CS 4400 : OPTIMIZATION TECHNIQUES

Semester Hours: 3.0  
Contact Hours: 3

Coordinator: Robert Green

Text: Introduction to Mathematical Programming

Author(s): W. WINSTON AND M. VENKATARAMANAN

Year: 2002

SPECIFIC COURSE INFORMATION

Catalog Description:

Linear programming, game theory, PERT, network analysis; duality theory and sensitivity analysis; applications. Computer programs written to implement several techniques. Prerequisites: CS 1010 or CS 2010 and either MATH2220 or MATH 3220.

Course type: ELECTIVE

SPECIFIC COURSE GOALS

• I can understand and explain the Simplex Method
• I can perform sensitivity analysis on various optimization problems
• I can formulate and solve various optimization problems
• I can implement and apply evolutionary and heuristic techniques

LIST OF TOPICS COVERED

• Linear Programming Problem Formulations
  o Blending, Diet, Multiperiod, Work Scheduling, Project Scheduling, and Financial Optimization Problems
• Solving Linear Programs
  o Python
  o Gurobi
• Simplex Algorithm
- Basic and non-basic variables
- Multiple Optimal Solutions
- Unbounded Linear Programs
- Degeneracy
- Big-M Method
- Two-Phase Simplex Method
- Unrestricted Variables

- Sensitivity Analysis
- Duality Theory
- Metaheuristic Algorithms