COURSE OUTLINE

(1) GENERAL

SCHOOL	SCHOOL OF SCIENCES		
ACADEMIC UNIT	DEPARTMENT OF MATHEMATICS		
LEVEL OF STUDIES	POSTGRADUATE **Studies in Mathematics**		
COURSE CODE	**C1**	**SEMESTER**	
COURSE TITLE	DISCRETE MATHEMATICS		
INDEPENDENT TEACHING ACTIVITIES		**WEEKLY TEACHING HOURS**	**CREDITS**
		3	10
COURSE TYPE	SPECIALISED GENERAL KNOWLEDGE		
PREREQUISITE COURSES:	NO		
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	GREEK		
IS THE COURSE OFFERED TO ERASMUS STUDENTS	YES		
COURSE WEBSITE (URL)	http://www.math.aegean.gr/index.php/en/academics/undergraduate-programs		

(2) LEARNING OUTCOMES

Learning outcomes
This course aims at introducing students to graph theory and computation theory. The first part of the course covers some historical facts and then the students are familiarized with graph connectivity, traversability theory (Euler and Hamilton cycles), finding the shortest path in a graph, trees, planarity and graph coloring. The second part of the course covers the concept of regular languages and how a problem can be encoded as a string of a language, fundamental computation models like Finite State Machines and Turing Machines and the complexity of algorithms. Finally, they learn about problem classification depending on its solvability and the complexity of the algorithm that solves it.
General Competences
Working Independently Working in an international environment Working in an interdisciplinary environment

(3) SYLLABUS

First Part: Definition of various graph models. Definition of a vertex, an edge, and a path. Distance between two vertices. Eccentricity of a vertex. Weighted Graphs. Graph connectivity and traversability theory (Euler and Hamilton cycles), conditions sufficient for the existence of Hamiltonian cycles, the travelling salesman problem, finding the shortest path in a graph (Dijkstra and Bellman-Ford's Algorithms). Trees (algorithms for finding minimum spanning trees in a connected graph, tree traversal methods), planarity (Kuratowski's theorem and applications of planar graphs) and graph coloring (4-colors problem, chromatic number of graph and methods of finding of the chromatic polynomial of a graph).

Second Part: Problem definition. Decision Problems. Regular languages and how a decision problem can be encoded as a string of a language. Fundamental computation models and its variants: Finite State Machines and Turing Machines. Complexity of algorithms. Problem classification depending on

its solvability and the complexity of the algorithm that solves it.

(4) TEACHING and LEARNING METHODS - EVALUATION

DELIVERY	Face-to-face
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY	• Use of ICT in teaching (slides and interactive whiteboard). • Communication with students via e-mail. • Uploading course material on moodle system.
TEACHING METHODS	***Activity*** / ***Semester workload*** Lectures: 39 Independent study: 148.5 Assignments: 62.5 Course total (25 per ECTS): ***250***
STUDENT PERFORMANCE EVALUATION	Student evaluation is done in Greek through a written examination which includes short-answer equations and problem solving. For students with disabilities, evaluation takes place via oral exams.

(5) ATTACHED BIBLIOGRAPHY

1. Elements of Discrete Mathematics, C. L. Liu, McGraw Hill Computer Science Series.
2. Introduction to the theory of computation, Michael Sipser, Cengage Learning.