

Course Title: Nanomaterials for Environment and Catalysis

Semester: VIII

Course Code: CH-465

Credit Hours: 3-0

Pre-requisite: Nil

1. Course Objectives. This course aims to provide students an advanced level understanding of nanochemistry in terms of impact and utilization of nanomaterials in environment and relevant ethical concerns. The course also highlights the use of nanomaterials in catalysis, synthetic techniques and industrial applications

2. Course Outcomes. On successful completion of the course the student will have sound knowledge about nanomaterials and their environmental impact. The students will also know about several applications of nanomaterials in catalysis and renewable technologies.

3. Course Outline

- (1) An overview of fundamental concepts of nanoscience
- (2) Nanomaterials for Environment
- (3) Ethical concerns with nanomaterials and modern day challenges
- (4) Nanoparticles for chemical degradation in environment
- (5) Use of nanomaterials in pollutants removal from soil and water: Key examples.
- (6) Nanoscale biopolymers in environmental remediation: Key examples
- (7) Nanoscale environmental sensors preparation and applications for environment
- (8) Light harvesting nanomaterials.
- (9) Artificial photosynthesis.
- (10) Water Splitting by advanced nanomaterials: key examples
- (11) Photocatalysis, homogeneous and heterogeneous catalysis.
- (12) Nanomaterials and their use in water-decontamination
- (13) Industrial uses of some nanomaterials as catalysts: Key examples

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. G. Ozin, A. Arsenault, Andr & C. Cademartiri, Ludovico, Nanochemistry - A Chemical Approach to Nanomaterials, Royal Society of Chemistry (2009).
- d. Handouts