

## SYLLABUS

### 1. Data about the program of study

1.1 Institution	Technical University of Cluj-Napoca
1.2 Faculty	Faculty of Electronics, Telecommunications and Information Technology
1.3 Department	Mathematics
1.4 Field of study	Electronic Engineering, Telecommunications and Information Technologies
1.5 Cycle of study	Bachelor of Science
1.6 Program of study / Qualification	Applied Electronics / Engineer
1.7 Form of education	Full time
1.8 Subject code	<i>Codul disciplinei se găsește pe site la secțiunea "Planuri de învățământ" (<a href="https://etti.utcluj.ro/planuri-de-invatamant.html">https://etti.utcluj.ro/planuri-de-invatamant.html</a>)</i>

### 2. Data about the subject

2.1 Subject name	Differential Equations		
2.2 Subject area	Theoretical area Methodological area Analytic area		
2.3 Course responsible	Prof. univ. Dorian Popa – <a href="mailto:Popa.Dorian@math.utcluj.ro">Popa.Dorian@math.utcluj.ro</a>		
2.4 Teacher in charge with seminar / laboratory / project	Conf. dr. Alina Baias – <a href="mailto:baias.alina@math.utcluj.ro">baias.alina@math.utcluj.ro</a> Conf. dr. Diana Otrocol- <a href="mailto:diana.otrocol@math.utcluj.ro">diana.otrocol@math.utcluj.ro</a>		
2.5 Year of study 1	2.6 Semester 1	2.7 Assessment	2.8 Subject category

### 3. Estimated total time

3.1 Number of hours per week		of which: 2 course		2 seminar	
3.4 To Total hours in the curriculum		of which: 28 course		28 seminar / laboratory	
Supplementary study in the library, online specialized platforms and in the field					
Preparation for seminars / laboratories, homework, reports, portfolios and essays					
Tutoring					
Exams and tests					
Other activities: .....					
3.7 Total hours of individual study					
3.8 Total hours per semester	28				
3.9 Number of credit points					

### 4. Pre-requisites (where appropriate)

4.1 curriculum	<i>Calculus. Functions of one variable</i>
4.2 competence	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
--	---

### 5. Requirements (where appropriate)

5.1. for the course	Basic knowledge of differential and integral Calculus for one variable
5.2. for the seminars/laboratories / projects	Basic knowledge of differential and integral Calculus for one variable

### 6. Specific competences

### 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 differential equations.
7.2 Specific objectives	Use of the differential equations in order to solve problems in engineering

### 8. Contents

	Teaching methods	Notes
1. Examples which lead to differential equations	Explanation Demonstration Collaboration Interactive activities	
2. Basic notions. Problems concerning differential equations		
3. Differential equations of order one		
4. Existence and uniqueness theorem for the Cauchy problem		
5. Linear equations of order n.		
6. Linear and homogeneous equations with constant coefficients		
7. Linear and nonhomogeneous equations with constant coefficients.		
8. Series solutions for differential equations		
9. Bessel equation and Bessel functions		
10. Linear systems of differential equations		
11. Partial Differential Equations of order one.		
12. Cauchy problem for partial differential equations of order one		
13. Partial differential equations of order two.		
14. Wave equation .Separation of variables.		
<b>8.2 Seminar/laboratory / project</b>	Teaching methods	Notes
1. Differential equations of order one	Explanation Demonstration Collaboration Interactive activities	
2. Problems concerning differential equations of order one		
3. Differential equations reducible to order one		
4. Cauchy problem. Differential inequalities		
5. Linear and nonhomogeneous equations of order n		
6. Differential equations integrated by series		
7. Applications of Bessel functions		
8. Systems of differential equations		
9. Applications of Laplace transform		
10. Partial differential equations of order one		
11. Linear partial differential equations of order one		
12. Cvasilinear partial differential equations of order one		
13. Partial differential equations of order two		
14. Applications of partial differential equations of order two.		
Bibliography		
1. V. Barbu, Ecuatii diferentiale, Editura Junimea, 1985.		
2. Peter J.Collins, Differential and Integral Equations, Oxford University Press, 2005.		
3. R.P.Agarval, D.O'Regan, An Introduction to Ordinary Differential Equations, Springer, 2008.		



4. D.Popa, Calculus, Mediamira Cluj-Napoca, 2006.


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

The discipline content and the acquired skills are in agreement with the expectations of the professional organizations and the employers in the field, where the students carry out the internship stages and/or occupy a job (in the field of .....), and the expectations of the national organization for quality assurance (ARACIS).

**10. Evaluation**

Activity type	10.1 Assessment criteria	10.2 Assessment methods	10.3 Weight in the final grade
10.4 Course	The level of acquired theoretical knowledge and practical skills	<i>Probă scrisă/online/face to face</i>	80%
10.5 Seminar/Laboratory	The level of acquired knowledge and abilities	<i>Verificare pe parcurs prin teste de laborator</i>	20%
10.6 Minimum standard of performance			

Date of filling in:	Responsible	Title Surname NAME	Signature
	Course	Prof. dr. Dorian Popa	
	Applications	Conf. dr. Alina Baias Conf. dr. Diana Otrocol	

Date of approval in the Department of Mathematics 05.06.2024	Head of Department of Mathematics Prof. dr. Dorian Popa 
Date of approval in the Council of Automation and Computer Science	Dean Prof. dr. eng. Mihaela Dinsoreanu