SYLLABUS [1]

THIS COURSE UNIT IS TAUGHT IN ROMANIAN LANGUAGE

1. Information about the program

1.1 Higher education institution	Politehnica University of Timișoara
1.2 Faculty[2]/ Department [3]	Faculty of Industrial Chemistry and Environmental Engineering | Department of Mathematics
1.3 Chair	—
1.4 Field of study (name/code[4])	Chemical and Environmental Engineering / FA
1.5 Study cycle	Bachelor
1.6 Study program (name/code/qualification)	Chemical and Environmental Engineering / FA / engineer

2. Information about the discipline

2.1 Name of discipline/ formative category[5]			Mathematical Analysis / DF				
2.2 Coordinator (holder) of course activities			Lect. Dr. Lazăr Ioana-Claudia				
2.3 Coordinator (holder) of applied activities[6]			Lect. Dr. Lazăr Ioana-Claudia				
2.4 Year of study[7]	1	**2.5** Semester	2	**2.6** Type of evaluation	E	**2.7** Type of discipline[8]	DI

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
3.1* Total number of fully assisted hours / semester	56 of which:	**3.2*** course	28	**3.3*** seminar / laboratory / project	28
3.4 Number of hours partially assisted / week	2 of which:	**3.5** training	2	**3.6** hours for diploma project elaboration	-
3.4* Total number of hours partially assisted / semester	28 of which:	**3.5*** training	28	**3.6*** hours for diploma project elaboration	-
3.7 Number of hours of unassisted activities / week	3 of which:	additional documentary hours in the library, on the specialized electronic platforms and on the field			-
		hours of individual study after manual, course support, bibliography and notes			2
		training seminars / laboratories, homework and papers, portfolios and essays			1
3.7* Number of hours of unassisted activities / semester	42 of which:	additional documentary hours in the library, on the specialized electronic platforms and on the field			-
		hours of individual study after manual, course support, bibliography and notes			28
		training seminars / laboratories, homework and papers, portfolios and essays			14
3.8 Total hours / week [10]	9				
3.8* Total hours /semester	126				
3.9 Number of credits	4				

4. **Prerequisites** (where applicable)

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[1] The form corresponds to the Discipline File promoted by OMECTS 5703 / 18.12.2011 and to the requirements of the ARACIS Specific Standards valid from 01.10.2017.

[2] The name of the faculty which manages the educational curriculum to which the discipline belongs

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

[4] The code provided in HG no.140 / 16.03.2017 or similar HGs updated annually shall be entered.

[5] 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).

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

[7] Year of studies in which the discipline is provided in the curriculum.

[8] Discipline may have one of the following regimes: imposed discipline (DI), optional discipline (DO) or optional discipline (Df).

[9] 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.

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

4.1 Curriculum	• Mathematics taught in high-school
4.2 Competencies	• Mathematical thinking

5. Conditions (where applicable)

5.1 of the course	• Big classroom; blackboard
5.2 to conduct practical activities	• Big classroom; blackboard

6. Specific competencies acquired through this discipline

Specific competencies	• Recognizing the main classes /types of mathematical problems and selecting the appropriate methods and techniques for their solving • Identifying the basic notions used to describe some processes and phenomena
Professional competencies ascribed to the specific competencies	• Description, analysis and use of the basic concepts on structure and reactivity of organic compounds • Operation of the plant equipment and analytical methods specific for organic chemical technologies • Description, analysis and use of the basic concepts and theories from engineering science field • Description, analysis and use of the basic concepts and theories from chemistry and chemical engineering field • Processes and systems operation applying the knowledge from chemical engineering field • Operation of the inorganic chemical technologies and of the remediation technologies • Achieving of some technological design elements, assisted management and optimization of the processes from the profile industry • Interdisciplinary approach (based on knowledge of mathematics, physics and chemistry) of chemical engineering problems • Processes and systems operation applying the knowledge from food chemistry and biochemical technologies • Modern techniques for food manufacturing and control of food quality • Analysis of the technical solutions necessary to prevent, reduce and eliminate the adverse phenomena on the environment • The use of legal norms and best available technologies (BAT) to prevent and mitigate the impact of natural and anthropogenic phenomena onto environment • Cooperation with the institutions responsible for environmental management and involvement in policy and environmental strategies definition • Coordination of activities and technological processes based on technical specifications • Explanation of the anthropogenic or natural origin mechanisms, processes and effects that determine and influence the environmental pollution • Management and solving of specific environmental issues for sustainable development. • Applying of general principles of computing technology • Development and operation of the pollutants monitoring systems • Environment quality control, impact and risk assessment and development of the technological options with minimum impact on the environment in accordance with the requirements of BAT / BREF and legislation • Conducting of the specific activities for management and marketing in environment engineering and protection •

Transversal competencies ascribed to the specific competencies	• Identification and compliance of the professional ethics and deontology rules, taking responsibility for the taken decisions and the related risks • Identification of the roles and responsibilities in a multidisciplinary team and application of relational techniques and effective work within the team • Efficient use of the informational sources and communication resources and professional assisted training (portals, Internet, specialized software, data bases, online courses, etc..) both in Romanian and in an international language • Performing the professional tasks in accordance with the specified requirements and imposed time, with the rules of professional ethics and moral conduct, following a predetermined work plan and qualified guidance • Solve the professional tasks in accordance with the overall objectives set by integrating in the working group and the distribution of tasks to subordinate levels • Information and permanent documentation in its field of interest in Romanian and in a foreign language with the use of modern information and communication

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

7.1 The general objective of the discipline	• Constructing the mathematical foundation, the basis for the engineering studies that follow. Understanding the conceptual notions of differential calculus.
7.2 Specific objectives	• The knowledge of concrete situations when differential calculus is applicable. Developing abilities of solving problems in mathematical analysis. The accumulation of abilities necessary in order to select and combine mathematical results in differential calculus. Such results will be useful in solving specific problems in engineering.

8. Content [11]

8.1 Course	Number of hours	Teaching methods [12]
Single variable functions	14	Lecture, discussion, proof, questioning, explanation, example, comparative analysis, case study, e-mail, electronic resources
1. Number sequences	4	
2. Number series	2	
3. Polynomial approximation. Applications	2	
4. Function series	2	
5. Power series. Taylor series	2	
6. Fourier series	2	
Multivariable functions	14	
1. Elements of topology. Sequences	2	
2. Limits and continuity	2	
3. Derivability. Differentiability	4	
4. Implicit functions. Change of variables	2	
5. Taylor's formula. Applications	4	
Bibliography [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	4	Discussion, questioning, explanation, case study, e-mail, electronic resources
Number series	2	
Polynomial approximation. Applications	2	
Function series	6	
Elements of topology. Sequences. Limits and continuity	4	
Derivability. Differentiability	4	
Implicit functions. Change of variables	2	
Taylor's formula. Applications	4	

[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.).

[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".

Bibliography [15] 1. O. Lipovan, Analiză Matematică – Calcul Diferențial, Editura Politehnica, 2011;
2. D. Dăianu, Mathematical Analysis, Ed. Politehnica, 2014;
3. P. Găvruță, 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 covers all notions in mathematical analysis (differential calculus) necessary in solving specific problems in engineering.

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.	Written exam during the examination period.	2/3
10.5 Applied activities	**S:** Solving concrete problems by using the theoretical results presented at the course.	Two tests during the exercise session (one at the middle of the semester, the other at the end of the semester). Homeworks and attendances are rewarded by points (0.25 points each). These points are added to the average grade obtained on the two tests.	1/3
	L:		
	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])

- The definitions of the basic notions, the statements of the main theoretical results, and the ability to apply these results in solving simple problems.
- Identifying and selecting methods to address simple concrete problems.
- Concretely, the minimal performance standards refer to:
  1. knowing to solve limits of sequences;
  2. knowing to study the convergence of series;
  3. knowing to compute the partial derivatives of basic functions;
  4. knowing basic differentiation rules;
  5. knowing how to apply certain optimization techniques related to the use of polynomial approximation.
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Date of completion	**Course coordinator (signature)**	**Coordinator of applied activities (signature)**
1.12.2020	……	……

[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.)
[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.

Head of Department (signature)	Date of approval in the Faculty Council [19]	Dean (signature)
……		……

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