SYLLABUS [1]

1. Information about the program

1.1 Higher education institution	UNIVERSITY POLITEHNICA OF TIMISOARA
1.2 Faculty[2]/ Department [3]	ELECTRONICS, TELECOMUNICATON AND INFORMATION TECHNOLOGIES / DEPARTMENT OF MATHEMATICS
1.3 Chair	—
1.4 Field of study (name/code[4])	ELECTRONIC ENGINEERING, TELECOMUNICATION AND INFORMATION TECHNOLOGIES
1.5 Study cycle	License
1.6 Study program (name/code/qualification)	TST-ENG/20/20/10/100/10/TST-ENG

2. Information about the discipline

2.1 Name of discipline/ formative category[5]	Calculus 1/DF						
2.2 Coordinator (holder) of course activities	Prof. dr. Moza Gheorghe						
2.3 Coordinator (holder) of applied activities[6]	Drd. Vesa Loredana						
2.4 Year of study[7]	1	**2.5** Semester	1	**2.6** Type of evaluation	E	**2.7** Type of discipline[8]	DOb

3. Total estimated time – hours / semester: direct teaching activities (fully assisted or partly assisted) and individual training activities (unassisted) [9]

3.1 Number of fully assisted hours / week	4 of which:	**3.2** course	2	**3.3** seminar / laboratory / project	2/0/0
3.1* Total number of fully assisted hours / semester	56 of which:	**3.2*** course	28	**3.3*** seminar / laboratory / project	28/0/0
3.4 Number of hours partially assisted / week	of which:	**3.5** training		**3.6** hours for diploma project elaboration	
3.4* Total number of hours partially assisted / semester	of which:	**3.5*** training		**3.6*** hours for diploma project elaboration	
3.7 Number of hours of unassisted activities / week	3.14 of which:	additional documentary hours in the library, on the specialized electronic platforms and on the field			1
		hours of individual study after manual, course support, bibliography and notes			1.14
		training seminars / laboratories, homework and papers, portfolios and essays			1
3.7* Number of hours of unassisted activities / semester	44 of which:	additional documentary hours in the library, on the specialized electronic platforms and on the field			14
		hours of individual study after manual, course support, bibliography and notes			16
		training seminars / laboratories, homework and papers, portfolios and essays			14
3.8 Total hours / week [10]	7.14				
3.8* Total hours /semester	100				
3.9 Number of credits	4				

4. Prerequisites (where applicable)

4.1 Curriculum	• High school math and algebra textbooks
4.2 Competencies	• high school knowledge in Mathematics, level M2 or higher

5. **Conditions** (where applicable)

5.1 of the course	• Internet, laptop, large classroom, projector, blackboard
5.2 to conduct practical activities	• Internet, classroom for 20-30 students, laptop, projector, blackboard

6. **Specific competencies** acquired through this discipline

Specific competencies	• Ability to mathematically solve the convergence of sequences and series; • Ability to test the continuity of a function of several variables; • Ability to manipulate differential calculus, approximate functions of several variables and determine the extremes of a function; • Ability to work with double and triple integrals
Professional competencies ascribed to the specific competencies	• 1. Use of fundamentals in terms of devices, circuits, systems, instrumentation and electronics technology. 2. Application of basic methods for signal acquisition and processing. 3. Application of knowledge, concepts and basic methods related to computer system architecture, microprocessors, microcontrollers, programming languages and techniques. 4. Design, implementation and service operation of data, voice, video multimedia, based on understanding and applying fundamental concepts in communications and information transmission. 5. Solving technological problems in fields of applied electronics.
Transversal competencies ascribed to the specific competencies	• 1. Methodical analysis of field-related problems aimed at identifying acknowledged solutions, thus ensuring the accomplishment of professional tasks. 2. Definition of activity stages and their distribution to subordinates in terms of responsibilities, providing effective exchange of information and interpersonal communication. 3. Adaptation to new technologies, professional and personal development through continuous training, using printed documentation sources, specialized software and electronic resources in Romanian and at least one foreign language.

7. **Objectives of the discipline** (based on the grid of specific competencies acquired - pct.6)

7.1 The general objective of the discipline	• The discipline aims at the formation of a logical thinking and some basic skills of using mathematics within the discipline. Formation of skills to understand the fundamental elements of a reasoning, to make a classification between different levels of abstraction. Development of the ability to use efficiently the specialized bibliography. Acquiring the skills of calculation, the ability to analyze, understand, synthesize and interpret the results obtained by methods of mathematical analysis and other mathematical chapters that are based on it.
7.2 Specific objectives	• Ability to use basic results from numerical series, continuity of functions, differential and integral calculus, as well as their applications.

8. **Content** [11]

8.1 Course	Number of hours	Teaching methods [12]
Numeric sequences	1	On the blackboard, the university's "Virtual Campus" web application, online through the Zoom, Google meet, screen sharing or graphics
Numerical series	3	
Sequences and series of functions	3	
Limits and continuity of functions	3	
First order differentiability	2	

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[11] It details all the didactic activities foreseen in the curriculum (lectures and seminar themes, the list of laboratory works, the content of the stages of project preparation, the theme of each practice stage). The titles of the laboratory work carried out on the stands shall be accompanied by the notation "(*)".
[12] Presentation of the teaching methods will include the use of new technologies (e-mail, personalized web page, electronic resources etc.).

Differentiability of compounded functions	2	tablet applications, resources in electronic format (courses and seminars are uploaded to "Virtual Campus" as full open-access for students.
Higher order differentiability	2	
Implicit functions	2	
Taylor series	2	
Extremes of functions of several variables	2	
Double integrals. Changes of variables in double integrals	2	
Triple integrals. Changes of variables in triple integrals	2	
Applications of double and triple integrals	2	

Bibliography [13]
1. A. Kovacs, D. Mihailov, G. Tigan, Analiza Matematică, Calcul diferential şi integral, Culegere de probleme, Editura UPT, 2006, 262 pagini, ISBN 978-973-625-359-1.
2. G. Tigan, Differential and Integral Calculus, UPT Press, 2018, 240 pages, ISBN 978-606-554-651-6 .
3. G. Tigan, Learning Calculus by Solved Problems, UPT Press, **2019,** 167 pages, ISBN 978-606-35-0163-0
4. D. Păunescu, C. Hedrea, Calcul diferențial multidimensional, Editura UPT, 2016, 413 pagini, ISBN 978-606-350-023-7.
5. R. T. Smith, R. B. Minton, Calculus, New York McGraw-Hill, 2012, ISBN 978-007-131-657-6.
6. https://cv.upt.ro/course/view.php?id=5305&notifyeditingon=1

8.2 Applied activities [14]	Number of hours	Teaching methods
Numeric sequences and series	4	Similar to those for the course
Sequences and series of functions	3	
Limits and continuity of functions	3	
First order differentiability	4	
Higher order differentiability	2	
Implicit functions and Taylor series	4	
Extremes of functions of several variables	2	
Double and triple integrals	4	
Applications of double and triple integrals	2	

Bibliography [15]
1. A. Kovacs, D. Mihailov, G. Tigan, Analiza Matematică, Calcul diferential şi integral, Culegere de probleme, Editura UPT, 2006, 262 pagini, ISBN 978-973-625-359-1.
2. G. Tigan, Differential and Integral Calculus, UPT Press, 2018, 240 pages, ISBN 978-606-554-651-6 .
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9. **Corroboration of the content of the discipline with the expectations of the main representatives of the epistemic community, professional associations and employers in the field afferent to the program**

- Calculus is a classic discipline with a fundamental content that combines classic presentation techniques (sheet and pencil) as well as modern ones, through various software (e.g. Matlab, Mathematica) that can be used, for example, for graphic representation, numerical series calculation, double and triple integrals. The discipline is taught in most universities around the world to students in Computer Science.

10. **Evaluation**

Type of activity	**10.1** Evaluation criteria [16]	**10.2** Evaluation methods	**10.3** Share of the final grade
10.4 Course	Verification of the knowledge acquired	Face to face and/or online examination	2/3
10.5 Applied activities	**S:** Verification of the knowledge acquired	Tests during the semester (at least two), answers to the board, activity at class, homework solving, essays.	1/3
	L:		

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[13] At least one title must belong to the discipline team and at least one title should refer to a reference work for discipline, national and international circulation, existing in the UPT library.
[14] Types of application activities are those specified in footnote 5. If the discipline contains several types of applicative activities then they are sequentially in the lines of the table below. The type of activity will be in a distinct line as: "Seminar:", "Laboratory:", "Project:" and / or "Practice/training".
[15] At least one title must belong to the discipline team.
[16] Syllabus must contain the procedure for assessing the discipline, specifying the criteria, methods and forms of assessment, as well as specifying the weightings assigned to them in the final grade. The evaluation criteria shall be formulated separately for each activity foreseen in the curriculum (course, seminar, laboratory, project). They will also refer to the forms of verification (homework, papers, etc.)

	P[17]:		
	Pr:		

10.6 Minimum performance standard (minimum amount of knowledge necessary to pass the discipline and the way in which this knowledge is verified [18])

- Direct application of convergence criteria for simple numerical series
- Calculate the limits of simple functions of at least two variables
- Calculation of first order partial derivatives for simple functions
- Using Taylor's theorem for simple functions of one and two variables
- Finding extremum points for simple functions of two or three variables
- Applying implicit function theory for simple functions
- Calculate double integrals for simple functions defined on simple domains (such as rectangles, discs and triangles)

Date of completion	**Course coordinator (signature)**	**Coordinator of applied activities (signature)**
10.06.2023		
	…………………….………	…………………….………
Head of Department (signature)	**Date of approval in the Faculty Council** [19]	**Dean (signature)**
	14.09.2023	
…………………….………		…………………….………

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[17] In the case where the project is not a distinct discipline, this section also specifies how the outcome of the project evaluation makes the admission of the student conditional on the final assessment within the discipline.

[18] It will not explain how the promotion mark is awarded.

[19] The endorsement is preceded by the discussion of the board's view of the study program on the discipline record.