

Approval: 9th Senate Meeting

Course Name: Medical and NanoBiotechnology Lab

Course Number: BY524P

Credit: 0-0-2-1

Prerequisites: M.Tech. Biotechnology Students who enrolled for Medical and NanoBiotechnology specialization

Students intended for: M. Tech. Biotechnology

Elective or Compulsory: Elective

Semester: Even/odd

Course objective: This course gives a hands-on experimental training to the students in the areas of medical and nanobiotechnology. As a part of the course, a selected list of experiments from the contents below will be conducted.

Content of experiments:

Cellular Fuel and Cellular Communication:

- Glucose production assay from hepatocytes cells
- Determine the effect of fasting and feeding in glucose output from hepatocytes cells
- Hormonal regulation of gluconeogenic key regulators at their transcripts (real time PCR) and protein (Western blotting) levels
- Determine the effect of Insulin and Glucagon in regulating various second messengers (cAMP, Ca²⁺) level and their downstream effector molecules from hepatocytes cells

Disease Biology:

- Culture and Gram's staining of Gram positive and negative bacteria,
- Isolation and characterization of some common pathogenic bacteria from human samples.
- ELISA for viral diseases (hepatitis and measles) and/or smRNP
- EITB for parasitic disease (cysticercosis) diagnosis.
- Immunofluorescence for lupus diagnosis
- Enzyme assay for insulin activity from hepatocyte cell line.

NanoBiotechnology:

- Synthesis and characterisation of gold nanoparticles.
- Synthesis and characterization of silver nanoparticle.
- Synthesis and characterization of quantum dots.
- Understanding the analyte specific aggregation of nanoparticle for biosensing application.

- Studying the antibacterial property of silver nanoparticles.
- Synthesis and characterization of polymeric nanoparticles as a drug delivery vehicle.
- Fabrication of nanoparticle impregnated antibacterial polymeric films.

Protein Sciences in Therapeutics:

- Site-directed mutagenesis
- Protein structure modification
- Visualization of proteins for engineering purpose
- Obtaining highest purity of Proteins using gel filtration
- Ion Exchange methods to purify proteins
- Biophysical characterization of proteins.
- Protein folding in-vitro
- pH and salt dependent studies of proteins.
- Protein aggregation