

System Bioengineering II (580.422): NEUROSCIENCES (Spring 2015)

Class time: MF 01:30 PM - 02:20 PM | Mudd 26, W 01:30 PM - 02:20 PM | Krieger 205

Sections (1-2): Th 10:30 AM - 11:20 AM | Krieger 300 (1), Latrobe 120 (2)

Sections (3-4): Th 02:00 PM - 02:50 PM | Gilman 55 (3), Krieger 308 (4)

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Textbook: "Neuroscience (5th Ed)" by Purves et al. published by Sinauer Associates

Syllabus

Week	Lecture	Date	Instructor	Title	Content	HW	
1	1	Mon, Jan 26	Wang	Course Introduction, Policy	From neuron to behavior		
	2	Wed, Jan 28	Wang	Methods in Psychophysics	Psychometric function, signal detection theory		
	3	Fri, Jan 30	Wang	Essentials of neural coding (1)	Quantitative analysis of neural firing	1	Wang
2	4	Mon, Feb 02	Wang	Essentials of neural coding (2)	Poisson model of spike train, simulation		
	5	Wed, Feb 04	Young	Neural excitability 1	Neural excitability, excitation, inhibition, review of Hodgkin Huxley		
	6	Fri, Feb 06	Young	Neural excitability 2	calcium, bursting, complex neurons	2	Wang
3	7	Mon, Feb 09	Young	Synaptic transmission and neuromodulation	synaptic transmission, pre and postsynaptic mechanisms		
	8	Wed, Feb 11	Young	Synaptic integration 1	dendrites, cable theory, electrotonic propagation		
	9	Fri, Feb 13	Young	Synaptic integration 2	propagation of action potentials, synaptic integration, spines	3	Young
4	10	Mon, Feb 16	Young	Neural integration	How is information presented to dendrites?		
	11	Wed, Feb 18	Kirkwood	Cellular mechanisms of learning (1)	Hippocampal LTP		
	12	Fri, Feb 20	Kirkwood	Cellular mechanisms of learning (2)	Spike timing and the mechanism of LTP and LTD	4	Young
5	13	Mon, Feb 23	Connor	Visual system (1)	Early visual system: From Retina to V1		
	14	Wed, Feb 25	Connor	Visual system (2)	Central visual processing		
	15	Fri, Feb 27	Chib	Brain stimulation			
6		Mon, Mar 02	Exam #1	(include Lectures 1-15)	Note: Exam will take place in the evening		
	16	Mon, Mar 02	Wang	Periphery Auditory system	Cochlea, hair cells, auditory nerve		
	17	Wed, Mar 04	Wang	Central Auditory system (1)	Brainstem processing, sound localization		
	18	Fri, Mar 06	Wang	Central Auditory system (2)	Cortical processing, speech processing	5	Wang
7	19	Mon, Mar 09	Young	Hearing loss and cochlear implant	Cochlear implant and its underlying neural mechanisms		
	20	Wed, Mar 11	Wang	Somatosensory system (1)	Tactile receptors		
	21	Fri, Mar 13	Wang	Somatosensory system (2)	Central somatosensory system	6	Wang

8		Mon, Mar 16	Spring Break			
		Wed, Mar 18	Spring Break			
		Fri, Mar 20	Spring Break			
9	22	Mon, Mar 23	Shadmehr	Introduction to neural basis of motor control		
	23	Wed, Mar 25	Shadmehr	The motor system of the spinal cord		
	24	Fri, Mar 27	Shadmehr	Muscles, proprioception, and reflexes	7	Shadmehr
10	25	Mon, Mar 30	Shadmehr	From visual goals to motor commands		
	26	Wed, Apr 01	Shadmehr	Posterior parietal cortex		
	27	Fri, Apr 03	Shadmehr	Motor areas of the frontal lobe	8	Shadmehr
11		Mon, Apr 06	Exam #2	(include Lectures 16-27)	Note: Exam will take place in the evening	
	28	Mon, Apr 06	Bastian	Cerebellum		
	29	Wed, Apr 08	Bastian	Basal ganglia		
	30	Fri, Apr 10	Zhang	Perceptrons and feedforward networks	9	Zhang
12	31	Mon, Apr 13	Zhang	Recurrent networks, attractors networks		
	32	Wed, Apr 15	Zhang	Hippocampal place cells and models		
	33	Fri, Apr 17	Zhang	Models of learning and plasticity	10	Zhang
13	34	Mon, Apr 20	Zhang	Map formation and Kohonen nets		
	35	Wed, Apr 22	Zhang	Population coding and decoding		
	36	Fri, Apr 24	Guest lecturer	Human brain recording		
14	37	Mon, Apr 27	Sarma	Deep brain stimulation		
	38	Wed, Apr 29	Guest lecturer	Brain-machine interface		
	39	Fri, May 01	Wang	Course summary		
		TBD	Exam #3 (final)	(include Lectures 28-39, plus general questions)		