ Associations between sensorimotor gating.pdf](https://courseworks2.columbia.edu/courses/214115/files/23042343?wrap=1)

[Actions](https://courseworks2.columbia.edu/courses/214115/assignments/syllabus)

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

**April 1: Functional neural plasticity associated with expert dance training**  
Presenter(s): Divya

[Review article.pdf](https://courseworks2.columbia.edu/courses/214115/files/23042336?wrap=1)

[Actions](https://courseworks2.columbia.edu/courses/214115/assignments/syllabus)

[Research article\_The Dancing Brain.pdf](https://courseworks2.columbia.edu/courses/214115/files/23042335?wrap=1)

[Actions](https://courseworks2.columbia.edu/courses/214115/assignments/syllabus)

**April 8: Structural and functional neural plasticity associated with cognitive behavioral therapy**  
Presenter(s): Darian

[Review article 1.pdf](https://courseworks2.columbia.edu/courses/214115/files/23042345?wrap=1)

[Actions](https://courseworks2.columbia.edu/courses/214115/assignments/syllabus)

[Review article 2.pdf](https://courseworks2.columbia.edu/courses/214115/files/23042346?wrap=1)

[Actions](https://courseworks2.columbia.edu/courses/214115/assignments/syllabus)

[Research article.pdf](https://courseworks2.columbia.edu/courses/214115/files/23042347?wrap=1)

[Actions](https://courseworks2.columbia.edu/courses/214115/assignments/syllabus)

**April 15: Epigenetic neural plasticity and exposure based therapy for PTSD**  
Presenter(s): Payton

[Review article.pdf](https://courseworks2.columbia.edu/courses/214115/files/23042318?wrap=1)

[Actions](https://courseworks2.columbia.edu/courses/214115/assignments/syllabus)

[Research article\_ Epigenetics of traumatic stress.pdf](https://courseworks2.columbia.edu/courses/214115/files/23042302?wrap=1)

[Actions](https://courseworks2.columbia.edu/courses/214115/assignments/syllabus)

[Research\_ Supplementary for research article.pdf](https://courseworks2.columbia.edu/courses/214115/files/23042303?wrap=1)

[Actions](https://courseworks2.columbia.edu/courses/214115/assignments/syllabus)

*Rough draft of original mini review paper due by 10:10am*

**April 22: Functional neural plasticity of mirror visual feedback**  
Presenter(s): Quan

[Review article.pdf](https://courseworks2.columbia.edu/courses/214115/files/23042342?wrap=1)

[Actions](https://courseworks2.columbia.edu/courses/214115/assignments/syllabus)

[Research article\_ Neural Correlates of MVF.pdf](https://courseworks2.columbia.edu/courses/214115/files/23042341?wrap=1)

[Actions](https://courseworks2.columbia.edu/courses/214115/assignments/syllabus)

**April 29: Functional neural plasticity associated with meditation and negative affective processing**  
Presenter(s): Hana, Sarah

[Review article.pdf](https://courseworks2.columbia.edu/courses/214115/files/23042339?wrap=1)

[Actions](https://courseworks2.columbia.edu/courses/214115/assignments/syllabus)

[Research\_ Meditation-induced neuroplastic.pdf](https://courseworks2.columbia.edu/courses/214115/files/23042338?wrap=1)

[Actions](https://courseworks2.columbia.edu/courses/214115/assignments/syllabus)

**May 6: Final original mini-scientific review paper due by 9:00am**