SYLLABUS
COURSE DESCRIPTION

COURSE TITLE	**Mathematics I**
COURSE CODE	76201
SCIENTIFIC SECTOR	MAT/02
DEGREE	Bachelor in Computer Science
SEMESTER	1st
YEAR	1st
CREDITS	12
MODULAR	Yes

TOTAL LECTURING HOURS	40
TOTAL LAB HOURS	20
PREREQUISITES	There are no prerequisites.
COURSE PAGE	https://ole.unibz.it/

SPECIFIC EDUCATIONAL OBJECTIVES	• Type of course: "di base" for L-31 • Scientific area: "Formazione matematica-fisica" for L-31 MODULE 1: The aim of this module is to present a rather comprehensive treatment of linear algebra and its applications. It covers vector and matrix theory to some degree of mathematical logic and rigor, emphasizing topics useful in other disciplines such as solving linear equations and computing determinants and eigenvalues of matrices. The course also provides practice in using linear algebra to think about problems in computer science, and in actually using linear algebra computations to address these problems. MODULE 2: The aim of this module is to introduce students to elementary mathematical logic and to provide a detailed introduction to basic topics in discrete mathematics. An overview of proof methods and their relation to logic will be given. The course will discuss logic as a tool for representation and reasoning in computer science. The induction principle is introduced in a number of variants, and methods to analyse and describe the main properties of relations, functions, graphs and trees will be studied. We will also introduce the basic principles governing the complex mathematical notion of cardinality of a set including different notions of infinite sets.

MODULE 1	**Linear Algebra**
MODULE CODE	76201A
MODULE SCIENTIFIC SECTOR	MAT/02
CREDITS	6
LECTURER	Bruno Carpentieri
SCIENTIFIC SECTOR OF THE LECTURER	MAT/08
TEACHING LANGUAGE	English
OFFICE HOURS	Faculty of Computer Science, Piazza Domenicani 3, Office 3.10, Bruno.Carpentieri@unibz.it, By appointment via email.
TEACHING ASSISTANT	Faculty of Computer Science, Piazza Domenicani 3, Office 3.10, Bruno.Carpentieri@unibz.it Simone Ugolini, Piazza Domenicani, 3 – Office 1.04, Simone.Ugolini@unibz.it
OFFICE HOURS	TBA, Simone Ugolini, Piazza Domenicani, 3, Office 1.04, Simone.Ugolini@unibz.it
LIST OF TOPICS COVERED	• Background on complex numbers, trigonometry and polynominals • Vectors and matrices: • Linear Systems • Vector spaces: • Linear operators • Spectral analysis
TEACHING FORMAT	Frontal lectures, exercises in lab.

MODULE 2	**Logic and Discrete Mathematics**
MODULE CODE	76201B
MODULE SCIENTIFIC SECTOR	MAT/01
CREDITS	6
LECTURER	Oliver Kutz
SCIENTIFIC SECTOR OF THE LECTURER	INF/01

TEACHING LANGUAGE	English
OFFICE HOURS	Office 303, Oliver.Kutz@unibz.it By appointment via email, Piazza Domenicani, 3 - Office 303
TEACHING ASSISTANT	Oliver Kutz, Oliver.Kutz@unibz.it Troquard Nicolas nicolas.troquard@unibz.it
OFFICE HOURS	By appointment via email.
LIST OF TOPICS COVERED	• Elements of logic and methods of mathematical proof • Numbers and number theory • Sets, functions and counting • Relations and graphs • Classical Logic (Propositional and first-order) • Logic in computer science
TEACHING FORMAT	Frontal lectures, exercises in lab.

LEARNING OUTCOMES	**Knowledge and understanding** • Have a solid knowledge of mathematics and logics that are in support of computer science; **Applying knowledge and understanding** • Be able to use the tools of mathematics and logics to solve problems; **Making judgments** • Be able to work autonomously according to the own level of knowledge and understanding; **Ability to learn** • Have developed learning capabilities to pursue further studies with a high degree of autonomy.

ASSESSMENT	Written exam for each of the two modules. The written exams consist of verification questions, transfer of knowledge questions and exercises. The learning outcome related to knowledge and understanding, applying knowledge and understanding and those related to the student's ability to learn and apply the acquired learning skills, will be assessed.
ASSESSMENT LANGUAGE	English
EVALUATION CRITERIA AND CRITERIA FOR AWARDING MARKS	Final Written Exam, 100% covering the full program. Written exam questions will be evaluated in terms of correctness, clarity, quality of argumentation, problem solving ability. Both modules must be positive to pass the course.

	A positive evaluation of one module remains valid for all three regular exam sessions of the academic year.

REQUIRED READINGS	MODULE 1: Gilbert Strang: Introduction to Linear Algebra, Fourth Edition Carl D. Mayer: Matrix Analysis and Applied Linear Algebra MODULE 2: Mordechai Ben-Ari: Mathematical Logic for Computer Science, Springer-Verlag [Main book for Logic part] Susanna Epp: Discrete Mathematics with Applications, Cengage Learning, 4th edition. [Main book for Discrete Math part]
SUPPLEMENTARY READINGS	MODULE 1: Philip N. Klein: Coding the Matrix Linear Algebra through Applications to Computer Science, First Edition MODULE 2: H. Enderton: A Mathematical Introduction to Logic, Academic Press. [Auxiliary book for Logic part] H. D. Ebbinghaus, J. Flum, W. Thomas: Mathematical Logic, Springer-Verlag. [Auxiliary book for Logic part] Kenneth Rosen: Discrete Mathematics and its Applications, McGraw-Hill, 7th edition. [Auxiliary book for Discrete Math part]
SOFTWARE USED	