

EME 921 - Momentum, Heat & Mass Transfer in Chemical Engineering Separation Processes

Credit Hours: 3

Pre-requisites: Nil

Course Objectives

- To provide expertise in the area of Momentum, Heat, & Mass Transfer in Chemical Engineering separation processes.
- To teach the techniques related to laws of viscosity and mechanism of momentum transport, velocity distribution in laminar flow, and diffusely in mass transport.
- Ultimately, teach them thermal separation processes.

Course Contents:

- Mechanism of Transfer Phenomenon
- Dimensionless Numbers & their significance in MHMT.
- Navier Stoke's Equation
- Development of Transfer Scenarios and balance Equations.
- Application of Boundary Conditions
- Raison d'etre of Boundary Conditions

<p>Momentum Transfer</p> <ul style="list-style-type: none">• Equation of Continuity• Non-Newtonian Fluids and compressible fluids• Case Studies: MT in a circular pipe <p>Heat Transfer</p> <ul style="list-style-type: none">• Conduction -vs- Convection• Free Convection & Forced Convection• Case Studies: HT through insulation, HT through Fins <p>Mass Transfer</p> <ul style="list-style-type: none">• 2 Film Theory• Equilibria @ interface• Vapor-Liquid-Equilibria• Case Study: Distillation Column	<p>Detailed Case Study</p> <p>Module 1: Fixed Bed Reactor</p> <ul style="list-style-type: none">• Momentum Heat & Mass Transfer co-phenomena.• Interaction and effects of MT on Heat & Mass Transfer. <p>Module 2: CFD scenario of Inkjet</p> <ul style="list-style-type: none">• Concept of continuity models• Concept of Boundary Conditions• Steady - transient transformations <p>Module 3: CFD simulations of fluidized bed</p> <ul style="list-style-type: none">• Concept of fluidization• Concept of space velocity• Concept of simultaneous heat and mass transfer <p>Module 4: CFD simulations of Hi-Gee operations</p> <ul style="list-style-type: none">• Concept of rotary motion• Concept of gravitation• Concept of rotary momentum
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Un-Steady State Conditions

- Introduction to the equations involved in unsteady state MHMT.

Recommended Reading (including Textbooks and Reference books)

- Transport Phenomena, R. B Bird & W.E STEWART.
- Transport Phenomena, R.S BROD KEY, & HC HERSHEY