SYLLABUS

1. Data about the program of study

1.1 Institution	Technical University of Cluj-Napoca
1.2 Faculty	Faculty of Automation and Computer Science
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	Telecommunications Technologies and Systems/ Engineer Applied Electronics/Engineer
1.7 Form of education	Full time
1.8 Subject code	TST-E09.00/EA-E09.00

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. Dorian Popa, Ph.D. – Popa.Dorian@math.utcluj.ro						
2.4 Teacher in charge with seminar / laboratory / project	Assist. Prof. Alina Baias, Ph.D – baias.alina@math.utcluj.ro						
2.5 Year of study	1	2.6 Semester	2	2.7 Assessment	E	2.8 Subject category	DF/DI

3. Estimated total time

3.1 Numbers of hours per week:	4	3.2 of which, lecture	2	3.3 applications	2
3.4 Total hours in the curriculum:	56	3.5 of which, lecture:	28	3.6 applications	28

Distribution of time	hours
Manual, lecture material and notes, bibliography	30
Supplementary study in the library, online specialized platforms and in the field	5
Preparation for seminars / laboratories, homework, reports, portfolios and essays	28
Tutoring	3
Exams and tests	3
Other activities:	

3.7 Total hours of individual study	69
3.8 Total hours per semester	125
3.9 Number of credit points	5

4. Pre-requisites (where appropriate)

4.1 curriculum	Calculus. Functions of one variable. Operating with basic Mathematical, Engineering and Computer Science concepts
4.2 competence	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

Professional competences	C1. Use of the fundamental elements related to devices, circuits, systems, instrumentation and electronic technology C2. Applying the basic methods for the acquisition and processing of signals C3. Application of the basic knowledge, concepts and methods regarding the architecture of computer systems, microprocessors, microcontrollers, languages and programming techniques
Transversal 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 differential equations.
7.2 Specific objectives	Use of the differential equations in order to solve problems in engineering

8. Contents

8.1 Lecture (syllabus)	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 nonhogeneous 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.		
8.2 Seminar/laboratory / project	Teaching methods	Notes

1. Differential equations of order one 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.	Explanation Demonstration Collaboration Interactive activities	

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 Competences acquired will be used in the following COR occupations (Electronics Engineer; Telecommunications Engineer; Electronics Design Engineer; System and Computer Design Engineer; Communications Design Engineer) or in the new occupations proposed to be included in COR (Sale Support Engineer; Multimedia Applications Developer; Network Engineer; Communications Systems Test Engineer; Project Manager; Traffic Engineer; Communications Systems Consultant).

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	Written exam	80%
10.5 Seminar/Laboratory	The level of acquired knowledge and abilities	Verification through laboratory tests	20%
10.6 Minimum standard of performance			
✓ M>5			

Date of filling in:	Responsible	Title First name SURNAME	Signature
29.09.2020	Course	Prof. Dorian Popa, Ph.D.	
	Applications	Prof. Dorian Popa, Ph.D.	
		Assist. Prof. Alina Baias, Ph.D	

Date of approval in the Department of Communications 30.09.2020	Head of Communications Department Prof. Virgil DOBROTA, Ph.D.
Date of approval in the Council of Faculty of Electronics, Telecommunications and Information Technology 30.09.2020	Dean Prof. Gabriel OLTEAN, Ph.D.