

Department of Nano Science



PROGRAMME : *M.Sc NANO SCIENCE AND NANO TECHNOLOGY*

PROGRAMME OUTCOMES

PO - 1	Provide understanding of physical, chemical and biological principles in the multi-disciplinary field of nanoscience and nanotechnology
PO - 2	Develop skills on the synthesis of nanomaterials and fabrication of micro- and nano-structures
PO - 3	Familiarize the graduates with the advanced nanoscale characterization techniques and develop the analytical ability
PO - 4	Enable graduates with professional, scientific research, and computational skills for employment in industries, R & D centres and higher education
PO - 5	Prepare the graduates to take individual and team work responsibilities in a multidisciplinary environment

SL. NO	COURSE NAME	COURSE OUTCOME	
1	SEMESTER - I MATHEMATICAL PHYSICS	CO - 1	Comprehend the concept of Vector analysis along with Applications of Vectors.
		CO - 2	Conceptualize Vector space and study of Dirac Delta Function and Applications.
		CO - 3	Analyze characteristics of matrices and its different types and also solve linear equations.
		CO - 4	Solve Linear Differential equations and discuss the properties of special functions.
		CO - 5	Realize the basics of Tensor Analysis and its applications.
2	QUANTUM MECHANICS	CO - 1	Better understanding of the mathematical foundations of angular momentum of a system of particles.
		CO - 2	Apply the perturbation theory to scattering matrix and partial wave analysis. Compare and analyze the different approximation methods

		CO - 3	Applications of various approximation methods in solving the Schrodinger equation.
		CO - 4	Understand the concept of Scattering cross-section, scattering amplitude of Born approximation and partial wave analysis method
		CO - 5	Grasp the central concept and principles of relativistic Quantum Mechanics and solve problems.
3	SOLID STATE PHYSICS	CO - 1	Determine the structure factors of fundamental crystal lattices
		CO - 2	analyze the X-ray diffraction patterns of simple crystal structures
		CO - 3	classify the different crystal binding forces and explain the vibrations of lattice structures
		CO - 4	Able to explain various magnetic phenomena and describe the different types of magnetic ordering (Diamagnetism, Paramagnetism, Ferromagnetism) based on the exchange interaction.
		CO - 5	Differentiate between type-I and type-II superconductors and score on the theoretical explanation of super conductivity viz Cooper pairs and BCS theory.
4	ELECTRONICS	CO - 1	Construct circuits using Integrated circuits, op-amps.
		CO - 2	Use the appropriate measuring device to record the data with precision
		CO - 3	To comprehend and compare the different characteristics of semiconductor devices and their various applications
		CO - 4	Understand the operation of several digital circuits both combinational and sequential
		CO - 5	Solve simultaneous equations, perform D/A conversion using Op-amp

5	SEMESTER - II FUNDAMENTALS OF NANOSCIENCE	CO - 1	Remember key concepts of nanoscience and nanotechnology. The Basic concept, methods and techniques of nanoscaffolds
		CO - 2	Understand how nanotechnology can be tailored and used for biomedical purposes, catalyst.
		CO - 3	explain the properties of nanomaterials are size dependent. Predict the behavior of nanomaterials
		CO - 4	demonstrate the approaches to design and fabrication of nanomaterials
		CO - 5	summarise the scientific method and justify its use in science
6	SYNTHESIS OF NANOMATERIALS	CO - 1	Understand the basic and advanced concepts of nanomaterial preparations.
		CO - 2	Understand the importance of synthesis method addressed in the material properties and investigate the various factors influencing the properties of nanomaterials.
		CO - 3	Gain expertise in optimizing the synthesis methodology and will be able to fabricate device architectures and new nanomaterials with novel biological activity.
		CO - 4	Illustrate the Synthesis of nanomaterials by biological methods
		CO - 5	Methods for the fabrication through lithography techniques.
7	Properties of Nanomaterials	CO - 1	Analyze fundamentals of nanotechnology, different classes of nanomaterials and their sizes and dimensions
		CO - 2	Relate the physical properties of nanostructured material
		CO - 3	Describe various magnetic properties of nanomaterials
		CO - 4	Distinguish various characterization techniques involved in nanomaterial
		CO - 5	Demonstrate skills required for application of nanomaterials.

8	SEMESTER -III Characterization of Nanomaterials	CO - 1	Understand the basic concepts of Nanomaterials
		CO - 2	Apply the physics of modulus in Nanomaterials
		CO - 3	Analyze the processing of Nanomaterials.
		CO - 4	Identify the characterization techniques of Nanomaterials
		CO - 5	Apply the Nanomaterials in optical fields
9	BASICS OF NANOBIOTECHNOLOGY	CO - 1	Be aware with the principle of nanobiotechnology.
		CO - 2	Acquire the theoretical knowledge on toxicology assays
		CO - 3	Explain the theoretical principles of nanoparticles in cancer therapy.
		CO - 4	Evaluate and suggest suitable techniques for drug delivery system
		CO - 5	Summarise the significance of nanoscale & its dimensions, in 3D bio printing
10	Research Methodology	CO - 1	To learn the basics of knowledge in research.
		CO - 2	Define and formulate the research problems
		CO - 3	Explain the needs for research designs
		CO - 4	Execute the experimental data and research report
		CO - 5	Summarise the ethical issues and environmental impacts
11	SEMESTER - IV MAGNETIC NANOMATERIALS AND DEVICES	CO - 1	To learn the basics of magnetism.
		CO - 2	Define the transport of electrons in magnetism
		CO - 3	Explain the function of nanomagnets
		CO - 4	Evaluate the imaging of media
		CO - 5	Discuss the properties of magnetic materials
12	NANOSENSORS	CO - 1	To learn the types of sensors.
		CO - 2	Define the basics of sensors
		CO - 3	Explain the biomedical needs of sensors.
		CO - 4	Evaluate the instrumentation of biomedical sensors

		CO - 5	Summarise the surface Plasmon properties of sensors
13	NANOMEDICINE AND DRUG DELIVERY	CO - 1	To learn the basics of nanomedicine and drug delivery.
		CO - 2	To understand the biopharmaceutical and drug delivery
		CO - 3	Explain the types of sensors.
		CO - 4	Evaluate the properties of nanocarriers
		CO - 5	Summarise the application of nanocarriers in drug delivery
14	CAL ASPECTS OF NANOTECHNOLOGY	CO - 1	To learn the ethical issues of nanotechnology.
		CO - 2	Define the goals of nanotechnology in societal implications
		CO - 3	Explain the role of nanoparticles in environment.
		CO - 4	Execute the safest way of nanotechnology in environment
		CO - 5	Summarise the methods of nanopurification
15	CARBON NANOSTRUCTURES AND APPLICATIONS	CO - 1	To introduce the structure and symmetry of carbon nanotubes.
		CO - 2	Explain the electronic properties of graphene
		CO - 3	Evaluate the optical properties graphene.
		CO - 4	Determine the elastic properties of graphene
		CO - 5	Summarise the energy vibrations of graphene