

SYSE 3060 Systems Optimization

General Information:

Course Information

Credit Hours: 3 Lecture: 3 Hours Lab: None

Catalog Description:

Mathematical tools applied to system optimization including problem formulations, identification of decision variables and constraints, use of graphical methods, linear programming, concepts of duality, and sensitivity analysis. Applications include transportation problem analysis, network analysis, project management, decision analysis, game theory, Markovian process, queuing problems, and inventory problems.

Prerequisites: ICEE 2060, 2080

Required Texts:

- Operations Research: Applications and Algorithms. 4th Edition. Winston, Wayne. Thomson Brooks/Cole, 2004. ISBN: 0-534-38058-1
- Fundamental Of Engineering Supplied-Reference Handbook (p) NCEES, 7th edition, Natl Council Of Examiners , ISBN: [1-932613-19-6](https://www.ncees.org/publications/1-932613-19-6)

Course Objectives:

Upon completion of this course each student will be able to:

- Formulate an optimization problem
- Identify decision variables and constraints
- Solve optimization problems employing graphical and iterative methods
- Understand the simplex method and duality
- Perform sensitivity analysis on an optimized solution
- Apply linear programming to solve optimization problems in a range of engineering application areas
- Understand applications of integer programming: formulate and solve an integer programming problem

Course Outline

Topics covered in this course include:

- Matrices and Vectors
- Overview of the Operations Research Modeling Approach
- Introduction to Linear Programming
- Solving Linear Programming Problems: Graphical Approaches
- Basic Feasible Solutions and Extreme Points
- Simplex Method
- Algebra of the Simplex Method
- Duality Theory and Sensitivity Analysis
- Economic Interpretation of the Dual
- Transportation and Assignment Problems
- Network Analysis, Including PERT-CPM
- Integer Programming
- Nonlinear Programming
- Game Theory and Decision analysis
- Introduction to Markov chains
- Introduction to Queuing Theory
- Introduction to Inventory Analysis

Grading Policy and Assignments:

Students will be evaluated based on the combination of class activities. The final grade will be assessed with the following criteria:

Grading		Assessment	
A	90% or better		
B	80% or better		
C	70% or better	Homework	20%
D	60% or better	Tests (3)	60%
F	Less than 60%	Quizzes (5)	20%