King Fahd University of Petroleum & Minerals
Chemical Engineering Department
CHE 304 – Transport Phenomena III
2009 – 2010 (092)

Catalog Description:

This course covers fundamentals of mass transfer, differential equations of mass transfer, steady-state and unsteady-state molecular diffusion, convective mass transfer, interface mass transfer, mass transfer theories, mass transfer equipment..

Prerequisite:

CHE 204 Transport Phenomena I

Co-requisite:

CHE 300 Transport Phenomena II

Textbooks:

Fundamentals of Momentum, Heat, and Mass Transfer, by J.R. Welty, C.E. Wicks, R.E. Wilson, 4th Ed., John Wiley & Sons, New York (2000).

Ref. Books:

1. Diffusional Mass Transfer, by A.H.P. Skelland, Robert E. Kriger Publishing Company, Inc. (1985).
2. Mass Transfer Operations, by R.E. Treybal, 3rd Ed., McGraw-Hill, New York (1981)
3. Transport Processes and Unit Operations, by C. J. Geankoplis, 3rd Ed., Prentice Hall, New Jersey (1993)

Course Objective:

Develop student's concepts of diffusion and convection mass transfer in chemical and biological systems.

Course Outcomes

Upon successful completion of this course, the students will be able to:

1. Estimate values of molecular diffusion coefficients and predict effect of temperature and pressure on the molecular diffusion coefficient.
2. Write Ficks law for a given diffusion situation.
3. Develop the differential equations of mass transfer.
4. Estimate molar/mass flux and concentration profiles for steady state and unsteady-state molecular diffusion.
5. Use concept of boundary layer to calculate convective mass transfer coefficient on a flat plat.
6. Estimate convective mass transfer coefficients for a number of situations using empirical correlations.
7. Model situations involving convective mass transfer.
8. Analyze mass transfer equipment.

Course Outline:

Topic	Number of Lectures	Chapter
Fundamentals of Mass Transfer	5	24 (Welty *et al.*)
Differential Equations of Mass Transfer	2	25 (Welty *et al.*)
Steady-State Molecular Diffusion	5	26 (Welty *et al.*)
Unsteady-State Molecular Diffusion	3	27 (Welty *et al.*)
Convective Mass Transfer	4	28 (Welty *et al.*)
Convective Mass Transfer Between Phases	2	29 (Welty et al.)
Convective Mass Transfer Correlations	3	30 (Welty et al.)
Mass Transfer Equipment	5	31 (Welty et al.)
Review	1	