UNIVERSITÀ DEGLI STUDI DI PALERMO

SCHOOL	POLYTECHNIC SCHOOL
ACADEMIC YEAR	2016/2017
FIRST CYCLE COURSE	BIOMEDICAL ENGINEERING
SUBJECT	GEOMETRY
TYPE OF EDUCATIONAL ACTIVITY	A
AMBIT	50292-Matematica, informatica e statistica
CODE	03675
SCIENTIFIC SECTOR(S)	MAT/03
HEAD PROFESSOR(S)	DI NOTO ALESSANDRA Professore a contratto Univ. di PALERMO
OTHER PROFESSOR(S)	
CREDITS	6
INDIVIDUAL STUDY (Hrs)	96
COURSE ACTIVITY (Hrs)	54
PROPAEDEUTICAL SUBJECTS	
YEAR	1
TERM (SEMESTER)	2° semester
ATTENDANCE	Not mandatory
EVALUATION	Out of 30
TEACHER OFFICE HOURS	**DI NOTO ALESSANDRA** Tuesday 11:00 13:00 3° piano DEIM (Dipartimento Energia, Ingegneria dell'Informazione e Modelli Matematici), stanza U331.

DOCENTE: Prof.ssa ALESSANDRA DI NOTO

TEACHING METHODS	Lectures
ASSESSMENT METHODS	Final exam: written examination and not mandatory oral examination. The exam consists to a written part (5 questions, both practical and theoretical, in 2 hours) on the whole program. The examination board, through the elaborate, evaluate knowledge of the topics, critical abilities and ability to communicate knowledge. The evaluation is expressed in thirtieths (minimum threshold of sufficiency 18/30). The student, who reaches sufficiency in the written part, may take the oral part. Evalutation criteria: Mark 28 to 30 - 30 with distinction: Learning outcomes have been achieved to a very good/excellent level. Excellent knowledge of the concepts, methods and techniques of the discipline. Excellent critical abilities and ability to communicate knowledge. The student is strongly able to apply the knowledge acquired for solving the proposed problems. Mark 25 to 27: Learning outcomes have been achieved to a good level. Good knowledge of the concepts, methods and techniques of the discipline. Good critical abilities and ability to communicate knowledge. The student is able to apply the knowledge acquired for solving the proposed problems. Mark 18 to 24: Learning outcomes have been achieved to an acceptable/basic level. Acceptable/basic knowledge of the concepts, methods and techniques of the discipline. Acceptable/basic critical abilities and ability to communicate knowledge. The student is able to apply the knowledge acquired for solving the proposed problems but with limited level of autonomy and effectiveness. Mark below 18: Learning outcomes have not been met. Insufficient knowledge and understanding of concepts, methods and techniques of the discipline. Insufficient critical abilities and ability to communicate knowledge. Inadequate application of theoretical and technical knowledge for solving the proposed problems.
LEARNING OUTCOMES	Knowledge and understanding: The student will be able to use the basic methods of linear algebra and analytical geometry. He will know the notions of linearly dependent vectors and linearly independent vectors. He will be able to determinate the basis and the dimension of a vector space. Furthermore, he will be able to solve a system of linear equations and will be able to deal with problems in affine and euclidean geometry. Applying knowledge and understanding: The student will be able to analyze the characteristics of a problem by using tools of linear algebra and analytical geometry. He will be able to solve a system of linear equations. Moreover, the student will be able to calculate the eigenvalues and eigenvectors of an endomorphism, the rank and determinant of a matrix. Furthermore, he will be able to solve problems in affine and euclidean geometry. Making Judgments: The student will be able to evaluate the difficulty of a problem, by choosing the most efficient approach. Communication skills: The student will be able to explain effectively the fundamental results in geometry. Learning skills: The student will be able to follow talks and specialized courses, by using the knowledge acquired in the lectures.
EDUCATIONAL OBJECTIVES	The aim of the course is to provide the basic notions of mathematical and scientific language. Furthermore, it gives tools and methodologies needed for continuing efficiently the engineering studies.
PREREQUISITES	Linear Algebra
SUGGESTED BIBLIOGRAPHY	1) G. Vaccaro - A. Carfagna - L. Piccolella, Lezioni di geometria e algebra lineare, Zanichelli; 2) E. Sernesi, Geometria 1, Bollati Boringhieri; 3) S. Abeasis, Elementi di algebra lineare e geometria, Zanichelli.

SYLLABUS

Hrs	Frontal teaching
20	LINEAR ALGEBRA: Fields. Vector spaces over a field. Vector subspaces. Operations on subspaces: intersection, sum, direct sum. Linear combination of vectors. Subspaces generated by n vectors. Generators of a vector space. Linearly independent vectors and linearly dependent vectors. Basis and dimension of a vector space. Grassmann vectorial relation. Rectangular matrices and square matrices. Operation with matrices. Diagonal matrices. Triangular matrices. Invertible matrices. Transpose of a matrix. Symmetric matrices. Orthogonal matrices. Rank of a matrix. Determinant of a matrix. Binet’s theorem. Inverse matrix. Systems of linear equations. Coefficient matrix and augmented matrix of a linear system. Gauss–Jordan reduction. Rouche'-Capelli's theorem. Cramer's rule. Linear maps. Kernel and image of a linear map. Isomorphisms. Matrices of linear maps. Diagonalizable endomorphisms. Eigenvalues and eigenvectors. Conics
12	AFFINE GEOMETRY AND EUCLIDEAN GEOMETRY: Affine spaces. Affine coordinates. Affine subspaces. Parametric and cartesian equations of line in the affine plane. Parametric and cartesian equations of lines in an affine three-dimensional space. Parametric and cartesian equations of planes in an affine three-dimensional space. Relation among lines, relation among lines and planes, relation among planes in an affine threedimensional space. Sheaf of planes. Inner product. Norm of a vector. Orthogonal vectors. Orthogonal basis and orthonormal basis. Euclidean space E^n. Cartesian coordinates. Distance between points. Normal vectors to a line. Normal vectors to a plane. Perpendicular lines. Perpendicular planes. Lines perpendicular to a plane. Distance from a point to a line. Distance from a point to a plane.
22	Esercizi di algebra lineare, geometria affine e geometria euclidea.