



## Introduction to Operations Research

Course Code	Course Num.	Course Name	Credit Hours	Lec	Lab	Tut	Prerequisites
MAT	351	Introduction to Operations Research	3	3	0	1	MAT 223

### *Objectives:*

The core subject of this course is Linear Programming (LP), basically an optimization technique applicable to the solution of problems in which the objective function (expression to be optimized) and constraints are linear. Such techniques find applications across a very wide variety of subjects in engineering, economics, finance and manufacturing. The course should be accompanied by Lab sessions in order to learn students a known software of linear programming (e.g. TORA provided with Taha's book).

### *Syllabus:*

- **Introduction to Operations Research.**
- **Introduction to Linear programming:** Linear programming formulations; Graphical Linear Programming Solution, Graphical Sensitivity analysis.
- **The Simplex Method:** Standard Linear Programming; Determination of Basic Feasible Solutions; The Simplex Algorithm.
- **Special Cases of the Simplex:** Degeneracy, Alternative optimum, Unbounded solution, Infeasibility.
- **Duality and Sensitivity Analysis:** Formulation of the Dual Problem; Relationship between Optimal Primal and Optimal Dual Solutions; Economic interpretation of Duality, Dual Simplex and Sensitivity Analysis.
- **Special linear programming models:** The transportation model; The assignment model, Critical Path and PERT.
- **Introduction to Integer Linear Programming:** Illustrative applications, Branch and Bound algorithm, Application to the Traveling Salesman Problem.

### *References:*

- **Introduction to Operations Research**, by F. Hillier and G. Lieberman, 7<sup>th</sup> Edition, McGraw Hill, (2001).
- **Operations Research: Applications and Algorithms** by Wayne L. Winston, Wadsworth, 3<sup>rd</sup> Edition (1997).
- **Operations Research: An Introduction** by H. Taha, 8<sup>th</sup> Edition, Prentice Hall, 8<sup>th</sup> Edition, (2006).

