

## **CHE-853 Green Process Engineering**

**Credit Hours: 3**

**Pre-requisites: Nil**

### **Course Objectives**

- To improve the environmental performance and safety of chemical processes
- To reduce the risks to man and the environment of chemical products.
- The principles of sustainable and green processes are described.
- To understand the important concepts such as waste minimization and reductions in materials and energy consumption and risk and hazard are introduced.
- Students will learn about the sustainable processes in chemical engineering.

### **Course Contents**

- Introduction: Principles of green chemistry and sustainability & Waste minimization
- Reduction of materials use & Reduction of energy requirement
- Reduction of risk and hazards & Sustainable use of chemical feedstock
- Energy and water, Life cycle assessment & Bio-catalysis
- Green catalysis for process industry & Process intensification
- Fuel cells- clean energy technology for the future
- Supercritical CO<sub>2</sub> for safer processes
- Extraction of natural products with superheated water
- Details of lab work, workshops practice (if applicable)

### **Course Outcomes**

- The procedure related to the reduction of environmental risks by introducing Green Processes in all related areas of research.

### **Recommended Reading (including Textbooks and Reference books)**

- Handbook of Green Chemistry and Technology By J. Clark and D. Macquarrie
- Handbook of Green Chemistry and Technology By Willi Jäger, Rannacher, Warnatz
- Computational methods for fluid dynamics by Joel H. Ferziger, Milovan Perić
- Control and optimization of multiscale process systems By Panagiotis Christofides