Course Name:
Operations Research
Course Number:
20308
Credit:
4
Course Content (outline):

1. Modeling
   - Overview, Model Classification, Formulation of Linear Programming, Classification of Mathematical Programming Models
2. Linear Programming
   - Simplex Method, Linear Programs with Bounded Variables, Linear Programming in Matrix Form, Revised Simplex Method
3. Sensitivity Analysis
   - Shadow Prices, Reduced Costs, Variations in Objective Coefficients and Righthand-Side Values, Simultaneous Variations Within the Ranges, Parametric Programming
4. Duality
   - Definition of the Dual Problem, Duality Properties, The Dual and Primal-Dual Simplex Method, Duality in Mathematical Economics, Application of Duality in Game Theory
5. Introduction to Graph Theory
   - The Definition, Directed Graph, Computer Representation of Graphs and Digraphs, Walks, Trails, Paths and cycles, Basic properties, Examples.
6. Networks
   - General Network-Flow Problem, Special Network Models, Simplex Method for Networks, Special Methods for Solving Network Problem
7. Integer Programming
   - Integer-Programming Models, Formulating Integer Programs, Sample Problems, Branch-and-Bound Procedure, Cutting Planes Procedure
8. Large-Scale Systems
   - Large-Scale Problems, Decomposition Method, Column Generation Method
9. Practical Applications of Mathematical Programming
   - Example of Problems

References:

1. Bradley, S., Hax, A., & Magnanti, T. (1977). Applied mathematical programming.
2. Hillier, Frederick S. and Lieberman, Gerald J. (2015). Introduction to Operations Research, McGraw-Hill.
3. Winston, W. L., & Goldberg, J. B. (2004). *Operations research: applications and algorithms* (Vol. 3). Boston: Duxbury press.
4. Cormen, T. H., Leiserson, C. E., Rivest, R. L. & Stein, C. (2009). Introduction to algorithms, *The MIT press*.
5. West, D. B. (2001). *Introduction to graph theory* (Vol. 2). Upper Saddle River: Prentice Hall.
6. Ravindra, K. A., Magnanti, T. L., & Orlin, J. B. (1993). Network flows: Theory, algorithms, and applications.
7. Antonio, J. C., Roberto, M., & Enriqne, C. (2006). Decomposition techniques in mathematical programming.

Some Other Useful References

8. Wagner, Principles of Operations Research.
9. Dantzig, Linear Programming & Extensions.
10. Luenberger, Introduction to Linear & Nonlinear Programming.
11. Lasdon, Optimally Theory for Large Systems.
12. Ford & Fulkerson, Flows in Network
13. Dorfman, Samuelson, Solow, Linear Programming & Economic Analysis.
14. Hadley, Linear Programming.