THE OHIO STATE UNIVERSITY
COLLEGE OF ENGINEERING

Modeling and Simulation-Based Design

MATSCEN 4321

Credit Hours:
3.00

Course Levels:
Undergraduate (1000-5000 level)

Course Components:
Lecture
Lab

Course Description:
Practical modeling and simulation techniques appropriate to senior-level design in materials science and engineering.

Prerequisites and Co-requisites:
Prereq: 2321, 3321, and enrollment as MatScEn-BS major; or permission of instructor.

Course Goals / Objectives:
- Knowledge of setup and execution of advanced modeling and simulation for materials structure, properties, and process problems
- Apply modeling and simulation techniques to open-ended problem solving involving engineering materials

Course Topics:

- Modeling and Simulation - Introduction and examples: computation in materials design; basics (Input, equations, execution, output); numerical methods vs. length/time scales and application areas; common features and differences.
- Applied modeling - Properties vs. process modeling: general concepts, independent of specific materials and methods; methods vs. application & materials class; form student project teams; begin development of student project proposals.
- Property modeling - Introduction of computational methods: calculate structural features and properties in the instructor’s field of expertise (e.g., classical molecular dynamics, phase field modeling, etc).
- Process modeling - Introduction to practical process modeling (goals, methods) in an area selected by instructor. Hands-on labs with standard software typically used in an industrial environment.
- Presentation of Student Projects

Designation:
Required