Computational Neuroscience

Faculty: Larry Abbott, Ken Miller, Ashok Litwin Kumar, Stefano Fusi, Kim Stachenfeld
TAs: Ching Fang, Ishani Ganguly, Francisco Sacadura, Erica Shook

Meetings: Tuesdays & Thursdays 2:00-3:30
Location: Green Science Center, Fifth Floor, Rm L5.084

Webpage: https://ctn.zuckermaninstitute.columbia.edu/courses

September
5  (Larry) Introduction to Course and to Computational Neuroscience
7  (Larry) Electrical Properties of Neurons, Integrate-and-Fire Model
12 (Larry) Numerical Methods, Filtering (Assignment 1)
14 (Larry) The Hodgkin-Huxley Model
19 (Larry) Types of Neuron Models and Networks (Assignment 2)
20 Assignment 1 Due
21 (Larry) Adaptation, Synapses, Synaptic Plasticity
26 (Stefano) Generalized Linear Models

October
27 Assignment 2 Due
28 (Ken) Linear Algebra I (Assignment 3)
3  (Ken) Linear Algebra II
5  (Ken) PCA and Dimensionality Reduction
10 (Ken) Rate Networks/E-I networks I (Assignment 4)
11 Assignment 3 Due
12 (Ken) Rate Networks/E-I networks II
17 (Ken) Unsupervised/Hebbian Learning, Developmental Models (Assignment 5)
18 Assignment 4 Due
29 (Ashok) Introduction to Probability, Encoding, Decoding
24 (Ashok) Decoding, Fisher Information I
25 Assignment 5 Due
26 (Ashok) Decoding, Fisher Information II (Assignment 6)
31 (Ashok) Information Theory

November
2  (Ashok) Optimization I (Assignment 7)
7  Holiday
8  Assignment 6 Due
9  (Ashok) Optimization II
14 (Stefano) The Perceptron (Assignment 8)
15 Assignment 7 Due
16 (Stefano) Multilayer Perceptrons and Mixed Selectivity
21 (Stefano) Deep Learning (Assignment 9)
22 Assignment 8 Due
23 Holiday
28 (Stefano) Learning in Recurrent Networks
30 (Stefano) Continual Learning and Catastrophic Forgetting

December
5  (Kim) Reinforcement Learning (Assignment 10)
6  Assignment 9 Due
7  Course Wrapup
13 Assignment 10 Due