

Introduction to Nanoscience

Course Code: PAS7209

Course Type: IDC

Course Credits: 2

Course Objectives: Understanding the Nanoscience

Learning Outcomes: After the completion of the course the student will be able to understand the basic of Nanoscience

Course Contents

Unit I Background to Nanoscience: Defination of Nano, Scientific revolution- Atomic Structure and atomic size, emergence and challengs of nanoscience and nanotechnology, carbon age-new form of carbon (CNT to Graphene), influence of nano over micro/macro, size effects and crystals, large surface to volume ration, surface effects on the properties.

Unit II Types of nanostructure and properties of nanomaterials: One dimensional, Two dimensional and Three dimensional nanostructured materials, Quantum Dots shell structures, metal oxides, semiconductors, composites, mechanical-physical-chemical properties.

Unit III Application of Nanomaterial: Ferroelectric materials, coating, molecular electronics and nanoelectronics, biological and environmental, membrane based application, polymer based application.

Prescribed Textbooks:

1. B.D. Cullity and S.R.Stock, "Elements of X-Ray Diffraction" Third edition, Prentice Hall, NJ , 200 2.
2. David B. Williams, C. Barry Carter, " Transmission Electron Microscopy: A Textbook for Materials Science" ,Springer, pub. 2009.
3. Joseph I Goldstein, Dale E Newbury, Patrick Echlin and David C Joy, "Scanning Electron Microscopy and X-Ray Microanalysis", 3rd Edition , 2005.

4.Surender Kumar Sharma, Dalip Singh Verma, Latif Ullah Khan ,Shalendra Kumar, Sher Bahadar Khan, Handbook of Materials Characterization Springer 2018