King Fahd University of Petroleum and Minerals
Department of Mathematics
Course #: Math 581
Title: Advanced Linear Programming

TOPICS:

Theory of linear programming, Simplex Algorithm, Two phase simplex method, Big-M simplex method.

Duality theory (weak and strong duality theorems, Complementary slackness conditions, Dual simplex method).

Integer Programming (Branch and Bound, and Cutting Plane methods).

Transportation problem (North -West corner, Least cost and Vogel's methods, and u-v-method for optimality) and assignment problem (Hungarian method).

Linear fractional programming (Charnes-Cooper method).

Convex functions and properties, Karush-Kuhn Tucker conditions, Wolfe method.

Sensitivity Analysis (Change in cost vector, Change in right hand side, Change in adding new constraints, Adding new decision variables, and change in the coefficient of a matrix A).

Revised Simplex Method, Revised two phase Simplex Method, Revised Big-M Simplex Method.

Karmarkar's Algorithm for linear programming problems.

References:
1. Robert J. Vanderbei, **Linear Programming Foundations and Extensions**, Fifth Edition **Springer Science** + **Business Media New York 2020** ISBN 978-3-030-39415-8 (eBook).
2. Hamdy A. Taha, **Operations Research - An Introduction, 10th Edition, 2017, Pearson.**