

Course Code	Course Title	Credit Hours
ENE-814	Functionalized Nanomaterials for Environmental Applications	3 (3+0)

Course Description

This course will introduce students to synthesis, functionalization, and applications of nanomaterials for all environmental matrices. The course is designed for postgraduate students who will benefit from the course contents, especially the surface modification techniques for nanomaterials in water/wastewater treatment.

Course Outline

Introduction to nanomaterials: Covers fundamental techniques in nanomaterial synthesis, characterization methods, and their diverse applications in environmental remediation and sustainability efforts.

Surface capping agents: Explores different types of surface capping agents, their mechanisms in stabilizing nanomaterials, and their applications in enhancing environmental nanotechnology processes.

Phase transfer applications and challenges: Discusses phase transfer processes in nanomaterials, focusing on their applications in environmental science and the challenges involved in achieving efficient material transfer.

Nano and micro encapsulation: Examines nano and micro encapsulation techniques using inorganic oxides and silica shells, focusing on their use in environmental protection and contaminant isolation.

Biochar/Activated carbon functionalization: Covers the functionalization of biochar and activated carbon, highlighting their enhanced capabilities in water purification, pollutant adsorption, and environmental remediation.

Graphene, carbon nanotubes: Analyzes the properties of graphene and carbon nanotubes, discussing their innovative applications in environmental technology, including pollution control and energy storage.

Nanotechnology overview and comparison

Nanomaterial's toxicity, hazards, and remedial measures: Discusses the potential toxicity and hazards associated with nanomaterials, emphasizing safety measures and remediation strategies to mitigate environmental and health risks.

Recommended Books

1. Inorganic Nanoparticles: Synthesis, Applications, and Perspectives (2017)
Claudia Altavilla, ISBN 1439817618
2. Nanotechnologies for Environmental Remediation (2019), Giusy Lofrano,
Giovanni Libralato, Jeanette Brown, ISBN 331953162X