Course Title	Discrete Mathematics				
Course Code	ACSC191				
Course Type	Compulsory				
Level	BSc (Level 1)				
Year / Semester	1st (Spring)				
Teacher's Name	Dr Savvas Pericleous				
ECTS	5	Lectures / week	3	Laboratories/week	-
Course Purpose	The aim of the course is to familiarize students with the main concepts and principles of elementary discrete mathematics and develop their reasoning and problem-solving abilities. We introduce various techniques and mathematical tools to study discrete structures (that is, objects that come in discrete form, as opposed to continuous mathematics that study objects that vary continuously). The topics covered in this course (Mathematical Logic, Proof methods, Set Theory, and Graph Theory) form the basis of the mathematical foundation of computer science.				
Learning Outcomes	By the end of the course, students must be able to: 1. Identify the core principles of mathematical logic and explain its applicability to computer science. 2. Use symbolic logic and truth tables to prove equivalence of statements by determining the validity of arguments and formulate statements into symbolic form using logical connectives and quantifiers. 3. Identify and correctly employ different methods of proofs including direct proofs as well as indirect, proofs by contradiction and mathematical induction. 4. Develop ability of dealing with abstract notions and reasoning through the introduction and manipulation of basic ideas from the theory of sets, functions and relations. 5. Apply Boolean combination of sets and operations on such expressions, examine various characterisations of functions and relations, compare matrix and graphical methods for their representation, analyse their properties and ways of combining them; and provide an elementary introduction to Relational Databases. 6. Discuss basic concepts of Elementary Graph Theory, decide whether a graph is Eulerian or not and employ Kruskall's algorithm for finding minimal spanning trees in related problem situations.				
Prerequisites	None		Corequisites	None	

Course Content	• **Mathematical logic**: Propositional Algebra; Logical Operators; Basic logic Equivalences; Predicates; Quantifiers. • **Proof Methods**: Direct Proofs; Mathematical Induction; Contradiction and Contraposition. • **Sets**: Basic Definitions; Set operations; Venn diagrams; Set Identities • **Relations and Functions**: Relations; Equivalence Relations; Equivalence Classes; Definition and Properties of Functions; Inverse Functions; Composition of Functions; Introduction to Relational Databases. • **Graph Theory**: Terminology, Graph Representation and Isomorphism; Connectivity; Traversability; Eulerian graphs; Kruskall's algorithm for finding Minimal Spanning Trees.
Teaching Methodology	Students are taught the course through lectures (3 hours per week). For the delivery of the class material, power point presentations are primarily used, along with the whiteboard. The lecture notes, consisting of slides presented in class, the course outline and additional material, are made available to the students through the University's e-learning platform. Students are also advised to use the subject's textbook or reference books for further reading and practice in solving related exercises. The theoretical part of each lecture is accompanied with detailed solved examples on which emphasis is given in the class. The solutions to these exercises, as well as specimen solutions for all tests and assignments, are discussed with students. Students are encouraged to make full use of the instructor's office hours (6 per week), where they can ask questions and further discuss lecture material on a one-to-one basis.
Bibliography	**(a) Textbooks:** • Kenneth H. Rosen. Discrete Mathematics and Its Applications, 7th Edition, Tata McGraw-Hill, 2012 **(b) References**: • Richard Johnsonbaugh. Discrete Mathematics, 8th Edition, Pearson, 2018
Assessment	The Students are assessed via continuous assessment throughout the duration of the Semester, which forms the Coursework grade and the final written exam. The coursework and the final exam grades are weighted 40% and 60%, respectively, and compose the final grade of the course. The continuous assessment of the students is comprised of two mid-term written tests. Students are prepared for the final exam, by revision on the taught material, problem solving and concept testing. The final assessment is designed to comply with the subject's expected learning outcomes.
Language	**English**