SYLLABUS[1]

1. Information about the program

1.1 Higher education institution	POLITEHNICA UNIVERSITY OF TIMISOARA
1.2 Faculty[2] / Department[3]	ELECTRONICS AND TELECOMUNICATIONS / DEPARTMENT OF MATHEMATICS
1.3 Chair	—
1.4 Field of study (name/code[4])	ELECTRONICS AND TELECOMUNICATIONS/100
1.5 Study cycle	Bachelor
1.6 Study program (name/code)/Qualification	TST

2. Information about the discipline

2.1 Name of discipline			MATHEMATICS II				
2.2 Coordinator (holder) of course activities			PhD. Lect. Camelia ARIESANU				
2.3 Coordinator (holder) of applied activities [5]			PhD. Lect. Camelia ARIESANU				
2.4 Year of study[6]	I	**2.5** Semester	1	**2.6** Type of evaluation	Exam	**2.7** Type of discipline	Obligatory

3. Total estimated time (hours / semester of didactic activities)

3.1 No. of hrs. / week	4 , of which:	**3.2** course	2	**3.3** seminar/laboratory/ project/training	2
3.4 Total no. of hrs. in the education curricula	56 , of which:	**3.5** course	28	**3.6** applied activities	28

3.7 Distribution of time for individual activities related to the discipline	hrs.
Study using a manual, course materials, bibliography and lecture notes	14
Additional documentation in the library, on specialized electronic platforms and on the field	14
Preparation for seminars / laboratories, homeworks, assignments, portfolios, and essays	12
Tutoring	2
Examinations	2
Other activities -	-
Total hrs. of individual activities	46

3.8 Total hrs. / semester[7]	100
3.9 No. of credits	5

4. Prerequisites (where applicable)

4.1 Curriculum	• College-level Mathematics; Calculus, Linear Algebra and Coordinate Geometry
4.2 Competencies	• An appropriate using of mathematical notions and tools

5. Conditions (where applicable)

5.1 of the course	•
5.2 to conduct practical activities	•

[1] The form corresponds to the Syllabus promoted by OMECTS 5703/18.12.2011 (Annex3).
[2] The name of the faculty which manages the educational curriculum to which the discipline belongs.
[3] The name of the department entrusted with the discipline, and to which the course coordinator / holder belongs.
[4] Fill in the code provided in GD no. 493/17.07.2013.
[5] The applied activities refer to: seminar (S) / laboratory (L) / project (P) / practice/training (Pr).
[6] The year of study to which the discipline is provided in the curriculum.
[7] It is obtained by summing up the number of hrs. from 3.4 and 3.7.

6. Specific competencies acquired

Professional competencies[8]	• Work with scientifically and computer engineering tools • Acquiring knowledge of tensorial calculus • Acquiring necessary knowledge in geometry and algebra •
Transversal competencies	• Behaviour honorable, responsible, ethical, within the law to ensure problems resolution • Identify, describe and project management workflows by taking over their roles in the team and description of clear and concise verbal and written in English, the results of the activity • Demonstrating the spirit of initiative and action to update professional knowledge, economic and organizational culture

7. Objectives of the discipline (based on the grid of specific competencies acquired)

7.1 General objective of the discipline	• The goal of this course is to master the fundamentals of linear algebra, mainly the arithmetic vector space and its linear transformations.
7.2 Specific objectives	• The main goal of the course is to help students master the basic concepts and skills they use later in their careers.

8. Content

8.1 Course	No. of hours	Teaching methods
Linear equations : Consistency of linear equations; Cramer's rule; least square solution of a system of linear equations; homogeneous linear systems;	2	Disquisition, lecture, dialog, explanation, example.
Vector spaces: Linear dependence and independence; bases and dimension; linear subspaces*;*	4	
Linear maps: Linear maps and its matrices; the kernel and image of a linear map;	2	
Eigenvalues and eigenvectors: Characteristic polynomial, eigenvalues and eigenvectors of a squared matrix; diagonalization*;*	4	
Inner product vector spaces: The inner product and the associated norm; unit vectors, angles, orthogonal vectors; Orthonormal bases; orthogonal matrices; Gramm-Schmidt Process; Linear transformations of inner product vector spaces. Orthogonal diagonalization of symmetric matrice.	6	
Three dimensional geometry: The three dimensional space; geometric vectors; the dot product and cross product of two geometric vectors; orientation of three dimensional	2	

[8] The professional competencies and the transversal competencies will be treated according to the Methodology of OMECTS 5703/18.12.2011. The competencies listed in the National Register of Qualifications in Higher Education [Registrul Național al Calificărilor din Învățământul Superior RNCIS] (http://www.rncis.ro/portal/page?_pageid=117,70218&_dad=portal&_schema=PORTAL) will be used for the field of study from 1.4 and the program of study from 1.6 of this form, involving the discipline.

space; orthonormal frames; translation, rotation about a point in the plane, rotation about an axis in space; lines and planes in the three dimensional space; projections and distances*;*		
Differential Geometry of curves and surfaces: the tangent and normals to a 3D curve. The curvature and torsion of a 3D curve. The tangent plan and the normal to a surface*.*	4	

Bibliography[9] 1. David C. Lay, Linear Algebra and its Applications, Addison-Wesley, 2012
2. Camelia Ariesanu, Algebra liniara si geometrie analitica si diferentiala (in romanian)
3. V. A. Topogonov, Differential Geometry of Curves and Surfaces, Birkhauser, 2006.

8.2 Applied activities[10]	No. of hours	Teaching methods
Systems of linear equations. Cramer's rule, least square solution of a system of linear equations; homogeneous linear systems	2	Solving problems, explanation, example, conversation, homework
Linear dependence and independence of vectors in R^n. Bases and dimension, linear subspaces.	4	
Linear maps, the matrix associated to fixed bases, kernel and image.	2	
The algorithm for computation of eigenvalues and eigenspaces of a squared matrix. Algebraic and geometric multiplicity. Application: power matrix, systems of linear differential equations of first order.	4	
Problems involving computation of the inner product of two vectors in R^n, the norm and the unit vector	2	
Orthonormal bases. Application of the Gramm-Schmidt orthogonalization method. Symmetric transformations	2	
Of R^n and orthogonal diagonalization. Problems involving operations with geometric vectors in the three dimensional space.	4	
The straight line and the plane in space.	2	
Problems related to the differential geometry of 3d curves and surfaces	4	

[9] At least one title must belong to the department staff teaching the discipline, and at least 3 titles must refer to national and international works relevant for the discipline, and which can be found in the Politehnica University Library.
[10] The types of applied activities are those specified in footnote 5. If the discipline contains several types of applied activities, then these will be written consecutively in the lines of the table below. The type of activity will be written in a distinct line, as „Seminar:", „Laboratory:", „Project:" and/or „Practice/Training:".

Bibliography [11] 1. David C. Lay, Linear Algebra and its Applications, Addison-Wesley, 2012
2. Camelia Ariesanu, Algebra liniara si geometrie analitica si diferentiala (in romanian)
3. V. A. Topogonov, Differential Geometry of Curves and Surfaces, Birkhauser, 2006.

9. Corroboration of the content of the discipline with the expectations of the main representatives of the epistemic community, professional associations and employers in the field afferent to the program

- Understanding the correct use of mathematical and engineering sciences is essential.
- Discipline creates special mathematical skills of students on which they will be able to meet the requirements of the labor market in various areas or to continue research in the higher stages of study.

10. Evaluation

Type of activity	**10.1** Evaluation criteria	**10.2** Evaluation methods	**10.3** Share of the final grade
10.4 Course	Four problems	Written Exam	67%
10.5 Applied activities	**S:** Three problems for each test	Written Tests and Oral Examination	33%
	L: -	-	-
	P: -	-	-
	Pr: -	-	-
10.6 Minimum performance standard (minimum amount of knowledge necessary to pass the discipline and the way in which this knowledge is verified)			
• 60%			

Date of completion	**Course coordinator (signature)**	**Coordinator of applied activities (signature)**
1.10.2016	.....	.....
Head of Department (signature)	**Date of approval in the Faculty Council[12]**	**Dean (signature)**
.....		.....

[11] At least one title must belong to the staff teaching the discipline.
[12] Avizarea este precedată de discutarea punctului de vedere al board-ului de care aparţine programul de studiu cu privire la fişa disciplinei.