

SYLLABUS

1. Information regarding the programme

1.1 Higher education institution	Babeş-Bolyai University of Cluj-Napoca
1.2 Faculty	Faculty of Environmental Science and Engineering
1.3 Department	Department of Environmental Analysis and Engineering
1.4 Field of study	Environmental Engineering
1.5 Study cycle	Bachelor
1.6 Study programme / Qualification	Environmental Engineering

2. Information regarding the discipline

2.1 Name of the discipline	Applied Mathematics						
2.2 Course coordinator	Lecturer Veronica Oana Nechita, Ph.D.						
2.3 Seminar coordinator	Lecturer Veronica Oana Nechita, Ph.D.						
2.4 Year of study	1	2.5 Semester	1	2.6. Type of evaluation	C	2.7 Type of discipline	
2.8 Code of Discipline							

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

3.1 Hours per week	4	Of which: 3.2 course	2	3.3 Seminar/laboratory	2
3.4 Total hours in the curriculum	56	Of which: 3.5 course	28	3.6 Seminar/Laboratory	28
Time allotment:					Hours
Learning using manual, course support, bibliography, course notes					24
Additional documentation (in libraries, on electronic platforms, field documentation)					-
Preparation for seminars/labs, homework, papers, portfolios and essays					12
Tutorship					2
Evaluations					4
Other activities:					-
3.7 Total individual study hours	42				
3.8 Total hours per semester	98				
3.9 Number of credits	4				

4. Prerequisites (if necessary)

4.1 Curriculum	•
4.2 Competencies	•

5. Conditions (where applicable)

5.1. for the course	•
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5.2. for the seminar /lab activities	•
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6. Specific competencies acquired

Professional competencies	•
Transversal competencies	•

7. Objectives of the discipline (outcome of the acquired competencies)

7.1 General objective of the discipline	• Familiarization of students with the mathematical notions necessary to solve the specific problems in their field of training
7.2 Specific objectives	•

8. Contents

8.1 Course	Teaching methods	Remarks
1. Linear algebra	Lecture, explanations, examples	
2. Systems of linear equations. Resolution methods	Lecture, explanations, examples	
3. Analytical geometry in the plane. Equations of the line	Lecture, explanations, examples	
4. Tapered	Lecture, explanations, examples	

5. Derivatives of real functions of a real variable. Properties.	Lecture, explanations, examples	
6. Interpretation and the role of the derivative in problem-solving. Minimums and maximums	Lecture, explanations, examples	
7. Partial derivatives for functions of two or more real variables	Lecture, explanations, examples	
8. Integral. Properties	Lecture, explanations, examples	
9. Integration techniques. Areas and volumes.	Lecture, explanations, examples	
10. Numerical integration methods	Lecture, explanations, examples	
11. First-order differential equations	Lecture, explanations, examples	
12. Higher-order differential equations. Applications of differential equations	Lecture, explanations, examples	
13. Systems of linear differential equations	Lecture, explanations, examples	
14. Numerical solutions of differential equations	Lecture, explanations, examples	

Bibliography

1. Maria Micula, Rodica Sobolu, Florica Matei - Analiză matematică. Manual universitar, AcademicPres, Cluj-Napoca, 2008
2. David F. Parkhurst – Applied Mathematics for Environmental Science, Springer, 2007
3. Adrian Burd – Mathematical Methods in the Earth and Environmental Sciences, Cambridge University Press, 2019
4. Constantin Udriște, Valeria Tomuleanu, Gheorghe Vernic – Matematică. Geometrie analitică. Manual pentru clasa a XI-a, EDP, 1991
5. Course Notes (MsTeams)

8.2 Seminar / laboratory	Teaching methods	Remarks
1. Matrix and determinants	Teaching methods	
2. Related functions. Graphic	Dialogue, explanations, discussions	
3. Solving systems of linear equations	Dialogue, explanations, discussions	
4. Equations of the line in the plane	Dialogue, explanations, discussions	

5. Conical on the normal equation. Bringing Conics to the Normal Equation	Dialogue, explanations, discussions	
6. Deriving functions from a real variable	Dialogue, explanations, discussions	
7. Minimum and maximum problems	Dialogue, explanations, discussions	
8. Partial derivatives. Extreme problems	Dialogue, explanations, discussions	
9. Undefined integrals	Dialogue, explanations, discussions	
10. Integral defined. Arias, volumes	Dialogue, explanations, discussions	
11. Approximate calculation of integrals	Dialogue, explanations, discussions	
12. Equations with separable variables. Homogeneous and inhomogeneous first-order linear equations	Dialogue, explanations, discussions	
13. Higher-order differential equations	Dialogue, explanations, discussions	
14. Systems of linear differential equations	Dialogue, explanations, discussions	
Bibliography 1. Maria Micula, Rodica Sobolu, Florica Matei - Analiză matematică. Manual universitar, AcademicPres, Cluj-Napoca, 2008 2. David F. Parkhurst – Applied Mathematics for Environmental Science, Springer, 2007 3. Adrian Burd – Mathematical Methods in the Earth and Environmental Sciences, Cambridge University Press, 2019 4. Constantin Udriște, Valeria Tomuleanu, Gheorghe Vernic – Matematică. Geometrie analitică. Manual pentru clasa a XI-a, EDP, 1991 5. List of proposed issues for the seminar (MsTeams)		

9. Corroborating the content of the discipline with the expectations of the epistemic community, professional associations, and representative employers within the field of the program

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10. Evaluation

Activity Type	10.1 Evaluation criteria	10.2 Evaluation methods	10.3 Weight of the final grade
10.4 Course	The understanding of the notions taught in the course and the ability to work with them by solving problems is verified in writing	Two written papers, in the middle and at the end of the semester	90%
10.5 Seminar/laboratory	Active participation in solving the proposed problems	Discussion, problem-solving, individual study, teamwork	10%
10.6 Minimum Performance Standards			
- Attendance at 75% of the seminar hours is mandatory 10 points are awarded ex officio. For each of the papers, a maximum of 40 points are awarded, for the seminar activity, a maximum of 10 points are awarded, and the final grade is calculated by rounding following the addition of the scores and division by 10.			

Date of completion Signature of the course coordinator Signature of the seminar coordinator

15.11.2024

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Date of approval

Signature of the head of the department

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