Fall Semester, 2009
Lecture Time: M-W-F; 11:00-11:50AM
Classroom: Anderson Hall, Room #8

Instructor: Vinay Parikh, Ph.D.
Office: 872 WH : Phone (215) 204- 1572
Office Hours: T,Th;10:00-11:00AM or by appointment

Course: NS 2122 (CELLULAR AND MOLECULAR NEUROSCIENCE)
Section: 001
Department of Psychology and Neuroscience Program (CLA)

REQUIRED MATERIALS: Byrnes, J. H. and Roberts, J. L. (2009). *From Molecules to Networks: An Introduction to Cellular and Molecular Neuroscience*. Second Edition, San Diego, CA: Academic Press.

OTHER REFERENCES:

Squire, L.R. et al. (2007). *Fundamental Neuroscience*. Third Edition, San Diego, CA: Academic Press.

Seigel, G.J. et al. (2006). *Basic Neurochemistry: Molecular, Cellular and Medical Aspects*. Seventh Edition, San Diego, CA: Academic Press.

COURSE GOALS*:* An exciting scientific frontier is the molecular genetics and cellular dynamics of brain function. This course addresses phenomena at a cellular and molecular level that underlie brain plasticity and function. The cellular basis of the nervous system, biochemical pathways contributing to brain energy metabolism, molecular constituents of neuronal membrane excitability and synaptic transmission, proteins enabling neural receptor function, and molecular events leading to synaptic integration and information processing will be covered. The molecular cascade initiated by learning that involves glutamate release and activation of AMPA and NMDA receptors and that result in genetic changes and structural formation of synapses is one example of molecular mechanisms to be addressed in this course.

FACULTY: Dr. Vinay Parikh – Psychology and Neuroscience Program, CLA

PREREQUISITES*:* Neuroscience 1051 – Fundamentals of Neuroscience.

DISABILITY DISCLOSURE*:* Any student who has a need for accommodation based on the impact of a disability should contact me privately to discuss the specific situation as soon as possible.

ACADEMIC REQUIREMENTS*:* The course grade is based on three semester examinations on topics covered in each semester, in-class quizzes and consistent attendance.

Grading Scheme

Attendance	= 10%
In-class quizzes	= 15%
First-term examination	= 20%
Midterm examination	= 20%
Final examination	= 35%

There is also a cumulative final exam that can be taken for extra credit. Please inform the instructor in advance (few weeks ahead of Final Exam) if you would like to take it.

IN-CLASS QUIZZES

Once every week, you will receive a five-ten question quiz that will pertain to the material covered in class the previous week. The quizzes will be designed so that if you attended lectures and were listening, you should be able to answer the questions. You will be allowed to use your notes during the quizzes.

ACADEMIC FREEDOM DISCLOSURE: Freedom to teach and freedom to learn are inseparable facets of academic freedom. The University has adopted a policy on Student and Faculty Academic Rights and Responsibilities (Policy # 03.70.02), which can be accessed through the following link: http://policies.temple.edu/getdoc.asp?policy_no=03.70.02.

MAKE-UP EXAM POLICY: Make-up exams are more difficult than the regularly scheduled exams. If you miss a scheduled exam due to illness or an emergency, you must contact the course Instructor by phone (215.204.1572) or email (vinay.parikh@temple.edu) before the end of the exam period on the scheduled day. If you simply miss the exam without making contact in advance or during the exam period, you are not eligible for a make-up exam. There is no make-up for the Final Exam.

COURSE LECTURE TOPICS AND READING ASSIGNMENTS
(Note: Individual topics covered in each class will be posted on the *BLACKBOARD* on a weekly basis)

Aug 31st – Sep 4th: Cellular and subcellular components of the nervous system
Assignment: Byrnes and Roberts Chapter 1 – Cellular components of nervous tissue.
Chapter 2 - Subcellular organization of the nervous system: Organelles and their functions.

Sep 9th-11th: Energy metabolism of the brain
Assignment: Byrnes and Roberts Chapter 3 – Brain energy metabolism

Sep 14th-18th: Brain electrophysiology I
Assignment: Byrnes and Roberts Chapter 4 – Electrotonic properties of axons and dendrites. Chapter 5 – Membrane potential and action potential.

Sep 21st-25th: Brain electrophysiology II
Assignment: Byrnes and Roberts Chapter 6 – Molecular properties of ion channels and excitable membranes. Chapter 7 – Dynamical properties of excitable membranes.

Sep 28th-Oct 2nd: Neurotransmission
Assignment: Byrnes and Roberts Chapter 8 – Release of Neurotransmitters.

Oct 5th- 12th: Classical versus non-classical neurotransmission
Assignment: Byrnes and Roberts Chapter 9 –Pharmacology and Biochemistry of synaptic transmission: Classical Transmitters. Chapter 10 – Nonclassic signaling in the brain

Oct 14th- 16th: Neurotransmitter receptors and signal transduction
Assignment: Byrnes and Roberts Chapter 11 – Neurotransmitter receptors and Chapter 12 – Intracellular signaling

Oct 19th- 21st**: Review and Exam 1** (Topics included: **Cellular and subcellular components of the nervous system, Energy metabolism, Brain electrophysiology I)**

Oct 23rd-Oct26th: Neurotransmitter receptors and signal transduction (cont.)
Assignment: Byrnes and Roberts Chapter 11 – Neurotransmitter receptors and Chapter 12 – Intracellular signaling

Oct 28th-Nov 4th: Gene expression and protein synthesis

Assignment: Byrnes and Roberts Chapter 13 – Regulation of neuronal gene expression and protein synthesis.

Nov 6th-9th: Cell-cell communication

Assignment: Byrnes and Roberts Chapter 15 –: Connexin- and Pannexin-based channels in the nervous system: Gap junctions and more.

Nov 11th-13th: **Review and Exam 2** (Topics included: **Brain Electrophysiology II, Neurotransmission, Neurotransmitter receptors and signal transduction,**)

Nov 16th-25th: Synaptic integration and information processing

Assignment: Byrnes and Roberts Chapter 16 – Postsynaptic potentials and synaptic integration, Chapter 17 – Complex information processing in dendrites, Chapter 18 – Information processing in neural networks.

Nov 30th-Dec 2nd: Neurobiology of learning and memory

Assignment: Byrnes and Roberts Chapter 19 – Learning and memory: Basic mechanisms.

Dec 4th-7th: Neurodegenerative diseases

Assignment: Byrnes and Roberts Chapter 20 – Molecular and Cellular Mechanisms of Neurodegenerative Diseases.

Dec 9th: Review

Dec 10th/11th**:** Study leave

Dec 14th**: Final Exam** (Topics included: **Gene expression and protein synthesis, Cell-Cell communication, Synaptic integration and information processing, Neurobiology of learning and memory, Neurodegenerative diseases**).

Final Exam for Extra Credit: Cumulative over the reading and lecture material presented during the semester

Extra Credit – 1. Participate in a Neuroscience Research Experiment

2. a) Attend a Journal Club/Neuroscience Seminar

FALL SEMESTER 2009 NEUROSCIENCE SEMINAR SERIES

Wednesday 2:30-4:00 Hamilton Library, Weiss Hall

b) Submit a 1-2 page write-up on any topic covered in the seminar series.