

July 28, 2019 (Sunday): arrival

Week 1:

Day 1. July 29 (Monday) Bootcamp

S Baccus: Biophysics of neurobiology

M Goldman: Linear algebra and mathematical modeling in neuroscience

Day 2. July 30 (Tuesday) Single neurons and synapses, dynamical systems

D Johnston: single synapse and neuron physiology

B Mel: dendritic modeling

B Ermentrout: single neuron modeling and dynamical systems theory

B Ermentrout: XPP tutorial

Day 3. July 31 (Wednesday) probability, statistics

U Eden: introduction to probability and statistics in neuroscience

U Eden: advanced tools of statistical data analysis

Backyard brains: G Gage

BBQ

Day 4. August 1 (Thursday) neural coding

A Fairhall: introduction to neural coding

A Fairhall: adaptation coding and mechanisms

S Baccus: introduction to sensory systems

Day 5. August 2 (Friday) neural circuits and E-I balance

K Harris: Cortical microcircuits and E-I balance

H Sompolinsky: Recurrent network theory of E-I balance

Mitya Chklovskii: theory of neural coding and the concept of optimality

Week 2:

Day 6. August 5 (Monday) Network rhythms and synchrony:

E Marder: pattern generation and robustness in neural circuits

N Kopell: network mechanisms of neural synchrony

Day 7. August 6 (Tuesday) Synaptic plasticity and homeostatic regulation

S Fusi : memory storage capacity and tradeoff with forgetting

S Solla: perceptrons and learning rules

Day 8. August 7 (Wednesday) Recurrent networks and integrators

Mike Shadlen: working memory experiments and models
M Goldman: neural integrators

Day 9. August 8 (Thursday) Hippocampus

L Frank: hippocampus as a key structure for spatial navigation and episodic memory
I Fiete: modeling hippocampus as a continuous attractor network

Day 10. August 9 (Friday) High-dimensional data analysis

S Ganguli: high-dimensional neural population dynamics
James Fitzgerald: Whole brain neural activity patterns and behavior
Sara Solla: perceptual manifolds

August 10 (Saturday)

Special MBL Massey Lecture w/ Brains Minds and Machines course

Christof Koch

Week 3:

Day 11. August 12 (Monday) training recurrent neural networks

L Abbott: trained RNN as tool of computational neuroscience
J Tenenbaum: bridging from circuit neuroscience to human cognition
Greg Wayne: Interface between computational neuroscience and AI

Day 12. August 13 (Tuesday) Reinforcement learning

N Uchida: circuit mechanisms of dopamine signaling
Anne Collins: computational model of valuation and reinforcement learning

Student final project evaluation.

Day 13. August 14 (Wednesday) motor control and cognition

Reza Shadmehr : experiments and theory of movement control
M Fee: basal ganglia and learnt motor behavior
Shaul Druckmann: neuronal dynamics in motor planning

BBQ

Day 14. August 15 (Thursday) Connectomics

H Zeng : Large-scale, cell-type specific connectomics
XJ Wang: Analysis and modeling of multi-regional large-scale brain circuits

Day 15. August 16 (Friday) large-scale brain functions

J Haxby: distributed cognitive processes in the human brain
XJ Wang: distributed brain dynamics and cognition

Week 4:

Day 16. August 19 (Monday)

E Brown : neurobiology of (un)consciousness
T Sejnowski: waves in the brain

Day 17. August 20 (Tuesday) Mental illness

Klaas Stephan : Computational Psychiatry
D Redish : failure modes of decision-making and addiction

Day 18. August 21 (Wednesday) project day

Day 19. August 22 (Thursday) student presentations

Day 20. August 23 (Friday) departure