

Course Title: Nano-hybrid Systems

Semester: VII

Course Code: CH-462

Credit Hours: 3-0

Pre-requisite: Nil

1. Course Objectives. This course aims to provide students an advanced level understanding of nanochemistry of hybrid materials and composite systems developed on a nanoscale. The course also highlights key ways to manipulate their properties for utilization in diverse applications.

2. Course Outcomes. On successful completion of the course the student will have sound knowledge about nano-hybrid systems, their properties, modern nanocomposites and their applications.

3. Course Outline

a. Nanochemistry:

- (1) An overview of key concepts in Nanochemistry
- (2) Classification of nanomaterials and surface modification techniques
- (3) Nano-hybrid systems/nano-composites
- (4) Classification of Organic-Inorganic hybrid nanomaterials.
- (5) Synthesis techniques of organic-inorganic nano-hybrids.
- (6) Mesoporous organic-inorganic hybrid nanomaterials.
- (7) Optimization of mechanical, electrical and optical properties of organic-inorganic nano-hybrid systems.
- (8) Self-assembled nano-hybrid some key examples
- (9) Grafting of polymer chains to nano-building blocks
- (10) Bio-nanohybrids
- (11) Magnetic nanohybrids and their applications
- (12) Characterization techniques for nano-hybrid systems: some examples.
- (13) Key examples of applied nano-hybrid functional materials and their applications
- (14) Challenges in the fields of nano-hybrids: future perspective

4. Text / Reference Books

- a. Ludovico Cademartiri, Geoffrey 'Ozin, Concepts of Nanochemistry, Wiley, 2009.
- b. T. Pradeep, et al., A Textbook of Nanoscience and Nanotechnology, Tata McGraw Hill Ltd (2012).
- c. Handouts