Chemical Engineering Department
ChE 316: Separation Processes I

Catalogue Data: (3 credit hours – 4 contact hours)
Theories and equipment design involving evaporation, drying, crystallization and membrane based separation processes with main focus on reverse osmosis, gas permeation and dialysis.

Textbook:
J.D. Seader and E. J. Henley, Separation Process Principles, John Wiley, 1998.
C.J. Geankoplis, Transport Processes and Unit Operations, Prentice Hall, 1993.

References:
J.F. Richardson and Coulson, Chemical Engineering Volume 2, BH Publishers, 1996
W.L. McCabe, J.C. Smith and Peter Harriot, Unit Operation of Chemical Engineering, Sixth Edition, McGraw Hill, 2001.

Instructor: Dr. Mohammad Asif, Room: 2B45

Topics to be covered:

Course Module 1: Membrane based separation processes	**5 weeks**
General introduction to separation processes Introduction to membrane separation processes and their industrial applications Membrane material Membrane modules Module flow patterns Module cascades Transport in membranes Concentration polarization Reverse osmosis Gas permeation Dialysis	
Course Module 2: Evaporation	**3 weeks**
Introduction to evaporation Types of evaporators and operation methods Calculation methods for single effect evaporators Calculation methods for multiple-effect evaporators	
Course Module 3: Drying	**4 weeks**
Introduction to drying its terminologies and definitions Rate of drying curves and phases of drying Calculation methods for constant-rate drying period Calculation methods for falling-rate drying period Material and heat balances for continuous dryers Constant-rate drying with convection, conduction and radiation Equations for various types of dryers Drying equipment	

Course requirement:
Homework assignments
Quiz
Two midterm tests
Final examinations

Computer usage: moderate

Laboratory projects: none

Course Assessment:
Through homeworks (10%), quiz (10%), two midterm tests (30%), final examination (50%)

Contribution to course goals:
Engineering Science or design ____3____ credits
Engineering design _____ credits
Mathematics or Basic Science _____ credits

Prepared by: Dr. Mohammad Asif