GAZI UNIVERSITY, FACULTY of ENGINEERING
INDUSTRIAL ENGINEERING DEPARTMENT

IE 202 OPERATIONS RESEARCH - I

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REFERENCES

1) Hamdy Taha, An Introduction to Operations Research, 7th Ed., 2003, Prentice Hall.
2) Wayne L. Winston, Operations Research-Applications and Algorithms, 4th Ed., 2004, Thomson Learning Inc.

COURSE PLAN

1. INTRODUCTION, DEFINITION OF OPERATIONS RESEARCH: A brief history and development of operations research, definition of basic concepts in Operations Research.
2. MODELING: Verbal definition of linear programming problems, construction of mathematical model of various decision problems.
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4. GRAPHICAL SOLUTION METHOD: Plotting a linear programming problem with two variables on a two dimensional graph, denoting the feasible solution space and finding the optimal. Graphical post-optimal analysis of the objective coefficients.
5. GRAPHICAL SOLUTION METHOD: Graphical sensitivity analysis on the constraints' right-hand-side constants. Special solution cases that might be encountered in the graphical solutions of linear programming problems (Alternative optima, degeneracy, infeasible and unbounded solutions).
6. ALGEBRAIC SOLUTION METHOD-SIMPLEX ALGORITHM: Statement of constraints system in the standard form as the simultaneous equations, and based on this form application of the algebraic technique the Simplex Algorithm. Application of the algorithm to maximization and minimization problems.
7. ARTIFICIAL STARTING SOLUTION: Big-M and Two-Phase Methods
8. SPECIAL CASES IN THE SIMPLEX METHOD APPLICATIONS: Alternative optima, degeneracy, infeasible and unbounded solutions.
9. DUALITY: Primal-dual relationship. Forming dual forms when primal models are given. Methods for finding dual forms.
10. DUALITY: Complementary-Slackness Conditions, Reduced Cost Analysis.
11. MIDTERM EXAM
12. DUAL-SIMPLEX METHOD: Solution to optimal but infeasible problems.
13. MATRIX REPRESENTATION: Matrix operations of the Simplex Algorithm
14. SENSITIVITY ANALYSIS: Post-optimality analysis for the changes affecting feasibility
15. SENSITIVITY ANALYSIS: Post-optimality analysis for the changes affecting optimality

EVALUATION

50% MIDTERM EXAM, 50% FINAL