

Readings Fall 2017: Neural Circuits and Behavior

Time: 5-7:30 PM

Dates: Thursdays from September 7 to December 14

Location: Skirball 2nd floor conference room

Course Co-Directors: Robert Froemke (robert.froemke@med.nyu.edu; 212-263-4082) and Bernardo Rudy (bernardo.rudy@med.nyu.edu, 212-263-0431)

Course Objective and Description: Development of novel methods for monitoring and manipulating specific neural populations have provided a tremendous opportunity for studying the functional organization of neural circuits and the neural basis of behavior. In this course, we will read classic papers that defined major models for understanding perception and behavior, combined with contemporary studies using cutting-edge approaches (e.g., opto/pharmacogenetics, imaging, connectomics, and/or computational methods) to ask and answer new questions.

This readings course will essentially be a journal club, with each week focusing on one or two papers on topics such as sensory perception, learning and memory, or social behavior. The primary readings should be contemporary (in the last 0-3 years), placed in the context of the rest of the literature.

Course Requirements: Throughout the course, participants are expected to read each primary paper, attend each class and participate in group discussions. Each student will lead the discussion for 2-3 classes (depending on number of students).

Schedule:

September 7: Organizational meeting and intro to the topic

Paper 1: Abbott, Nature 2010: The rat pack.

Paper 2: Boyden et al., Nature Neuroscience 2005: Millisecond-timescale, genetically targeted optical control of neural activity.

September 14: Sensory perception

Paper 1: Salzman et al., Nature 1990: Cortical microstimulation influences perceptual judgements of motion direction.

Paper 2: Guo et al., Neuron 2014: Flow of cortical activity underlying a tactile decision in mice.

September 21: Threat avoidance/fear conditioning

Paper 1: Han et al., Science 2009: Selective erasure of a fear memory.

Paper 2: Letzkus et al, Nature 2011: A disinhibitory microcircuit for associative fear learning in the auditory cortex.

Paper 3: LeDoux, Trends in Cognitive Sciences 2017: Semantics, surplus meaning, and the science of fear.

September 28: Spatial learning and memory

Paper 1: Morris et al., Nature 1982: Place navigation impaired in rats with hippocampal lesions.

Paper 2: Kitamura et al., Science 2017: Engrams and circuits crucial for systems consolidation of a memory.

October 5: Sleep and wakefulness

Paper 1: Schiff et al., Nature 2007: Behavioural improvements with thalamic stimulation after severe traumatic brain injury.

Paper 2: Chung et al., Nature 2017: Identification of preoptic sleep neurons using retrograde labelling and gene profiling.

No class October 12 (Skirball retreat) or October 19 (NIH study section)

October 26: Social behavior

Paper 1: Wang et al., Science 2011: Bidirectional control of social hierarchy by synaptic efficacy in medial prefrontal cortex.

Paper 2: Dolen et al., Nature 2013: Social reward requires coordinated activity of nucleus accumbens oxytocin and serotonin.

November 2: Student topics 1

November 9: Student topics 2

No class November 16 (SFN) or November 23 (Thanksgiving)

November 30: Student topics 3

December 7: Student topics 4

December 14: Student topics 5