SYLLABUS

1. Program information

1.1 Higher education institution	Technical University of Cluj-Napoca
1.2 Faculty	Faculty of Electronics, Telecommunications and Information Technology
1.3 Department	Bases of Electronics
1.4 Field of study	Electronic engineering, telecommunications and information technologies
1.5 Cycle of study	Bachelor of Science
1.6 Study program / Qualification	Electronic engineering, telecommunications and information technologies/ Engineer
1.7 Form of education	IF – full-time education

2. Course information

2.1 Course title	Mathematical Analysis			Course code	1.00
2.2 Course coordinator	*Assoc.Prof. Adela Elisabeta Capătă, PhD – adela.capata@math.utcluj.ro*				
2.3 Seminar/ laboratory/ project/ practical activity coordinator	*Assoc.Prof. Adela Elisabeta Capătă, PhD – adela.capata@math.utcluj.ro*				
2.4 Year of study	I	2.5 Semester	1	2.6 Type of assessment	E
2.7 Course status	Formative category				DF
	Optionality				DOB

3. Estimated total time

3.1 Hours per week	4	of which:	3.2 Lecture	2	3.3 Seminar	2	3.3 Laboratory	0	3.3 Project	0	3.3 Practical training	0
3.4 Hours per semester	56	of which:	3.5 Lecture	28	3.6 Seminar	28	3.6 Laboratory	0	3.6 Project	0	3.3 Practical training	0

3.7 Time distribution (hours per semester) for individual study and assessment:	
(a) Assessment	4
(b) Study using textbook, course materials, bibliography, and notes	20
(c) Additional documentation in the library, on specialized electronic platforms, and in the field	6
(d) Preparation for seminars/laboratories, assignments, reports, portfolios and essays	14
(e) Tutoring	
(f) Other activities	
3.8 Total hours of individual study and assessment (sum of (3.7(a)...3.7(f))	44
3.9 Total hours per semester (3.4+3.8)	100
3.10 Number of credits	4.0

4. Prerequisites (where applicable)

4.1 curriculum	
4.2 competencies	

5. Requirements (where applicable)

5.1. for the development of the lecture	Blackboard/whiteboard, chuck/marker, computer, video projector, graphics tablet.
5.2. for the development of the seminar/ laboratory/ project	Blackboard/whiteboard, chuck/marker, computer, video projector, graphics tablet.

6. Specific competencies acquired

Professional competencies	C1. Use of the fundamental elements related to devices, circuits, systems, instrumentation and electronic technology C1.2 Analysis of electronic circuits and systems of low/ medium complexity, for the purpose of designing and measuring them C1.5 Design and implementation of electronic circuits of low/ medium complexity using CADCAM technologies and standards in the field C2. Applying the basic methods for the acquisition and processing of signals C2.1 Temporal, spectral and statistical characterization of signals C2.4 Use of specific methods and tools for signal analysis C3. Application of the basic knowledge, concepts and methods regarding the architecture of computer systems, microprocessors, microcontrollers, languages and programming C3.3 Solving concrete practical problems including elements of data structures and algorithms, programming and use of microprocessors or microcontrollers C3.4 Elaboration of programs in a general and/ or specific programming language, starting from the specification of the requirements to the execution, debugging and interpretation of the results in correlation with the processor used. C3.5 Development of projects involving hardware components (processors) and software components (programming)
Transversal competencie	

7. Expected learning outcomes

Knowledge	- The student/graduate identifies and describes basic concepts, principles and methods in mathematics, physics, chemistry, technical drawing, economics and computer science.

Skills	- The student/graduate solves mathematics, physics and chemistry problems with engineering applicability and validates the solution obtained.
Responsibility and autonomy	- The student/graduate applies the values of ethics and professional deontology specific to the engineering profession. - The student/graduate applies logical reasoning, evaluation and self-assessment in decision-making. - The student/graduate communicates effectively about engineering activities with a wide range of audiences. - The student/graduate is engaged in lifelong learning in order to acquire and implement knowledge, as needed, using appropriate learning strategies. - The student/graduate promotes dialogue, cooperation, respect for others and interculturality. - The student/graduate works effectively as a team member or as a team leader. - The student/graduate fluently uses at least one international language in technical communication.

8. Course objectives (based on the grid of specific competencies acquired)

8.1 General objective of the course	A presentation of the fundamental notions and concepts of mathematical analysis, and their application in electronic engineering, telecommunications, and information technologies.
8.2 Specific objectives	The student/graduate develops a Taylor series function. The student/graduate acquires methods for Fourier series expansion of common signals. The student/graduate determines the extrema of functions of several variables.

9. Contents

9.1 Lecture	**No. of hours**	**Teaching methods**	**Remarks**
Recapitulation of some concepts and results from high school	2	Exposure, problematization and discovery learning, demonstration, collaboration.	
Series of real numbers. Convergence tests	4		
Series of functions. Power series. Elementary complex functions	4		
Fourier series. Fourier expanssions in sin and cos	4		
Functions of several variables. Limit. Continuity	2		
Partial derivatives. Differential. Differential operators. Taylor's formula. The derivative of composite functions	4		
Local extremum points/conditional local extremum points of functions of several	4		
Implicit functions	2		
Recapapitulation	2		

9.1 Lecture	No. of hours	Teaching methods	Remarks
Bibliography 1. D. Popa, Calculus, Mediamira, 2006 2. I. Gavrea, Analiză matematică, Editura Mediamira, Cluj-Napoca, 2004 3. A. Halanay, V. Olariu, V. Turbatu, Analiză matematică, EDP, 1983 4. D.M. Ivan, Calculus, Editura Mediamira, 2003 5. Course lectures 6. Aplicația Geogebra https://www.geogebra.org/			

9.2 Seminar /laboratory /project /practical training	No. of hours	Teaching methods	Remarks
Sequences of real numbers, limits, derivatives	2	Conversation, problem-solving and discovery learning, analogy, exercise, modeling, homework and individual study, collaboration.	
Series of real numbers	4		
Power series. Complex elementary functions	4		
Fourier series	4		
Functions of several variables: limit, continuity	2		
Partial derivatives, differential operators, the differential at a point, the derivative of composite functions	6		
Extremum points for functions of several variables	4		
Implicit functions	2		
Bibliography 1. D.M. Ivan, Problems in calculus, Mediamira, 2005 2. I. Gavrea, Analiză matematică (Culegere de probleme) vol I, Mediamira, Cluj-Napoca, 2009 3. N. Donciu, D. Flondor, Algebră și analiză matematică, Culegere de probleme,vol.I,EDP,1978 4. Aplicația Geogebra https://www.geogebra.org/			

10. Alignment of the course contents with the expectations of the epistemic community, professional associations, and representative employers in the field related to the program

The course content and the teaching-learning-assessment methods are aligned with the current requirements of the Electronics, Telecommunications, and Information Technology Engineering field, considering the expectations of the academic and professional community, representative employers, as well as the national quality assurance standards in higher education. The course helps prepare students in line with employer expectations and the quality requirements set for engineering study programs.

11. Assessment

Activity type	11.1 Assessment criteria	11.2 Assessment methods (and type of assessment: continuous/ summative)	11.3 Weight in final grade

11.4 Lecture	Solving 4 problems and a theory point.	Written/oral exam 2 hours (face-to-face or online on the Teams platform)	80%
11.5 Seminar/ Laboratory/ Project /Practical activity	Problem-solving skills. Seminar activity.	Evaluation of the activity from seminar classes (participation in activities, test).	20%
11.6 Minimum performance standard: The grade on the written exam must be at least 5.			

Completion date:	**Course coordinators**	**teaching rank, title First name LAST NAME**	**Signature**
23.06.2026	Lecture	Assoc.Prof. Adela Elisabeta CAPĂTĂ, PhD	
	Applications	Assoc.Prof. Adela Elisabeta CAPĂTĂ, PhD	

Approval of the Head of the Department coordinating the course, only if this differs from the department organizing the study program	Head of the Mathematics Department Prof. Vasile Dorian POPA, Ph.D.

Date of approval by the Council of the Department of Bases of Electronics 26.06.2026	Head of the Bases of Electronics Department Prof. Sorin HINTEA, Ph.D.
Date of approval by the Council of the Faculty of Electronics, Telecommunications and Information Technology 30.06.2026	Dean, Prof. Ovidiu-Aurel POP, Ph.D.