

Course Title: Advanced Nanomaterials

Semester: VII

Course Code: CH-463

Credit Hours: 3-0

Pre-requisite: Nil

1. Course Objectives. This course aims to provide students detailed knowledge of recent advances in nanochemistry and modern day applications. The course will introduce students to advanced nanomaterials, their properties and prevalent challenges in a variety of fields.

2. Course Outcomes. On successful completion of the course the student will have knowledge about advanced nanomaterials, and their utilization in cutting-edge devices. The students will be able to acquire and apply recent research trends in the field of nanotechnology.

3. Course Outline

a.

- (1) An overview of key concepts in nanoscience.
- (2) Introduction to advanced functional nanomaterials: properties and some examples.
- (3) Surface engineering techniques and molecular self-assembly
- (4) Nano-clusters i.e. Gold Clusters, synthesis and characterization techniques.
- (5) Superlattices: Fabrication and characterization techniques for superlattices
- (6) Magnetic Superlattices and applications
- (7) Nano-phonic Bragg stacks and applications
- (8) Mechanically robust and functional superlattices
- (9) Anisotropic nanomaterials: growth, synthetic strategies and some applications
- (10) Advanced nanomaterials in plasmonics.
- (11) Nanoelectronics

4. Text / Reference Books

- a. Wiley, 2009
- b. a. Ludovico Cademartiri, Geoffrey Ozin, Concepts "of Nanochemistry", T. Pradeep, et al., A Textbook of Nanoscience and Nanotechnology, Tata McGraw Hill Ltd (2012).
- c. G. Ozin, A. Arsenault, Andr & C. Cademartiri, Ludovico, Nanochemistry - A Chemical Approach to Nanomaterials, Royal Society of Chemistry (2009).
- d. Handouts