SYLLABUS
APPLIED ELECTROPHYSIOLOGY M SC

Module I: Electrophysiology instrumentation and Mesurement	Weightage (%)
• Electrophysiological principles, instrumentation and measurements of electrical signals arisen from active nerves and muscles, and the specific design of bioinstrumentation amplifier and Ag/AgCl electrode for measuring bioelectrical signals. • Routine clinical electrodiagnosis and monitoring procedures, include Electromyogram (EMG), Electrocardiogram (ECG), Electroencephalogram (EEG), Somatosensory Evoked Potentials (SEP), Visual Evoked Potentials (VEP), Auditory Evoked Potentials (AEP), Transcranial magnetic stimulation (TMS) and Nerve Conduction Studies (NCS). • Analysis and interpretation bioelectrical signals, noise interference during measurements. • Electrical safety during electrophysiological measurements. • Cellular electrophysiological techniques – voltage and patch clamp	30
Module II: Biomechanics of Tissues and Biomaterials	
• Fundamentals of mechanics, inverse dynamics, human joint load analysis, fundamentals of human movement analysis, application to musculoskeletalsystem and body support system. • Mechanical properties of biological tissues (bone, muscle, tendon, ligament, and other connective tissues), viscoelasticity, bone fracture and fixation, responses of biological tissues to their mechanical environment, and stress strain relationship. • Stress/strain analysis for axial, torsional, flexural and combined loads, stress transformation, strength design theory, biocompatibility of biomaterials.	40
Module III: Molecular and Functional Imaging: From Body System to Molecules (brief ideas only)	
• Introduction of imaging techniques and their significance: Functional andmolecular imaging - Application in clinical trials and preclinical studies; Impact on the diagnostic and monitoring approach, treatment strategies, anddevelopment of medical devices • Principles of biomedical imaging techniques and their applications from bodysystems to molecules, with emphasis on functional imaging. The imaging ofbody systems, organs, tissues, cells and molecules and their biological, biochemical, biomechanical, bioelectrical functions. • Computed Tomography (e.g. peripheral quantitative computed tomography (pqCT), micro-CT) Magnetic Resonance Imaging (e.g. diffusion, perfusion, functional magnetic resonance imaging and spectroscopy). Nuclear Imaging (e.g. positron emission tomography, single photon emission computed tomography). • Optical and Thermal Imaging (e.g. electron microscopy, confocal microscopy, fluorescence microscopy, optical coherence tomography, infrared microscopy, atomic force microscopy, bioluminescence, near-infrared spectroscopy)	30

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• Imaging from man to molecules: multi-modality imaging approaches in the study of etiology, diagnosis, monitoring and therapy of selected disease states or organ/tissue functions; cancer staging, atherosclerosis and osteoporosis. • The benefits to the development / improvement of drugs, drug delivery systems, tissue engineering etc.	