

**CH409 TRANSPORT PHENOMENA**

**Course Description & Objectives:**

*The course deals about various transport processes like Momentum Transfer, Heat Transfer and Mass Transfer. It includes the dynamics of fluid behavior and their turbulence nature.*

**Course Outcomes:**

*Students have an understanding and appreciation for the implications of the science of transport phenomena on society as a whole, and recognize connections between transport phenomena and other areas of study.*

**UNIT I - Transport Properties**

Introduction: Transport Properties, Estimation of transport properties, pressure, Temperature, Concentration dependence, Newton's Law of viscosity.

**UNIT II - Momentum Balance**

Boundary conditions, Flow problems flat plate, Circular pipe, Annulus, Creeping flow.

**UNIT III - Energy Balance**

Boundary conditions, Fourier's law of conduction, Composite wall, Extended Fin surface, Viscous heat source, Chemical heat source, Electric heat source.

**UNIT IV - Mass Balance**

Boundary conditions, diffusion through a stagnant gas film, homogeneous, heterogeneous reactions, falling liquid film, chemical reaction inside a porous catalyst.

**UNIT V - Flow Problems**

Equation of change for isothermal, Non isothermal systems, use of equation of change to solve flow problems, introduction to turbulent flow.

**TEXT BOOK:**

1. R.B.Bird, W.E. Stewart, "Transport Phenomena", 1st ed., Mc Graw Hill, 2003.

**REFERENCE BOOKS :**

1. James. R. Welty, Robert. E. E. Wilson, "Fundamentals of Momentum, Heat and Mass Transfer", 2nd ed., John Wiley & sons, 2002.
2. L. Theodore, "Transport Phenomena", 2nd ed., John Wiley & Sons, 2002.
3. J. Geankoplis, "Transport Processes & Unit Operations", 3rd ed., Prentice Hall of India, 2003.