THE OHIO STATE UNIVERSITY
COLLEGE OF ENGINEERING

Modeling and Simulation Lab II

MATSCEN 3321

Credit Hours:
2.00

Course Levels:
Undergraduate (1000-5000 level)

Course Components:
Lecture

Course Description:
Modeling and simulation techniques appropriate to junior-level study in materials science and engineering.

Prerequisites and Co-requisites:
Prereq: 2321, 3141, and 3151, and enrollment as MatScEn-BS student; or permission of instructor.

Course Goals / Objectives:
- Visualize phenomena, conduct virtual experiments, and use modeling and simulation techniques that provide quantitative engineering estimates related to material structure, processing, and properties
- Introduce students to transport and kinetics modeling and simulation; elementary case studies
- Introduce students to structural transformations modeling and simulation; elementary case studies
- Introduce students to electronic/optical properties modeling and simulation; elementary case studies
- Introduce students to structural properties modeling and simulation; elementary case studies
- Define limitations to models and simulations and methods by which to assess accuracy

Course Topics:

- Lab A. Introduction to transport and kinetics modeling and simulation: Representative Examples: Steady-state and non-steady-state diffusion; case studies; e.g., MatLab, COMSOL.
- Lab B. Introduction to structural transformations modeling and simulation: Representative Examples: Prediction of volume fraction of product phase/precipitate during a specified cooling history; case studies; e.g., MatLab, PANDAT/PanPrecipitation.
- Lab C. Introduction to electronic/optical properties modeling and simulation: Representative Examples: Band structures, optical properties, and simple device structures; case studies; e.g., NanoHub.
- Lab D: Introduction to structural properties modeling and simulation: Representative Examples: precipitate strengthening; percolation of yield throughout a polycrystal; yield around a crack tip; case studies; e.g., MatLab, COMSOL.

Designation:
Required