SYLLABUS
Mathematical analysis II
(Integral calculus and differential equations)

1. Data about the program of study

1.1	Institution	The Technical University of Cluj-Napoca
1.2	Faculty	Automation and Computer Science
1.3	Department	Mathematics
1.4	Field of study	Systems Engineering
1.5	Cycle of study	Bachelor of Science
1.6	Program of study/Qualification	Automation and Applied Informatics, English
1.7	Form of education	Full time
1.8	Subject code	8.00

2. Data about the subject

2.1	Subject name					Mathematical analysis II					
2.2	Subject area					Mathematics					
2.3	Course responsible/lecturer					Conf. dr. Alina Ramona Baias					
2.4	Teachers in charge of aapplications					Conf. dr. Alina Ramona Baias					
2.5	Year of Study	I	2.6	Semester	2	2.7	Assessment	exam	2.8	Subject category	DF/OB

3. Estimated total time

3.1	Number of hours per week	4	3.2	of which, course	2	3.3	applications	2
3.4	Total hours in the teaching plan	56	3.5	of which, course	28	3.6	applications	28

Individual study	Hours
Manual, lecture material and notes, bibliography	20
Supplementary study in the library, online and in the field	14
Preparation for seminars/laboratory works, homework, reports, portfolios, essays	34
Tutoring	3
Exams and tests	3
Other activities	0

3.7	Total hours of individual study	74
3.8	Total hours per semester	130
3.9	Number of credit points	5

4. Pre-requisites (where appropriate)

4.1	Curriculum	Basic knowledge Integral Calculus
4.2	Competence	Competences in elementary Integral Calculus: primitives, definite integrals.

5. Requirements (where appropriate)

5.1	For the course	
5.2	For the applications	

6. Specific competences

Professional competences	**C1 –** Operating with basic Mathematical, Engineering, and Computer Science concepts **C1.1 –** Recognizing and describing concepts that are specific to the fields of calculability, complexity, programming paradigms, and modeling computational and communication systems **C1.3 –** Building models for various components of computing systems **C1.5 –** Providing a theoretical background for the characteristics of the designed systems
Cross competences	N/A

7. Discipline objectives (as results from the *key competences gained*)

7.1	General objective	A presentation of the concepts, notions, methods and fundamental techniques used in integral calculus.
7.2	Specific objectives	Use of the integral calculus in order to solve problems in engineering.

8. Contents

8.1. Lecture (syllabus)		Teaching methods	Notes
1	Ordinary differential equations (ODE) of order one (Part 1)	Explanation Demonstration Collaboration Interactive activities	
2	Ordinary differential equations (ODE) of order one (Part 2)		
3	Linear homogeneous ODE with constant coefficients		
4	Linear non-homogeneous ODE with constant coefficients		
5	The Riemann integral. Primitives.		
6	Improper integrals.		
7	Integrals depending on parameters.		
8	Special functions		
9	Paths. Vector fields. Line integrals with respect to the coordinates. Circulation.		
10	Differential Forms. Exact differential forms. Path-independence. Work.		
11	Line integrals with respect to the arc length. Total mass, center of mass.		
12	Double integrals (Part1)		
13	Double integrals (Part 2). Green-Riemann formula.		
14	Volume integrals. Applications		

Bibliography

1. Mircea Ivan. Elemente de calcul integral. Mediamira, Cluj-Napoca, 2003. ISBN 973-9357-40-7.
2. Dumitru Mircea Ivan. Calculus. Editura Mediamira, Cluj-Napoca, 2002. ISBN 973-9358-88-8.
3. D. Inoan, Elemente de calcul integral, Ed. U.T.Press, 2006

8.2. Applications (Seminars)		Teaching methods	Notes
1	Ordinary differential equations (ODE) of order one (Part1) (Exercises)	Explanation Demonstration Collaboration Interactive activities	
2	Ordinary differential equations (ODE) of order one (Part 2)(Exercises)		
3	Linear homogeneous ODE with constant coefficients (Exercises)		
4	Linear non-homogeneous ODE with constant coefficients (Exercises)		
5	The Riemann integral. Primitives (Exercises)		
6	Improper integrals (Exercises)		
7	Integrals depending on parameters(Exercises)		
8	Special functions (Exercises)		
9	Line integrals with respect to the coordinates(Exercises)		
10	Differential forms (Exercises)		
11	Line integrals with respect to the arc length. (Exercises)		
12	Double integral. (Part1) (Exercises)		
13	Double integra (Part 2). The Green-Riemann formula. (Exercises)		
14	Volume integral. (Exercises)		

Bibliography

1. Dumitru Mircea Ivan, et al. Analiză matematică - Culegere de probleme pentru seminarii, examene şi concursuri. Editura Mediamira, Cluj-Napoca, 2002. ISBN 973-9357-20-2.
2. Mircea Ivan et al. Culegere de Probleme Pentru Seminarii, Examene şi Concursuri. UT Press, Cluj-Napoca,
3. D. Inoan, Elemente de calcul integral, Ed. U.T. PRES, 2006
4. N. Lungu, A. Chis, D.Inoan, M. Rus, V. Dincuţă, Ecuaţii diferenţiale. Culegere de probleme, U.T. PRES, 2007 2000.

9. Bridging course contents with the expectations of the representatives of the community, professional associations and employers in the field

Collaboration with engineers in order to identify and solve problems raised by the market.

10. Evaluation

Activity type	10.1	Assessment criteria	10.2	Assessment methods	10.3	Weight in the final grade
Course		Abilities of understanding and using creatively the concepts and proofs		Written examination		30%
Applications		Abilities of solving problems and applying algorithms		Written examination		70%

10.4 Minimum standard of performance
Ability to present coherently a theoretical subject and to solve problems with practical content.

Date of filling in: 01.06.2024		**Title Firstname NAME**	**Signature**
	Course	Conf. dr. Alina Ramona Baias	
	Aplications	Conf. dr. Alina Ramona Baias	

Date of approval by the Department Board	Head of Departament Prof.dr.ing. Honoriu VĂLEAN
Date of approval by the Faculty Council _____	Dean Prof.dr.ing. Mihaela Dinsoreanu