

SYLLABUS

Approved,
DEAN

Prof.univ.dr.ing. Gilbert-Rainer Gillich

1. Program Data

1.1. Institution of Higher Education	Babeş-Bolyai University
1.2. Faculty	Faculty of Engineering
1.3. Department	Department of Engineering Science
1.4. Field of Study	Electrical Engineering
1.5. Course of Study	Bachelor
1.6. Study Programme	Electromechanics

2. Discipline Data

2.1. Discipline Name	Linear algebra, analytical and differential geometry						
2.2. Course Coordinator	Lect.univ.dr. Andrea Amalia Minda						
2.3.1. Seminary Coordinator	Lect.univ.dr. Andrea Amalia Minda						
2.3.2. Laboratory Coordinator							
2.3.3. Project Coordinator							
2.4. Year of Study	I	2.5. Semester	I	2.6. Evaluation Time	E	2.7. Discipline Regime	Cmp.

3. Estimated Total Time (hours per semester of teaching activities)

3.1. Number of Hours per Week	4	from which: 3.2. Course	2	3.3. seminar	2
3.4. Total Hours from the Curriculum Plan	56	from which: 3.5. Course	28	3.6. laboratory & project	28
Time Fund Distribution - hours					
Study of Handbook, Course Materials, Bibliography & Notes					30
Additional Documentation in Library, on Special E-learning Platforms & in the Field					20
Preparation of seminars/laboratories/ projects, topics, reports, portfolios & essays					17
Mentoring					
Examination					2
Other Activities					
3.7. Total Time of Individual Study	69				
3.8. Total Hours per Semester	125				
3.9. Number of Credits	5				

4. Pre-condition (where is the case)

4.1. of Curriculum	High School Linear Algebra, Analytic Geometry
4.2. of Competences	Basic geometry and algebra

5. Condition (where is the case)

5.1. of Course Progress	Video projector, PC, whiteboard, chalk, MS Teams
5.2.1. of Seminar Progress	•
5.2.2. of Laboratory Progress	
5.2.3. of Project Progress	•

6. Acquired Specific Competences

Professional Competences	Application and adequacy of basic knowledge of mathematics, physics, chemistry specific in the field of electrical engineering (CP1) Operating with basic concepts in the field of computer technology and information technology. (CP2)
Transversal Competences	Identifying the objectives to be achieved, the available resources, the conditions for their completion, the work stages, the related deadlines and the related risks. (CT1)

7. Discipline Objectives (coming out from the Checklist of Acquired Specific Competences)

7.1. General Objective of Discipline	The course aims at transmitting and acquiring knowledge of algebra, analytic and differential geometry necessary in the study of disciplines specific to the engineering field and the study of properties related to these notions and learning algorithms and specific techniques.
7.2. Specific Objectives	<ul style="list-style-type: none"> - learning mathematical methods that have applications in engineering, physics, mechanics, machinery, mechanisms, strength of materials, computer science, numerical methods, study and technology of materials. - explanation and interpretation of processes and theoretical and practical contents of the subject. - use of mathematical calculation and application methods, techniques and tools; - acquiring the basic knowledge of algebra, analytical and differential geometry necessary to understand the mathematical mechanisms applied in the other disciplines using it; - development of students' logical thinking, formation of skills to use rigorous reasoning.

8. Content

8. Content		
8.1. Course	Teaching methods	Observation
1. Review: matrices, determinants, systems of equations	exposition, problematization, heuristic conversation, explanation	2 hours
2. Vector spaces. Linear dependence and independence		2 hours
3. Base. Change of base.		2 hours
4. Linear applications. Associated matrix		2 hours
5. Vectors and eigenvalues associated with a linear operator		2 hours
6. Reducing the matrix of a linear operator to diagonal form		2 hours
7. Linear forms, bilinear forms and quadratic forms		2 hours
8. Reduction of quadratic forms to canonical expression		2 hours
9. Free vectors		2 hours
10. Scalar product. The vector product. The mixed product.		2 hours
11. Plane equation. Straight line in space		2 hours
12. Study of conics		2 hours
13. Curve in space. Tangent to curve. The normal plane to the curve. Oscillating plane. Main normal. Binormal. Rectifying plane.		2 hours
14. Curvature of a curve. Torsion		2 hours
Bibliography 1. A.A. Minda, Note de curs 2. I. Anghel, C. Anghel, Algebra Liniară. Programare Liniară. Curs Vol. 1, Editura Eftimie Murgu Reșița, 2003 3. I. Anghel, C. Anghel, Algebră Liniară. Geometrie Analitică și Diferențială, Curs Vol. 2, Editura Eftimie Murgu Reșița, 2001 4. M.S.Stoian, D.Ciobanu, Algebra liniara si geometrie analitica, Partea I, Ed. Matrix Rom, Bucuresti, 2008 5. C. Udriste, C. Radu și alții, Algebra, geometrie si ecuații diferențiale, Editura Didactică și Pedagogică, București, 1982		
8.2.1. Seminar	Teaching methods	Observation
1. Review: matrices, determinants, systems of equations	problem solving and discovery, solving exercises, linking theoretical knowledge to practical applications	2 hours
2. Vector spaces. Linear dependence and independence		2 hours
3. Base. Change of base.		2 hours
4. Linear applications. Associated matrix		2 hours
5. Vectors and eigenvalues associated with a linear operator		2 hours
6. Reducing the matrix of a linear operator to diagonal form		2 hours
7. Linear forms, bilinear forms and quadratic forms		2 hours
8. Reduction of quadratic forms to canonical expression		2 hours
9. Free vectors		2 hours
10. Scalar product. The vector product. The mixed product.		2 hours
11. Plane equation. Straight line in space		2 hours
12. Study of conics		2 hours
13. Curve in space. Tangent to curve. The normal plane to the curve. Oscillating plane. Main normal. Binormal. Rectifying plane.		2 hours
14. Curvature of a curve. Torsion		2 hours
Bibliography		

1. A.A. Minda, Note de curs 2. I. Anghel, C. Anghel, Algebra Liniară. Programare Liniară. Curs Vol. 1, Editura Eftimie Murgu Reșița, 2003 3. I. Anghel, C. Anghel, Algebră Liniară. Geometrie Analitică și Diferențială, Curs Vol. 2, Editura Eftimie Murgu Reșița, 2001 4. M.S.Stoian, D.Ciobanu, Algebra liniara si geometrie analitica, Partea I, Ed. Matrix Rom, Bucuresti, 2008 5. C. Udriste, C. Radu și alții, Algebra, geometrie si ecuații diferențiale, Editura Didactică și Pedagogică, București, 1982		
8.2.3. Project	Teaching methods	Observation

9. Corroborating Discipline's Contents with the Expectation of the Epistemic Community Representatives, the Professional Associations and the Employers' Representatives from the Programme Corresponding Field

- They have been established with the main employers by previous discussions at the study programme substantiation.

10. Evaluation

Type of activity	10.1. Evaluation criteria	10.2. Evaluation methods	10.3. Weight from the final grade
10.4. Course	Debates participation	Continuous evaluation according to number of interventions and quality of response	10%
	Acquired knowledge level	Exam (on paper)	60 %
10.5.1. Seminary	Activity / implication	Continuous evaluation according to number of interventions and quality of response	30%
	Gained competence level	Continuous evaluation Summative evaluation	
10.5.2. Laboratory	Activity / implication		
	Gained competence level in practice		
10.5.3. Project	Readiness in phrasing the project stages		
	Project quality		
10.6. Performance Minimum Standard			
<ul style="list-style-type: none"> • Completion of Applicative Seminar Activities 			

Completion Date

1.05.22

Course Coordinator's Signature

Lect.univ.dr. Andrea Amalia Minda

Seminar Coordinator's Signature

Lect.univ.dr. Andrea Amalia Minda

Department Endorsement Date

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Chief of Department Signature

Ș.l.dr.fiz. Cornel Hațiegan