SYLLABUS

Discipline name	Differential Equations
Profile	Electronics and Telecommunications Engineering
Specialization	Telecommunications Technologies and Systems
Code	51321009
Course leader	Prof. Dorian Popa, Ph.D., dorian.popa@math.utcluj.ro
Collaborators	Associate Prof. Radu Peter, Ph.D., radu.peter@math.utcluj.ro
Department	Mathematics
Faculty	Automation and Computer Science

Sem.	Type of discipline	Course	Applications			Course	Applications			Ind. study	TOTAL	Credits	Form of assessment
		[hours/week]				[hours/sem.]							
			S	L	P		S	L	P				
2	Fundamental	2	2		-	28	-	28	-	94	150	5	Exam

Acquired competences :
Acquired skills (what the student is able to do):
Notions and results concerning differential equations and equations with partial derivatives of order one and two. Cauchy problem for different type of equations Bessel equation and Bessel functions. Dynamic systems.
Acquired abilities: (what type of equipment/instruments/software the student is able to handle)   ■ To solve a differential equation and a system of differential equations.   ■ To operate with Bessel functions   ■ To use differential equations in some applications

Prerequisites (if necessary)
Notions on mathematical analysis, algebra and trigonometry from high school

A. Course/Lecture (course/lecture titles)
1. Examples which leads to differential equations   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 with constant coefficients   7. Linear and monhogeneous equations with constant coefficients.   8. Series solutions for differential equations   9. Bessel equation and Bessel functions   10. Linear systems of differential equations   11. Equations with partial derivatives of order one.   12. Cauchy problem for equations with partial derivatives of order one   13. Linear equations with partial derivatives of order two.   14. Wave equation .Separation of variables.

B1. Applications – Laboratory (list of laboratories), Seminar (contents), Project (project contents)	
1	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. Linear equation with partial derivatives of order one 11. Cvasilinear equations with partial derivatives of order one 12. Cvasilinear equations with partial derivatives of order one 13. Equations with partial derivatives of order two 14. Applications of partial differential equations of order two.
C. Individual study (reference study contents, synthesis materials, projects, applications etc.)	

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14 sets of problems (the preparation part in every laboratory).
Applications of differential equations in comunications.

Individual study structure	Course study	Problem solving, laboratory, project	Applications preparation	Examination time	Additional reference study	Total no. of individual study hours
Hours	28	6	18	3	9	64

References (Textbooks, courses, laboratory manual, exercise book)
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.

Final evaluation	
Evaluation method	Writen paper – 3 hours containing theory and problems. After 7 courses partial evaluation (3 hours)
Mark components	Seminar S Theory T Problems P
Mark computation	N=0,2S+0,2T+0,6P

Course leader,

Professor Dorian POPA, Ph.D.