MANGALORE UNIVERSITY

DEPARTMENT OF MICROBIOLOGY

MSc Microbiology

MBS- 556: Bio Nanotechnology

40h

OBJECTIVES

1. To understand unique properties of nanomaterials.
2. To learn different methods of nanomaterials synthesis.
3. To learn nanoparticles characterization techniques.
4. To understand applications of nanomaterials in various fields.
5. To understand toxicity of nanomaterials.

COURSE OUTCOME

CO1: Students are trained to synthesis of nanoparticles.

CO2: Students are trained to developefficient methods for nanoparticles synthesis.

CO3: Understanding principle and mechanism of synthesis.

CO4: Screening for various applications like cancer treatment, drug delivery, antibacterial therapy, agricultural and environmental applications.

CO5: Development of new nanoparticles for various applications.

Unit-I

Nanomaterials- Definition of nanomaterials, Nanoparticles and types of nanoparticles. Properties of nanoparticles and metallic nanoparticles. Properties and Characterizations: Optical (UV-Vis/Fluorescence), X-ray diffraction, Imaging and size (Electron microscopy, light scattering, Zeta potential), Surface and Vibrational (FTIR and RAMAN), SERS Magnetic, Electrical and Electrochemical**.**

Unit II

Green Nanotechnology: Green Synthesis, need for green synthesis of nanoparticles. Extracellular and intracellular nanoparticles. Biological synthesis of nanoparticles using bacteria, fungi, actinomycetes, yeast, virus and plants. Principles of nanoparticles synthesis, Biopolymeric nanoparticles.

Unit III

Applications of Nanoparticles- Antimicrobial activity, targeted drug delivery, combination chemotherapy (cancer therapy), Antioxidant and haemolytic properties, applications in water and waste water treatment and catalytic properties., in food preservation. Nano medicine and its developments.

Unit IV

Nanomaterials and Toxicity Evaluation: Cytotoxicity, Genotoxicity, *in vivo* tests/assays etc. Toxicological Hazards of Nanoparticles: Current data on toxicology of engineered Nanoparticles.

Note: Each Unit 10h