MSE 952 Materials for Biomedical Applications

CHs: **3**

Pre-requisites: **Nil**

Course Objectives:

- To provide students with the general concepts of Surface chemistry and physics of selected metals, polymers, and ceramics; surface characterization methodology
- To introduce various forms of nanomaterials.
- To provide students with basic principles of materials for Orthopedic and Dental applications, Bio compatibility of Metallic, Polymeric and Ceramic implants.
- To introduce on basic level some of the tools used to characterize nanomaterials.
- To introduce various examples of engineering applications of biocompatibility of materials

Course Contents:

- Surface chemistry and physics of selected metals, polymers, and ceramics;
- Surface characterization methodology; modification of biomaterials surfaces;
- Quantitative assays of cell behavior in culture; biosensor and micro-arrays;
- Bulk properties of implants; and acute and chronic response to implanted biomaterials.
- Synthetic Materials for Orthopedic and Dental applications, Bio compatibility of Metallic, Polymeric and Ceramic ImplantsSpecial Implants and Materials for Stents.

Course Outcome:

- The course is designed to introduce important concepts of nanomaterials for Biomedical applications
- Students will be able to comprehend the potential impact, in all classes of materials, of the control of nanostructure
- Outline the material for Biomedical application production routes currently available
- Identify possible opportunities for material for Biomedical application in product development and enhancement.

Recommended Text/ Reference Books

- Biomaterials Sciences; An Introduction to Materials in Medicine, Renter, Buddy D.

- Engineering materials for biomedical Applications, Hin, TeohSwee.
- Bio-Implant Interface; Improving biomaterials and Tissue Reaction by J. E. Ellingson and S. P. Lyngstadass
- Bio-based Polymers and Composites by Richard Wool and X. Susan
- Bio-Materials &Prototyping Applications in Medicine by BopayaBidanda and Paulo Bartolo
- Bio-Implant Interface; Improving Biomaterials and Tissue Reactions by J.E Ellingsen and S.P. Lygstadaas
- Bio-MEMS: Technologies and Applications by Wianjun Wang and Steven A. Soper