UNIVERSITY of NICOSIA

Course Code	Course Title	ECTS Credits
MATH-375	Graph Theory	6
Department	**Semester**	**Prerequisites**
Mathematics	Fall	MATH-185
Type of Course	**Field**	**Language of Instruction**
Elective	Mathematics	English
Level of Course	**Year of Study**	**Lecturer(s)**
1st Cycle	3rd	Dr Florent Domenach
Mode of Delivery	**Work Placement**	**Co-requisites**
Face-to-face	N/A	None

Objectives of the Course:

Interest in graphs and their applications has grown exponentially in the past two decades, largely due to the usefulness of graphs as models for computation and optimizations. This course targets the need for a fresh approach to the theory.
The main objectives of the course are to:

- Provide students with good knowledge of graph theoretical concepts.
- Cover their use in mathematics, natural science and computer science

Learning Outcomes:

After completing the course students are expected to be able to:

- Model various applications as problems on graphs.
- Determine whether or not a graph possesses certain properties.
- Design and analyze efficient algorithms for solving graph problems.
- Utilize important classes of problems in graph theory
- Formulate and prove fundamental theorems on trees, matchings, connectivity, colorings, plane and Hamiltonian graphs

Course Contents:

1. Definitions.
2. Bipartite graphs. A characterization of bipartite graphs.
3. Isomorphism of graphs.
4. Representations of graphs: adjacency and incidence matrices.
5. Eulerian circuits and trails. Euler Theorem.
6. Extremal problems on graphs. Mantel's Theorem.
7. Graphic sequences.
8. Directed graphs: degrees, connectivity, Eulerian circuits, de Bruijn graphs.
9. Tournaments, kings in tournaments.
10. Trees, characterizations of trees.
11. Distances in graphs. Centers of trees.
12. Prufer codes. Cayley Formula.

Learning Activities and Teaching Methods:

Lectures, Handouts and Assignments

Assessment Methods:

2 Mid-Term Exams; Final Exam; Class Participation.

Required Textbooks/Reading:

Authors	Title	Publisher	Year	ISBN
D. B. West	Introduction to Graph Theory	Prentice Hall	2001	ISBN-10: 0130144002 ISBN-13: 978-0130144003

Recommended Textbooks/Reading:

Authors	Title	Publisher	Year	ISBN
Buckley, Fred and Marty Lewinter	A Friendly Introduction to Graph Theory	Prentice-Hall	2002.	ISBN-10: 0130669490 ISBN-13: 978-0130669490
Chartrand, G. and Linda Lesniak	Graphs and Digraphs	4th ed., Chapman & Hall/CRC	2004	ISBN-10: 1584883901 ISBN-13: 978-1584883906
Wilson, Robin J.	Introduction to Graph Theory	5th ed., Addison-Wesley	2010	ISBN-10: 027372889X ISBN-13: 978-0273728894