SYLLABUS [1]

THIS COURSE UNIT IS TAUGHT IN ROMANIAN LANGUAGE

1. Information about the program

1.1 Higher education institution	Politehnica University Timișoara
1.2 Faculty[2]/ Department [3]	Faculty of Industrial Chemistry and Environmental Engineering/Department of Mathematics
1.3 Chair	—
1.4 Field of study (name/code[4])	Chemical Engineering/50
1.5 Study cycle	Bachelor's degree
1.6 Study program (name/code/qualification)	Chemistry and Engineering of Organic Substances, Oil Chemistry and Charcoal Chemistry/20/Engineer

2. Information about the discipline

2.1 Name of discipline/ formative category[5]			Algebra and Geometry/DF				
2.2 Coordinator (holder) of course activities			Lecturer Nicolae Lupa PhD				
2.3 Coordinator (holder) of applied activities[6]			Lecturer Nicolae Lupa PhD, Asist. Loredana Vesa PhD Student				
2.4 Year of study[7]	1	**2.5** Semester	1	**2.6** Type of evaluation	E	**2.7** Type of discipline[8]	DI

3. Total estimated time – hours / semester: direct teaching activities (fully assisted or partly assisted) and individual training activities (unassisted) [9]

3.1 Number of fully assisted hours / week	4 of which:	**3.2** course	2	**3.3** seminar / laboratory / project	2
3.1* Total number of fully assisted hours / semester	56 of which:	**3.2*** course	28	**3.3*** seminar / laboratory / project	28
3.4 Number of hours partially assisted / week	0 of which:	**3.5** training	0	**3.6** hours for diploma project elaboration	0
3.4* Total number of hours partially assisted / semester	0 of which:	**3.5*** training	0	**3.6*** hours for diploma project elaboration	0
3.7 Number of hours of unassisted activities / week	4 of which:	additional documentary hours in the library, on the specialized electronic platforms and on the field			1
		hours of individual study after manual, course support, bibliography and notes			2
		training seminars / laboratories, homework and papers, portfolios and essays			1
3.7* Number of hours of unassisted activities / semester	56 of which:	additional documentary hours in the library, on the specialized electronic platforms and on the field			14
		hours of individual study after manual, course support, bibliography and notes			28
		training seminars / laboratories, homework and papers, portfolios and essays			14
3.8 Total hours / week [10]	8				
3.8* Total hours /semester	112				
3.9 Number of credits	4				

4. **Prerequisites** (where applicable)

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[1] The form corresponds to the Discipline File promoted by OMECTS 5703 / 18.12.2011 and to the requirements of the ARACIS Specific Standards valid from 01.10.2017.

[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] The code provided in HG no.140 / 16.03.2017 or similar HGs updated annually shall be entered.

[5] Discipline falls under the educational curriculum in one of the following formative disciplines: Basic Discipline (DF), Domain Discipline (DD), Specialist Discipline (DS) or Complementary Discipline (DC).

[6] Application activities refer to: seminar (S) / laboratory (L) / project (P) / practice/training (Pr).

[7] Year of studies in which the discipline is provided in the curriculum.

[8] Discipline may have one of the following regimes: imposed discipline (DI), optional discipline (DO) or optional discipline (Df).

[9] The number of hours in the headings 3.1 *, 3.2 *, ..., 3.8 * is obtained by multiplying by 14 (weeks) the number of hours in headings 3.1, 3.2, ..., 3.8. The information in sections 3.1, 3.4 and 3.7 is the verification keys used by ARACIS as: (3.1) + (3.4) ≥ 28 hours / wk. and (3.8) ≤ 40 hours / wk.

[10] The total number of hours / week is obtained by summing up the number of hours in points 3.1, 3.4 and 3.7.

4.1 Curriculum	•
4.2 Competencies	• Basic knowledge of College Algebra

5. Conditions (where applicable)

5.1 of the course	• Whiteboard • Noise will not be tolerated
5.2 to conduct practical activities	• Whiteboard • Noise will not be tolerated

6. Specific competencies acquired through this discipline

Specific competencies	• Using some mathematical concepts and techniques in the approach of some real problems specific to the field. • Applying mathematical modeling on engineering problems.
Professional competencies ascribed to the specific competencies	• Description, analysis and use of the basic concepts and theories from engineering science field.
Transversal competencies ascribed to the specific competencies	• Performing the professional tasks in accordance with the specified requirements and imposed time, with the rules of professional ethics and moral conduct, following a predetermined work plan and qualified guidance. • Information and permanent documentation in its field of interest in Romanian and in a foreign language with the use of modern information and communication.

7. Objectives of the discipline (based on the grid of specific competencies acquired - pct.6)

7.1 The general objective of the discipline	• Training and development of logical skills necessary in the study of the basic disciplines of the program.
7.2 Specific objectives	• Emphasizing basic methods and techniques provided by various mathematics chapters, necessary for the design and analysis of mathematical models of real problems and processes specific to the field. • Development of logical thinking.

8. Content [11]

8.1 Course	Number of hours	Teaching methods [12]
Linear systems	2	Lecture / explanation / case study / discussion / resources in electronic format
Row echelon form/reduced row echelon form of a matrix. Gauss/Gauss-Jordan method to solve linear systems.	2	
Vector spaces: definition, properties, examples. Bases. Coordinate vectors. Basis transformation matrices.	4	
Subspaces of a vector space: definition, standard examples. Finding a basis for a subspace. Dimension of a subspace.	2	

[11] It details all the didactic activities foreseen in the curriculum (lectures and seminar themes, the list of laboratory works, the content of the stages of project preparation, the theme of each practice stage). The titles of the laboratory work carried out on the stands shall be accompanied by the notation "(*)".
[12] Presentation of the teaching methods will include the use of new technologies (e-mail, personalized web page, electronic resources etc.).

Euclidian vector spaces. Scalar product. Vectorial product. Orthonormal bases. Orthogonal matrices. Gram-Schmidt process.	4	
Linear transformations/linear operators. Matrix representation of a linear transformation/linear operator. Eigenvalues and eigenvectors of a linear operator/square matrix.	4	
Bilinear forms. Quadratic forms. Types of quadratic forms: positive/negative definite quadratic forms, non-definite quadratic forms.	2	
Lines and planes in 3D.	4	
Differential geometry of curves and surfaces	4	

Bibliography [13] 1. A. Juratoni, O. Bundău, Exerciții și probleme de algebră liniară, geometrie analitică și diferențială, Ed. Politehnica, Timișoara, 2012 (in Romanian).
2. N. Lupa, Algebra and Geometry for Engineers (Electronic course materials).

8.2 Applied activities [14]	Number of hours	Teaching methods
Matrices. Operations with matrices. Determinants. The rank of a matrix. Invertible matrices.	2	Exercises / explanation / case study / discussion / resources in electronic format
Exercises and problems for learning and training the notions and results taught in the unit courses.	12	

Bibliography [15] 1. A. Juratoni, O. Bundău, Exerciții și probleme de algebră liniară, geometrie analitică și diferențială, Ed. Politehnica, Timișoara, 2012 (in Romanian).
2. N. Lupa, Algebra and Geometry for Engineers (Electronic course materials).

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

- Algebra and Geometry provides both the necessary background in the study of specific disciplines of the field and the analysis of mathematical models of real problems/processes. The chapters are part of Linear Algebra and Geometry studied in the most technical universities in Romania, but also in the prestigious universities in the world.

10. Evaluation

Type of activity	**10.1** Evaluation criteria [16]	**10.2** Evaluation methods	**10.3** Share of the final grade
10.4 Course	Ability to correctly use the notions and methods presented in the unit courses.	Written exam	(2/3) * 100 %
10.5 Applied activities	**S:** Learning the issues covered in the course.	Two tests, the activity during the semester is also important.	(1/3) * 100 %

[13] At least one title must belong to the discipline team and at least one title should refer to a reference work for discipline, national and international circulation, existing in the UPT library.
[14] Types of application activities are those specified in footnote 5. If the discipline contains several types of applicative activities then they are sequentially in the lines of the table below. The type of activity will be in a distinct line as: "Seminar:", "Laboratory:", "Project:" and / or "Practice/training".
[15] At least one title must belong to the discipline team.
[16] Syllabus must contain the procedure for assessing the discipline, specifying the criteria, methods and forms of assessment, as well as specifying the weightings assigned to them in the final grade. The evaluation criteria shall be formulated separately for each activity foreseen in the curriculum (course, seminar, laboratory, project). They will also refer to the forms of verification (homework, papers, etc.)

	L:		
	P[17]**:**		
	Pr:		

10.6 Minimum performance standard (minimum amount of knowledge necessary to pass the discipline and the way in which this knowledge is verified [18])

- Ability to compute a row echelon form/the reduced row echelon form of a matrix.
- Ability to find a base in a subspace of a vector space.
- Ability to identify an orthogonal system of vectors.
- Ability to find the eigenvalues of a 2X2 matrix.
- Ability to identify the direction of a line and the vector normal to a plane.

Date of completion	**Course coordinator (signature)**	**Coordinator of applied activities (signature)**
02.12.2020	……	……
Head of Department (signature)	**Date of approval in the Faculty Council** [19]	**Dean (signature)**
……		……

[17] In the case where the project is not a distinct discipline, this section also specifies how the outcome of the project evaluation makes the admission of the student conditional on the final assessment within the discipline.

[18] It will not explain how the promotion mark is awarded.

[19] The endorsement is preceded by the discussion of the board's view of the study program on the discipline record.