PCH236 ADVANCED SEPARATION PROCESSES

L	T	P	Cr
3	1	0	3.5

Course Objective:
To understand the governing mechanisms and driving forces of various advanced separation processes and to perform process and design calculations for advanced separation processes.

Membrane Separation Processes: Types and properties of membranes, Membrane modules, Transport mechanism in membrane process, Formation of liquid membranes, Operational aspects of liquid membrane.

Ultrafiltration: Ultrafiltration modules and applicability, Concentration polarization, Fundamentals of reverse osmosis, Osmotic pressure, Relation between chemical potential and osmotic pressure, Factors affecting the performance of reverse osmosis plant, reverse osmosis membrane module, Membrane age, Advantages, disadvantages and application of reverse osmosis process.

Pervaporation: Theory of pervaporation, Separation factor, Classical pervaporation, Factors affecting pervaporation, Air heated pervaporation, Osmotic distillation, Thermo-pervaporation, Reactive pervaporation, Advantages of pervaporation, Application of pervaporation.

Chromatographic Separations: Theory of chromatographic separation, Selectivity or separation factor, Efficiency of chromatographic system, Types of chromatography, Liquid chromatography, Liquid-solid chromatography, Advantages and disadvantages of chromatographic separations.

Gas Separation: Different techniques of gas separations and their applications.

Dialysis: Theory of dialysis, Separation factor in dialysis, Fluid film resistance in dialysis, Dialysis membrane, Applications of dialysis process.

Course learning outcomes (CLOs):

The students will be able to

1. apply modern separation techniques in various applications
2. analyze and design novel membranes for intended application
3. analyze and design pervaporation, chromatography and dialysis based separation processes

Recommended Books:

1. *Seader J.D., Ernet J. Henlay, and Keith, D., Separation Process Principles,Wiley (2010).*
2. *King, C.J., Separation Processes, Tata McGraw - Hill Publishing Co., Ltd. (1982).*
3. *Osadar, V., and Nakagawa, I.,Membrance Science and Technology, Marcel Dekkar (1992).*
4. *Schoew, H.M., New Chemical Engineering Separation Techniques,Interscience Publishers (1972).*
5. *Kestory, R.E., Synthetic Polymeric Membrances, Wiley (1987).*

Evaluation Scheme:

S.No.	Evaluation Elements	Weightage (%)
1.	MST	30
2.	EST	45
3.	Sessional (may include Assignments/Projects/Tutorials/Quizes/Lab Evaluations)	25