

## 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-E01.00/EA-E01.00

### 2. Data about the subject

2.1 Subject name	Mathematical Analysis						
2.2 Subject area	Theoretical area, Methodological area Analytic area						
2.3 Course responsible	Prof. Dorian POPA, Ph.D. – <a href="mailto:Popa.Dorian@math.utcluj.ro">Popa.Dorian@math.utcluj.ro</a>						
2.4 Teacher in charge with seminar / laboratory / project	Assoc. Prof. Adela CAPATA, Ph.D. – <a href="mailto:adela.capata@math.utcluj.ro">adela.capata@math.utcluj.ro</a>						
2.5 Year of study	1	2.6 Semester	1	2.7 Assessment	E	2.8 Subject category	DF/DI

### 3. Estimated total time

3.1 Number of hours per week	4	of which: course	2	seminar	2
3.4 To Total hours in the curriculum	56	of which: course	28	seminar / laboratory	28
Manual, lecture material and notes, bibliography					20
Supplementary study in the library, online specialized platforms and in the field					0
Preparation for seminars / laboratories, homework, reports, portfolios and essays					18
Tutoring					3
Exams and tests					3
Other activities: .....					
3.7 Total hours of individual study					44
3.8 Total hours per semester					100
3.9 Number of credit points					4

### 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 Calculus for one variable
5.2. for the seminars/laboratories / projects	Basic knowledge of Differential Calculus for one variable

### 6. Specific competences

<b>Professional competences</b>	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
<b>Transversal competences</b>	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 calculus.
7.2 Specific objectives	Use of the differential calculus in order to solve problems in engineering

### 8. Contents

Course	Teaching methods	Notes
Course 1 – The sets $\mathbb{R}$ and $\mathbb{C}$ . Sequences.	Explanation Demonstration Collaboration Interactive activities	
Course 2 – Series of real numbers.		
Course 3 – Series with positive terms.		
Course 4 – Sequences and series of functions. Power series.		
Course 5 Taylor formula. Taylor series.		
Course 6– Trigonometric series. Fourier series.		
Course 7 – Metric spaces. Topology of a metric space.		
Course 8 - Partial derivatives. The directional derivative.		
Course 9 –The differential of a function.		
Course 10 – Local extrema of a function.		
Course 11 – Implicit functions.		
Course 12- Conditional extrema.		
Course 13 – Improper integrals.		
Course 14 – Integrals dependent on parameters		
<b>Bibliography</b> Manual, lecture material and notes, bibliography: <ol style="list-style-type: none"> <li>1. Dorian Popa, Calculus – Mediamira Cluj-Napoca, 2006.</li> <li>2. O. Stănășilă, Analiză matematică, EDP București, 1981.</li> <li>3. N. Vornicescu, D.M.Ivan, D. Popa, Calcul diferențial, Editura Mediamira, 2004.</li> <li>4. M. Ivan, Calculus, Mediamira Cluj-Napoca, 2004.</li> <li>5. G.N.Berman, A problem book in Mathematical Analysis, Mir Publisher , Moscow,1977.</li> </ol>		

8.2 Seminar/laboratory / proiect	Teaching methods	Notes
Seminar 1 – Sequences of real numbers. Seminar 2 – Series of real numbers. Seminar 3 – Series with positive terms. Seminar 4 – Series of functions. Seminar 5 – Power series. Applications. Seminar 6 – Taylor series. Applications. Seminar 7 – Trigonometric series. Fourier Series. Seminar 8 – Metric spaces. Applications Seminar 9 – Partial derivatives Seminar 10 – Problems with partial derivatives. Seminar 11 – Local extrema. Seminar 12 – Implicit functions Seminar 13 – Conditional extrema. Seminar 14 – Generalized integrals.	Explanation Demonstration Collaboration Interactive activities	
<b>Bibliography</b> 1. Dorian Popa, Calculus – Mediamira Cluj-Napoca, 2006. 2. O. Stănășilă, Analiză matematică, EDP București, 1981. 3. N. Vornicescu, D.M.Ivan, D. Popa, Calcul diferențial, Editura Mediamira, 2004. 4. M. Ivan, Calculus, Mediamira Cluj-Napoca, 2004. 5. G.N.Berman, A problem book in Mathematical Analysis, Mir Publisher , Moscow,1977.		

### 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			

Data of filling in:	Responsible	Title First name SURNAME	Signature
27.09.2021	Course	Prof. Dorian POPA, Ph.D.	
	Applications	Assoc. Prof. Adela CAPATA, Ph.D.	

Date of approval in the Department of Communications 27.09.2021	Head of Communications Department Prof. Virgil DOBROTA, Ph.D.
Date of approval in the Council of Faculty of Electronics, Telecommunications and Information Technology 27.09.2021	Dean Prof. Gabriel OLTEAN, Ph.D.