CH-905 Nano and Biodevices

Credit Hours: 3-0

Prerequisite: Nil

Course Objectives

Nano-biodevices is a course to introduce students to the nano and bio devices and their application/s in the industry and academia.

Course Outcomes

The course will enable students to understand the role of nanostructures in various analytical techniques such as biosensors, electrochemical sensors, lab on a chip and separation techniques.

Course Contents

Introduction to natural and incidental nanoparticles, engineered nanoparticles and their syntheses, biologically inspired nanostructures – introduction to biomimetics, Biotechnology applications of nanostructures. An introduction to nanobiotechnology, with a focus on biological applications such as bioimaging and biosensing. Principles underlying methods of nanomaterials fabrication and characterization will be introduced for biological applications. Examples of Nanoparticles, quantum dots, and carbon nanotubes for bio-nanodevices fabrication, microcontact printing of proteins, Cells and nanostructures interaction, Nanoparticle–biomaterial Hybrid Systems for bioelectronic Devices, DNA-Templated Electronics, Biomimetic Fabrication of DNA-Based Metallic Nanowires and Networks, DNA–Gold-Nanoparticle Conjugates, Advantages and disadvantages of various nanomaterials in biological applications. Fabrication of electrochemical, luminescence and physical biosensors for biological systems. Lab on chip devices Use of microscopic and laser fabrication techniques for nanodevices and characterization. Fate of nanomaterials in the environment and their ethical use.

Recommended Books

1- Nanobiotechnology: Concepts, Applications and Perspectives, Edited by Christof M. Niemeyer, Chad A. Mirkin, Wiley Interscience 2004.

2- Nanobiotechnology, Inorganic Nanoparticles vs Organic Nanoparticles; Editing by: Jesus M. de la Fuente, V. Grazu, Elsevier 2012.
3- Nanobiotechnology: Concepts and Applications in Health, Agriculture, and Environment; Edited By Rajesh Singh Tomar, Anurag Jyoti, Shuchi Kaushik, Apple Academic Press 2020., Edited by GREG HAUGSTAD, John Wiley & Sons, (2012) ISBN: 978-0-470-63882-8.