SYLLABUS

S14020 - From Molecules to Machine Learning: Introduction to Neuroscience by Caltech Students

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Week	Topic	Learning Objectives
1	**Introduction to Neuroscience**	● Ions, action potentials, and synapses ● Sensation and movement
2	**Brain Physiology**	● Path to discovering brain physiology ● Emotion, learning, and memory
3	**Development and Diseases**	● Development of layered brain ● Neurological, psychiatric, and addiction disorders
4	**Modeling and Machine Learning**	● Neuroimaging techniques ● Timeline of ML development
5	**Topics in Psychology**	● Decision-making, game theory and neuroeconomics ● Impact of digitization on human behavior
6	**Ethics and Unresolved Issues**	● Dreams, consciousness and the complexity paradox ● Anything you suggest we discuss in class!

Week	Educational Resources	Entertaining Readings
1	Action Potentials The Synapse	Ancient Beliefs about the Brain Technical Insight Into How Lidocaine Works
2	Brain Physiology Further Details Learning and Memory	Phineas Gage 1848 Woman Can't Feel Fear
3	Neural Development Neurological vs. Psychiatric Disorders	What Happens if You Develop 2 Brains? David Helfgott
4	Human Connectome Project Mathematical Intuition for Neural Networks	MRI of a Pug Gives People Nightmares Inspirational Quote Generator
5	Neuroeconomics Deep Dive Quarantine Psychological Impact Research	5 Ways Social Media Affects the Brain 10 Common Flaws with How We Think
6	Racial Bias in Pain Assessment Finite Or Infinite Mind?	Are Dogs Self-Conscious? Lucid Dreaming