



NEUROSCIENCE OF HUMAN MOVEMENTS

PROF. VARADHAN SKM

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IIT Madras

PRE-REQUISITES : Motivation & open-mindedness is the only pre-requisite

INDUSTRIES APPLICABLE TO : This course will prepare individuals with no knowledge of neuroscience to become knowledgeable about neuroscience of movements.

INTENDED AUDIENCE : Students with an interest in Neuroscience

COURSE OUTLINE :

Neuroscience of Human Movement will focus on the neural system responsible for movement generation, movement control and learning of actions. The course will start from the very basics of neuroscience and build theory to understand the movement control system in relatively good detail and depth. The successful student of this course will be able to appreciate in-depth, the brain processes that control movement.

ABOUT INSTRUCTOR :

Prof. Varadhan SKM is an Assistant Professor in Biomedical Engg at IIT Madras. His research interests are in the area of Neural control of movements, Motor learning, and Dexterous object manipulation in the presence of static and dynamic perturbations (See website for more details). He teaches courses on Biomechanics, Neuromechanics, Engg Mechanics, Biomedical Instrumentation, Quantitative Physiology.

COURSE PLAN :

Week 1 : Introduction, Membrane Physiology, Nernst Equation, GHK Equation, Action potential

Week 2 : Neuromuscular Junction, Skeletal Muscles

Week 3 : Skeletal muscles, Motor Units

Week 4 : Receptors, Muscle Spindles, Golgi Tendon Organs, Spinal control

Week 5 : Monosynaptic, Oligosynaptic & Polysynaptic reflexes,

Week 6 : Preprogrammed reactions, Spinal control, Overview of motor control system, Primary Motor cortex – Part 1

Week 7 : Primary Motor cortex – Part 2, Lesions, Brain Machine interfaces

Week 8 : Primary Motor Cortex – Part 3, Role of Cerebellum in movement control

Week 9 : Role of Cerebellum in movement control

Week 10 : Parietal & Pre-motor cortex

Week 11 : Role of Basal Ganglia in movement control

Week 12 : Role of Basal Ganglia in movement control