

SYLLABUS

1. Information about the program

1.1 Higher education institution	Politehnica University Timisoara
1.2 Faculty ¹ / Department ²	Chemical Engineering, Biotechnologies and Environmental Protection / Mathematics
1.3 Field of study (name/code ³)	Chemical Engineering / 10.30.50
1.4 Study cycle	License
1.5 Study program (name/code/qualification)	Chemical Engineering / 10.30.50.60 / engineer

2. Information about the discipline

2.1 Name of discipline/ formative category ⁴	Calculus / DF						
2.2 Coordinator (holder) of course activities	Lector dr. Ioana-Claudia LAZĂR						
2.3 Coordinator (holder) of applied activities ⁵	Lector dr. Ioana-Claudia LAZĂR						
2.4 Year of study ⁶	I	2.5 Semester	2	2.6 Type of evaluation	E	2.7 Regime of discipline ⁷	DI

3. Total estimated time – hours / semester: direct teaching activities (fully assisted or partly assisted) and individual training activities (unassisted)⁸

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 ⁹	7.14				
3.8* Total hours /semester	100				
3.9 Number of credits	4				

4. Prerequisites (where applicable)

4.1 Curriculum	<ul style="list-style-type: none"> Mathematics taught in high school
4.2 Competencies	<ul style="list-style-type: none"> Mathematical thinking

¹ The name of the faculty which manages the educational curriculum to which the discipline belongs

² The name of the department entrusted with the discipline, and to which the course coordinator/holder belongs.

³ The code provided in HG - on the approval of the Nomenclature of fields and specializations / study programs, annually updated.

⁴ Discipline falls under the educational curriculum in one of the following formative disciplines: Basic Discipline (DF), Domain Discipline (DD), Specialist Discipline (DS) or Complementary Discipline (DC).

⁵ Application activities refer to: seminar (S) / laboratory (L) / project (P) / practice/training (Pr).

⁶ Year of studies in which the discipline is provided in the curriculum.

⁷ Discipline may have one of the following regimes: imposed discipline (DI) or compulsory discipline (DOb)-for the other fundamental fields of studies offered by UPT, optional discipline (DO) or optional discipline (Df).

⁸ The number of hours in the headings 3.1 *, 3.2 *, ..., 3.8 * is obtained by multiplying by 14 (weeks) the number of hours in headings 3.1, 3.2, ..., 3.8. The information in sections 3.1, 3.4 and 3.7 is the verification keys used by ARACIS as: (3.1) + (3.4) ≥ 28 hours / wk. and (3.8) ≤ 40 hours / wk.

⁹ The total number of hours / week is obtained by summing up the number of hours in points 3.1, 3.4 and 3.7.

5. Conditions (where applicable)

5.1 of the course	<ul style="list-style-type: none"> • Big room; blackboard
5.2 to conduct practical activities	<ul style="list-style-type: none"> • Big room; blackboard

6. Specific competencies acquired through this discipline

Specific competencies	<ul style="list-style-type: none"> • Recognizing the main classes / types of mathematical problems and selecting the right methods and techniques for solving them • Identifying the basic notions used to describe processes and phenomena
Professional competencies ascribed to the specific competencies	<ul style="list-style-type: none"> • - Analyse production processes for improvement; • - Manage chemical testing procedures; • - Test materials; • - Write technical reports • -Performs chemical experiments • -Approve engineering design • -Assess environmental impact

Transversal competencies ascribed to the specific competencies

- - Conduct quality control;
- - Apply scientific, technological and engineering knowledge;
- - Uses equipment, instruments or technological equipment accurately.

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

7.1 The general objective of the discipline	<ul style="list-style-type: none"> • Building a mathematical background, basis for the engineering studies to follow. Understanding the main notions in analysis.
7.2 Specific objectives	<ul style="list-style-type: none"> • Understanding concrete situations when analysis is being applied. Developing abilities necessary to solve problems which make use of analysis. Accumulating competencies of selection and of merging mathematical results from analysis in order to use them for solving specific engineering problems.

8. Content ¹⁰

8.1 Course	Number of hours	Teaching methods ¹¹
Number sequences	2	Exposition, conversation, proof, problematizing, explanation, example, comparative analysis, case analysis, e-mail, electronic resources
Number series	4	
Limit and continuity	2	
Derivable functions of a single variable	2	
Sequences and series of functions	2	
Power series. Taylor series	2	

¹⁰ 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 "(*)".

¹¹ Presentation of the teaching methods will include the use of new technologies (e-mail, personalized web page, electronic resources etc.).

Trigonometric series. Fourier series	2	
Derivability	2	
Differentiation. Taylor's formula	2	
Local extremes	2	
Implicit functions. Systems of implicit functions	2	
Conditional extremes	2	
Change of variables	2	
Bibliography ^{12 13} 1. O. Lipovan, Analiză Matematică – Calcul Diferențial, Editura Politehnica, 2011; 2. D. Dăianu, Mathematical Analysis, Ed. Politehnica, 2014; 3. W. L. Wendland, O. Steinbach, Analysis – Integral and Differentialrechnung, gewöhnliche Differentialgleichungen, komplexe Funktionentheorie, Teubner Verlag, 2005.		
8.2 Applied activities ¹⁴	Number of hours	Teaching methods
Number sequences	2	Exercises, discussion, problematizing, explanation, case analysis, e-mail, electronic resources
Number series	4	
Limit and continuity. Derivable functions of a single variable	4	
Sequences and series of functions	6	
Derivability	2	
Differentiation. Taylor's formula	2	
Local extremes	2	
Implicit functions. Systems of implicit functions	2	
Conditional extremes. Change of variables	4	
Bibliography ¹⁵ 1. O. Lipovan, Analiză Matematică – Calcul Diferențial, Editura Politehnica, 2011; 2. D. Dăianu, Mathematical Analysis, Ed. Politehnica, 2014; 3. P. Găvrută, D. Dăianu, C. Lăzureanu, L. Cădariu, L. Ciurdariu, Probleme de Analiză Matematică. Calcul Diferențial, Ed. Mirton, 2004; 4. I.- C. Lazăr, Analiză Matematică, Ed. Politehnica, 2015; 5. D. Duca, E. Duca, Exerciții si probleme de analiză matematică (volumul I), Casa Cărții de Știință, Cluj-Napoca, 2007.		

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

- The content of the discipline ensures the knowledge of analysis necessary to solve specific engineerical problems

10. Evaluation

Type of activity	10.1 Evaluation criteria ¹⁶	10.2 Evaluation methods	10.3 Share of the final grade
10.4 Course	Knowing the main notions and results. Knowing the proofs of the main theoretical results. Applying the theoretical results in solving concrete problems	Exam	2/3
10.5 Applied activities	S: Solving some concrete problems using the results presented during the lecture	A test given during the problem session (at the end of the semester). Each homework and activity is graded 0.25 points. These	1/3

¹² 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.

¹³ Cel puțin un un titlu trebuie să aparțină colectivului disciplinei iar cel puțin un titlu trebuie să se refere la o lucrare de referință pentru disciplină, de circulație națională și internațională, existentă în biblioteca UPT.

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.)

		points are being added to the grade obtained at the test.	
	L:		
	P¹⁷:		
	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)

- The definitions of the basic notions, the main theoretical results, the ability of applying these results in solving simple problems
- Identifying and selecting the methods for solving concrete simple problems
- Concretely, the minimal performance standards are referring to:
 1. Knowing how to compute the limit of a number sequence;
 2. Knowing how to study the convergence of number series and of function series;
 3. Knowing how to compute the partial derivatives of the basic functions;
 4. The knowledge of the basic differentiation rules;
 5. The knowledge of certain optimization techniques which use polynomial approximation.
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Date of completion

**Course coordinator
(signature)**

**Coordinator of applied activities
(signature)**

Lect. Univ. Dr. Ioana-Claudia Lazăr

Lect. Univ. Dr. Ioana-Claudia Lazăr

**Head of Department
(signature)**

Date of approval in the Faculty Council ¹⁹

**Dean
(signature)**

Conf.univ. dr. Tudor BÎNZAR

Ș.L.dr.ing. Miircea Laurențiu DAN

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.