

MODULE INFORMATION SHEET

Name of Module Unit	Algebra with geometry
Name in polish language	Algebra z geometrią
Module type	compulsory
Form of studying	full-time day courses
Level of study	undergraduate course (B.Sc. level)
Type of study (for extra-mural courses)	-
Programme	Environmental Engineering
Speciality	Environmental Engineering
Responsible department	Faculty of Mathematics and Information Sciences
Responsible person	Dr hab. Ewa Zadrzyńska-Piętka

Semester	Lectures(E)	Tutorials	Laboratory	Computer Exercises	Projects	ECTS
1	30 (Exam)	30				6

Objectives (summary)

1. To acquaint students with basic notions of algebra, analytic geometry and differential geometry.
2. To learn students to use these notions in practical problems.

Prerequisites

The knowledge of an extended program of mathematics for secondary school.

Rules of integrated grade setting

1. The subject ends with an examination.
2. To take the exam a student must have credit for tutorials.
3. The credit for tutorials is given on the basis of two control tests and the student's activity.
4. The exam has two parts: the practical part and theoretical part.
The practical part relies on solving problems similar to those done during the tutorials.
The theoretical part consists of theoretical problems, theorems and their proofs.

Recommended readings

1. S.K. Stein, Calculus and Analytic Geometry, McGraw-Hill Book Company, 1987.
2. David Poole, Linear Algebra (A Modern Introduction), Thomas Books/Cole, Second Edition, 2006.
3. S. Lipschutz, M. Lipson, Linear Algebra, McGraw-Hill, Third Edition, 2001.

Contents of lectures (syllabus)

	Topics	Time (hrs.)	Scope (S / Ex)
1	Groups and fields. The field of complex numbers.	4	S
2	Vector spaces. Linear combination of vectors. Basis and dimension of a vector space.	2	S
3	Matrices. Linear transformations.	3	S
4	Determinants and their properties	2	S
5	Rank of a matrix. Systems of linear equations-the Cramer theorem, the Kronecker-Capelli theorem, the Gauss elimination method.	3	S
6	Eigenvalues and eigenvectors of linear transformations. Quadratic forms.	3	S
8	Vectors in three dimensions. The scalar, vector and triple scalar product of vectors.	3	S
9	Plane and line in space	4	S
10	Surfaces in space	2	S
11	Parametric equations of space curves. The Frenet trihedron.	2	S
12	Curvature and torsion of a curve. Tangent plane and normal line to a surface.	2	S
Total		30	

S – topics listed in the legal study programme standards from 12.07.2007

Ex – extended topics

Lecturers

Dr hab. Ewa Zadrzyńska-Piętka

Assessment method

The subject is assessed on the basis of a number of points obtained for tutorial as well as on the basis of the examination.

The exam has two parts: the practical part and theoretical part. The practical part relies on solving problems similar to those done during the classes. The theoretical part consists of theoretical problems, theorems and their proofs. Each part is assessed from 0 to 20 points. Students who have obtained at least 29 points for the tutorials need not to pass the practical part unless they want to get a better mark. Students who do not write the practical part, have to obtain at least 7 points for the theoretical part. Students who do not write the practical part of the exam and who passed the theoretical part get additionally 50% of points obtained for the credit of the tutorials. The minimum number of points to pass the exam is 41 points (it is the sum of points obtained for the tutorials and exam).

The table of marks for the exam

The points	The marks
0-40	2.0
41-48	3.0
49-56	3.5
57-64	4
65-72	4.5
73-80	5

Contents of tutorials

	Topics	Time (hrs.)	Scope (S / Ex)
1	Plane curves: circle, parabola, ellipse, hyperbola.	2	S
2	Polar coordinates . Decomposition of rational functions into partial fractions.	2	S
3	Complex numbers-operations on complex numbers, the trigonometric form, Moivre's formula, roots of complex numbers, polynomials in complex domain.	4	S
4	Vector spaces- linear combination of vectors, basis and dimension of a vector space.	1	S
5	Matrices. Linear transformations and their matrices. Determinants.	3	S
6	The first control test	2	
7	An inverse matrix. Matrix equations. Systems of linear equations- the Cramer theorem, the Kronecker-Capelli theorem, the Gauss elimination method. Linear systems with parameters.	4	S
8	Eigenvalues and eigenvectors of matrices. Quadratic forms.	2	S
9	Plane in space	2	S
10	Line in space	2	S
11	The second control test	2	
12	Surfaces in space	2	S
13	The Frenet trihedron. Curvature and torsion of a curve. Tangent plane and normal line to a surface.	2	S
Total		30	hours

S – topics listed in the legal study programme standards from 12.07.2007

Ex – extended topics

Persons responsible for tutorials

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Assessment method for tutorials

The credit for tutorials is given on the basis of two control tests and the student's activity. Each control test is assessed from 0 to 20 points. For the activity during classes one can obtain maximum 4 points. The maximum number of possibly obtained points is 60 points, and the minimum number of points to obtain the credit is 21 points.

The table of marks for tutorials

The points	The marks
0-20	2.0
21-24	3.0
25-28	3.5
29-33	4
34-37	4.5
38-40	5