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 / CAICAM
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]			Engineering of inorganic products / DS				
2.2 Coordinator (holder) of course activities			Assoc Prof. dr. eng. Lavinia LUPA.				
2.3 Coordinator (holder) of applied activities[5]			Assoc Prof. dr. eng. Lavinia LUPA				
2.4 Year of study[6]	III	**2.5** Semester	6	**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	6 of which:	**3.2** course	3	**3.3** seminar / laboratory / project	0/3/0
3.1* Total number of fully assisted hours / semester	84 of which:	**3.2*** course	42	**3.3*** seminar / laboratory / project	0/42/0
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	4.71 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			1.71
		training seminars / laboratories, homework and papers, portfolios and essays			2
3.7* Number of hours of unassisted activities / semester	66 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			24
		training seminars / laboratories, homework and papers, portfolios and essays			28
3.8 Total hours / week [9]	10.71				
3.8* Total hours /semester	150				
3.9 Number of credits	6				

4. **Prerequisites** (where applicable)

4.1 Curriculum	• Inorganic chemistry, physical chemistry, the basics of chemical technology, mass transfer processes, heat transfer processes, reactors, machinery in the chemical industry

[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.

4.2 Competencies	• To complete the course, students must have minimal knowledge regarding the description, analysis and use of fundamental concepts and theories in the field of engineering sciences, inorganic chemistry and chemical engineering

5. Conditions (where applicable)

5.1 of the course	• Medium room with a minimum of 25 seats, support material: blackboard and video projector
5.2 to conduct practical activities	• Specialized laboratory

6. Specific competencies acquired through this discipline

Specific competencies	• knowledge and appropriate use of discipline-specific notions • understanding the fundamental phenomena specific to the discipline; • identifying terms, relationships, processes, perceiving relationships and connections; • correct use of specialized terms; • explaining and interpreting some processes and the theoretical and practical ideas of the discipline; • generalization, specialization, integration of some fields; • the use of specific investigation methods, techniques and tools; • relationships between different types of representations, between representations and the object; • description of states, systems, processes, phenomena; • the ability to put the acquired knowledge into practice
Professional competencies ascribed to the specific competencies	• - 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	• Ensuring the skills necessary to explain and interpret the principles and methods used in the exploitation of processes and installations specific to the inorganic chemical industry. • Acquiring the necessary knowledge to create a mass balance and some design elements for processes specific to the technology of inorganic substances
7.2 Specific objectives	• Interpretation of the principles and methods used in the industrial synthesis of some inorganic substances. • Recognition of the basic elements of inorganic chemical technologies and those of depollution. • The use of the basic concepts specific to inorganic chemical technologies and those of depollution when making the mass balance for a specific technology. • Use of interdisciplinary knowledge in staff management and operation of a specific installation

8. Content [10]

8.1 Course	Number of hours	Teaching methods [11]
1 General aspects regarding the production of inorganic chemical substances in the world 2. Economic aspects regarding the production of inorganic chemical substances 3. Fields of use of inorganic chemical substances	4	
4. Chemical operations and processes – general aspects	4	
5. Ammonium carbonate manufacturing technology	4	
6. Ammonia manufacturing technology	8	
7. Sulfuric acid manufacturing technology.	8	
8. Nitric acid manufacturing technology	4	
9. Ammonium nitrate manufacturing technology	3	
10. Phosphoric acid manufacturing technology	4	
11. Ammonium phosphate manufacturing technology. Processes for obtaining ammonium metal phosphates	3	

Bibliography [12]
1. Pode R., Protectia mediului în tehnologia acidului sulfuric, Ed. Politehnica, Timisoara, 2009.
2. Pincovschi E., Popescu D. I., Elemente de chimie industriala anorganica, Ed. Ars Docendi, Bucuresti, 2004.
3. Iovi A., Tehnologia ingrasamintelor minerale, Ed. Didactica si Pedagocica, Bucuresti, 1977
4. C. Calistru, C. Leonte, Tehnologia substantelor anorganice, Editura Didactica si Pedagogica, Bucuresti, 1972;
5. E. Pincovschi, R. Pode, Tehnologia carbonatului de sodiu, Seria: Sinteze Anorganice, Editura Proema, Baia Mare, 1997;
6. Soda Govora, Raport 2019;
7. Iovi A., Iovi C., Negrea P., Chimia si tehnologia ingrasamintelor complexe, Ed. Politehnica, 1999

8.2 Applied activities [13]	Number of hours	Teaching methods
Protection of work	2	Training methods used during the hours of practical applications: cooperative learning methods and techniques, debate, case study, panel discussion, problem solving, brainstorming, SWOT analysis, working directly on the laboratory installation, etc.
Laboratory 1. Absorption of ammonia in saturated sodium chloride solution	4	
Laboratory 2. Calcination of crude sodium bicarbonate	4	
Laboratory 3. Obtaining of calcium chloride from the waste lye resulting from the manufacture of soda by the ammoniacal process	4	
Laboratory 4. Obtaining of sodium hydroxide by causticizing soda with lime	4	
Laboratory 5. Obtaining of copper sulfate from metallic copper and sulfuric acid	4	
Laboratory 6. Obtaining of potassium nitrate through the double exchange reaction between sodium nitrate and potassium chloride	4	
Laboratory 7. Obtaining of calcium nitrate from limestone and nitric acid	4	
Laboratory 8. Obtaining of cobalt-ammonium phosphate	4	
Laboratory 9. Obtaining of copper-ammonium phosphate	4	
Laboratory 10. Recoveries	4	

[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.).
[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] 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 [14] 1. Iovi A., Negrea P., Tehnologia ingrasamintelor minerale, Indrumator de laborator, Centru de multiplicare Universitatea „Politehnica" Timisoara, 1997

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

- Correlation of the course content and practical applications with the requirements of employers in the field of inorganic chemical engineering was taken into account

10. Evaluation

Type of activity	**10.1** Evaluation criteria [15]	**10.2** Evaluation methods	**10.3** Share of the final grade
10.4 Course	The answer to the examination subjects from the course area	Oral exam with 3 subjects	66%
10.5 Applied activities	**S:**		
	L: Solving the problems corresponding to laboratory works	Answers to questions, presentation of reports. Evidence of attendance	34%
	P[16]**:**		
	Pr:		
10.6 Minimum performance standard (minimum amount of knowledge necessary to pass the discipline and the way in which this knowledge is verified [17])			
• Demonstration of the competence to recognize the basic elements of inorganic chemical technologies and those of depollution • Demonstration of competence in using the basic concepts corresponding to inorganic chemical technologies and those of depollution when making the mass balance for a specific process			

Date of completion	**Course coordinator (signature)** Assoc. Prof. dr. eng. Lavinia LUPA	**Coordinator of applied activities (signature)** Assoc. Prof. dr. eng. Lavinia LUPA
Head of Department (signature) Conf.dr.ing. Andrea KELLENBERGER	**Date of approval in the Faculty Council** [18]	**Dean (signature)** Ș.L.dr.ing. Mircea Laurențiu DAN

[14] At least one title must belong to the discipline team.
[15] 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.)
[16] 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.
[17] It will not explain how the promotion mark is awarded.
[18] The endorsement is preceded by the discussion of the board's view of the study program on the discipline record.