SYLLABUS [1]

THIS COURSE UNIT IS TAUGHT IN ROMANIAN LANGUAGE

1. Information about the program

1.1 Higher education institution	University POLITEHNICA Timisoara
1.2 Faculty[2]/ Department [3]	Faculty of Industrial Chemistry and Environmental Engineering / C.A.I.C.A.M.
1.3 Chair	—
1.4 Field of study (name/code[4])	Environmental Engineering / DL-50
1.5 Study cycle	bachelor
1.6 Study program (name/code/qualification)	IPMI/S-10/ ENGINEER – code 214613

2. Information about the discipline

2.1 Name of discipline/ formative category[5]			**PHYSICAL CHEMISTRY I**				
2.2 Coordinator (holder) of course activities			S. L. Dr. Ing. Erika Reisz				
2.3 Coordinator (holder) of applied activities[6]			S. L. Dr. Ing. Erika Reisz				
2.4 Year of study[7]	II	**2.5** Semester	3	**2.6** Type of evaluation	E	**2.7** Type of discipline[8]	imposed discipline (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	3 of which:	**3.2** course	2.5	**3.3** seminar / laboratory / project	2
3.1* Total number of fully assisted hours / semester	49 of which:	**3.2*** course	21	**3.3*** seminar / laboratory / project	28
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	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
		training seminars / laboratories, homework and papers, portfolios and essays			1
3.7* Number of hours of unassisted activities / semester	of which:	additional documentary hours in the library, on the specialized electronic platforms and on the field			10
		hours of individual study after manual, course support, bibliography and notes			10
		training seminars / laboratories, homework and papers, portfolios and essays			10
3.8 Total hours / week [10]					
3.8* Total hours /semester	91				
3.9 Number of credits	4				

4. **Prerequisites** (where applicable)

---

[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	•
4.2 Competencies	•

5. Conditions (where applicable)

5.1 of the course	• Classroom equipped with video projection facilities
5.2 to conduct practical activities	• Laboratory with facilities for experiments adequate to the program and the competencies to be acquired

6. Specific competencies acquired through this discipline

Specific competencies	•
Professional competencies ascribed to the specific competencies	• Description, analysis and use of fundamental concepts and theories in the field of chemistry and chemical engineering • Realization of elements of technological design, management and assisted optimization of processes in chemical industry
Transversal competencies ascribed to the specific competencies	• Completion of professional tasks according to the specified requirements and within the imposed deadlines, in compliance with the norms of professional ethics and moral conduct, following a prior work plan and with qualified guidance • Solving professional tasks in accordance with the general objectives established by integrating into a working group and distributing tasks for subordinate levels • Permanent information and documentation in its field of activity in Romanian and in a language of international circulation, using modern methods of information, documentation 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	• Understanding the fundamental principles of chemical thermodynamics and their application in the case of processes of industrial or practical interest •
7.2 Specific objectives	• Defining basic notions, concepts, theories and models in the field of chemistry and engineering and their appropriate use in professional communication • Using basic knowledge in the field of chemistry and chemical engineering to explain and interpret engineering phenomena • Identification and application of concepts, methods and theories for solving problems typical of chemical engineering in conditions of qualified assistance • Critical analysis and use of working principles, methods and techniques for quantitative and qualitative evaluation of chemical engineering processes • Application of fundamental concepts and theories in the field of chemistry and chemical engineering for the elaboration of professional projects • Monitoring the processes in the chemical industry, identifying abnormal situations and proposing solutions in conditions of qualified assistance • Critical evaluation of processes, equipment, procedures and products in the chemical industry using specific evaluation tools and methods • Elaboration of professional projects for technologies in the field of chemical engineering • Description of programming knowledge acquired in designing simple mathematical models for specific ISAPM processes • Use of basic knowledge for mathematical modeling of processes of industrial relevance, including the use of software products specific to inorganic and depollution chemical technologies. Using mathematical models to design specific equipment

	• Comparative evaluation of the performances of some simple technological processes based on specific parameters •

8. Content [11]

8.1 Course	Number of hours	Teaching methods [12]
1. Fundamental notions of chemical thermodynamics	7	Lecture-debate, debate, demonstration, panel discussion, problematization, case study, brainstorming, methods and techniques of cooperative learning, etc.
2. First law of thermodynamics.	10	
3. Thermal effects of processes	5	
4. Second law of thermodynamics	4	
5. Third law of thermodynamics	2	

Bibliography [13]

1. C. M. Davidescu, „Introducere in termodinamica chimica”, Ed. Politehnica, Timisoara, 2002;
2. P. W. Atkins, „Physical Chemistry”, 8th Ed., Oxford University Press, Oxford, 2006;
3. J. M. Smith, H.C. Van Ness, M.M. Abbott, „Introduction to Chemical Engineering Thermodinamics, 7th Ed., McGraw-Hill, New York, 2005,
4. J. R. Elliott, C. T. Lira, „Introductory Chemical Engineering. Thermodynamics”, Prentice Hall, 2001;
5. K. T. Valsaraj, „Elements of Environmental Engineering. Thermodynamics and Kinetics”, Lewis Publishers, CRC Press, Boca Raton, 2000;
6. K. I. Masel, „Kinetics and Catalysis”, John Wiley, New York, 2001
7. R. J. Hunter, „ Fundaments of Colloid Science”, Oxford University Press, Oxford, 2001;
8. C. M. Davidescu, C. Pacurariu, „Chimie fizica”, Litografia IPTVT, Timisoara, 1990;
9. M. Poraicu, E. Merca, C. M. Davidescu, C. Pacurariu, Gh. Parlea, „Lucrari practice de chimie fizica”, Litografia IPTVT, Timisoara, 1985;

8.2 Applied activities [14]	Number of hours	Teaching methods
1. Applications of the first law of thermodynamics to energy exchange processes without phase transformation	6	Training methods used during theoretical application classes: methods and techniques of learning through cooperation, debate, case study, panel discussion, problematization, brainstorming, project, SWOT analysis, etc.
2. Laws of thermochemistry	5	
3. Second law of thermodynamics	1	
4. Third law of thermodynamics	2	

[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. C. M. Davidescu, „Introducere in termodinamica chimica", Ed. Politehnica, Timisoara, 2002;
2. P. W. Atkins, „Physical Chemistry", 8th Ed., Oxford University Press, Oxford, 2006;
3. J. M. Smith, H.C. Van Ness, M.M. Abbott, „Introduction to Chemical Engineering Thermodinamics, 7th Ed., McGraw-Hill, New York, 2005,
4. J. R. Elliott, C. T. Lira, „Introductory Chemical Engineering. Thermodynamics", Prentice Hall, 2001;
5. K. T. Valsaraj, „Elements of Environmental Engineering. Thermodynamics and Kinetics", Lewis Publishers, CRC Press, Boca Raton, 2000;
6. K. I. Masel, „Kinetics and Catalysis", John Wiley, New York, 2001
7. R. J. Hunter, „ Fundaments of Colloid Science", Oxford University Press, Oxford, 2001;
8. C. M. Davidescu, C. Pacurariu, „Chimie fizica", Litografia IPTVT, Timisoara, 1990;
9. M. Poraicu, E. Merca, C. M. Davidescu, C. Pacurariu, Gh. Parlea, „Lucrari practice de chimie fizica", Litografia IPTVT, Timisoara, 1985;

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 Physical Chemistry discipline is in line with similar disciplines from the country and abroad as well as with the expectations of the professional associations and representative employers in the field.

10. Evaluation

Type of activity	**10.1** Evaluation criteria [16]	**10.2** Evaluation methods	**10.3** Share of the final grade
10.4 Course	Master of fundamental notions in the field of chemical thermodynamics. Ability to assimilate and apply the notions taught in the course	3-hour written exam, based on questions with different degrees of difficulty, assessing students' ability to assimilate, think and synthesize and a numerical application	0.67
10.5 Applied activities	**S:** Practical applications in the form of numerical applications or problems in order to deepen the theoretical notions taught	Testing students based on numerical applications or problems in order to complete the activity on the way	0.33
	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])			
• Demonstrating the assimilation of the theoretical knowledge taught in the course and the ability to operate with the fundamental concepts and methods of Physical Chemistry. Completion of the evaluation activity through the written exam with a minimum grade of 5 • Demonstration of competence in selecting the most appropriate experimental, analytical or computational methods for solving theoretical and practical problems of Physical Chemistry. Completion of the seminar activity with a minimum grade of 5			

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

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

.....

.....