

PART I (ARUN: 15 lectures and 4 tutorial classes)

Teaching Assistant: Vaishnavi Adella (vaishnaviade@iisc)

Total marks for Assignments associated with this part: 30

L1 3 Jan 2025 F Introductory class
T 4 Jan 2025 Sa **MATLAB Tutorial**
AA0 Assignment 0 posted

Set I. Probability & Random variables

L2 6 Jan 2025 M Probability
AA1 Assignment 1 posted
L3 8 Jan 2025 W Random variables
L4 10 Jan 2025 F Functions of random variables
L5 13 Jan 2025 M Cross-correlation
ADA1 Data Assignment posted

Set II. Linear Algebra

AA2 Assignment 2 posted
L6 15 Jan 2025 W Linear Algebra 1
L7 17 Jan 2025 F Linear Algebra 2
L8 20 Jan 2025 M Linear Algebra 3
L9 22 Jan 2025 W Eigenvalues
L10 24 Jan 2025 F Fourier series

Set III: Information Theory

AA3 Assignment 3 posted
L11 27 Jan 2025 M Entropy
L12 29 Jan 2025 W Mutual Information
L13 31 Jan 2025 F Efficient Coding

Set IV: Special topics

L14 3 Feb 2025 M Linear Classifiers
L15 5 Feb 2025 W Signal detection theory

PART II (RISHI: 25 lectures and 8 tutorial classes)

Teaching Assistant: Sarang Saini (sarangsaini@iisc)

Total marks for Assignments associated with this part: 40

L16	7 Feb 2025	F	Introductory class
T1	8 Feb 2025	Sa	Tutorial 1: Basic electric circuits
L17	10 Feb 2025	M	Introduction to single neuron models
L18	12 Feb 2025	W	Modeling neuronal passive properties
L19	14 Feb 2025	F	How to model an entire passive neuron with dendrites?
T2	15 Feb 2025	Sa	Tutorial 2: Basic programming and introduction to NEURON
RA0 Assignment 0 posted (Submission deadline: 21 Feb 2025)			
L20	17 Feb 2025	M	Modeling ion channels
L21	19 Feb 2025	W	HH-type model: modeling various ion channels using it and its inadequacies
L22	21 Feb 2025	F	Addressing the inadequacies of the HH-type model-I: Markov models
T3	22 Feb 2025	Sa	Tutorial 3: Passive models
RA1 Assignment 1 posted (Submission deadline: 2 Mar 2025)			
L23	24 Feb 2025	M	Addressing the inadequacies of the HH-type model-II: Stochastic channel models
L24	26 Feb 2025	W	Ion channels in single neuronal models: Modeling somatodendritic variability
L25	28 Feb 2025	F	Modeling synapses and incorporating them into single neuron models
T4	1 Mar 2025	Sa	Tutorial 4: Implementing the H-H model
RA2 Assignment 2 posted (Submission deadline: 13 Mar 2025)			
L26	3 Mar 2025	M	Calcium dynamics: Modeling the ON mechanisms
L27	5 Mar 2025	W	Calcium dynamics: Modeling the OFF mechanisms
L28	7 Mar 2025	F	Modeling signaling pathways
T5	8 Mar 2025	Sa	Tutorial 5: Custom H-H models and Markovian models
RA3 Assignment 3 posted (Submission deadline: 23 Mar 2025)			
L29	10 Mar 2025	M	Noise and the nervous system
L30	12 Mar 2025	W	Network models
L31	14 Mar 2025	F	A neuron can be a network!
T6	15 Mar 2025	Sa	Tutorial 6: Modeling with 3D reconstructions

L32 17 Mar 2025 M Oscillations in the brain
L33 19 Mar 2025 W Intrinsic oscillations
L34 21 Mar 2025 F Network oscillations

T7 22 Mar 2025 Sa Tutorial 7: Calcium handling and calcium-dependent channels

RA4 Assignment 4 posted (Submission deadline: 3 Apr 2025)

24 Mar 2025 M Project proposal presentation

L35 26 Mar 2025 W Synfire chains, temporal coding, and coincidence detection
L36 28 Mar 2025 F Modeling local field potentials

T8 29 Mar 2025 Sa Tutorial 8: Modeling synapses and networks

L37 31 Mar 2025 M Short-term synaptic plasticity models
L38 2 Apr 2025 W Long-term synaptic plasticity models
L39 4 Apr 2025 F Mechanistic models for synaptic plasticity

CP1 5 Apr 2025 Sa Class presentation on Assignments 3 and 4 (RA3 & RA4)

L40 7 Apr 2025 M Interactions between various forms of neuronal plasticity

9 Apr 2025 (W) is reserved for a spill over class, if any.

11 Apr 2025 F Project progress evaluation

23 Apr 2025 W Project submission deadline

25 Apr 2025 F Final project presentation