

## **NSE-901**

### **Advanced Concepts in Nanoscience and Engineering**

**Credit Hours:** 3

**Prerequisites:** Nil

#### **Course Objectives:**

- The course will focus on advanced aspects of nanotechnology.

#### **Course Contents:**

- Impact of dimensions at nanoscale on electronic, optical, magnetic, structural and chemical properties of a particular material.
- Introduction to key elements of quantum and statistical physics for nanomaterials.
- Chemical routes for obtaining 0, 1 and 2 D nanomaterials.
- Physical techniques employed to obtain various type of nanomaterials.
- Introduction of characterization techniques for studying properties of materials at nanoscale.
- Highlights exciting developments, challenges and opportunities in nanotechnology.

#### **Course Outcomes:**

The objective of this course is to give an understanding of the advanced concepts of Nanotechnology. The course will therefore provide an introduction to key elements of quantum and statistical physics for nanomaterials and brief overview of the synthesis/fabrication and characterization tools used in nanotechnology.

#### **Recommended Books:**

- Nanoscience and Nanotechnology in Engineering, Vijay K. Varadan, A. Sivathanu Pillai and Debashish Mukherji, World Scientific Publishing Company 2010
- [Selected Topics in Nanoscience and Nanotechnology](#), Andrew T. S. Wee, World Scientific Publishing Company, 2009.
- Molecular Chemistry of Sol-Gel Derived Nanomaterials, Robert Corriu and Nguyen Trong Anh, John Wiley & Sons, Ltd. 2009.
- [Aligned Carbon Nanotubes: Physics, Concepts, Fabrication and Devices](#), Zhifeng Ren, Yucheng Lan, Yang Wang (auth.), Springer Berlin Heidelberg, 2013.
- Textbook of Nanoscience and Nanotechnology, Murty, B.S., Shankar, P., Raj, B., Rath, B.B., Murday, J.Co-publication with Universities Press (India) Pvt. Ltd. 2013
- Characterization of Materials 2<sup>nd</sup> Edition by Elton N. Kaufmann of Argonne National Laboratory, Argonne, Illinois, John Wiley and Sons, Inc. 1999-2014.