

**DEPARTMENT OF MATHEMATICS,**

**UNIVERSITY OF KARACHI,**

**Course Outline**

**MATH 645: OPERATIONS RESEARCH - I**

**Course contents:**

Introduction: Origins, Nature and Impact of Operation Research. The Operations Research Modeling approach, Linear programming (LP): Introduction and Methods for solving LP models and assumptions in LP Model Theory of the simplex Method, Breaking in the simplex Method, Modified Simplex Methods. Applications of simplex and modified simplex methods, Duality theory, Sensitivity analysis and applications to linear programming, Dual Simplex Method, Parametric Linear Programming. Upper Bound Technique, Extension of Linear Programming to Transportation and Assignment Models and Methods for solving these models, Integer and Nonlinear Programming Methods and their application

Dynamic Programming (DP): Introduction, characteristics of DP, Determinate DP, Probabilistic DP, and their applications.

**Labs / Drills:**

Linear Programming (Three Cases), Simplex Method (Three Cases), Duality and Sensitivity Analysis (Four Cases), Transportational and Assignment Method (Three Cases), Integer Programming (Four Cases), Non Linear Programming (Three Cases) and Dynamic Programming (One Case).

**Books Recommended:**

1. Saaty, L. S., Mathematical Methods of Operations Research, John Wiley, 1986.
2. Rao, S. S., Optimization Problem, Willey Eastern, New Delhi, 1987.
3. Killier, F. S. and Lieberman, G. J., Operations Research, Holden Day, San Fransisco, Calif. 1988.

4. Mustafi, C. K., Operations Research, Willey Eastern, New Delhi, 1982.
5. Gupta, P. K. and Hira, D. S., Operations Research S. Chand, New Delhi, 1994.
6. Moder and Elmaghrby, Hand Book of Operation Research Models and Application, Vols 1 and 2, Van Nostrand Renhold, 1982.
7. Taha, S. A., Operation Research, Willey Eastern, New Delhi, 1996.
8. Minkash, T. A., The Optimization Problem, Eastern Publishers, 1992.
9. Loomba, N. P., Management – A quantitative Perspective, Barnch College, City University of New York, 1978.
10. Hiller, F., Introduction to Operational Research, Stanford University, Eighth Edition, 2005.