Synaptic Plasticity Course Syllabus

**1.Course Objective**

This class is designed to establish a conceptual and technical foundation for senior undergrad and grad students who may develop their careers in the research of plasticity-associated neuroscience. Whereas the class will go through major findings in the plasticity field, the emphasis will be placed on why these findings are important, how these findings are made, and what challenges/debates these findings trigger. It is the objective of the instructors that students after this class will not only understand the basic theoretical framework of neural plasticity but also start to develop the ability to identify critical neuroscience questions and to formulate potential approaches to these questions.

**2.Organization of Course Content** (thematic, topic, chronologic, etc.)

Class will be organized by topics.

Tentative topics are:

Introduction (Cajal/Sherrington)

Synaptic Transmission (Katz/Scheller)

Review of Synaptic Biophysics I (Katz)

Synaptic Integration (Pitts/McCullon)

LTP (Hebb/Bliss/Lomo)

LTP Debate

LTD

Cell Biology LTP/LTD I

LTP/LTD at Inhibitory Synapse

Theory of Synaptic Plasticity

LTP/LTD in vivo

Regulation of Synaptic Plasticity

Membrane plasticity

Circuitry plasticity

Non-Hebbian Plasticity

Adv Topic: Plasticity and Brain Diseases

Adv Topic: Metaplasticity

Adv Topic: Plasticity and Drug Discovery.

**3.Course Requirements**

1.Required texts and other readings

0-3 hrs of paper reading is required for each week.

2.Weekly assignments

0-3 hrs of paper reading and discussion is required

3.Papers/projects (number, type, length, and deadlines)

One for final exam. It will be an experimental design-based research proposal. Two-page limit.

4.Exams (number, type, and dates)

Written exam. It will be a research proposal of two pages.

5.Approximate time spent outside of class

Please note: Students need to be evaluated in a substantial fashion before the deadline for Monitored Withdrawal, usually by the end of the ninth week of the term.

~0-3 hr/week

6.Grading Policy

Graded based on the attendance and the final written exam.

7.Relative weight of each requirement

Attendance, 15%; written examine, 85%.

8.Policy on late work and make-ups

Late work and make-ups are only available for special requests.

9.Other: