University of Nicosia, Cyprus

Course Code	**Course Title**	**ECTS Credits**
MATH-101	Discrete Mathematics	6
Department	**Semester**	**Prerequisites**
Computer Science	Fall, Spring	MATH-180
Type of Course	**Field**	**Language of Instruction**
Required	Mathematics	English
Level of Course	**Year of Study**	**Lecturer(s)**
1st Cycle	1st	Dr George Portides
Mode of Delivery	**Work Placement**	**Co-requisites**
Face-to-face	N/A	None

Objectives of the Course*:*

The main objectives of the course are to:

- Cover symbolic propositional and predicate logic.
- Discuss proofing techniques with special emphasis on mathematical induction
- Familiarize students with set theory
- Provide students with deep knowledge of relations
- Discuss functions and their properties
- Introduce students to graphs-digraphs-trees and model problems in computing.
- Cover combinations and permutations

Learning Outcomes:

After completion of the course students are expected to be able to:

1. Apply formal methods of symbolic propositional and predicate logic.
2. Outline the basic structure of proof techniques, with emphasis on mathematical induction.
3. Perform the operations associated with sets.
4. Identify, describe and determine the properties of relations.
5. Identify functions and determine their properties.
6. Relate the concepts of graphs-digraphs-trees and model computing problems to programming algorithms.
7. Compute combinations and permutations of a set

Course Contents:

1. Introduction to logic, quantifiers and conditional propositions, methods of proof, truth tables.
2. Use of the first and second principle of mathematical induction in proving problems involving the set of natural numbers.
3. Set theory, set operations and algebra, switching circuits.
4. Relations and their properties, closure of relations, directed graphs, equivalence relations, partial order relations, Hasse diagrams.

5. Functions, domain, codomain and range, the properties of one-to-one and onto, composite and inverse functions, the pigeonhole principle.
6. Graphs, concepts and definitions, the travelling salesman problem.
7. Trees, spanning trees, minimum spanning tree algorithm.
8. Directed graphs, shortest paths, Dijkstra's algorithm for shortest path.
9. Combinations, permutations, Pascal's triangle, the Binomial theorem.

Learning Activities and Teaching Methods:

Lectures, Exercises and Tests

Assessment Methods:

One test, One Final Exam

Required Textbooks/Reading:

Authors	Title	Publisher	Year	ISBN
Haggart R.	Discrete Mathematics for Computing	Pearson	2002	0-201-73047-2

Recommended Textbooks/Reading:

Authors	Title	Publisher	Year	ISBN
Dossey et al.	Discrete Mathematics	Pearson	2006	0-321-30515-9