Lecture 1 (From Galvani to Gray Matter)

Fundamentals of Neuroprosthetics (Lectures 2–8)

- Lecture 2: Electrical Dynamics of the Neuron
- Lecture 3: Signal Acquisition and Electrode Technologies
- Lecture 4: Cortical and Subcortical Anatomy for BCI
- Lecture 5: Principles of Neural Signal Decoding
- Lecture 6: Theoretical Frameworks: Prosthesis vs. Interface
- Lecture 7: Neural Plasticity and Long-term Adaptation
- Lecture 8: Sensory Feedback: Closing the Loop

Clinical Applications and Current Use-Cases (Lectures 9–16)

- Lecture 9: BCIs in Stroke Rehabilitation
- Lecture 10: Neuroprosthetics for Spinal Cord Injury
- Lecture 11: ALS and Locked-In Syndrome Communication Systems
- Lecture 12: Parkinson's Disease: Deep Brain Stimulation and Beyond
- Lecture 13: Neuroprosthetic Approaches in Epilepsy
- Lecture 14: Psychiatric Neuromodulation: Depression, OCD, PTSD
- Lecture 15: Retinal and Cochlear Neuroprosthetics
- Lecture 16: Peripheral Nerve and Muscle Interfaces

Technical and Engineering Foundations (Lectures 17–24)

- Lecture 17: Electrode Materials and Biocompatibility
- Lecture 18: Wireless Systems for Implanted Interfaces
- Lecture 19: Noise Reduction and Signal Processing Techniques
- Lecture 20: Machine Learning Pipelines for Neural Decoding
- Lecture 21: Real-Time Systems and Hardware Considerations
- Lecture 22: Power, Data, and Bandwidth Constraints
- Lecture 23: Software Architectures for BCIs
- Lecture 24: Safety, Reliability, and Long-term Stability

Advanced, Cutting-Edge Technologies (Lectures 25–32)

- Lecture 25: Neuralink and High-Bandwidth BCIs
- Lecture 26: Synchron and Endovascular Interfaces
- Lecture 27: Real-Time Speech Decoding Systems
- Lecture 28: Advanced Visual Cortex Prosthetics
- Lecture 29: Memory Prosthetics and Hippocampal Interfaces
- Lecture 30: Neuroprosthetics for Cognitive Enhancement

- Lecture 31: Brain-to-Brain Communication Interfaces
- Lecture 32: Augmented Reality and Neuroprosthetic Integration

Systems Neuroscience for Interface Targets (Lectures 33–40)

- Lecture 33: Detailed Mapping of Motor Cortex
- Lecture 34: Visual Cortex: Encoding and Decoding Visual Information
- Lecture 35: Thalamocortical Networks in BCIs
- Lecture 36: The Cerebellum and Sensorimotor Coordination
- Lecture 37: Hippocampal and Entorhinal Interfaces
- Lecture 38: Prefrontal Cortex: Decision-Making and Executive Control
- Lecture 39: Basal Ganglia: Motivation, Reward, and Action Selection
- Lecture 40: Brainstem Interfaces and Vital Function Control

Ethical, Philosophical, and Future Considerations (Lectures 41–48)

- Lecture 41: Ethical Considerations in Neuroprosthetics
- Lecture 42: Regulatory Pathways and FDA Approval
- Lecture 43: Privacy, Security, and Ownership of Neural Data
- Lecture 44: Neuroprosthetics and Artificial Intelligence Integration
- Lecture 45: Consciousness, Identity, and Agency in BCIs
- Lecture 46: Neuroethics and Societal Implications of Enhancement
- Lecture 47: The Future of Neuroprosthetics: Horizons and Challenges
- Lecture 48: Synthesis and Integration: The Neuroprosthetic Revolution