Study programmes: Bachelor studies – Informatics

Course name: M120 - Linear Algebra and Analytic Geometry

Lecturers: Milan Božić, Aleksandar Lipkovski, Dragana Todorić, Zoran Petrović, Goran Đanković, Predrag Tanović, Zoran Petrić

Status: Compulsory

ECTS: 7

Attendance prerequisites: None

Course aims: Insight into modern development of linear algebra and analytic geometry. Acquisition of basic methods of linear algebra. Applications of coordinate method in tackling important geometrical problems.

Course outcome: Upon completion of the course, students have the basic knowledge of linear algebra and analytic geometry. They are able to understand relations between geometrical objects in space. Students are prepared to follow advanced courses in which they can use their knowledge of linear algebra and analitic geometry.

Course content:

1) Groups (examples of groups: (Z,+), (Q,+), (R,+), (C,+), (Z_n,+_n), groups of isometries of equilateral triangle and square), fields (Q,R,C,Z_p).
2) Systems of linear equations, matrices, determinants, Cramer's rule, inverse of a matrix.
3) Vector space, linear span, linear independence, basis and dimension of a vector space. Coordinates. Subspaces.
4) Euclidean space, dot product, vector and mixed product in Euclidian space. Cartesian coordinate system, equation of a line, equation of a plane, distance, angle.
5) Second-order curves, ellipse, hyperbola, parabola, canonical equationes of second-order curves.
6) Linear maps, kernel and image of a linear map, linear maps and systems of linear equations, matrix representations of a linear map, change of basis and coordinates; equivalent and similar matrices.
7) Diagonalization of a linear operator. Eigenvalues and eigenvectors.
8) Polynomialas related to matrices and linear operators. Minimal and characteristic polynomial. Diagonalization. Cayley-Hamilton theorem.
9) Bilinear and quadratic forms. Matrix representation of a form. Diagonalization. Classification of real symmetric forms. Low of inertia. Conections with 5).
10) Inner product space. Norm, distance, angle. Gram-Schmidt orthogonalization process. Orthogonal projection of a vector onto a subspace, distance between subspaces. Conections with 4).
11) Orthogonal matrices. Symmetric operators, diagonalization. Orthogonal operators and canonical forms.

Literature:

1. A. Lipschutz, Schaum's Outline of Theory and Problems of Linear Algebra, 2nd edition, Mc Graw-Hill, New York, 1991.
2. A. Lipkovski, Linearna algebra i analitička geometrija, 2nd edition, Zavod za udžbenike i nastavna sredstva, Beograd, 2007.
3. G. Kalajdžić, Linearna algebra, 5th edition, Matematički fakultet, Beograd, 2007.

Number of hours:	**Lectures:**	**Tutorials:**		
6	3	3		

Teaching and learning methods: Frontal / Interactive / Tutorials / Lectures / Exercises

Assessment (maximal 100 points)			
Course assignments	**points**	**Final exam**	**Points**
Lectures	-	Written exam	-
Exercises / Tutorials	10	Oral exam	-
Colloquia	30	Written-oral exam	60
Essay / Project	-		