

GUJARAT UNIVERSITY

Proposed Syllabus

ELECTIVE COURSE: Introduction to Nanotechnology

Objective: The present course is designed for first year students of any group, i.e. Mathematics or Biology. This is purely an informative and introductory course which avoids hard-core physics, technology or mathematical models / theory involved in the subject. The course is designed to motivate the students and give flavour of new and upcoming subject.

Unit – I: Concept of Nanotechnology

Nanotechnology, Nanotech Generation, Nanoscience, New form of Carbon, Nanocomposites, Polymer Nanocomposites, Nanomaterials, Properties of nanomaterials, One, two and three dimensional nanomaterials, Molecular nanotechnology, Nanostructured materials by self-assembly, Nanocrystals, What nanodevices can do in the medical field?, nanopores, nanoionics, nanomechanics, Nanorobotics.

Unit – II: Tools to measure and make nanostructures

Tools and Techniques, microscopy, Metrology, Simulation, Carbon Nanotube (CNT) – fabrication, Purification of CNTs, Dispersion, Scanning Probe Microscopes (SPM), Atomic Force Microscopy (AFM), Single Molecule Techniques, Microlithography and MEMs, Electron beam lithography and focused ion bombardment.

UNIT – III: Applications of Nanotechnology

Identified potential applications, Expected benefits from nanotechnologies, Can nanotechnology helps in addressing various challenges?, Energy and Energy Efficiency, new energy producers, Medicine, security, Other Applications, Constructions.

UNIT – IV: Impact of Nanotechnology

Societal impact of nanotechnology, Social and ethical impact, Health and environmental impact, Risks with nanotechnology, Indian Scenario in nanotechnology

Book:

Nanotechnology: technology Revolution of 21st Century
Rakesh Rathi (S. Chand & Company, New Delhi)

Reference books:

Introduction to Nanoscience, S. M. Lindsay (Oxford Press)
Nano: The Essentials, T. Pradeep (Tata McGraw Hill)