Computational Neuroscience
Larry Abbott, Ken Miller, Ashok Litwin Kumar, Stefano Fusi, Sean Escola
TAs: Ho Yin Chau, Elom Amematsro, David Clark, Zhenrui Liao
Meetings: Tuesdays & Thursdays 2:00-3:30
Location: Green Science Center, Fifth Floor, Rm L5.084
Text - Theoretical Neuroscience by P. Dayan and L.F. Abbott (MIT Press)
Webpage - https://ctn.zuckermaninstitute.columbia.edu/courses

September
6  (Larry) Introduction to Course and to Computational Neuroscience
8  (Larry) Electrical Properties of Neurons, Integrate-and-Fire Model
13 (Larry) Numerical Methods, Filtering (Assignment 1)
15 (Larry) The Hodgkin-Huxley Model
20 (Larry) Types of Neuron Models and Networks (Assignment 2)
21 Assignment 1 Due
22 (Stefano) Adaptation, Synapses, Synaptic Plasticity
27 (Sean) Generalized Linear Models

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

November
1  (Ashok) Information Theory
3  (Ashok) Optimization I (Assignment 7)
8  Holiday
9  Assignment 6 Due
10 (Ashok) Optimization II
15 (Stefano) The Perceptron (Assignment 8)
16 Assignment 7 Due
17 (Stefano) Multilayer Perceptrons and Mixed Selectivity
22 (Stefano) Deep Learning (Assignment 9)
23 Assignment 8 Due
24  Holiday
29 (Sean) Learning in Recurrent Networks

December
1  (Stefano) Continual Learning and Catastrophic Forgetting
6 (Stefano) Reinforcement Learning (Assignment 10)
7 Assignment 9 Due
8 (Larry) Course Wrapup
14 Assignment 10 Due