SYLLABUS [1]

THIS COURSE UNIT IS TAUGHT IN ROMANIAN LANGUAGE

1. Information about the program

1.1 Higher education institution	"POLITEHNICA" UNIVERSITY FROM TIMISOARA
1.2 Faculty[2]/ Department [3]	Faculty of Industrial Chemistry and Environmental Engineering, / CAICAM
1.3 Chair	—
1.4 Field of study (name/code[4])	Chemical Engineering/ DL-50
1.5 Study cycle	Bachelor's Degree
1.6 Study program (name/code/qualification)	Inorganic substances engineering and environmental protection-ISAPM/L10302005010 /Chemical Engineer counselor - 214 504, Chemical Engineer - 214 513, Teacher for gymnasium school - 233 002, Chemical Engineering Design - 214 503; Specialty reviewer chemical engineer - 214 507

2. Information about the discipline

2.1 Name of discipline/ formative category[5]	Materials science						
2.2 Coordinator (holder) of course activities	Radu LAZĂU, Sorina BORAN						
2.3 Coordinator (holder) of applied activities[6]	Radu LAZĂU, Sorina BORAN						
2.4 Year of study[7]	1	**2.5** Semester	1	**2.6** Type of evaluation	Exam	**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	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	2 of which:	additional documentary hours in the library, on the specialized electronic platforms and on the field			0.5
		hours of individual study after manual, course support, bibliography and notes			1
		training seminars / laboratories, homework and papers, portfolios and essays			0.5
3.7* Number of hours of unassisted activities / semester	28 of which:	additional documentary hours in the library, on the specialized electronic platforms and on the field			7
		hours of individual study after manual, course support, bibliography and notes			14
		training seminars / laboratories, homework and papers, portfolios and essays			7
3.8 Total hours / week [10]	6				
3.8* Total hours /semester	84				
3.9 Number of credits	5				

[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. Prerequisites (where applicable)

4.1 Curriculum	• Basic knowledge of chemistry
4.2 Competencies	•

5. Conditions (where applicable)

5.1 of the course	• Large-sized room equipped with blackboard, computer, and overhead projector
5.2 to conduct practical activities	• Specialized laboratory

6. Specific competencies acquired through this discipline

Specific competencies	• Description, analysis and use of the basic concepts and theories in the field of materials science and chemistry
Professional competencies ascribed to the specific competencies	• 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
Transversal competencies ascribed to the specific competencies	• 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	• Building of basic knowledge regarding the making and properties of oxide/ metallic/ polymeric materials
7.2 Specific objectives	• Building competences regarding the choice capacity of adequate materials related to their use

8. Content [11]

8.1 Course	Number of hours	Teaching methods [12]
Oxide materials: ceramics - definition, classification, raw materials, phisical-chemical processes during firing, specific properties	7	Exposition,conversation, questioning, case study
Glass and glass products: composition, structure, types of glasses, specific properties	4	
Inorganic binders: cement, lime, plaster and construction materials based on these.	5	
Metals – structure and physical-chemical properties, obtaining methods. Alloys.	4	
Polymers - fundamental notions. Classification of polymers: according to the nature of the formation reactions, according to the structural shape of macromolecules, according to the	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.).

chemical and technological properties.		
Polymer nomenclature. Physical states and phase states of polymers. Polymer transition temperatures.	2	
Amorphous polymers. Semicrystalline polymers. Polymer examples – discussions.	3	
Processes for recovery of polymer waste: reprocessing, reconditioning, chemical degradation, incineration, pyrolysis.	1	

Bibliography [13]

1. I. Lazău - Chimia fizică a stării solide-silicaţi, Centrul de multiplicare- Universitatea Tehnică Timişoara, 1993
2. M. Voicu, P. Gladcov, Gh. Amza, P. Szel, D. Drimer, R. Iova – Tehnologia materioalelor, Ed. Didactică şi Pedagogică, Bucureşti, 1981
3. D.F. Shriver, P. W. Atkins, C.H. Langford - Inorganic Chemistry, 2 nd edition, Oxford University Press, 1990
4. R.W.Cahn, P. Haasen, E.J. Kramer - Materials Science and Technology, vol. 1,2,3, ... 18, VCH Weinheim, New York, Basel, Cambrige, 1993

D. Feldman, A. Barbalata – Synthetic Polymers: Technology, properties, applications, Chapman&Hall, London, 1996

8.2 Applied activities [14]	Number of hours	Teaching methods
Crystalline vs. amorphous state. Structure and properties, examples, discussions.	2	Experimental work
Slip casting o ceramic products in plaster molds. Illustration of other slip casting methods.	2	
Plastic forming of ceramic products. Plasticity, moisture content, deformability, and contraction of a ceramic paste.	2	
Preparation of low-melting glasses colored with transitional metal ions. Melting and forming. Other examples for glass-making technologies.	2	
Determination of the moisture content for normal consistency plaster paste; setting time (beginning/end).	2	
$CaCO_3$ content of different limestone and marble samples. Lime firing and slacking.	2	
Metals mutual reactivity applied in metal obtaining and purifying. Metals reactivity towards acids and bases. Alloys.	4	
Overview of oxide and metallic materials. Quiz on laboratory work.	2	
Heating behavior of polymers (plastic materials). Obtaining expanded polystyrene. Processing of thermoplastic polymers by extrusion, injection and thermoforming. Welding of polymeric materials. Press processing of thermoreactive materials. Quiz on laboratory work.	10	

Bibliography [15]

1. R. Lazău – Ghid de aplicaţii practice şi probleme pentru tehnologia ceramicii, Ed. Politehnica, Timişoara, 2008
2. A. Laţia, C. Vancea – Indrumător de laborator tehnologia sticlei, Centrul de multiăplicare , Univerisitatea Politehnica din Timişoara, 2001
3. P. Spacu, C. Gheorghiu, M. Stan, M. Brezeanu – Tratat de chimie anorganică vol.III, Ed. Tehnică, Bucureşti 1978
4. I. Manoviciu – Chimia compuşilor macromoleculari, Lito IPT, Timişoara, 1979

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 Materials science course and laboratory works aim to ensure basic knowledge and skills for the future graduates, which are mandatory for any engineer and facilitate understanding of materials making/ use, and therefore meet the expectations of the employers in the industry and epistemic community.

[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.

10. Evaluation

Type of activity	**10.1** Evaluation criteria [16]	**10.2** Evaluation methods	**10.3** Share of the final grade
10.4 Course	Basic knowledge of the main theoretical notions taught within the course. Ability to connect and apply the notions in critical assessment of materials properties and materials choice.	Online test with multiple questions for each main topic: oxide, metallic and polymeric materials, 15 minutes each.	66%
10.5 Applied activities	**S:**		
	L: Teamwork ability, correct resolving of tasks and results supply by a timely manner	Assignments, 10 minutes quiz for each main topic	34%
	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])			
• Promotion mark: 5			

Date of completion	**Course coordinator (signature)**	**Coordinator of applied activities (signature)**
04.12.2020	……	……
Head of Department (signature)	**Date of approval in the Faculty Council [19]**	**Dean (signature)**
……		……

[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.