



**THE OHIO STATE UNIVERSITY**  
COLLEGE OF ENGINEERING

# Advanced Transport

## CBE 8815

**Credit Hours:**

3.00 - 3.00

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**Course Levels:**

Graduate (5000-8000 level)

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**Course Components:**

Lecture

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**Course Description:**

Momentum and mass transfer theory at both the macroscopic and microscopic levels utilizing integral and differential conservation equations.

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**Prerequisites and Co-requisites:**

Prereq: Grad standing in ChemEng, or permission of instructor.

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**Course Goals / Objectives:**

- Analyze, model, and solve problems that involve momentum and mass transfer
  - Appreciate the analogy among mass, momentum, and heat transfer and the similarity in the solution methods associated with them
  - Apply shell-balance and equations-of-change approaches (both analytical and numerical solutions) to solve mass transfer and fluid mechanics problems relevant in the field of chemical and biomolecular engineering
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**Course Topics:**

- Integral and differential conservation equations
  - Similarities between momentum, mass, and heat transfer
  - Dimensionless analysis and time scales
  - Similarity methodology and numerical analysis
  - Steady and unsteady-state creeping and laminar flows
  - Viscous and inviscid flows
  - Transport at interfaces
  - Lubrication theory
  - Boundary layer theory
  - Forced and natural convection
  - Solution of mass transfer problems with one and two independent variables, without and with chemical reactions
  - Applications of mass and momentum transport to chemical and biomolecular engineering processes
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**Designation:**

Required