UNIVERSITÀ DI PAVIA

## Anno Accademico 2018/2019

# GEOMETRY AND ALGEBRA

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| **Enrollment year** | 2018/2019 |
| **Academic year** | 2018/2019 |
| **Regulations** | DM270 |
| **Academic discipline** | MAT/03 (GEOMETRY) |
| **Department** | DEPARTMENT OF ELECTRICAL,COMPUTER AND BIOMEDICAL ENGINEERING |
| **Course** | INDUSTRIAL ENGINEERING |
| **Curriculum** | PERCORSO COMUNE |
| **Year of study** | 1° |
| **Period** | 1st semester (01/10/2018 - 18/01/2019) |
| **ECTS** | 6 |
| **Lesson hours** | 60 lesson hours |
| **Language** | Italian |
| **Activity type** | WRITTEN AND ORAL TEST |
| **Teacher** | BONSANTE FRANCESCO (titolare) - 6 ECTS |
| **Prerequisites** | The same mathematics prerequisites for enrollment into the Engineering Faculty.<br>In particular, the following issues are required<br>elementary set theory;<br>basic algebra: monomials/polynomials, polynomial division, equations and inequations (inequalities) of degree 1 or 2, also for fractions of polynomials;<br>functions;<br>basic trigonometry: goniometric functions, trigonometric equations and inequations, double- and half-angle formulae etc., laws for right and oblique triangles;<br>Euclidean basic 2D and 3D geometry, including area and volume formulas for mosto common figures, parallelism and orthogonality between straight lines and/or planes, parallelograms. |

## Learning outcomes

This is a basic course on Linear Algebra and Analytic Geometry. Particular emphasis will be given to topics useful in other disciplines, with a great deal of motivation and many computational examples. A tutoring staff, composed by experienced graduate or undergraduate students, provides an expert help and support for students attending the course.

## Course contents

Preliminaries
Polynomials and algebraic equations. Complex numbers and the Fundamental Theorem of Algebra.

Linear Algebra
Vector spaces, vectors of R^n, linear subspaces; linear span of a set of vectors; spanning sets and linear independence, basis, coordinates, and dimension. Operations with matrices, determinant and rank of a matrix, inverse of a matrix. Linear systems, Rouché-Capelli and Cramer theorems, Gauss elimination method, representation of the set of the solutions of a linear system. Linear mappings between vector spaces, kernel and image, matrix associated with a linear mapping. Eigenvalues and eigenvectors of a linear operator, diagonalisation of a linear operator. Inner product in R^n, orthonormal basis, Gram-Schmidt process. Orthogonal matrices. Real quadratic forms. Spectral theorem: real symmetric matrices and orthogonal diagonalisation.

Analitic Geometry
Coordinate systems in 2- and 3-dimensional spaces; straight lines and planes. Canonical forms of plane conics. Quadric surfaces.

## Teaching methods

Lectures (hours/year in lecture theatre): 22.5
Practical class (hours/year in lecture theatre): 37.5
Practicals / Workshops (hours/year in lecture theatre): 0

**Reccomended or required readings**

F.Bisi, F.Bonsante, S. Brivio. Lezioni di Algebra Lineare con Aplicazioni alla Geometria Analitica. Edizioni La Dotta.

## Assessment methods

The final exam consists of a written and an oral test. Both have to be passed within the same session. A minimum grade in the written test will be required to be admitted to the oral test. Under certain specific conditions, the student can be exonerated from oral test.
(see http://matematica.unipv.it/attach/FBFA5D9FEBE21FDF/file/regolesame1516.pdf for details).

## Further information

The final exam consists of a written and an oral test. Both have to be passed within the same session. A minimum grade in the written test will be required to be admitted to the oral test. Under certain specific conditions, the student can be exonerated from oral test.
(see http://matematica.unipv.it/attach/FBFA5D9FEBE21FDF/file/regolesame1516.pdf for details).

## Sustainable development goals - Agenda 2030

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