

SYLLABUS

1. Information regarding the programme

1.1 Higher education institution	Babeş-Bolyai University of Cluj-Napoca
1.2 Faculty	Environmental Science and Engineering
1.3 Department	Environmental Analysis and Assessment
1.4 Field of study	Environmental Engineering
1.5 Study cycle	Bachelor
1.6 Study programme / Qualification	Environmental Engineering

2. Information regarding the discipline

2.1 Name of the discipline	Corrosion and corrosion protection NLR4142					
2.2 Course coordinator	Assoc. Prof. PhD Habil. Delia Maria Gligor					
2.3 Seminar coordinator	Assoc. Prof. PhD Habil. Delia Maria Gligor					
2.4. Year of study	IV	2.5 Semester	8	2.6. Type of evaluation	E	2.7 Type of discipline in the field

3. Total estimated time (hours/semester of didactic activities)

3.1 Hours per week	4	Of which: 3.2 course	2	3.3 laboratory	1
3.4 Total hours in the curriculum	36	Of which: 3.5 course	24	3.6 laboratory	12
Time allotment:					hours
Learning using manual, course support, bibliography, course notes					8
Additional documentation (in libraries, on electronic platforms, field documentation)					6
Preparation for seminars/labs, homework, papers, portfolios and essays					4
Tutorship					2
Evaluations					4
Other activities:					-
3.7 Total individual study hours	24				
3.8 Total hours per semester	60				
3.9 Number of ECTS credits	3				

4. Prerequisites (if necessary)

4.1. curriculum	
4.2. competencies	

5. Conditions (if necessary)

5.1. for the course	Students are not allowed to be late or use their mobile phones during the course.
5.2. for the laboratory activities	Students are not allowed to be late or use their mobile phones during the course. Students will present themselves in the laboratory with a lab coat, gloves, and lab cloth.

	The laboratory report will be done no later than the week following the actual performance of the work.
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6. Specific competencies acquired

Professional competencies	- Critical analysis of models and theories in the field of fundamental sciences for addressing the specific problems of knowledge and environmental protection - Application of notions from the field of fundamental sciences and engineering to address the specific problems of environmental protection knowledge - Explaining and interpreting some properties, concepts, approaches, models and notions regarding fundamental and engineering sciences - Recognition and description of concepts, theories, methods and elementary models regarding fundamental sciences and engineering sciences - Presentation of projects related to engineering fields
Transversal competencies	- Identifying and respecting the rules of professional ethics and deontology, as suming responsibilities for the decisions taken and related risks - Identifying roles and responsibilities in a multidisciplinary team and applying effective communication and work techniques within the team - The effective use of information sources and resources for communication and assisted professional training (portals, Internet, specialized software applications, databases, online courses, etc.) both in Romanian and in an international language - The description, analysis and use of concepts and theories from the fundamental scientific fields (mathematics, physics, chemistry) and from the field of engineering sciences - Description, analysis and use of concepts and theories from the economic-managerial field applied in the environmental field

7. Objectives of the discipline (outcome of the acquired competencies)

7.1 General objective of the discipline	• Acquisition of the main theoretical aspects (fundamental notions of thermodynamics and electrochemical kinetics) and applications (the implications of these aspects in the processes of corrosion and anti-corrosion protection)
7.2 Specific objective of the discipline	• Learning the basic principles for knowing the causes and effects of corrosion, the speed of corrosion. • Knowledge of optimal corrosion protection solutions and their applications in environmental protection.

8. Content

8.1 Course	Teaching methods	Remarks
8.1.1. Introduction to the study of electrochemistry: electrolytes, electrolysis.	lecture, explanation, conversation	2 hours
8.1.2. Introduction to the study of electrochemistry: electrodes, electrode potential.	lecture, explanation, conversation	2 hours
8.1.3. Definitions and classification of corrosion processes.	lecture, explanation, conversation	2 hours
8.1.4. Chemical corrosion.	lecture, explanation, conversation	2 hours
8.1.5. Electrochemical corrosion.	lecture, explanation, conversation	2 hours

8.1.6. Thermodynamics of metal corrosion in aqueous solutions.	lecture, explanation, conversation	2 hours
8.1.7. Electrochemical corrosion kinetics.	lecture, explanation, conversation	2 hours
8.1.8. Factors that influence the speed of electrochemical corrosion: factors determined by the nature of the material.	lecture, explanation, conversation	2 hours
8.1.9. External factors influencing the corrosion rate.	lecture, explanation, conversation	2 hours
8.1.10. Electrochemical corrosion investigation methods.	lecture, explanation, conversation	2 hours
8.1.11. Methods of anticorrosive protection of metallic materials: corrosion prevention methods; the use of materials and alloys resistant to corrosion.	lecture, explanation, conversation	2 hours
8.1.12. Methods of treating the corrosive environment.	lecture, explanation, conversation	2 hours

Bibliography

1. Course support.

2. Delia Maria Gligor, Mihaela Ligia Ungureșan, Noțiuni de electrochimie, Editura Galaxia Gutenberg, Cluj-Napoca, 2009.

3. Delia Maria Gligor, Cristina Roșu, Elemente fundamentale de chimia mediului, Editura Galaxia Gutenberg, Cluj-Napoca, 2012.

4. Mihaela Ligia Ungureșan, Delia Maria Gligor, General chemistry, Editura Galaxia Gutenberg, Cluj-Napoca, 2012.

5. L. Oniciu, L. Mureșan, Electrochimie aplicată, Presa Universitară Clujeană, Cluj-Napoca, 1998.

6. L. Oniciu, E. Constantinescu, Electrochimie și coroziune, Ed. did. si pedag., București, 1982.

7. Mihaela Ligia Ungureșan, Lorentz Jăntschi, Delia Maria Gligor, Aplicații educaționale de chimie pe calculator, Editura Mediamira, Cluj-Napoca, 2004.

8. I. G. Murgulescu, O. Radovici, Introducere în chimia fizică, vol. IV, Electrochimia, Ed. Acad., București, 1986.

9. P.W. Atkins, Tratat de chimie fizică, Ed. Tehnică, București, 1996.

8.2 Laboratory	Teaching methods	Remarks
8.2.1. Notions of labor protection. Presentation of laboratory utensils and equipment	experiment, conversation, learning by discovery	2 hours
8.2.2. The influence of concentration on the conductance of electrolyte solutions	experiment, conversation, learning by discovery	4 hours
8.2.3. The influence of the concentration of the electrochemically active species on the electrode potential	experiment, conversation, learning by discovery	4 hours
8.2.4. Spontaneous deposition of copper on iron and zinc electrodes	experiment, conversation, learning by discovery	4 hours
8.2.5. Laboratory colloquium	experiment, conversation, learning by discovery	4 hours

Bibliography

1. Laboratory reports

9. Corroborating the content of the discipline with the expectations of the epistemic community, professional associations and representative employers within the field of the program

- Critical analysis of models and theories in the field of fundamental sciences for addressing the specific problems of knowledge and environmental protection
- Application of notions from the field of fundamental sciences and engineering to address the specific problems of environmental protection knowledge

10. Evaluation

Type of activity	10.1 Evaluation criteria	10.2 Evaluation methods	10.3 Share in the grade (%)
10.4 Course	The correctness of the answers – the acquisition and correct understanding of the issues covered in the course	Written exam - access to the exam is conditioned by taking the laboratory colloquium and presenting the laboratory reports corresponding to all practical works	80 %
10.5 Laboratory activities	The activity carried out in the laboratory - acquisition and correct understanding of the problem treated in the laboratory	The laboratory reports corresponding to all practical works - are taught in the last week of didactic activity	20 %
	Laboratory colloquium	Laboratory colloquium - test - is held in the last week of didactic activity	
10.6 Minimum performance standards			
- Grade 5 (five) both at the laboratory colloquium and at the exam according to the scale - Knowledge of the main concepts of chemical and electrochemical corrosion			

Date

4th December 2024

Signature of course coordinator

Sign

Signature of laboratory coordinator

Sign

Date of approval

Signature of the head of department