Syllabus

Course Description

Course Title	Linear Algebra
Course Code	76238
Course Title Additional	
Scientific-Disciplinary Sector	MAT/02
Language	English
Degree Course	Bachelor in Computer Science
Other Degree Courses (Loaned)	
Lecturers	Prof. Bruno Carpentieri, Bruno.Carpentieri@unibz.it https://www.unibz.it/en/faculties/engineering/academic-staff/person/38064
Teaching Assistant	
Semester	First semester
Course Year/s	1
CP	6
Teaching Hours	40
Lab Hours	20
Individual Study Hours	90
Planned Office Hours	
Contents Summary	The aim of this course is to present a rather comprehensive treatment of linear algebra and its applications, giving a general overview of the field. 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.
Course Topics	- Background on complex numbers, trigonometry and polynominals

	- Vectors and matrices - Linear Systems - Vector spaces - Linear operators - Spectral analysis
Keywords	Linear algebra, vectors, dot product, orthogonality, matrices, matrix operations, linear systems, Gaussian elimination, LU factorization, rank, consistency, homogeneous systems, vector spaces, subspaces, basis, dimension, rank–nullity theorem, linear transformations, range, kernel, determinants, eigenvalues, eigenvectors, spectral analysis, applications in computer science.
Recommended Prerequisites	There are no prerequisites for this course.
Propaedeutic Courses	There are no prerequisites for this course.
Teaching Format	The course includes frontal lectures and exercises.
Mandatory Attendance	Attendance is not compulsory, but non-attending students must contact the lecturer to agree on independent study modalities.
Specific Educational Objectives and Learning Outcomes	Knowledge and Understanding - D1.1: Have a solid knowledge of mathematical analysis, algebra, numerical calculus, discrete mathematics and elementary notion of logic that are in support of computer science Applying knowledge and understanding - D2.1: Be able to use the tools of mathematics and logic to solve problems. Ability to make judgments - D3.2: Be able to work autonomously according to the own level of knowledge and understanding. Communication skills - D4.1: Be able to use one of the three languages English, Italian and German, and be able to use technical terms and communication appropriately. Learning skills - D5.1: Have developed learning capabilities to pursue further studies with a high degree of autonomy.

Specific Educational Objectives and Learning Outcomes (additional info.)	
Assessment	The written exam will include verification questions, transfer-of-knowledge questions, and exercises. The aim is to assess the extent to which students have acquired knowledge and understanding, are able to apply that knowledge, and can demonstrate critical judgment. The same assessment criteria apply to both attending and non-attending students.
Evaluation Criteria	The final written exam accounts for 100% of the grade and covers the entire program. Exam questions will be assessed based on correctness, clarity, quality of argumentation, and problem-solving ability. The same evaluation criteria apply to both attending and non-attending students.
Required Readings	• Gilbert Strang. Introduction to Linear Algebra. Wellesley-Cambridge Press, Wellesley, 4th edition, February 2009. ISBN 978-0-9802327-1-4. • Gilbert Strang. Algebra lineare. Apogeo Education, 1st edition, 2008. ISBN 978-88-387-8607-5. • Carl D. Meyer. Matrix analysis and applied linear algebra. SIAM: Society for Industrial and Applied Mathematics, Philadelphia, May 2010. ISBN 978-0-89871-454-8.
Supplementary Readings	Philip N. Klein. Coding the Matrix: Linear Algebra through Applications to Computer Science. Newtonian Press, Newton, Mass., 1st edition, September 2013. ISBN 978-0-615-88099-0.
Further Information	If the use of specific software is required, it will be communicated during class by the lecturer.
Sustainable Development Goals (SDGs)	Quality education