

Internship programme (15 May, 2024-15 July, 2024)

S.N. Bose Innovation Centre

School of Interdisciplinary Studies

Department of Nanoscience and Nanotechnology ● Department of Genome Science

General Module	
Research Methods	Theory
	<ul style="list-style-type: none"> • Research methodology • Ethics in research • Intellectual property and related laws • Protecting your research

Module 1		
	Theory	Practical
Basic cell culture techniques	<ul style="list-style-type: none"> • Basic outline of animal cell culture laboratory and good laboratory practices • Basic idea of cell lines • Establishment of primary culture • Cell lysis • DNA extraction principle • Cell counting techniques 	<ul style="list-style-type: none"> • Good laboratory practices • Preparation and sterilization of media and reagents • Subculture and maintenance of cell • Lines • Cell counting techniques • Cell viability assays • DNA extraction and quantification
Module 2		
Light and fluorescence microscopy	<ul style="list-style-type: none"> • Basic of optics and optical principles • Types of optical microscopy • Applications and limitations • Sample preparation for light and fluorescence microscope • Handling and image acquisition from basic light microscope, Fluorescent and Confocal Microscopy. 	<ul style="list-style-type: none"> • Bright and dark field microscopy • Phase contrast microscopy • Sample preparation for fluorescence microscopy • Fluorescence microscopy • Sample preparation for confocal microscopy • Confocal Microscopy • Z-stacking and measurement of cell width
Module 3		
Spectroscopy	<ul style="list-style-type: none"> • Introduction to spectroscopy and spectrometry • Types and principles of 	<ul style="list-style-type: none"> • Construction of standard curve for measuring OD/fluorimetry • Quantification of total protein

NB: Intern to choose between Module 1 and Module 5

General Module and Module 2, 3, and 4 are compulsory for all

	<p>spectroscopy</p> <ul style="list-style-type: none"> • Mass Spectrometry • Ultraviolet-Visible Spectroscopy • Infrared Spectroscopy • Nuclear Magnetic Resonance spectroscopy 	<p>content of cells by Bradford method</p> <ul style="list-style-type: none"> • DNA quantification by fluorimetry • Multimode reader • NMR data acquisition and analysis
Module 4		
Basic nanotechnology	<ul style="list-style-type: none"> • Basics of Nanoscience and Nanotechnology • Introduction to Nanomaterials • Tools and techniques of Nanoscience and Nanotechnology • Applications of Nanoscience and Nanotechnology 	<ul style="list-style-type: none"> • Synthesis of optically active metal nanoparticles and analysis of localized surface plasmon resonance (LSPR) • Synthesis of super paramagnetic nanomaterials • Synthesis of semiconductor nanoparticles and characterization and optical characterization • Synthesis of polymeric nanoparticle • Characterization of nanoparticle: Sample preparation for DLS and data analysis. HR-TEM data analysis, AFM data analysis. • Loading of drug candidate in/on nanoparticle • Application of drug loaded nanoparticle in animal cancer cell treatment
Module 5		
Methods in Microbiology	<ul style="list-style-type: none"> • Basic outline of bacterial culture technique • Idea of different types of culture system • Importance of pure culture • Bacteria enumeration techniques • Antimicrobials and antimicrobial assay • Principles of isolation of genomic DNA • PCR • Protein extraction • Extrachromosomal inheritance- Plasmid • Gene cloning 	<ul style="list-style-type: none"> • Basic microbiological techniques: Sterilization • Pure culture isolation and maintenance • Antimicrobial assay • Cell lysis • DNA extraction • PCR amplification of target gene • Agarose gel electrophoresis • SDS-PAGE from isolated cellular protein • Isolation of plasmid DNA • TA-cloning

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