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 Denumirea disciplinei	**Technologies with low impact on the environment**						
2.2 Titularul activităţilor de curs				Prof.univ.dr.ing. **Cristina Rosu**			
2.3 Titularul activităţilor de seminar				Prof.univ. dr.ing. **Cristina Rosu**			
2.4 Year of study	**IV**	2.5 Semester	**7**	2.6. Type of evaluation	**C**	2.7 Type of discipline	**Optional**

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

3.1 Hours per week	**4**	Of which: 3.2 course	**2**	3.3 seminar	**2**
3.4 Total hours in the curriculum	**56**	Of which: 3.5 course	**28**	3.6 seminar/laboratory	**28**
Time allotment:					hours
Learning using manual, course support, bibliography, course notes					**12**
Additional documentation (in libraries, on electronic platforms, field documentation)					**12**
Preparation for seminars/labs, homework, papers, portfolios and essays					**12**
Tutorship					**2**
Evaluations					**2**
Other activities:					**2**

3.7 Total individual study hours	42
3.8 Total hours per semester	**98**
3.9 Number of ECTS credits	**4**

4. Prerequisites (if necessary)

4.1. curriculum	
4.2. competencies	

5. Conditions (if necessary)

5.1. for the course	• Classroom of 40-50 seats equipped with video projector
5.2. for the seminar /lab activities	• Seminar room with 40-50 seats equipped with video projector

6. Specific competencies acquired

Professional competencies	• Knowledge of the main categories of clean/low environmental impact technologies and identification of BAT (Best Available Technology) technologies and application methods • Knowledge of the installations and equipment used in them and their operating principles • Acquisition of the ecological, energy and economic advantages of the application of different types of clean / low environmental impact technologies compared to classical technologies • Knowledge of the principles methodologies for assessing the environmental impact of industrial processes
Transversal competencies	• Information and documentation (at the library or online) • Teamwork • Case analysis • Identification of optimal solutions

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

7.1 General objective of the discipline	• Knowledge of the main categories of clean/low environmental impact technologies and their ways of application
7.2 Specific objective of the discipline	• Knowledge of the main regulations in the field of environmental protection • Knowledge of the key equipment used / limitations • Strategies for reducing / limiting pollutant emissions at source • Pollution prevention strategies • Acquiring the energy, ecological and economic advantages of the application of different types of clean technologies compared to the classic ones • Knowledge of the general aspects regarding the recovery of industrial waste

8. Content

8.1 Course 2 h / week	Teaching methods	Remarks
C 1 – Clean / low environmental impact technologies (basic definitions on clean technologies, environmental protection regulations, demarcation of clean technologies from depollution technologies)	Interactive lecture	Attendance at the course is optional, but it is recommended that students be present at least 7 courses (50%)
C 2 – Categories of clean/low environmental impact technologies and their application methods	Interactive lecture	
C 3 – Clean/low environmental impact industrial processes and technologies (types of technologies and areas of application)	Interactive lecture	
C 4 – Plants and equipment (key machinery) used in processes and . Clean industrial technologies / with low environmental impact	Interactive lecture	
C 5 – Energy, ecological and economic advantages in the	Presentation and	

application of different types of clean / low environmental impact technologies compared to classic technologies	presentation of case studies	
C 6 – Recovery technologies applied in industry (types of secondary energy resources, characteristics, mode of appearance, calculations)	Presentation and presentation of case studies	
C 7 – Industrial waste recovery (types of waste, characteristics, calculations)	Presentation and presentation of case studies	
C 8 – Assessment of the impact of industrial processes on the environment (types of impact and ways of assessing them)	Presentation and presentation of case studies	
C 9 – Perspectives in the field of clean industrial technologies with low environmental impact (development directions)	Interactive lecture	
C 10 – Case Analysis: Classical Technologies vs. Low Environmental Impact Technologies	Presentation and presentation of case studies	
C 11 – Case analysis: calculation of specific impact indicators.	Presentation and presentation of case studies	
C 12 – Case analysis: recovery and recovery of some types of industrial waste	Presentation and presentation of case studies	
C 13 – Case analysis: capitalization of secondary energy resources.	Presentation and presentation of case studies	
C 14 – Recap		

Bibliography

1. M. Ungureanu, R. Patrascu, „Tehnologii curate", Editura AGIR, Bucuresti, 2000
2. R. Patrascu, C. Raducanu, „Tehnologii complexe de recuperare a caldurii in industrie" Editura PRINTECH, Bucuresti, 1998
3. C. Rosu, „Tehnologii cu impact redus asupra mediului" - Suport de cursuri, editia 2020

8.2 Seminary 2 h / week	Teaching methods	Remarks
S 1 – Presentation of the seminar theme and organization of the choice of individual seminar topics	Lecture	80% mandatory attendance at seminars
S 2 – In-depth study of a technology with low environmental impact.	Presentation and presentation of case studies	
S 3 – Study of ways to apply some technologies with low environmental impact.	Presentation and presentation of case studies	
S 4 – Detailed study of a piece of equipment (key machine) with a technology with low environmental impact.	Presentation and presentation of case studies	
S 5 – Energy calculations for a technology with low environmental impact.	Presentation and presentation of case studies	
S 6 – Study of a recovery technology applied in industry	Presentation and presentation of case studies	
S 7 – Study of the recovery of an industrial waste and its recovery	Presentation and presentation of case studies	
S 8 – Calculations of impact indicators of industrial	Presentation and	

processes	presentation of case studies	
S 9 si S 10– Study visit (4 hours)	field	
S 11 si S 12 - Study visit (4 hours)	field	
S 13 – Recovery of a maximum of one seminar		
S 14 – Presentation of the report	Examinare orala	Nota seminar (30% din nota catalog)

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

- The accumulated knowledge is useful both to environmental managers in the field of industrial economic operators, but also to local authorities

10. Evaluation

Type of activity	10.1 Evaluation criteria	10.2 Evaluation methods	10.3 Share in the grade (%)
10.4 Course	Evaluation of the accumulated theoretical knowledge	Oral exam	**70%**
10.4 Seminar/lab activities			
	Assessment	A report that has a case study to analyze	**30%**
10.6 Minimum performance standard			

- Obtaining a grade of 5 in the seminar
- Obtaining a grade of 5 in the oral exam

Date Signature of course coordinator Signature of seminar coordinator

06.12.2024

Date of approval Signature of the head of department

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