



BIOMEDICAL NANOTECHNOLOGY

PROF. P. GOPINATH

Department of Biotechnology
IIT Roorkee

INTENDED AUDIENCE : UG/PG students of Biotechnology/ Nanotechnology.

PRE-REQUISITES : Basic knowledge in biology

COURSE OUTLINE :

Biomedical nanotechnology is a rapidly developing field, which includes a diverse collection of disciplines. The applications of nanotechnology are gaining overwhelming response in almost all the fields. Especially in healthcare sector, tremendous developments have been achieved. For example, cancer diagnosis and therapy, medical implants, tissue engineering etc. In the coming years, the developments in this field are expected to flourish and lead to several life saving medical technologies and treatment methods. Thus, the main objective of this course is to impart knowledge on biomedical applications of nanotechnology.

ABOUT INSTRUCTOR :

Prof. P. Gopinath is an Associate Professor in the Department of Biotechnology at Indian Institute of Technology (IIT) Roorkee, India. He received his B.Sc. degree in Microbiology and M.Sc. degree in Biotechnology from Bharathidasan University, India. He earned his Ph.D. in Biotechnology at Indian Institute of Technology Guwahati, India. He did his postdoctoral research at University of Rochester Medical Center, New York, USA. Currently his research group in nanobiotechnology laboratory is working on the development of various polymer based nanocarriers for the delivery of various anticancer agents including anticancer drugs, siRNA, genes etc. This group is also exploring the possibilities of various biocompatible imaging agents for cancer diagnosis. In order to realize the efficacy of such therapeutic and imaging agents, they are validating these systems in an artificial scaffold which mimics the in vivo condition to the closest extent. He has published more than 60 research articles, 5 books and 6 book chapters.

COURSE PLAN :

Week 01 : Introduction to nano, Nano-biomimicry, Synthesis of nanomaterials by physical and chemical methods, Synthesis of nanomaterials by biological methods, Characterisation of nanomaterials

Week 02 : DNA nanotechnology, Protein & glyco nanotechnology, Lipid nanotechnology, Bio-nanomachines, Carbon nanotube and its bio-applications.

Week 03 : Nanomaterials for cancer diagnosis, Nanomaterials for cancer therapy, Nanotechnology in tissue engineering, Nano artificial cells, Nanotechnology in organ printing.

Week 04 : Nanotechnology in point-of-care diagnostics, Nanopharmacology & drug targeting, Cellular uptake mechanisms of nanomaterials, In vitro methods to study antibacterial and anticancer properties of nanomaterials, Nanotoxicology