

SYLLABUS

1. Data about the program of study

1.1	Institution	The Technical University of Cluj-Napoca
1.2	Faculty	Faculty of Civil Engineering
1.3	Department	Civil Engineering and Management
1.4	Field of study	Civil Engineering
1.5	Cycle of study	Bachelor of Science
1.6	Program of study/Qualification	Civil, Industrial and Agricultural Buildings /Engineer (English language)
1.7	Form of education	Full time
1.8	Subject code	5.0

2. Data about the subject

2.1	Subject name				Chemistry						
2.2	Course responsible/lecturer				Associate Professor Ph.D. Eng. Claudiu ACIU - Claudiu.Aciu@ccm.utcluj.ro						
2.3	Teachers in charge of seminars				Associate Professor Ph.D. Eng. Claudiu ACIU - Claudiu.Aciu@ccm.utcluj.ro Lecturer Ph.D. Eng. Elena JUMATE - Elena.Jumate@ccm.utcluj.ro						
2.4	Year of study	1	2.5	Semester	1	2.6	Assessment	E	2.7	Subject category	DF/DI

3. Estimated total time

3.1	Number of hours per week	4	3.2	of which, course:	2	3.3	applications:	2
3.4	Total hours in the curriculum	56	3.5	of which, course:	28	3.6	applications:	28
Individual study								hours
Manual, lecture material and notes, bibliography								31
Supplementary study in the library, online and in the field								0
Preparation for seminars/laboratory works, homework, reports, portfolios, essays								20
Tutoring								14
Exams and tests								4
Other activities								0
3.7	Total hours of individual study		69					
3.8	Total hours per semester		125					
3.9	Number of credit points		5					

4. Pre-requisites (where appropriate)

4.1	Curriculum	---
4.2	Competence	Physics; Chemistry

5. Requirements (where appropriate)

5.1	For the course	Onsite lectures; the attendance to lectures will be a plus for the final grade.
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5.2	For the applications	Class attendance is mandatory.
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6. Specific competences

Professional competences	<p>After completing the discipline, students must have theoretical knowledge about:</p> <ul style="list-style-type: none"> --states of substances; --substances systems; interface phenomena; --water in construction; --the specific surface using Blaine permeability meter; --characteristics of building materials; --behaviour of the material under the action of water, temperature and loads; --determinations on inorganic mineral binders (plaster, lime and cement); --determinations on bitumen and bitumen impregnated materials; --determine mechanical strengths of building materials (plaster, lime and cement). <p>After completing the discipline, students will be able to use the following devices: hydrostatic balance; Blaine permeability meter; ph-meter, ductilometer, sifting apparatus; Vicat apparatus, hydraulic press; Automatic flexure/tension machine, etc.</p>
Cross competences	<p>1)Application of effective and responsible work strategies, punctuality, responsibility and personal liability based on principles, norms and values of professional ethics.</p> <p>2)Applying the techniques of effective team work on different hierarchical levels.</p> <p>3)Documentation in Romanian and in a foreign language, for professional and personal development through continuous training and effective adaptation to new technical specifications.</p>

7. Discipline objectives (as results from the *key competences gained*)

7.1	General objective	Developing expertise in control and quality assurance in support of training.
7.2	Specific objectives	Assimilating theoretical knowledge concerning the characteristics of the main building materials and methods for their determination.

8. Contents

8.1. Lecture (syllabus)	Teaching methods	Notes
1. Introduction, history, objectives of the course.	Power Point presentation	Onsite Lectures
2. State of aggregation: gas, liquid, solid.		
3. Interface phenomena.		
4. Substance systems: molecule dispersions, colloidal dispersions, coarse-grained dispersions.		
5. Chemical phenomena and their laws. Substance system reactions.		
6. Physico-chemical and mechanical characteristics of building materials.		
7. Water (structure and properties). Water in constructions.		
8. Behavior of materials under the action of water and heat.		
9. Materials behaviour under the action of static loads and dynamic loads, hardness, wear resistance and fatigue.		
10. Notions of silicon chemistry: structure of silicates, ceramic and refractory products, kaolinite.		
11. Notions of silicon chemistry: inorganic binders: definition, classification, feldspars, clays, plaster, lime and cement.		

12. Cement chemistry. Mineralogical components of cement. Cement hydration processes.		
13. Organic macromolecular compounds. Two-dimensional and three-dimensional macromolecules. Polymerization and polycondensation reactions.		
14. Complex hydrocarbon mixtures. The chemical composition and physical structure of bitumen. Properties and areas of use.		
Bibliography Daniela Lucia MANEA, Claudiu ACIU (2015). Materiale de Construcții și Chimie Aplicată. Building Materials and Applied Chemistry. Ed. U.T. PRESS, Cluj-Napoca. Florica PAUL (2008). Civil Engineering Materials – Second Edition. Ed. Matrix Rom, Bucuresti.		
8.2. Applications/Seminars	Teaching methods	Notes
1. Work protection and safety technique regulation.	Presentation and applications	Onsite Laboratory works
2. Units of measurement.		
3. Determining the physical-mechanical characteristics: mass, weight, volume.		
4. Calculation of the density; apparent density, bulk density, compactness and porosity.		
5. Determination of voids volume, humidity, water absorption.		
6. Determination of the specific surface using the Blaine permeameter.		
7. Solutions and concentrations.		
8. Determination of the quality of water.		
9. Determination of properties of plaster.		
10. Determination of properties of lime.		
11. Determination of properties of cement.		
12. Tests and determinations on bitumen and bitumen impregnated materials.		
13. Mechanical tests, practical examples.		
14. Final evaluation.		
Bibliography Claudiu ACIU, Daniela Lucia MANEA, Alexandru Gheorghe NETEA (2013). Building Materials and Applied Chemistry – Second Edition. Ed. U.T. PRESS, Cluj-Napoca. ISBN 978–973–662–893–1. Livia Ingrid DIACONU (2013). Chemistry for Civil Engineers. Ed. Societatii Academice “MATEI-TEIU BOTEZ”, Iasi. ISBN 978–606–582–045–6.		

9. Bridging course contents with the expectations of the representatives of the community, professional associations and employers in the field

Acquired skills will be necessary to the employees who work in the quality control of building materials, civil engineers as well as to the teachers in secondary education.

10. Evaluation

Activity type	10.1 Assessment criteria	10.2 Assessment methods	10.3 Weight in the final grade
10.4 Course	Multiple choice test	Written test	60%
10.5 Applications	Problems	Written test	20%

	Test of laboratory works	Test after each laboratory work	20%
10.6 Minimum standard of performance			
The condition of eligibility for the examination is to perform all assignments and all the laboratory works. Mark components: Laboratory (mark L); Problems (mark P); Multiple choice test (mark G). Mark computation formula: $N = 0,2L + 0,2P + 0.6G$; is calculated only if: $L \geq 5$, $P \geq 5$ and $G \geq 5$.			

Date of filling in:		Title Surname Name	Signature
	Lecturer	Associate Professor Ph.D. Eng. Claudiu ACIU	
	Teachers in charge of application	Associate Professor Ph.D. Eng. Claudiu ACIU	
		Lecturer Ph.D. Eng. Elena JUMATE	

Date of approval in the department CEM	Head of department Conf.dr.ing. Claudiu ACIU
20/06/2025	
Date of approval in the Council of the Faculty of Civil Engineering	Dean Prof.dr.ing Daniela Lucia MANEA
25/06/2025	