SYLLABUS

Course Code	*Course Num.*	*Course Name*	*Credit Hours*	*Lec.*	*Lab.*	*Tut.*	*Private study*	*Pre-requisites*	*Course Level*	*Teaching Language*
MAT	**651**	**Graph Theory and Combinatorics**	**4**	**3**	**٠**	**1**	**9**		**2^1-2^2**	**English**

A. Course Description

The course aims at introducing graph theory, algorithms, and networks. The main principles of combinatorics are presented.

B. Course Outcomes

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

1. Acquire a deep knowledge of the definitions of relevant vocabulary from graph theory and combinatorics,
2. Know the statements and proofs of many important theorems in the subject, and be able to perform related calculations.

References:

3. **J.A. Bondy, U. Murty**, *Graph Theory*; Springer, 1st Ed. 2008. (Main Reference)

Required Textbook

4. **A. Tucker**, *Applied Combinatorics*; Wiley and Sons, 6th Ed. 2012.
5. **R.J. Wilson**, *Introduction to Graph Theory*; Pearson Education, Singapore, 4th Ed. 2003.
6. **P.J. Cameron**, *Combinatorics: Topics, Techniques, Algorithms*; Cambridge University Press, 1st Ed. 1995.

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

C. Topics Outline

1. **Graph Theory:** Introduction to Graphs, subgraphs, connected Graphs, trees, nonseparable Graphs; Tree-Search Algorithms; Flows in Networks; Complexity of Algorithms; Connectivity; Planar Graphs; The Four-Color Problem; Matchings; Hamilton Cycles; Coverings and Packings; Electrical Networks; Integer Flows and Coverings; Stable Sets and Cliques; Colorings; Unsolved Problems.

2. **Combinatorics:** Counting principles; Arrangements and combinations; Numerations of object distributions; Generating functions and their coefficients; Partitions; Exponential generating functions and applications; Examples of recurrence relations, homogeneous recurrence relations, nonhomogeneous recurrence relations, solving recurrence relation by generating functions; Inclusion-Exclusion formula and applications, arranging objects with restricted positions; Burside's Theorem, The cycle index theorem, Polya's enumeration formula.

D. 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.

E. Exams & Grading System

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

- **Midterm :** 8th or 9th week.
- **Quizzes & Homeworks:** During the semester.
- **Final Exam:** 16th week.

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

Midterm : 30 %	**Final Exam:** 40 %
Quizzes, Homework, Attendance & Participation: 30 %	

The grading distribution:

A^+	A	B^+	B	C^+	C	F
[95, 100]	[90, 95)	[85, 90)	[80, 85)	[75, 80)	[70, 75)	[0, 70)

F. 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 Examsgoo.gl/ykm7t3