



SHP Neuroscience

Fall 2013

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Course website: www.columbia.edu/cu/shpneuro



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- 9/21 Lecture 1: Introduction to Nervous Systems**
What is a brain? ◦ Basic components of all neurons
- 9/28 Lecture 2: Neurons and Action Potentials**
Electrical properties of neurons ◦ Ion channels ◦ Action potentials
- 10/5 Lecture 3: Synaptic Transmission**
Chemical synaptic transmission ◦ Synapse structure ◦ Neurotransmitters
- 10/12 Lecture 4: Cellular Basis of Learning and Memory**
Synaptic plasticity ◦ NMDA-type glutamate receptors ◦ Long-term potentiation (LTP)
- 10/19 Lecture 5: Sensory Systems**
Sensory transduction & coding ◦ Strategies for sensing the environment across the animal kingdom ◦ Chemical senses ◦ Hearing ◦ Basics of vision
- 10/26 Lecture 6: Motor Systems**
Neural control and coordination of muscles ◦ Central pattern generators ◦ Motor system pathology
- 11/2 Lecture 7: Emotions and Social Behavior**
Emotional states and feelings ◦ Emotion and memory ◦ The social brain
- 11/9 Lecture 8: Reward and Pathological Learning**
The reward system of the brain ◦ How do addictive drugs work?
- 11/16 Lecture 9: Language and Thought**
Organization of language in the brain ◦ Disorders of thought and language ◦ Brain asymmetry
- 11/23 Lecture 10: Disorders of Thought and Mood**
Neuromodulation ◦ Depression and affective disorders ◦ Schizophrenia
- 11/30** Thanksgiving break. No class.
- 12/7 Lecture 11: Sleep and wakefulness**
What is sleep and why do we sleep? ◦ Oscillations and brain rhythms ◦ Arousal and attention ◦ Dreaming
- 12/14 Lecture 12: Applied Neuroscience and Wrap-up**
Neurorobotics ◦ Consciousness ◦ Art and the brain ◦ Random topics