

## **CHE-442: Membrane Technology**

**Credit Hours:** 3-0

**Pre-requisites:** None

### **Course Objectives**

- This course basically focused on liquid and gas separation technologies applied in Chemical and Bio-chemical engineering processes and operations. This course deals with procedures, designs and implementations of different separation technologies.
- Knowledge of purification of water and separation of different gases for further utilization. Advantages from a medical point of view include drug delivery and artificial kidneys. Purification of Natural and Flue gases to avoid global warming and increasing the efficiency of fuel. Different modules and chemicals were used in these separation techniques.
- This course gives an overall analysis and comparison of different separation techniques from the point of view of efficiency and economics.

### **Course Contents**

- i. Membranes for separation processes
- ii. Membrane materials, membrane preparation
- iii. Characterization of membranes
- iv. Membrane transport/solution-diffusion model
- v. Membrane transport/pore model
- vi. Membrane modules
- vii. Concentration profiles in laminar flow channels
- viii. Membrane reactors, membrane processes

### **Course Outcomes**

The student, upon completion of this course, will be able to:

- Analyze the aspects of liquid and gas separation techniques, design, equipment and materials of construction
- Synthesize different membranes using different procedures.
- Learn reverse osmosis and gas separation mathematical models
- Learn various separation mechanisms involved in these techniques.
- Analyze the effect of different membrane modules in each separation technique

- Conduct safety and loss prevention analysis, Hazard analysis
- Analyze these techniques economically, using data of different papers published recently

***Recommended Books***

- Marcel Mulder, Basic Principles of Membrane Technology.
- R.W.Baker, "Membrane Technology and Applications", 2006, Wiley.