



**THE OHIO STATE UNIVERSITY**  
COLLEGE OF ENGINEERING

# Computational Methods for Chemical Engineering

## CBE 2345

**Credit Hours:**

3.00

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**Course Levels:**

Undergraduate (1000-5000 level)

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**Course Description:**

Chemical engineering problems are often described by a complex set of mathematical equations that cannot be solved analytically. The main goal of this course is to introduce students to a variety of computational methods/algorithms to develop solutions to such challenging problems as well as how to implement these solutions on a computer using a relevant programming environment (e.g., Python)

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**Prerequisites and Co-requisites:**

CBE 2200

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**Course Goals / Objectives:**

- Understand and apply the basics of scientific computing.
  - Learn how to numerically setup and solve linear and nonlinear systems of equations as well as characterize potential errors in the identified solutions
  - Learn how to define, interpret, and solve constrained optimization problems using state-of-the-art software tools.
  - Learn fundamental concepts related to the characterization and solution methods for ordinary differential equations as a framework for modeling dynamic systems.
  - Learn the core concepts for constructing and interpreting data-driven models.
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**Course Topics:**

- Programming / Scientific Computing
  - Linear Systems
  - Nonlinear Systems
  - Differentiation, Interpolation, and Integration
  - Numerical Optimization
  - Initial Value Problems
  - Boundary Value Problems
  - Statistics, Regression, and Machine Learning
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**Designation:**

Required