1. Bioelectronics

Course Description:

Cell systems: The course covers the electrophysiology of biological structures from an engineering angle.

Introduction to cell systems –Tissue Organization Structure and Functions of Macromolecules: Polymers, Carbohydrates, Lipids, Nucleic Acids
Plasma Membrane Construction structural and functional aspects, ion channels, signal transduction, Neuronal structure, network and functioning Special senses and their modelling, natural and man-made biomimetic structures.

Basic Concepts of Bioelectronics Molecular Electronic Devices, Tissue Engineering, Micro and Nanoscale Biosensors and Materials, Different Types of Bioreceptors, Properties of "G-Wire" DNA, Metalloprotein Electronics

Types of Transducers, Electronic and Ionic Conductivities of Microtubules and Actin Filaments, Consequences for Cell Signaling and Applications to Bioelectronics, Biomedical, Brain-computer Interface & Artificial Brain Imaging & Nanotechnology, Interfacing Microelectronics and the Human Visual System, Microfluidic Device and Lab-on-a-chip

2. Socio- Ethical and Environmental aspects of nanotechnology/Electronics

Nanotechnology/nanoelectronics has witnessed a catapult effect in all walks of like from basic research to industries. The unique properties at nanoscale have created noteworthy interest and excitement, generating numerous research explorations. However cutting-edge capabilities frequently raise new questions which are associated with ethics, containment and regulation and policies. As nanotechnology has been transforming our lives dramatically it is also feared that self-replicating "nanobots" could create a havoc. A critical discussion and an in-depth analysis of ethical issues surrounding nanotechnology, including the interaction of nanomaterials with the body and environment thus needs to be studied at large.

Course structure

Scope and development of nanotechnology and nanoelectronics- an overview in the last ten years, Risks of nanotechnology to health and the environment: Exposure and entry of nanomaterials in biological systems, Nanotechnology risks need to be assessed, Nanogovernance: Laboratory safety -consideration of the health and well-being of fellow researchers, unsafe practices and Environmental consequences of research and development. Minimization of waste disposal and safe disposal of hazardous substances,