



COURSE DESCRIPTION GEOMETRY

SSD: GEOMETRIA (MAT/03)

DEGREE PROGRAMME: ARCHITETTURA (N14)
ACADEMIC YEAR 2022/2023

COURSE DESCRIPTION

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GENERAL INFORMATION ABOUT THE COURSE

INTEGRATED COURSE: 01281 - ANALISI MATEMATICA I E GEOMETRIA
MODULE: 00107 - GEOMETRIA
CHANNEL: 01 Cognome A - Z
YEAR OF THE DEGREE PROGRAMME: I
PERIOD IN WHICH THE COURSE IS DELIVERED: SEMESTER I
CFU: 3

REQUIRED PRELIMINARY COURSES

No one

PREREQUISITES

Good knowledge of mathematics as scheduled in programs of all upper secondary schools

LEARNING GOALS

The main objective of the course is the acquisition, by the student, of the logical-mathematical skills necessary to face future professional problems. From the point of view of contents, the course aims to provide the mathematical foundations necessary for the study of the scientific subjects of the master's degree course in architecture and their applications. The acquired training must allow students to be able to perform simple calculations, to be able to solve simple equations, inequalities, linear systems; to be able to carry out the study of real functions of a real variable and, finally, to be able to solve geometric questions potentially useful for the development

of design skills.

The course represents a module of the Calculus 1 and Geometry course, which in fact consists of the following modules:

1. Calculus 1 (MAT / 05 - 8 CFU);
2. Geometry (MAT / 03 - 3 CFU).

EXPECTED LEARNING OUTCOMES (DUBLIN DESCRIPTORS)

Knowledge and understanding

The student must show knowledge and understanding of basic elements of Mathematics and the mathematical language. The educational path of the course aims to provide students with the knowledge and basic methodological tools necessary for strengthening logical, inductive and deductive reasoning skills.

Applying knowledge and understanding

The student must show that he is able to use mathematical tools for the formalization of problems and the construction of simple mathematical models. The student must acquire the operational skills necessary to apply the study of the real functions of a real variable, the methods of solving equations, inequalities and linear systems and the knowledge of vectors and matrices both to theoretical-practical questions and to applicative problems of geometric nature.

COURSE CONTENT/SYLLABUS

MATRICES AND DETERMINANTS: Matrices - Operations with matrices: sum of matrices, product by a scalar, product rows by columns - Determinant of a matrix - Properties of determinants - Inverse matrices - Rank of a matrix. Exercises.

LINEAR SYSTEMS: Linear systems of m equations in n unknowns - Cramer's Theorem - Rouché-Capelli Theorem - Homogeneous systems. Exercises.

ELEMENTS OF PLANE GEOMETRY: The vector space \mathbb{R}^2 - Scalar product and its properties, orthogonality between vectors, the Euclidean plane - Representation theorem of the scalar product (proof), orthogonality criterion, Cauchy-Schwarz inequality and triangular inequality - Parametric equations and Cartesian equation of a line - Parallelism and perpendicularity between lines - Reference changes in the plane - Polar coordinates - Circumference, ellipse, hyperbola and parabola - General equation of conics - Classification of conics. Exercises.

ELEMENTS OF SPACE GEOMETRY. Parametric equations and Cartesian equations of a line in space - Director numbers of a line - Cartesian equation of a plane in space - Criteria of parallelism and perpendicularity between two planes, between two lines in space and between a line and a plane. Exercises.

READINGS/BIBLIOGRAPHY

1. P. Marcellini, C. Sbordone, Elementi di Calcolo, Liguori Editore.
2. P. Marcellini, C. Sbordone, Esercitazioni di matematica, I Volume (parte prima e parte seconda), Liguori Editore.
3. Aldo G.S.Ventre, Matematica Due, Federiciana Editrice Universitaria, 2011.

TEACHING METHODS OF THE COURSE (OR MODULE)

The teacher will use lectures for about 70% of the total hours and exercises to deepen theoretical aspects, for about 30% of the total hours.

EXAMINATION/EVALUATION CRITERIA

a) Exam type

- Written
- Oral
- Project discussion
- Other

In case of a written exam, questions refer to

- Multiple choice answers
- Open answers
- Numerical exercises

b) Evaluation pattern