MINISTERUL EDUCAŢIEI
UNIVERSITATEA „AUREL VLAICU" DIN ARAD
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SYLLABUS

1. Study programme

1.1. Higher education institution	**„Aurel Vlaicu" University of Arad**
1.2. Faculty	**of Exact Sciences**
1.3. Department	**Department of Mathematics and Computer Science**
1.4. Field of study	**Informatics**
1.5. Study level	**2024-2025**
1.6. Ciclul de studii	**Bachelor**
1.7. Study programme / Qualification	**Computer Science**
1.8. Form of education	**Full – Time study**

2. Course details

2.1. Name of the course	Differential and Integral Calculus
2.2. Course coordinator	**Prof.univ.dr. Sorin Nădăban**
2.3. Seminar/laboratory/project coordinator	**Lect. Univ.dr. Claudia Mihiț**
2.4. Study year	**1**
2.5. Semester	**1**
2.6. Evaluation type	**SE**
2.7. Course type	**Basic Discipline**

3. Estimated total time (hours per semester)

3.1. Hours per week	**4**
3.2. Lecture hours per week	**2**
3.3. Seminar/laboratory/project hours per week	**2**
3.4. Total hours per curriculum	**56**
3.5. Lecture hours per semester	**28**
3.6. Seminar/laboratory/project hours per semester	**28**
	Time division [hrs]
3.4.1. Independent study from textbooks, course support, bibliography and notes	**20**
3.4.2. Additional reading (libraries, specialized electronic platforms and field research)	**24**
3.4.3. Preparing of seminars/laboratories/projects, homework, papers, portfolios and essays	**10**
3.4.4. Tutorial coaching	**10**
3.4.5. Examinations	**5**
3.4.6. Other activities	**0**
3.7. Total individual study hours	**69**
3.8. Total hours per semester	**125**
3.9. Number of ECTS credits	**5**

4. Prerequisites (if applicable)

4.1. Curriculum related	-
4.2. Competence related	-

5. Conditions (if applicable)

5.1. for the lecture	-
5.2. for the seminar	-
5.3. for the laboratory	-
5.4. for the project	-

6. Specific educational objectives (competences to be acquired)

6.1. Competenţe profesionale	**C2. Development and maintenance of IT applications.** **C3. Using professional tools in an interdisciplinary context.** **C4. Using the theoretical foundations of computer science and formal models.**
6.2. Competenţe transversale	**CT1. Apply the rules of effective and rigorous work, resposability for scientific domain, for optimal skills.** **CT2. Effective conduct of organized activities in an interdisciplinary group and development of empathetic capacities of interpersonal communication, relationship and collaboration with various groups.** **CT3. Use of effective methods and techniques of learning, information, research and development of the capacity to capitalize on knowledge, adapting to the requirements of a dynamic society and communication in an international language.**

7. Course outcomes (resulting from the specific educational objectives to be acquired)

7.1. General outcomes	**- Student getting to know and understand the important theorems in mathematical analysis.** **- Students to develop the skills to correctly apply the knowledge gained to solve different types of problems.** **- The student must form and develop the ability to think and analyze the problems of mathematical analysis.**
7.2. Specific outcomes	**-The student is able to prove that he has acquired sufficient knowledge to understand notions such as: sequence of real numbers and numerical series, the limit of a function at a point, derivable function, primitive function, integrable function. Also the student is able to compute and apply the derivative of a function, primitive and integral. The student understands and can operate with strings and series of functions, can obtain developments in Taylor series or in Fourier series for a function. The student is able to prove that he has acquired sufficient knowledge to understand notions such as: partial derivatives, double and triple integrals. The student is able to apply partial derivatives to determine extremely local and extremely conditioned points.** **- The student is able to correctly apply the basic methods and principles in solving mathematical analysis problems.** **- The student is able to recognize the main classes / types of mathematical analysis problems and to select the appropriate methods and techniques for solving them.** **- The student can make projects for the mathematical modeling of a concrete problem.**

8. Outline (if applicable)

8.1 Lecture Outline	Teaching methods	Remarks
1. Differential calculus 1.1. Number series and number sequences; 1.2. Limit and continuity; 1.3. Classes of functions; 1.4. Differential calculus of real functions. 2. Integral calculus 2.1. Primitivable functions; 2.2. Integrable functions; 2.3. Generalised integrals; 2.4. Sequences and series of functions. 3. Differential and integral calculus in R^n 3.1. Differential calculus in R^n ; 3.2. Integral calculus in R^n .	Lecture, discussion, proof, exemplification	

8.2 Lecture References
1. S.Nădăban, Calculus- Elemente de calcul diferential si integral, Editura Mirton, Timisoara, 2010.
2. S.Nădăban, MathEco - Analiză matematică, Editura Mirton, Timisoara, 2001.
3. M. Megan, Analiză matematică, Editura Mirton, Timisoara, 1999 .
4. Gh. Siretchi, Calcul diferential si integral, Editura Stiintifica si Enciclopedica, Bucuresti, 1985.
5. O. Stănăşilă, Analiză matematică, Editura Didactica si Pedagogica, Bucuresti, 1981.

8.3 Seminar Outline	Teaching methods	Remarks

1. Differential calculus 1.1. Number series and number sequences; 1.2. Limit and continuity; 1.3. Classes of functions; 1.4. Differential calculus of real functions. 2. Integral calculus 2.1. Primitivable functions; 2.2. Integrable functions; 2.3. Generalised integrals; 2.4. Sequences and series of functions. 3. Differential and integral calculus in R^n 3.1. Differential calculus in R^n ; 3.2. Integral calculus in R^n .	Exercise, discussion and debate, exemplification, project	

8.4 Seminar References

1. S.Nădăban, Calculus- Elemente de calcul diferential si integral, Editura Mirton, Timisoara, 2010.
2. S.Nădăban, MathEco - Analiză matematică, Editura Mirton, Timisoara, 2001.
3. M. Megan, Analiză matematică, Editura Mirton, Timisoara, 1999 .
4. Gh. Siretchi, Calcul diferential si integral, Editura Stiintifica si Enciclopedica, Bucuresti, 1985.
5. O. Stănășilă, Analiză matematică, Editura Didactica si Pedagogica, Bucuresti, 1981.

8.5 Laboratory Outline	Teaching methods	Remarks
8.6 Laboratory Outline		

8.7 Project Outline	Teaching methods	Remarks
8.8 Project Outline		

9. Correlation of course outline with the expectations of the epistemic community, professional associations and representative employers within the field of the program

10. Evaluation / Grading (if applicable)

Activity type	Evaluation criteria	Evaluation methods	Percentage of the final grade
10.1. Lecture	☐ **knowledge;** ☐ **logical coherency;** ☐ **acquiring the specialty language;** ☐ **criteria that envisage attitudinal aspects: seriousness, conscientiousness and interest for the subject.**	Final speaking exam at the end of the semester Written exam during the semester Active participation to the course	20% 20% 10%
10.2. Seminar	**-capacity of using the acquired knowledge;** **-capacity of applying in practice;** **-conscientiousness and interest for the study.**	Current written works: homework, projects. Final written assessment (exam session) Active participation at seminars.	200% 20% 10%
10.3. Laboratory			
10.4. Project			

10.5 Minimal performance standard

Knowledge of the fundamental elements of theory, solving a simple application.

Course coordinator	Seminar/laboratory/project coordinator	Head of the Department Lect.univ.dr. Lorena Camelia POPA	Dean Prof.univ.dr. Sorin-Florin NĂDĂBAN