PHY5044 Introduction to Nanoscience and Nanotechnology

Course Code	PHY5044	Semester	
Course Title	*Introduction to Nanoscience and Nanotechnology*		
Credits	3	Type	Elective

Course Outcome

An introductory course on the topic in which basic introduction to nanoscience and nanotechnology is provided. Students will understand basic nanostructures and their special properties

Course Structure

Background of Nanoscience , Historical revolutions in Nanoscience and Nanotechnology, Concept of Surface to Volume ratio, 0 dimensional (OD) systems, Quantum dots, Quantum cages and Quantum cubes, One dimensional (1D) (Nanotubes, Nanorods, Nanowires, Nanoneedles, Nanofibres and Nanowhiskers, , 2D materials – Graphene and Beyond graphene, Quasi 2D systems and super lattices, 3D nanoparticles, metal oxides, semiconductors, composites, core shell systems, Quantum confinement, Density of states in 1-D, 2-D and 3-D confined systems, Size dependent optical(blue shift, SPR), magnetic (Superparamagnetism, single domain) electronic, physical/chemical properties, Applications of nanomaterials and nanotechnology, Introduction to Nanobiotechnology and nanotoxicology

Suggested Books

1. Nanoparticles: From theory to applications – G. Schmidt, Wiley Weinheim 2010.
2. Physical Fundamentals of Nanomaterials, A volume in Micro and Nano Technologies, Bangwei Zhang, Elsevier Inc. 2018.
3. Chemistry of nanomaterials: Synthesis, properties and applications by C. N. R. Rao H.C. Mult. Achim Müller and A. K. Cheetham, Wiley VCH, 2015
4. Processing & properties of structural naonmaterials - Leon L. Shaw, Nanochemistry: A Chemical Approach to Nanomaterials, Royal Society of Chemistry, Cambridge UK 2005.