ENGR 160  Introduction to Engineering Optimization Techniques  Syllabus

Instructor:

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Course Purpose:


Textbook:

No Official Textbook. Lecture notes are the source of reading.


Course Topics:

- Introduction to Optimization:
  - Design Variables, Design Constraints, and Objective Function
  - Different Classifications of Optimization Problems
  - Single-Variable and Multi-Variable Optimization
  - Engineering Applications of Optimization: Electrical Engineering, Mechanical Engineering, Industrial Engineering, Course Planning, Resource Management, etc.

- Linear Programming:
  - Identifying Linear Optimization Problem
  - Geometry of Linear Optimization Problems
  - Formulating Linear optimization problems
  - Applications and Examples of Linear Programming
  - Using MATLAB to Solve Linear Optimization Problems

- Integer Programming:
  - Integer variables and 0-1 decision making
  - Identifying Integer Optimization Problem
  - Geometry of Integer Optimization Problems
  - Formulating Integer Optimization Problems
Formulating Mixed-integer Optimization Problems
Applications and Examples of Integer and Mixed-Integer Programming
Using MATLAB to Solve Integer and Mixed-Integer Programming Problems

- Nonlinear Optimization
  - Nonlinear objective functions and constraints
  - Geometry of Nonlinear Programming Problems
  - Nonlinear Optimization Problem Approximated by Linear Problems
  - Nonlinear Optimization Problems that involve Convex functions
  - Formulating Nonlinear Optimization Problems
  - Applications and Examples of Nonlinear Programming
  - Using MATLAB to Solve Nonlinear Programming Problems

- Nonlinear Constrained Optimization:
  - Decision Making Under Uncertainty
  - Modeling Uncertainty in Optimization Problems
  - Stochastic Optimization
  - Formulating Stochastic Optimization Problems
  - Applications and Examples of Stochastic Programming
  - Using MATLAB to Solve Stochastic Programming Problems

Prerequisites:

Prerequisite(s): MATH 010A; either CS 010 or CS 010V or EE 020 or ME 018.

Grading (Percentage):

Homework – 15%
MATLAB Assignment* - 10%
Midterm Exam: 25%
Final Exam – 50%