

Computational Neuroscience

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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

- 2 (Larry) Electrical Properties of Neurons, Integrate-and-Fire Model
- 4 (Larry) Different Ways to Model Neurons and Neural Circuits
- 9 (Larry) Numerical Methods (Assignment 1)
- 11 (Larry) The Hodgkin-Huxley Model
- 16 (Larry) Probability, Encoding, Decoding (Assignment 2)
- 17 Assignment 1 Due
- 18 ZIFest - no class
- 23 (Lea) Generalized Linear Models
- 24 Assignment 2 Due
- 25 (Ken) Linear Algebra I
- 30 (Ken) Linear Algebra II (Assignment 3)

October

- 2 (Ken) PCA
- 7 (Lea) Dimensionality Reduction, Population Analysis (Assignment 4)
- 8 Assignment 3 Due
- 9 (Lea) Latent Variables, Estimation-Maximization
- 14 (Ashok) Feedforward Networks and Dimensionality (Assignment 5)
- 15 Assignment 4 Due
- 16 (Ken) Rate Networks, Fixed-Point and Chaotic Attractors
- 21 (Ken) E-I Networks (Assignment 6)
- 22 Assignment 5 Due
- 23 (Ashok) Continuous Attractor and Low Rank Networks
- 28 (Lea) Dynamic Systems Approaches to Cognition
- 29 Assignment 6 Due
- 30 (Ashok) Spiking Networks

November

- 4 Holiday
- 6 (Ashok) Connectomics
- 11 (Stefano) Perceptrons (Assignment 7)
- 13 (Ashok) Convex Optimization and Support Vector Machines
- 18 (Stefano) Multilayer Perceptrons and Mixed Selectivity (Assignment 8)
- 19 Assignment 7 Due
- 20 (Stefano) Deep Learning
- 25 (Stefano) Learning in Recurrent Networks (Assignment 9)
- 26 Assignment 8 Due
- 27 Holiday

December

- 2 (Stefano) Continual Learning and Catastrophic Forgetting
- 3 Assignment 9 Due
- 4 (Kim) Reinforcement Learning