

Computational Neuroscience NBIO136b Spring 2008

Instructor: Paul Miller (Volen 253, tel: 736-2890, email pmiller@brandeis.edu)

Office hours: Mon. 3-4pm, Tues. 1-2pm.

TA: Mark Bourjaily (Volen 214, email markbour@brandeis.edu)

Office hours: Tues. 10:30am-11:45am

Course website: http://people.brandeis.edu/~pmiller/COMP_NEURO

Lectures: Tuesday and Friday, 9:10-10:30am in Volen105

Book: Dayan and Abbott, Theoretical Neuroscience

Syllabus

Jan 15 (T)	Intro to course, Matlab and differential equations Beginners Tutorial in Matlab for those new to programming	
Jan 18 (F)	Electrical responses of neurons (Ch.5)	
Jan 22 (T)	Integrate-and-fire models (Ch.5)	
Jan 25 (F)	Spike trains and neuronal noise (Ch.1)	
Jan 29 (T)	Hodgkin-Huxley formalism (Ch.6)	
Feb 01 (F)	Other conductance-based models (Ch.6)	HW 1 due
Feb 05 (T)	Multi-compartments and bursting (Ch.6)	
Feb 08 (F)	Pattern Generators (Ch.6)	
Feb 12 (T)	Synaptic coupling (Ch.5)	
Feb 15 (F)	Short-term plasticity; release probability (Ch.5)	HW 2 due
Feb 18-22	No Classes	
Feb 26 (T)	Spike-triggered average and encoding (Chs.1-2)	
Feb 29 (F)	Mid-Term Exam	
Mar 4 (T)	Receptive fields and population decoding (Chs.2-3)	
Mar 7 (F)	Decoding, ROC and anti-neurons (Ch.3)	
Mar 11 (T)	Limitations of trial-averaging; Markov Processes	
Mar 14 (F)	Firing rate models (Ch.7)	HW 3 due
Mar 18 (T)	Network models: orientation tuning (Ch.7)	
Mar 21 (F)	Network models: short-term memory (Ch.7)	
Mar 25 (T)	Network models: decision-making (Ch.7)	
Mar 28 (F)	Network models: graded memory	HW 4 due
Apr 1 (T)	Network models: memory-based decisions	
Apr 4 (F)	Hebbian learning and STDP (Ch.8)	
Apr 8 (T)	Molecular mechanisms for LTP, CaMKII	
Apr 11 (F)	Homeostasis	HW 5 due
Apr 15 (T)	Inhibitory plasticity and rate-based modeling	
Apr 18 (F)	Classical conditioning, reinforcement learning (Ch.9)	
Apr 21-25	No Classes	
Apr 29 (F)	Supervised, reward-based learning (Ch.8)	HW6 due

Grading: 6HWs each 10%; Short in-class quizzes 10%; Mid-term 10%; Final exam 20%