SYLLABUS
2024-2025
DIFFERENTIAL AND PARTIAL DERIVATIVES EQUATIONS

1. Information on academic program

1.1. University	**„1 Decembrie 1918" University of Alba Iulia**
1.2. Faculty	**Faculty of Informatics and Engineering**
1.3. Department	**Informatics, Mathematics and Applied Electronics**
1.4. Field of Study	**Computer Science**
1.5. Cycle of Study	**Undergraduate**
1.6. Academic program / Qualification	**Computer Science/ 2511/ Systems Analyst, 2512/ Software developers** **Analyst 251201** **Computer System Programmer 251204** **Computer System Engineer 251203**

2. Information of Course Matter

2.1. **Course**		*Differential and partial derivatives equations*			2.2. **Code**	CSE205	
2.3. **Course Leader**			Aldea Mihaela				
2.4. **Seminar Tutor**			Aldea Mihaela				
2.5. Academic Year	**II**	2.6. Semester	**I**	2.7. Type of Evaluation (E – final exam/ CE - colloquy examination / CA -continuous assessment)	**CE**	2.8. Type of course (**C**– Compulsory, **Op** – optional, **F** - Facultative)	**C**

3. Course Structure (Weekly number of hours)

3.1. Weekly number of hours	**4**	3.2. course	***2***	3.3. seminar, laboratory	***2***
3.4. Total number of hours in the curriculum	**56**	3.5. course	***28***	3.6. seminar, laboratory	***28***

Allocation of time:	Hours
Individual study of readers	***14***
Documentation (library)	***14***
Home assignments, Essays, Portfolios	***14***
Tutorials	**-**
Assessment (examinations)	***2***
Other activities…….	**-**

3.7 Total number of hours for individual study	44
3.8 Total number of university activities	56
3.9 Total number of hours per semester	56+44 =100
3.10 Number of ECTS	4

4. Prerequisites (*where applicable*)

4.1. curriculum-based	Mathematical Analysis
4.2. competence-based	C4 The use of the theoretical basis of computer science and of formal models

5. Requisites (*where applicable*)

5.1. course-related	Room equipped with video projector / board
5.2. seminar/laboratory-based	Room equipped with video projector / board

6. Specific competences to be aquired (chosen by the course leader from the programme general competences grid)

Professional competences	C4 The use of the theoretical basis of computer science and of formal models C4.1 The definition of base concepts and principles of computer science and mathematics as well as of the mathematical theories and models. C4.2 The interpretation of mathematical and computer science (formal) models. C4.3 The identification of appropriate models and methods for solving real-life problems. C4.4 The use of simulation in the study of the behavior of developed models and evaluation of results. C4.5 The embedding of formal models in specific applications in various domains.
Transversal competences	

7. Course objectives (as per the programme specific competences grid)

7.1 General objectives of the course	Presentation with practical methods for solving of ordinary differential equations, systems of differential equations, higher order differential equations and with partial derivates of order 1 and 2.
7.2 Specific objectives of the course	Learning the basic techniques of solving differential calculus problems; knowledge and application of theorems, models, their properties and methods of work in the field of differential equations and partial derivatives; learning ability to search and use information; acquiring skills for conducting studies case

8. Course contents

8.1 Course (learning units)	**Teaching methods**	**Remarks**
1. First order differential equations: Basic concepts. Cauchy problem.	***Lecture, conversation, exemplification***	
2. Separable differential equations. Homogeneous equations.	***Lecture, conversation, exemplification***	
3. Linear differential equations	***Lecture, conversation, exemplification***	
4. Bernoulli, Riccati, Lagrange, Clairaut Differential equations	***Lecture, conversation, exemplification***	
5. Exact differential equations; Solutions existence and uniqueness	***Lecture, conversation, exemplification***	
6. Higher order differential equations: Cases and modalities for reduction the order of an equation; Linear differential equations with variable coefficients. Fundamental sets of solutions.	***Lecture, conversation, exemplification***	

7. Method of undetermined coefficients. Differential equations with constant coefficients.	***Lecture, conversation, exemplification***	
8. Systems of differential equations: Systems of first order differential equations, the equivalence with higher order differential equations. Cauchy problem.	***Lecture, conversation, exemplification***	
9. The fundamental matrix of a system of first order linear differential equations with variable coefficients.	***Lecture, conversation, exemplification***	
10. Systems of first order linear differential equations with constant coefficients. Matrix exponential	***Lecture, conversation, exemplification***	
11. Autonomous systems.	***Lecture, conversation, exemplification***	
12. Partial derivates equations: Linear, homogeneous and nonhomogeneous first order partial derivates equations.	***Lecture, conversation, exemplification***	
13. Second order partial derivates equations	***Lecture, conversation, exemplification***	
14. Equations of mathematical physics. Laplace equation.	***Lecture, conversation, exemplification***	
Seminars-laboratories	**Teaching methods**	
1 Problems for solving first order differential equations (4 seminars)	***Laboratory activities, exemplification, conversation***	
2 Problems for solving higher order differential equations (2 seminars)	***Laboratory activities, exemplification, conversation***	
3 Differential equations with constant coefficients (1 seminar)	***Laboratory activities, exemplification, conversation***	
4 Solving systems differential equations (3 seminars)	***Laboratory activities, exemplification, conversation***	
5 First order partial derivates equations (2 seminars)	***Laboratory activities, exemplification, conversation***	
6 Second order partial derivates equations (2 seminars)	***Laboratory activities, exemplification, conversation***	

References

1. I. A. Rus, *Ecuatii diferentiale, ecuatii integrale si sisteme dinamice*, Transilvania Press, Cluj-Napoca, 1996.
2. G. Tataru, *Ecuatii diferentiale si integrale,* Ed. Economica, Bucuresti, 2000
3. V. Olariu, T. Stanasila, *Ecuatii diferentiale si cu derivate partiale*, Editura Tehnica, 1982.
4. R. Redheffer, *Diffwerential Equations. Theory and applications*, Jones and Bartleft Publishers, Boston, 1991.
5. C. Dragusin, V. Prepelita, C. Radu, C. Caslaru, M. Gavrila,*Ecuatii diferentiale si ecuatii cu derivate partiale,* Ed. MatrixRom, Bucuresti, 2009
6. Gh. Micula, P. Pavel, *Ecuatii diferentiale si integrale prin exercitii si probleme*, Editura Dacia, 1989.
7. J. C. Robinson, *An introduction to ordinary differential equations,* Cambridge University Press, Cambridge, 2004.
8. Ana Niţă, Alina Niţă, *Ecuaţii şi sisteme diferenţiale,*Bucureşti, 2000.
9. Ghe. Vranceanu, M. Gozu, *Ecuatii diferentiale, sisteme de ecuatii diferentiale si ecuatii cu derivate partiale,* MATRIXROM, Bucuresti, 2004

9. Corroboration of course contents with the expectations of the epistemic community's significant representatives, professional associations and employers in the field of the academic programme

10. Assessment

Activity	10.1 Evaluation criteria	10.2 Evaluation methods	10.3 Percentage of final grade
10.4 Course	*Final evaluation*	*Written paper*	50%
	-	-	-
10.5 Seminar/laboratory	*Continuous assessment*	*Laboratory activities portfolio*	50%
	-		-
10.6 Minimum performance standard:			
Recognizing first-order differential equations, identifying the type; the recognition of a differential equation of higher order, of a system of linear differential equations; knowing the methods of solving them; recognizing and solving 1st and 2nd order partial differential equations. Attending the exam is only allowed if the student has at least 80% attendance at the seminar. The recovery before the colloquium of the seminar hours not carried out due to reasoned absences can be done by the student presenting a portfolio containing all the solved seminar topics. This portfolio can be presented no later than 5 days before the colloquium, according to a schedule agreed upon with the teacher.			

Submission date Course leader signature Seminar tutor signature

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Date of approval by Department members Department director signature

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