



DISCIPLINE ACADEMIC SHEET ACADEMIC YEAR 2025 – 2026

1. PROGRAMME DATA

1.1. Higher Education Institution	UNIVERSITY OF CRAIOVA
1.2. Faculty	Automation, Computers and Electronics
1.3. Department	Computers and Information Technology
1.4. Field of Study	Computers and Information Technology
1.5. Study level	L(License / Undergraduate)
1.6. Organizational form	IF
1.7. Study Program (name/code) /Qualification	Computers / L2060101010

2. DISCIPLINE DATA

2.1 Discipline Name	Applied Mathematics - Complements of Algebra						
2.2 Course Activities Holder	Associate Professor Florian MUNTEANU Ph.D.						
2.3. Practical Activities Holder	Associate Professor Florian MUNTEANU Ph.D.						
2.4. Study Year	I	2.5. Semester	II	2.6. Evaluation type	V	2.7. Discipline regime	DFA

3. ESTIMATED TOTAL TIME (hours per semester of teaching activities)

3.1. Number of hours per week	2	in which: 3.2 course	1	3.3. sem./lab./pr.	1
3.4. Total hours of curriculum	28	in which: 3.5 course	14	3.6. sem./lab./pr.	14
3.7. Time distribution - hours/week					hours
Study after manual, course support, bibliography and notes					9
Additional documentation in library, on specialized electronic platforms and field					3
Training seminars / labs, homework, portfolios and essays					4
Tutorial					2
Examinations					2
Other activities.....					2
Total hours per individual activities					22
3.8. Total hours per semester					50
3.9. Number of credits					2

4. PRECONDITIONS (where appropriate)

4.1. of curriculum	The students should have mathematical notions learned during the high school and those from the following disciplines: Mathematical Analysis, Linear Algebra, Analytical and Differential Geometry.
4.2. of competence	There are not necessary.

5. CONDITIONS (where appropriate)

5.1. of the course	The course is taught explanatory and interactively with the
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	students. Course support is provided in electronic format on the Google Classroom platform, and access to updated documentation is ensured. Also on the Student Records platform related to the official website of the University of Craiova, https://evstud.ucv.ro/. The teaching process has the following structure: -80% theoretical presentation, based on the course support; -20% interactive activity with the students.	
5.2. of the seminar	The seminar is taught interactively with the students. Seminar support is provided in electronic format on the Google Classroom platform and on https://evstud.ucv.ro/.	

6. COURSE OBJECTIVES – expected learning outcomes that are supported by completing and passing the course

Knowledge	Student/Graduate: - identifies and describes basic concepts, principles and methods in mathematics, strictly necessary for the formation of their professional skills. The main objective of this discipline is to contribute to the training of future engineers, providing them with fundamental knowledge in the field of Algebra. More precisely, the aim is to introduce the fundamental notions of abstract algebra as sets, relations, functions, elements of mathematical logic, elements of graph theory, complex vector spaces with scalar product (unitary spaces), Hilbert spaces, special linear operators on Hilbert spaces, Hilbert space C^2 and Bloch sphere, Pauli matrices, quantum logic gates, complementary to those taught at the Linear Algebra, Analytical and Differential Geometry course and seminar in 1st year / 1st semester. - explains and interprets theoretical results in mathematics. The basic concepts of abstract algebra used in mathematics, physics, measurement techniques, technical graphics, electrical engineering, electronic engineering, systems engineering, programming are covered. Skills in mathematics, engineering and programming are trained. The seminar aims to consolidate theoretical knowledge and create calculation skills through practical applications, exercises and problems.
Skills (Abilities)	Student/Graduate: - operates with basic mathematical concepts, principles and methods. - solve mathematical problems with applicability in engineering and validate the solution obtained. - performs engineering and economic calculations of medium complexity and associates them with graphical representations or specific to computer-aided design. - applies criteria and evaluation methods for the identification, modeling, experimentation, analysis and qualitative and quantitative assessment of phenomena and processes specific to the fundamental field using digital technologies. - acquires and processes data, interprets theoretical mathematical and experimental results.
Responsibility and autonomy	Student/Graduate: - applies the values of ethics and deontology of the engineering profession. - practices logical reasoning, evaluation and self-assessment in decision-making. - communicates effectively about engineering activities with a wide range of audiences. - is engaged in lifelong learning to acquire and implement knowledge, as needed, using appropriate learning strategies. - promotes dialogue, cooperation, respect for others and interculturality.

CONTENT

7.1. Course	The method of implementation	Teaching methods	Allocated time (hours)
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1. Sets, relations, functions	Face to face	Exposition The course is taught explanatory and interactively with the students. Course support is provided in electronic format on the Google Classroom platform, and access to updated documentation is ensured. The teaching process has the following structure: -80% theoretical presentation, based on the course support; -20% interactive activity with the students.	1
2. Elements of mathematical logic	Face to face		2
3. Elements of graph theory	Face to face		4
4. Complex vector spaces with scalar product (unitary spaces), Hilbert spaces	Face to face		1
5. Special linear operators on Hilbert spaces	Face to face		2
6. Hilbert space $\mathbb{C}^2$ and Bloch sphere	Face to face		2
7. Pauli matrices and quantum logic gates	Face to face		2

Bibliography:

1. Axler, S., Linear Algebra Done Right, Springer, San Francisco, ISBN 978-3-031-41025-3, 2024
2. Belage, A. et autres, Exercices resolus d'algebre lineaire, Masson, Paris, 1983
3. Munteanu, F. ș.a. Probleme de algebră liniară, geometrie analitică și geometrie diferențială, Ed. Universitaria, Craiova, 2010
4. Radu, C., Algebră liniară, geometrie analitică și diferențială, Ed. ALL, București, 1998
5. Scherer, W., Mathematics of Quantum Computing, Springer Nature Switzerland AG, 2019
6. Silov, G.E., Mathematical analysis. Finite dimensional spaces, Ed. St. Encicl., București, 198
7. Stănășilă, O., Analiză liniară și geometrie, Ed. ALL, București, 2000
8. Ștefănescu, Gh., O introducere în teoria grafurilor, suport online de curs, UPB, București, 2020
9. Tomescu, I., Probleme de combinatorică și teoria grafurilor, EDP, București, 1981
10. Vladimirescu, I., Matematici aplicate, Repr. Univ. Craiova, 1987
11. Vladimirescu, I., Munteanu, F., Algebră liniară, geometrie analitică și geometrie diferențială, Ed. Universitaria, Craiova, 2007
12. Vladislav, T., Rașa, I., Matematici financiare și ingineresti, Ed. Fair Partners, București, 2001

7.2. Seminar/laboratory/project	The method of implementation	Teaching methods	Allocated time (hours)
1. Sets, relations, functions	Face to face	Solving practical applications The seminar is taught interactively with the students. Seminar support is provided in electronic format on the Google Classroom platform.	1
2. Elements of mathematical logic	Face to face		1
3. Elements of graph theory	Face to face		4
4. Complex vector spaces with scalar product (unitary spaces), Hilbert spaces	Face to face		1
5. Special linear operators on Hilbert spaces	Face to face		2
6. Hilbert space $\mathbb{C}^2$ and Bloch sphere	Face to face		2
7. Pauli matrices and quantum logic gates	Face to face		2
8. Taking the colloquium	Face to face		1

Bibliography:

1. Axler, S., Linear Algebra Done Right, Springer, San Francisco, ISBN 978-3-031-41025-3, 2024
2. Belage, A. et autres, Exercices resolus d'algebre lineaire, Masson, Paris, 1983
3. Munteanu, F. ș.a. Probleme de algebră liniară, geometrie analitică și geometrie diferențială, Ed. Universitaria, Craiova, 2010
4. Radu, C., Algebră liniară, geometrie analitică și diferențială, Ed. ALL, București, 1998
5. Scherer, W., Mathematics of Quantum Computing, Springer Nature Switzerland AG, 2019
6. Silov, G.E., Mathematical analysis. Finite dimensional spaces, Ed. St. Encicl., București, 1983
7. Stănășilă, O., Analiză liniară și geometrie, Ed. ALL, București, 2000

8. Ștefănescu, Gh., O introducere în teoria grafurilor, suport online de curs, UPB, București, 2020
9. Tomescu, I., Probleme de combinatorică și teoria grafurilor, EDP, București, 1981
10. Vladimirescu, I., Matematici aplicate, Repr. Univ. Craiova, 1987
11. Vladimirescu, I., Munteanu, F., Algebră liniară, geometrie analitică și geometrie diferențială, Ed. Universitaria, Craiova, 2007
12. Vladislav, T., Rașa, I., Matematici financiare și ingineresti, Ed. Fair Partners, București, 2001

8. Correlating the content of the discipline with the expectations of representatives from the epistemic community, professional associations and representative employers in the field related to the program

Course content was discussed with representatives of

- Department of Computer Science and Information Technology, Faculty of Automation, Computers and Electronics
- Faculty of Automation, Computers and Electronics, University of Craiova

Development and acquiring of notions, methods, and actual mathematical techniques, used to the mathematical modelling of engineering problems.

9. EVALUATION

Activity Type	9.1. Evaluation criteria	9.2. Evaluation methods	9.3. Final mark weight
9.4. Course	- The understanding the problem - The mathematical statement - The solving of the problem	Colloquium: taking of a written report Colloquium assistance: 2 internal examiners Evaluations: The written report will be individual, will have a subject related to the contents of the course and seminar, and will be assessed by a score from 1 (for free) to 10. The weight of the score at the written report in the final score is 80%. Evaluations of continuous assessments is made during the semester, based on the activity of the students at the seminar, whose weight in the final score is 20%.	80% 20%
9.5. Seminar	- The degree of development of practical skills and the ability to operate with the fundamental notions, techniques, and methods introduced	The activity of the students at the seminar has the weight in the final score 20%. The final score is deduced by using the formula: $S_{\text{final}} = 0,8 \times WR + 0,2 \times SS,$ where WR is the score obtained at the written report and SS is the score at the activity at the seminar.	20%
9.6. Minimum standard of performance			
Minimum standards to promote: the understanding of the notions and basic terminology.			

- The obtaining of a minimum 50% from the continuous assessments and the written exam.
 - The the final score is made by rounding up to integer number
- Final scoring is done by rounding up. The minimum mark to promote the exam is **5**.

Date of Completion	Signature of the Course Activities Holder,	Signature of the Practical Activities Holder,
23.08.2025		

Date of Approval in the Department	Signature of the Department Director,
25.08.2025	Ș.l.dr.ing. Nicolae ENESCU

Date of Approval in the Faculty	Signature of the Dean,
	Prof.dr.ing. Dorin ȘENDRESCU