



## SYLLABUS

Course Code	Course Num.	Course Name	Credit Hours	Lec.	Lab.	Tut.	Private study	Pre-requisites	Course Level	Teaching Language
MAT	351	Introduction to Operations Research	3	2	0	2	5	MAT 223	5 <sup>1</sup>	English

### A. Course Description

This course describes the most important ideas, theoretical results, and examples of an introduction to operations research. The course includes the essential fundamentals of linear and integer programming. The emphasis is on calculations, and some applications are mentioned.

### B. Course Outcomes

At the end of this course the student will be able to:

- Be familiar with 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.
- Formulate a real problem with a linear program.
- Solve it with the appropriate method (Simplex algorithm, special algorithms for transportation or assignment problems, or algorithms for integer programming) by hand (if possible) or by using TORA software.

### C. References:

#### Required Textbook

*Operations Research: An Introduction*, H. Taha, Prentice Hall, 8<sup>th</sup> Edition, 2006.

#### Other references:

- *Introduction to Operations Research*, F. Hillier and G. Lieberman, 7<sup>th</sup> Edition, McGraw Hill, 2001.
- *Operations Research: Applications and Algorithms*, Wayne L. Winston, Wadsworth, 3<sup>rd</sup> Edition, 1997.

**Course Website:** Google Classroom Webpage: <http://www.imamm.org/>

<sup>1</sup> B.Sc. in Applied Mathematics.



#### D. Topics Outline

1. **Introduction to Linear Programming:** Overview, Linear Programming Formulations, Graphical Linear Programming Solution, Graphical Sensitivity Analysis.
2. **The Simplex Method:** Standard Linear Programming, Determination of Basic Feasible Solutions, The Simplex Algorithm.
3. **Special Cases of the Simplex:** Degeneracy, Alternative optimum, Unbounded solution, Infeasibility.
4. **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.
5. **Special Linear Programming Models:** The Transportation Model, The Assignment Model.
6. **Introduction to Integer Linear Programming:** Illustrative Applications, Branch and Bound algorithm, Application to the Traveling Salesman Problem.
7. **Tora Software:** Use of TORA Software to Solve Exercises and Problems from all Course Chapters.

#### E. Office Hours

Office hours give students the opportunity to ask in-depth questions and to explore points of confusion or interest that cannot be fully addressed in class.

#### F. Exams & Grading System

The semi-official dates of the exams for this course are:

- **Midterm 1:** 6<sup>th</sup> or 7<sup>th</sup> week.
- **Midterm 2:** 11<sup>th</sup> or 12<sup>th</sup> week.
- **Quizzes & Homework:** During the semester.
- **Final Exam:** 16<sup>th</sup> week.

Your course grade will be based on your semester work as follows:

<b>Midterm 1:</b> 20 %	<b>Midterm 2:</b> 20 %	<b>Final Exam:</b> 40 %
<b>Quizzes, Homework, Attendance &amp; Participation:</b> 20 %		

The grading distribution:

A <sup>+</sup>	A	B <sup>+</sup>	B	C <sup>+</sup>	C	D <sup>+</sup>	D	F
[95, 100]	[90, 95)	[85, 90)	[80, 85)	[75, 80)	[70, 75)	[65, 70)	[60, 65)	[0, 60)



## G. Student Attendance/Absence

Only three situations will be considered as possible excused absences:

- Occurrence of a birth or death in the immediate family will be excused. (“Immediate family” is defined by the University as spouse, grandparents, parents, brother, or sister).
- Severe illness in which a student is under the care of a doctor and physically unable to attend class will be excused. Students are not excused for a doctor's appointment. Do not make appointments that conflict with rehearsals. Notes from the University Health Center will be accepted.

[Executive Rules for Study Regulations and Exams](http://goo.gl/ykm7t3)  
[goo.gl/ykm7t3](http://goo.gl/ykm7t3)

