

**SPRING 2023**  
**ENME 625: MULTIDISCIPLINARY OPTIMIZATION**  
**TUESDAYS 4:00 - 6:40 PM**

Objective: To present applied and computational aspects of engineering optimization with a focus on problems that are multi-objective, may need to be approximated, and are multidisciplinary – their overall system optimization problem can be decomposed and solved by multiple subsystem optimization subproblems.

Outline:

1. Introduction
2. Convexity, generalized convexity, optimality, and duality concepts
3. Multi-objective optimization
  - 3.1. Multi-objective optimization concepts
  - 3.2. Heuristics, e.g., multi-objective genetic algorithm, constraint handling, solution set quality metrics
  - 3.3. Multi-objective robust optimization (under uncertainty)
4. Approximation
  - 4.1. Design of experiments
  - 4.2. Surrogate modeling
  - 4.3. Verification of surrogate models
  - 4.4. Surrogate-assisted optimization
5. Multi-Disciplinary Optimization (MDO)
  - 5.1. MDO
  - 5.2. MDO-based sensitivity and post optimality analysis

Grading: The grade will be based on 2 exams; 4 quizzes and two projects.

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