

**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, 4<sup>th</sup> 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, 3<sup>rd</sup> 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:**

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