Course name	LINEAR ALGEBRA
Scientific field	Electronics, Telecommunications and Information Technologies
Specialization	Electronics, Telecommunications and Information Technologies
Syllabus code	51380207
Teacher	Lector dr. Ioan Radu Peter; Ioan.Radu.Peter@math.utcluj.ro
Collaborators	
Department	Mathematics
Faculty	Automation and Computer Science

Sem.	Course type	Lecture	Applications			Lecture	Applications			Individual study	TOTAL	Credit	Assessment
		[ore/săpt.]				[ore/sem.]							
			S	L	P		S	L	P				
1	**FD**	**2**	**2**	**-**	**-**	**28**	**28**			**84**	**140**	**5**	**Exam**

Occupational skills Information tehnologies Engineers, Telecommunication Engineers.Computer Software Engineers, Applications, Computer Software Engineers, Systems Software,
Knowledge/understanding
Knowledge of linear algebra, geometry and their applications
Skills
Identifying complex problems and reviewing related information to develop and evaluate options and implement solutions.
Abilities
The ability to apply general rules to specific problems to produce answers that make sense.

Prerequisites
Linear Algebra and Analytic Geometry – elementary knowledge

A. Lecture (lecture title + curricula)	
1	Linear spaces. Definition. Linear subspaces. Examples.
2	Linear independence. Basis. Dimension. Change of basis.
3	Inner - product spaces. Definition, properties, Schwarz' inequality. Examples
4	Linear transformations. Definition, elementary properties, Kernel and Image.
5	The matrix associated to a linear transformation. The standard construction. Expresions in terms of coordinates.
6	Eigenvalues and eigenvectors. Definitions, invariant subspaces, characteristic polynomials.
7	The diagonal form. Canonical forms, diagonalizability.
8	The Jordan canonical form. Construction of a Jordan basis and a Jordan matrix.
9	Functions of a matrix. The n-th power of a matrix. Elementary functions of a matrix.
10	The adjoint operator. Definition, properties, examples.
11	Self-adjoint operators, unitary operators, properties of the eigenvalues and eigenvectors.
12	Bilinear forms, quadratic forms. The associated matrix.
13	The canonical form. Reduction to a canonical form. The method of eigenvalues and Jacobi's method.
14	Conics and quadrics. Reduction to a canonical form. Geometric properties.

B1. Applications – Laboratory works	
1	Determinants, matrices, geometric vectors
2	Linear spaces, bases, dimension
3	Inner-product spaces
4	Linear transformations. Examples
5	Linear transformations characterized in terms of matrices
6	Invariant subspaces, eigenvalues, eigenvectors
7	Diagonalizable linear transformations
8	Jordan bases, Jordan canonical forms
9	Elementary functions of a matrix, examples

10	The adjoint operator
11	Special classes of operators
12	Bilinear forms, quadratic forms
13	Reduction to a canonical form
14	Conics and quadrics, reduction to a canonical form
B2. Sala laborator (Denumire/sala) Str. Baritiu 26-28	

C. Individual study

14 sets of problems.
Applications: graphs in geometry

Individual study structure	Lecture notes study	Homework solving, labs, projects	Applications preparation	Assessment time	Supplementary bibliographical research	Total hours individual study
Nr. hours	28	4	45	3	4	84

D. Teaching strategies and methods

Interactive teaching style, partnership between teacher and students.

References –0/10/10 (număr de titluri aflate în biblioteca UTC-N)

1. S. Axler, Linear algebra done right, second edition, Springer, 1997
2. V. Pop, I. Rasa, Linear Algebra with Applications to Markov Chains, Ed. Mediamira, 2005
3. I. Gh. Sabac, Matematici speciale, E.D.P. , Bucuresti, 1981

Assessment rules	
Examination mode	Test paper: 1.5 hours
Grade components	T – test paper, S-seminar
Grade computation formula	Grade=0,8T+0,2S

Course holder

Assoc. Prof. Dr. Ioan Radu Peter