

NRO C69F The Synaptic Organization of the Brain

Fall, 1999; Room H-310; T 7 – 9 p.m.

Instructor: Paul W. Tsang

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Office Hours: T 6 – 7 p.m., or by appointment

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Course Description

Synaptic organization may be defined as the study of principles underlying the organization of neurons and synapses into circuits that mediate the functional operations of different brain regions. It is a multidisciplinary subject, requiring the integration of results from studies in molecular neurobiology, neuroanatomy, neurophysiology, neurochemistry, neuropharmacology, development and behaviour, as well as theoretical studies of computational neural models and neuronal networks. It is also a multilevel subject, beginning with the properties of the individual synapse building up through microcircuits and neurons to the local circuit characteristic of a given region and finally, to the interactions between various circuits that form a given system.

Text

The Synaptic Organization of the Brain, Fourth Edition. Gordon M. Sheppard (ed.), Oxford University Press, New York, 1998.

Organization

The course will meet weekly for two hours and will consist of lectures by the instructor and extensive class discussion. The textbook will be the major source of information, supplemented by illustrations and concepts provided by the instructor in class.

Evaluation

1. *Midterm exam* - tentative date*: Oct. 28, 5 - 7 p.m. 35%
*The exam may be held on a Friday or Saturday evening during the week of Oct 25
(multiple choice, short answer, label diagrams, draw circuits)
2. *Term Paper* – due last day of class (Nov 30) 30%
15 pages, on a topic of your choice (approved by the instructor)
3. *Final Exam* – held during the final exam period, date to be announced, 3 hours 35%

**1999 NRO C69F
Schedule of Topics**

Date	Topic
Sep 14	Introduction to the course Chapter 1: Introduction to synaptic circuits
Sep 21	Chapter 1, continued
Sep 28	Chapter 1 continued; Chapter 2: Membrane properties and neurotransmitter actions
Oct 5	Chapter 2, continued
Oct 12	Chapter 2, continued
Oct 19	Chapter 7: Cerebellum
Oct 26	Chapter 7, continued
Thu Oct 28, 5-7 p.m. (tentative date)	Midterm exam
Nov 2	Chapter 11: Hippocampus
Fri Nov 5	Last day to drop Fall Session courses (Section F) from academic record and GPA
Nov 9	Chapter 11, continued
Sat Nov 13	Christmas Examination Schedule published
Nov 16	Chapter 12: Neocortex
Nov 23	Chapter 12, continued Neural networks
Nov 30	Neural networks, continued Review Term papers due today
Mon Dec 13 – Tue Dec 21	Term test and final examination period

Possible topics for NRO C69F term paper

Detailed structure and function of a specific brain region,
e.g., frontal cortex

Structure, projections and functions of a specific brain region,
e.g., substantia nigra

Somatosensory/Pain pathways, neurotransmitters, etc.

Location, class and function of a neurotransmitter,
e.g., dopamine

Cellular and molecular mechanisms of drug actions
e.g., epilepsy medication

Evolution of a brain structure,
e.g., globus pallidus

etc.