

PROGRAM STRUCTURE

Nanopharmaceuticals and Its Industrial Applications Program

Module 1: Introduction to Nanotechnology

- Nanotechnology-Definitions & Components
- Opportunities and Scope
- Brief History of Nanotechnology
- Nanobiology
- Nanochemistry
- Nanotechnology in Therapeutics & Pharmaceuticals

Module 2: Biopharmaceutical Nanotechnology

- Nano Drug Delivery
 - Importance of Nanosize in Drug Delivery
 - Routes of Delivery
 - Targeted Drug Delivery
 - Delivery Profiles
 - Advantages of Nanostructured Delivery Systems
 - Activation and Targeting of Nanotechnology-based Drug Delivery Systems
 - Drug Release Mechanisms
 - Drug Targeting with Nanoparticles
 - Genetic Vaccines
- Quantum Dots for Biomarkers
- Microfluidics
 - Microcapillary electrophoresis DNA Chips for Genomics
 - Materials for Microfluidic Devices and Micro/Nano Fabrication Techniques
 - Active Microfluidic Devices
 - Smart Passive Microfluidic Devices
- Nanobiosensors and Biochips
 - Basic Components of Biosensors
 - Fiber-Optic Nanosensor System
 - Antibiotin Sensing Using LSPR Spectroscopy
 - LSPR Detection of a Carbohydrate-Binding Protein Interactions
 - Detection of Alzheimer's Disease Markers Using the LSPR Nanosensor Chip
 - SWNT—Oxidoreductase Enzyme Nanobiosensors
 - SWNT—Metalloprotein Nanobiosensors
 - Antibodies as Biosensors
 - Glucose biosensors
 - Biochips
- Diagnosis and Treatment

- Nanoparticles
- Cancer Diagnosis and Treatment
- Tissue Engineering and Regenerative Medicine
- Nano-bioelectronic

Module 3: Nanostructures in Pharmaceuticals

- Sculptured Thin Films
- Quantum Heterostructures
- Nanocomposites
- Nanofabrics
- Nanocapsules
- Dendrimers
- Nanoshells
- Nanocages
- Nanoflowers
- Nanofoam
- Nanofibers
- Nanomesh
- Nanotubes
- Fullerenes

Module 4: Applied Nanomaterials in Pharmaceutical Industries

- Nanoparticles
- Nanorobots
- Micelles
- Microemulsions
- Nanoliposomes
- Nanoporous materials
- Nanodiamonds
- Nanopolymers
- Drug Nanocrystals

Module 5: Nanomedicine: Promise of the Future in Disease Management

- Introduction: Clinical Needs for Nanomedicines
- Drug and Vaccine delivery through Nanomedicines
- Regenerative medicines
- Current Era of Nanomedicines
- Nanosurgery

Module 6: Pharmaceutical Nanotechnology

- Nanobiotechnology for Drug Discovery
- Nanoparticles Used in Pharmaceutical
- Prodrug Approach
- Cell-Targeting and Cell-Penetrating Peptides for Delivery of Drug
- Lipid-Based Colloidal Nanodrug-Delivery Systems
- Nanobiotechnology-Based Drug Delivery in Cancer
- Pulmonary Drug Delivery by Nanoparticles
- Physiological, Biochemical and Chemical Barriers Drug Delivery
- Nanobiotechnology-Based Transdermal Drug Delivery
- Controlled Release Dosage Forms
- Tablet Production by Nanosystems
- Challenges to Pharmaceutical Nanotechnology
- Future Aspects of Pharmaceutical Nanotechnology

Module 7: Nanotechnology -Laboratory & Lab Procedure

- **0-D systems: Laboratory Synthesis of Nanoparticles**
 - Photolithography
 - Electron Beam Lithography
 - Focused ion beam Lithography
 - X-ray lithography
 - Nanoparticles through Homogeneous Nucleation
 - Laser Ablation Synthesis
 - Chemical reduction method
 - Synthesis of Oxide Nanoparticles
 - Quantum dot
 - Properties of nanoparticles
 - Nanoparticles applications
- **1-D systems. Laboratory Synthesis of Nanowires and Nanorods**
- **Spontaneous growth**
 - Vapor (or solution) liquid solid (VLS or SLS) growth
- **Template-based synthesis**
 - Electroplating
 - Electrophoretic deposition
- **Electrospinning**
- **2-D systems: Laboratory Synthesis of Thin Films**
- **Vapor-Liquid-Solid method**

- Evaporation
- Molecular Beam Epitaxy (MBE)
- Sputtering
- Chemical Vapor Deposition (CVD)
- Atomic Layer Deposition (ALD)

- **Liquid-Phase deposition**
 - Electrochemical deposition
 - Chemical Solution Deposition
 - Langmuir-Blodgett films
 - Self-Assembled Monolayers (SAMs)

- **Characterization of Nanostructured Materials**

- **Structural Characterization**
 - X-ray diffraction (XRD)
 - Small angle X-ray scattering (SAXS)
 - Scanning electron microscopy (SEM)
 - Transmission electron microscopy (TEM)
 - Atomic force microscopy (AFM)
 - Scanning probe microscopy (SPM)
 - Gas adsorption

- **Chemical Characterization**
 - Optical spectroscopy
 - Absorption and transmission spectroscopy
 - Photoluminescence (PL)
 - Electron spectroscopy
 - Ionic spectrometry
 - Colorimetry
 - Fluorescence
 - Mass Spectrometry

Module 8: Nanopharmaceutical Products Overview

- Supplements
- Drugs
- Therapy
- Cosmetics