

CY342 Nanoscience: Understanding Small Systems

Credit: 3-0-0-3

Approval: Approved in 2nd Senate

Elective or Core: Elective

Prerequisite: Consent of the faculty member

Students intended for: B. Tech. 3rd Year

Semester: Odd/Even: Even

Course objective:

The course provides an introduction to nanoscience. Some of the fundamental concepts used to study the world at the nanoscale will be discussed in detail. Understanding of these concepts is fundamental in understanding how nanoscale interactions and phenomena differ from those in our common macroscale world. Finally the course provides specific study of the application of nanotechnology to different areas of science.

Course content:

- Big picture and principles of the small world. [6 hours]
- Why 'the smaller, the better'? [3 hours]
- Introduction to Nanoscale physics, Nanomaterials. [12 hours]
- Nanomechanics, Nanoelectronics, Nanophotonics. [9 hours]
- Nanoscale Fluid Mechanics, Nanoscale Heat transfer. [6 hours]
- Nanobiology, Molecular motors, future Nanoscience. [6 hours]

Text & Reference Books:

Introductory Nanoscience : Masaru Kuno, Garland Science 2011.

Foundations of Nanomechanics, A. N. Clealand, Springer, 2003.

Quantum Mechanics for Nanostructures : Vladimir V. Mitin, Dimitry I. Sementsov&Nizami Z. Vagidov, Cambridge, 2010.

Nanophysics and Nanotechnology: An introduction to the modern concepts in Nanoscience: Edward L. Wolf, Wiley-VCH, 2011.

Proposed by: Aniruddha Chakraborty

School: Basic Sciences